A New model for E-business Deployment in Libyan Public Universities

ALI MEFTAH BAKEER

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Declaration

I declare that the work in this thesis was carried out in accordance with the regulations of the University of Gloucestershire and is original except where indicated by specific reference in the text. No part of the thesis has been submitted as part of any other academic award. The thesis has not been presented to any other education institution in the United Kingdom or overseas.

Any views expressed in the thesis are those of the author and in no way represent those of the University.

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ABSTRACT

Electronic Business (e-Business) is recognised as being able to help organisations to achieve competitiveness benefits. In Libya, the uptake of e-business in the higher education sector has been relatively limited and ineffective. There is no guidance available to help Libyan universities to maximise their leverage by participating intelligently in e-business deployment. This research examines e-business deployment initiatives and provides insights and learning into how to successfully develop and implement these initiatives within universities in a developing country, specifically Libya. The aim of this research is to develop a robust framework to support an efficient e-business deployment focusing on the case of Libya. This is achieved by exploring selected completed and on-going successful initiatives and focusing on the barriers to, and the enablers of, these initiatives. As a result, the nature of successful e-business deployment is determined, and the e-business deployment requirements for universities in Libya are identified. A combination of research methodology approaches has been engaged in this research. Firstly, an extensive review of literature took place to summarise and create the arguments around the main e-business models and their related dimensions, contributing to the development of e-business deployment research. Secondly, a qualitative approach based on case studies, include an explanatory investigation in three cases, is selected as an appropriate methodology for this research. Questionnaires and semi-structured interviews are conducted to gather data from selected universities. The results show that Process, People and Technology barriers are the main barriers facing e-business deployment in Libyan universities. The collected data was analysed and problems were identified; as a result, the elements for a holistic approach to manage e-business deployment emerged. Based on the findings, an e-business deployment model is developed to provide a holistic approach for universities to plan, perform and review their e-business levels, as well as uncovering the main barriers preventing these universities from expanding e-business development. Also, a model of the implementation process of e-business deployment is proposed. From a practical point of view, this research provides realistic implications for decision makers and officials within Libyan universities involved in the process of planning, developing and implementing e-business initiatives.

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ .. الْحَمْدُ للّهِ رَبِّ الْعَالَمِينَ

In the Name of Allah, the Merciful, the Most Merciful.
Praise be to Allah, Lord of the Worlds

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DEDICATED TO

My Mother *"for their prayers and support".*

my father

My wife *"for her love, support and patience throughout long working days, was of great encouragement to me"*

My Children,

Reem, Sama and Rahaf

"who have made me stronger, better and more fulfilled than I could have ever imagined."

List of publications

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ABBREVIATIONS AND ACRONYMS

ABBREVIATION	DEFINITION
BIS	Business Information Systems
CMM	Capability Maturity Model
CPIT	Connect Publish Integrate Transfer
DTI	Department of Trade and Industry
E-business	Electronic Business
E-government	Electronic Government
E-learning	Electronic Learning
ERP	Enterprise Resource Planning
E-services	Electronic Services
FM	Financial Management
HRM	Human Resources Management
ICT	Information and Communication Technology
IS	Information Systems
IT	Information Technology
P-CMM	People Capability Maturity Model
SOG	Stage of Growth
SRM	Student's Record Management
WIMAX	Worldwide Interoperability for Microwave Access

Chapter 1 **Introduction**

1.1 Research Background

This chapter presents an overview of the research, including the research background, problem statement, aim and objectives, research scope, research methodology, contribution to knowledge, and a guide to the thesis. While technologies alone are not sufficient to assure the success of e-business implementation, supposed benefits and gains resulting from new technologies are unreliable until their assessment has been proven in actual practice. A number of other activities - such as business process reengineering, people skills development, change management, and interaction with business partners (Laudon and Laudon, 2004) must accompany electronic business (e-business) solutions. Organisations that are currently using e-business and those that have yet to use it, both need to assess their business practices, and take considered measures to ensure a productive and useful implementation (Chaffey *et al.,* 2009). In the case of e-business deployment, there are varieties of factors that need to be considered in order to effectively implement e-business in the higher education sector. This research will review the major issues associated with e-business deployment and implementation in the public universities in Libya and create a holistic approach for universities to continue improve their e-business application.

1.2 An E-business Overview

This research defines e-business as the wider definition of e-business as presented by Chaffey (2007, p. 13):

> "*all electronically mediated information exchanges, both within an organisation and with external stakeholders, supporting the range of business processes.*"

With the continuous introduction of new technologies, new business models and new communication approaches, e-business offers the potential for organisations to improve their competitive advantage (Chaffey *et al.,* 2009). The benefits of e-business have been known as they can change the structure of the organisations. The main benefits of e-business include improved quality of work, better financial control, faster communications, and faster access to common information (Hamilton, 2003). However, the uptake of e-business in the universities in Libya has been relatively limited and ineffective compared to other sectors, such as IS deployment in the banking and oil sectors (Sharkasi and Wynn, 2011; Akeel, Wynn and Zhang, 2013).

Several reasons have been cited for this slow uptake including the limited resources available to the universities to invest in e-business, and lack of readiness of the people, processes, and legacy systems which are all factors that have hindered e-business deployment (Kenan *et al.*, 2013; Elzawi *et al.*, 2013).

1.3 Problem Statement

Given the history of the technologies, strategic e-business deployment can be unsuccessful because related risks represent barriers and challenges to their implementation. The barriers and challenges to e-business deployment and implementation need to be managed when applying planned e-business keys in the universities. The barriers and challenges to e-business deployment could exist both inside and outside of the organisations and include large initial investment associated with building essential infrastructure and training of personnel, integration with legacy systems, and interoperability of distributed software applications (Ndou, 2004; Zhu and Kraemer, 2005). In Libya, the universities do not have sufficient resources to invest in e-business, establish professional development for staff, or rationalise processes to improve organisational performance (Twati and Gammack, 2006). The cost of funding such e-business investments and the missed opportunities of not benefiting from their intended capabilities established a great loss for these universities. However, the universities need to consider a holistic approach to make full utilisation of their existing deployment and investment in e-business including effective benefits realisation planning (Sweisi, 2010). E-business deployment and management theories are introduced to process of e-business deployment to address this specific need for the universities in Libya to improve their e-business capacity and related required implementation process. Therefore, more research is required to investigate the tactical requirements and practices of e-business deployment in the university sector.

1.4 Purpose of the research

According to Kituyi and Tusubira (2013), universities still face challenges of adopting e-mail and Internet/Intranet (e-business) services. E-business still in its early stages and completely new in Libya and is generating a serious challenge to service providers and users in public universities (Rhema and Miliszewska, 2010). Most importantly, this affects many aspects of the higher education installations, to the extent that organisations such as the universities cannot develop infrastructure and guarantee

regular maintenance of IS and ICT equipment. Libyan universities still struggle with the challenge of inadequate professional and staff skills. Moreover, Libyan public universities still have to rely upon traditional or early stages of using technology in their University operations. This represents an added challenge to the deployment of e-business applications in the Libyan public universities. Thus, Libyan universities indeed need specific e-business deployment plans and realistic e-business models that can reflect real requirements and demand considered by these universities. Over the past decade, a number of e-business deployment models have been developed and applied to organisations. However, most of these e-business models designed in Western countries, where the technological and organisational environment is still significantly different to that in developing countries such as Libya. This study will discover and examine if and how a number of these models could be used or adapted in the Libyan university context.

1.5 Motivation and rationale of the research

Previous studies have discussed e-business deployment by large organisations, including some universities. Universities nowadays have become dependent on information and communication technologies (ICT) in managing their operations and providing services (Espinoza and Eduardo González, 2013). Libya has recently undertaken administrative reform, especially in universities, supported by a strategic plan for e-government developing ICT infrastructure, making e-business applications in education sector a key component of its overall development plans. The Libyan Ministry of Higher Education (LMHE) fund and manage eleven public universities in Libya (see Table 1.1), with a common management, financing and regulation system that aims to improve the universities' management and services. However, Libyan universities are still facing many challenges that affect their management Nevertheless, there is a lack of literature on e-business deployment in the field of e-business deployment in the public universities specifically Libyan universities.

Table 1.1 Public Libyan universities in academic year 2012/13

No	University name	Established	Region	No of students	University Staff P.T: Part time			Total Employee
					Libyans	Foreign	P.T	
1	Bengazi	1955	Bengazi	84026	1639	240	808	4176
2	Tripoli	1957	Tripoli	83855	2595	120	909	4784
3	Omar.Amukhtrar	1974	Al-Bayda	33035	822	691	203	866
4	Sebha	1976	Sebha	15945	685	146	214	791
5	Misurata	1983	Misurata	16206	578	75	349	416
6	Al-Zawya	1983	Al-Zawya	35500	658	59	341	2840
7	Al-Mergeb	1986	Al-Khoms	31030	749	128	661	497
8	Al-Zaitona	1986	Soq Al -Ahad	10626	768	28	373	304
9	Sirte	1989	Sirte	10811	264	152	145	313
10	AlJabal Gharbi	1991	Gherian	17649	600	53	825	3525
11	Al-Asmarya	1999	Zliten	4112	167	35	366	115
	Total			310845	9525	1727	5194	18627

Source: Prepared by the author based on 4ICU (2014)

This study attempts to make a valid and worthwhile contribution to this literature, as well as developing a new model of e-business deployment for Libyan universities. The value of this study lies in the fact that it is one of the few studies focussing on e-business deployment in Higher Education, in spite of the growing importance of this sector. This study attempts to support the universities to develop efficient ways to manage the daily administrative processes and information by exploring the operational implications of universities' using e-business-based processes in daily management. It will also develop a series of recommendations to those policy-makers of higher education institutions who intend to plan for e-business-based management at their university, particularly in Libya. As a result, the study is designed to contribute to research knowledge in the context of universities managerial issues, discovering how e-business deployment becomes important to universities' performance, and e-business deployment models; in particular, the extent to which they are suitable for Libyan universities. This study considered the first study to seriously assess e-business deployment in Libyan universities and map their operational processes. This considered being a cornerstone study to further studies in the field of e-business deployment in universities and adding to the body of knowledge on the nature of e-business deployment in universities.

1.6 The importance of the study

The importance of this study comes from the increasing worldwide interest in e-business, and in particular, this interest as it relates to the higher education sector in Libya (Galala and Yusof, 2013). This research will contribute to knowledge on e-business deployment as well as transferring the knowledge to one of the important fast

growing services sector in the world the educational sector, both by the novelty of its context and by its individual approach and perspective. Libyan public universities form an interesting context and domain for the study. This is because higher education reform initiative and programmes initiated recently in Libya have resulted in attempts at overall transformation of technology usage among Libyan public universities. Moreover, knowledge with and confidence in e-business among Libyan public universities has remained limited compared to other universities in and middle east universities, such as those in Jordan, who share similar characteristics in terms of socioeconomic and infrastructural development.

1.7 Research scope

This research focuses on e-business deployment in the university sector, specifically the tactical deployment of e-business in the local Libyan universities. The e-business deployment and operation considered at the process level because there is a need for the realisation of e-business application or performance. The assessment is through three e-business dimensions including university processes whether or not they are reliable to reflect the real situation of e-business, and the decision of development priority is ultimately based on the results of a theses assessment versus most important process judgement at business level. The study of e-business deployment in this research mainly concentrates on various participants from three public universities. The aim of this research is to attempt to determine the current e-business practices of different universities and create a holistic approach to support them to constantly their e-business application. This holistic/inclusive approach aims to help the universities to consider an e-business deployment plan, measure the role, and practice of three dimensions through determining its placement with the universities' process areas; and also to help to make the decision to implement based on careful situation analysis using the developed model. This model includes the stages that determined the level of e-business deployment in the universities at process level, and focuses specifically on the three e-business dimensions of technology, process and people situation.

1.8 Research aim, objectives and questions

The overall aim of this research is to gain an understanding of the factors involved in the introduction of e-business in the Libyan public universities, in order to derive lessons that may benefit other organisations that may be attempting e-business deployment in a similar environment.

Research objectives The overall aim of this research subsequently can be divided into the following objectives:

- To explore and establish the level of e-business deployment in Libyan universities
- To research the potential for increased application of e-business technologies and related information systems in Libyan universities
- To investigate (identify) the barriers to the increased deployment of e-business in Libyan Universities
- To develop a practical model for e-business deployment and a set of recommendations for its adoption in Libyan universities

1.8.1 Research questions

- What is the level of e-business deployment in Libyan universities?
- What are the barriers to the increased deployment of e-business in Libyan Universities?
- How can Libyan universities achieve a higher level of application of e-business technologies and related information systems and what are the potential benefits?
- What is the most appropriate conceptual and operational model for e-business deployment in universities in Libya?

1.9 Research methodology

In order to achieve the prime aim of the current research as identified in Section 1.8, a case study approach was adopted to take account of the universities context and investigate e-business deployment of three Libyan universities in depth. A qualitative approach for data collection and analysis was identified and applied as the most suitable strategy for the current research (for details see Chapter 4: Research Methodology). The research design was considered an empirical study with the university's managers to review e-business and its implementation in the studied universities. The study set a theoretical foundation for determining the research questions and provided the theoretical foundation of the applied research approach and methodology in studying and analysing e-business deployment in the current study. Furthermore, the study also explored the status of e-business deployment and within the universities as a means to determine the barriers to e-business deployment. However, in-depth investigation of e-business performance to date with key process managers at the universities was also conducted. Finally, the planned practices of e-

business within the studied universities were defined, and their e-business growth stages were assessed based on SCALE model.

The influence of e-business dimensions on the universities' technology, processes, and people were identified, and changing elements and/or units for assessing e-business capacity and application were discovered. A planned e-business deployment model was constructed based on the outputs gained from the collected data, and developed for universities to ensure e-business deployment is consistently planned, executed and reviewed within their e-business processes. The evaluation of the success of e-business deployment model with selected universities' practitioners was conducted, and the benefits and limits of the SCALE model were summarised for future development, and the results contributed to the recommendations and conclusions of the current research.

1.10 Thesis Structure

This thesis includes nine chapters. The description of the structure of the thesis and the inter-relationship between the various chapters and the main contents of each chapter are as follows:

Chapter one introduces the current thesis research. It provides the research background and context, and describes the essential steps required to conduct a study on the e-business deployment domain. The importance and purpose of this study was presented, whilst establishing and defining the research aim and objectives of this investigation. The main contributions of the current study to knowledge are then summarised. Finally, the chapter gives a guide to the readers about how the thesis is organised and broken into nine chapters.

Chapter two presents a review of the relevant literature and provides a theoretical foundation for the current study. It defined e-business and explores e-business deployment in higher education and related barriers in Libyan public universities. The chapter also discovers how e-business deployment initiatives can transfer the potential for universities to achieve the promised benefits, and highlights how different e-business concepts such as Stage of Growth, models (e.g. CPIT, CMM, and P-CMM) applications were introduced and the status of their usage. Furthermore, it discusses the approaches for improving e-business deployment and evaluates the importance of considering a new way for universities to deploy e-business. Finally, it demonstrates the need for improving e-business deployment stages and providing connected indictors of e-business capacity for the future.

Chapter three presents the provisional e-business deployment model, and highlights the stages of growth concept introduced by SCALE model. It also discusses the tactics of how SCALE model can be implemented and validated for improving e-business deployment. It describes the important change elements that are considered for assessment of the SCALE levels for universities to deploy e-business, which direct SCALE stages movement and e-business capacity improvement.

Chapter four introduces the methodological approach of the current research. It justifies the philosophical position, research strategies, and the research design. The applied research methods are justified and described according to how they have helped to achieve the research questions and objectives defined in Section 1.7. The chapter introduces the background of the questionnaire survey that was conducted with participants from different universities processes, including the aim and objectives, the questionnaire design and justification, and the scope of the survey. The chapter also presents the validation of case study research conducted in this study.

Chapter five presents the findings of the case studies with six key process managers in the universities. The chapter reviews the background of three interviewees and the university they represent. It describes the actual deployment and practices of these universities in e-business at the three levels technology, process, and people dimensions. It discusses the outputs of the questionnaires and comments from interviewees used to determine the main issues in deployment of e-business.

Chapter six describes the assessment of the e-business deployment in by UOMS cases practitioners. The chapter introduces the aim and a purpose of performing the assessment, justifies the questionnaire, and presents the e-business deployment assessment results. It discusses and analysis the findings of SCALE model assessment to understanding e-business levels at the university process level according to the three e-business deployment dimensions. It explores the interpretations of the survey results in order to determine the benefits and limits of the SCALE e-business model as well as discover the barriers to e-business deployment in the UOMS case to suggest opportunities for further development.

Chapter seven present the SCALE model replication in two universities cases, and current findings of the survey. It analyses the survey findings to establish the level of deployment and maturity of e-business in the surveyed universities. It discusses the survey and interviews outputs and addresses the quotations and comments from interviews participants and comments of survey respondents to assess the

understanding of key process managers on current e-business use and for improving e-business implementation with regard to internal resources, business processes, and organisational culture. The chapter also presents an applied e-business model stages that universities in Libya can use to develop, improve, define, execute and review their e-business deployment levels and plans.

Chapter eight links the results to the results of review of literature based on the established research questions and objectives. The answer of the research questions and areas investigation are defined. The chapter justifies the need for a considered appropriate e-business deployment model for Libyan universities. The chapter outlines how the SCALE model can assist the growth of e-business, and how three e-business dimensions contributed to determining the main contents of e-business deployment model. It summarises the main elements of the SCALE model including the five phases as well as providing a list of certification to the universities decision makers on how their universities can have better e-business levels. It provides recommendations on how practitioners can implement e-business. It outlines the contributions of current research as well as the limitations. It also foresees the future research based on the current study.

Chapter 2 **Literature review**

2.1 Introduction

The aim of this chapter is to define e-business (section 2.2), and review the related literature on e-business deployment. Section 2.3 review e-business deployments in Higher Education in particular in Libyan universities. Section 2.4 discusses the barrier to e-business deployment and related impact in the universities in Libya. The focus of this review will be guided by the research objectives outlined in the previous chapter. Section 2.5 will also review e-business theories, models, and e-business deployment dimensions. The aspects of maturity of e-business, and the concepts underpinning the stages of growth (SOG) models, will also be discussed. This chapter will also introduce and review a number of models including the Design–Actuality Gap Theory, as a considered path for e-business improvement progression, the Connect-Publish-Interact-Transfer (CPIT) model for technology related aspects, the Capability Maturity model (CMM) for business process deployment, the People Capability Maturity model (P-CMM) to assess the capacity of people's skills and capabilities, and the Stages of Growth (SOG) model for e-business progression and transformation. Finally, by combining the e-business factors in each model, an e-business deployment model will be configured to form a comprehensive multidimensional framework. A review and critical analysis of these models lead to a clarification of e-business deployment concepts and simplify the issues surrounding development of e-business deployment model. Ultimately, these models are lead to the establishment of a theoretical basis for the development of a provisional conceptual model which will assist the analyse of e-business deployment in Libyan universities.

2.2 E-business definitions

There are several applications of information and communication technology (ICT) and information systems (IS), these applications have been defined by the number of researchers from different aspects. However, the E in E-business stands for "electronic networks" and describes the application of electronic network technology to improve and change business processes. For example, Heeks (2004) defined electronic government as the use of ICT in government organisations for a variety of purposes, for example: to improve efficiency and effectiveness in government administration; enhance coordination and collaboration among governmental organisations; and to provide electronic services (e-services) to other stakeholders including citizens,

businesses. However, according to Roth (2000) e-services ‘‘are comprised of all interactive services that are delivered on the Internet using advanced telecommunications, information, and multimedia technologies’’.

E-services represents one prominent application of utilising information and communication technologies (ICTs) in different business areas. However, providing an exact definition of e-service is hard to come by as researchers have used many different definitions to describe e-service. Despite these different definitions, it can be argued that they all agree about the role of ICTs in facilitating the delivery of services, which make them electronic services. For example; Rowley (2006) stated that e-service comprises "…deeds, efforts or performances whose delivery is mediated by information technology. Such e-service includes the service element of e-tailing, customer support, and service delivery". This definition reflects three main components- service provider, service receiver and the channels of service delivery (i.e., technology). The Internet is the main channel of e-service delivery while other classic channels (e.g. telephone, call centre, mobile phone, television) are also considered. Rosenberg (2001) argue that, in educational applications, the role of ICTs is for learning that is delivered online via the internet. These applications are referred to as electronic learning (e-learning), and range from distance education, to computerized electronic learning, online learning, internet learning and many others. No agreed definition of e-learning has been yet proved in a rapidly changing education and technology environment.

However, the term electronic business includes the above terms, but also covers internal processes such as production, inventory management, product development, risk management, finance, knowledge management and human resources. Therefore, e-business is more complex, more focused on internal processes, and aimed at cost savings and improvements in efficiency. For the purpose of this research, the use of ICTs to improve the activities of public sector organisations have represented applications of utilising information and communication technologies (ICTs) at the process level in different business areas as electronic business (e-business), and defined these applications in different ways. Some of the important definitions of e-business are summarised in Table 2.1.

Table 2.1 E-business definitions

Source	**E-business Definition**
Dutta and Segev (1999)	Conducting business via the internet /doing business electronically and mostly using the internet.
Damanpour and Damanpour (2001)	E-business is about any business activities that involve transforming organisational internal and external relations to develop new market opportunities.
Chaffey (2002, p. 13)	All electronically mediated information exchanges, both within an organisation and with external stakeholders, supporting the range of business processes.
Stone (2003, p. 346)	E-business is not just the internet; it also involves a wider range of technologies such as wireless, intranets, portals, and content management software.
Wu *et al.* (2003, p. 425)	An organization which using the internet, websites, enterprise information portals and/or other electronic network technologies for conducting of its day-to-day business functions.
DTI definition : cited in Taylor and Murphy, (2004)	Integration of all these activities with the internal processes of a business through ICT into its operations, potentially redesigning its business processes around ICT or completely reinventing its business model.
Beynon (2007)	The employment of information and communication technologies (ICTs) and its use supports all business activities.
Chaffey (2011)	E-business is about the use of technologies and their associated networks to enable, improve, and transform a business process or enhance business systems to create better value for existing or potential stakeholders.
Van Hooft and Stegwee, 2001, p. 44)	"E-business is a secure, flexible, and integrated approach to delivering differentiated business value by combining the systems and processes that run core business operations with the simplicity and reach made possible by Internet technology".

Source: prepared by the researcher based on the literature

For example, Dutta and Segev, (1999) define e-business from the perspective of conducting business via the internet, while Barua *et al.* (2001) indicate that e-business is a process that involves the total digitization of value chains and business processes. Wu *et al.* (2003) argue that e-business is conducted using the internet, websites, enterprise information portals, and/or other electronic network technologies. At this stage, it is perhaps helpful to distinguish between an e-business – i.e., a noun: a company that is mainly based on internet based transactions, and e-business, which is another noun, with a different meaning: a process or activity that many types of business adopt to some extent. Whilst individual Libyan universities are attempting to adopt e-business, this study is primarily concerned with the process they could adopt to achieve this aim: a process of e-business deployment. The definitions included in Table 2.1 (given in chronological order) show that the change in meaning of e-business has tended to go hand-in-hand with the development in the sophistication of internet capabilities available to businesses. In particular, as internet applications and a wide range of related

technological developments have appeared, there has been an increasing integration between these developments, companies, and their customers, which in turn, has fuelled the increased complexity and utility of e-business processes. Therefore, this research assumes the wider definition of e-business as defined by Chaffey (2002, p. 13):

> "*All electronically mediated information exchanges, both within an organisation and with external stakeholders, supporting the range of business processes.*"

According to this definition, ICT will include any communication device or application, including: phones, network, hardware such as computers and software, webs technology and so on, as well as the various services and applications associated with them, such as video-conferencing and distance learning. ICTs are often spoken of in a particular context, such as ICTs in education. Damanpour (2001) stated that e-business is about any business activities that involve transforming organisations' internal and external relations to develop new market opportunities. This definition is based on the opportunities organisations have to redesign their systems (including IS and ICT) to carry out new ways of running their business. This could include operating processes such as using internet searches to increase online services to stakeholders by web-enabled systems.

2.3 E-business deployment in Higher Education

Smith and Mitry (2008) argue that in the developed world, the technology is now deeply integrated in higher education, and the basic process of online delivery has already become a global feature. E-business deployment for universities has been a concern for governments and researchers alike due to the significance of this issue to their national economies (Mofleh *et al.,* 2009). A number of e-business deployment studies have been undertaken in the developing world on universities. These studies shows that e-business activities could be helpful towards evaluating and managing planned development for those universities (Secundo *et al.,* 2010). However, most universities in the developing world are still prevented from using their e-business resources, and the cost of establishing a reliable e-business infrastructure is very expensive for many universities. Furthermore, a key area of concern in those previous studies is the lack of detail on how e-business deployment in universities can be undertaken.

Riemenschneider *et al.* (2003) argue that the unequal level of e-business infrastructure, applications, and services between the developed and the developing world in urban and rural regions also formalise how e-business is applied in organisations. The basis for an effective e-business is a way to facilitate improvements in a university's processes, in

addition to allowing a university to expand service diffusion, geographical accessibility, and so on (Sin Tan *et al.*, 2010). Therefore, e-business processes that will be integrated into the infrastructure must be known, where the understanding of e-business activities or processes is likely to lead to re-evaluated and adjusted e-business plans (Cassidy, 2016, P. 64). E-business activities here could be helpful towards evaluating and managing planned development for universities (Secundo *et al.*, 2010).

However, with the development of effective e-business deployment plans, the university could have a competitive advantage over others who cannot offer similar services or operating capabilities in their service domain. Similarly, Sin Tan *et al.* (2010) argue that adopting e-business can provide benefit in many ways:

1) Geographical reach: Fewer barriers are encountered for participants, as they are able to reach a greater range of geographical locations based on communication network applications.
2) Information sharing: Supporting any form of digital information, such as text, audio, video, graphics, or animation can be transferred to all users that are involved and connected to the network. However, based on the speed of internet transactions, university e-business participants are able to do more work than they normally projected, resulting in higher output.
3) New features: The ability to provide benefits for stakeholders by improving new types of e-business-based services. For example, lower costs, where internet-based processes could be cheaper than traditional methods by allowing users to communicate directly, removing any middle agents or additional processes.

2.3.1 E-business deployment in Libyan universities

This study supports the few studies already conducted in this area, and in particular highlight the related issues of e-business deployment in universities in Libya. In terms of e-business deployment projects in the higher education sector, Libya has initiated a number of national e-business development plans. This engagement by government has comprised of several phases for universities, which have been introduced to increase e-business process deployment and improve infrastructure by establishing e-business initiatives. For example, in 2012, the Libyan government was involved in a number of e-business development programs for higher education called ‘TEMPUS’ (Trans-European Mobility Scheme for University Studies). This is a European Union

programme which supports the modernisation of higher education in the partner countries which the Mediterranean region and in particular Libya is involved in, mainly through university cooperation projects. This initiative mainly helped to build the e-business skills and universities technological infrastructure that is required to support the development of Libya's e-business growing knowledge and support a higher education management. There are a few number of studies that mainly investigate the adoption of technology in education sector in Libya and related applications (e.g. Electronic records), and the ways to introduce ICT into collaborative learning processes. It discusses the issues that need be considered and addressed when considering e-business related components (e.g. Implementing ICT in the learning and teaching processes) and technological infrastructure, cultural and language aspects, and typically outline the prospects for the integration of e-business applications such as e-learning into Libyan higher education. Kenan *et al.* (2013) argued that the main environmental issues such as the social changes and technological developments within a Libya are likely to have an effect on the success of e-business. A number of studies were keen to address e-business deployment technology (e.g. e-learning systems) and its related influence on teaching and learning applications. Table 2.2 illustrates a number of key issues related to the e-business within the universities in Libya.

Table 2.2 E-business in Libyan Universities

Source	The study
Rhema and Miliszewska (2010)	E-learning in higher education in Libya
Elzawi and Wade (2012)	Barriers to ICT adoption in quality of engineering research in Libya: how to bridge the digital divide?
Rhema and Miliszewska (2012)	The potential of e-learning in assisting post-crisis countries in re-building their higher education systems.
Abod (2013)	Impacts of globalisation and awareness of higher education policy in deployment and use of ICT in Libyan universities.
Othman *et al.* (2013)	Attitudes of Libyan students towards ICT's applications and e-learning in the UK.
Abuzawayda *et al.* (2013)	Electronic records management in institutions of higher learning in Libya: deployment of dirks model
kenan *et al.* (2014)	Trends and policy issues for the e-learning implementation in Libyan universities.
Elzawi (2015)	A study on the impact of ICT on collaborative learning processes in Libyan higher education

The studies presented in Table 2.2, mainly focused on the use of technology and its applications in developing teaching methods in educational institutions. Kenan et al.

(2013) distinguish between e-business deployment drivers and barriers, the drivers, which include; computer usability, internet website enjoyment and the availability of software to support the e-business. The barriers cover the lack of ICT infrastructure; lack of internet access; and broader campuses geographical area. In addition, Arabic is the main language spoken in Libya, thus the English language is a significant barrier to e-business deployment (Elzawi and Wade, 2012; Nour, 2006). Similarly, Elzawi et al. (2012) definite barriers related to the unreliable power supply or electricity to operate ICT/IS systems and applications, as well as related equipment. This was supported by a previous study on e-business deployment in Nigerian organisations which indicated that the lack of power or electricity could negatively affect the achievement of e-business deployment and utilisation, especially in rural areas, discouraging them from e-business development (Apulu *et al.,* 2011). However, since this search gives a wider definition of e-business, the focus will be on expanding the concept of using technology and related applications to deploy e-business in Libyan universities, not only from one process and just technology tools standpoint, but more inclusively, to involve all university processes, and provide an assessment levels of e-business deployment from different perspectives.

2.4 Barriers to e-business deployment

The failure of many e-business projects in the developing world could be ascribed to poor understanding of issues in context leading to inappropriate solutions to e-business problems (Heeks, 2002). Previous studies have shown that e-business deployment increases significantly when it is supported by a clear and practical business strategy and suggested a number of solutions that can guide to building an e-business strategy (Hackbarth, and Kettinger, 2000; Gerow *et al.,* 2014). There have been number of studies reflected on the drivers and barriers associated with establishing e-business in organisations (Alonso *et al.,* 2005; Chaffey, 2007). These studies argue that the strongest operators of e-business organisations approach business plan by protecting and extending the existing business environment, reaching new services, or gaining advantages over competitors. Furthermore, Scupola (2003) stated that in the developing world, the government should form e-business policies to support organisations' procedures while providing financial and technological support as a way to improve the infrastructure for e-business. The infrastructure and security also were considered as critical obstacles that need to be addressed when an organisation attempts to adopt e-business (Jackson *et al.,* 2003).

People play a central role in e-business, thus the lack of skills, insufficient training, and poor awareness of e-business applications can also delay e-business applications (Jones *et al.*, 2003; Kapurubandara and Lawson, 2006; Kapurubandara, 2008). Moreover, Lawrenceand Tar (2010) stated that language was a factor that can discourage many people in the developing world from adopting e-business which support the outlines of e-business studies conducted in Libyan context (Elzawi and Wade, 2012; Nour, 2006). However, with English being one of the main languages that is used within e-business, this can act as a barrier to those developing nations that have yet to acquire a familiarity with it. This can lead to a lack of motivation within organisations attempting to adopt e-business processes.

In addition, Jutla *et al.* (2002) stated that employee readiness has been a debatable issue and an important barrier to e-business activity formation for the employer in getting the employees motivated for the change to e-business. Kapurubandara and Lawson (2007) indicate that internal, external barriers including political constraints and lack of skills are at the top of the e-business barriers list. Al-Weshah and Al-Zubi (2012), in their study on e-business enablers and barriers in the Jordanian communication sector, found three technology related factors that could lead to obstacles for an e-business organisation. They were security issues, quality of the internet and cost of implementation being the most prominent (see Table 2.3.). Unfortunately, organisations at these levels cannot develop e-business without encountering these barriers**.** Furthermore, numerous investigative studies have shown that several issues such as the socio-political stance of the developing country in question may hinder the ongoing evolution of the formation and development of e-business. Zhu *et al.* (2004) argued that the main e-business deployment barriers are infrastructure, organisation scope size, organisation competition, organizational readiness, and regulatory environment. The Table 2.3 is summarised a number of reviewed e-business barriers studies.

Table 2.3 E-business deployment barriers

Source	E-business deployment barriers
Jutla *et al.* (2002)	Lack of governmental support and encouragement.
Zhu *et al.* (2004)	Organisational, cultural, technological, human, financial, management and environmental.
Ebrahim and Irani (2005)	Organisations' resources, culture, organisational policies, management, and organisational readiness.
Kapurubandara and Lawson (2006)	Internal, external, political and people skills barriers.
Kenan *et al.* (2011)	Managerial, technological, and cultural barriers.
Asgarkhani (2009)	Lack of telecommunications and network infrastructure, limited PCs access, lack of financial resources for developing an infrastructure, lack of ICT literacy and cultural resistance, limited networking, and internet.
Alghamdi *et al.* (2011)	Incompatibility for business nature, lack of enablers (e.g. Availability of ICT skills, capable personnel and network infrastructure), cost issues (e.g. Costs of ICT infrastructure, software, and IS systems) and security and trust issues (e.g. Security and dependability of systems and legal frameworks)
Al-Weshah and Al-Zubi (2012)	Technology (security issues, costs of implementation and network quality). Organizational (lack of expert staff, lack of time for implementation, lack of top management support, and lack of staff skills). External (low use by stakeholders, the stability of government policy, a concern for the cultural environment, and legal and regulatory) barriers.
Manochehri *et al.* (2012)	Lack of security, high cost of implementation and the lack of expertise staff.
Baker (2012)	Lack of Infrastructure, competition, organizational readiness, and regulatory environment.
Kenan *et al.* (2013)	Lack of infrastructure, qualified personnel, and resistance to change).
Mohammed *et al.* (2016)	Internal barriers include top management, organisation characteristics, and cost of implementation. External barriers include, infrastructure, social, cultural, political, legal, and regulatory.

In regards to the developing world, many studies have indicated the barriers relating to the issue of e-business development and use. These barriers were categorised in number of groups, for example, Al-Weshah and Al-Zubi (2012) classified the barriers in three groups, which are technology barriers, organisational barriers and external barriers. Similarly, Kenan *et al.* (2013) argue that the barriers classification could be Managerial, technological and cultural barriers.

However, according to the above classification stated in the Table 2.2, e-business barriers classification could be grouped as technology related barriers which is including the infrastructure, IS, and internet connection; the human or people barriers which is representing the people skills and their capabilities and stated as internal factors by Mohammed *et al.* (2016). Last, the barriers related to the organisation characteristics, process management with it is political, legal, and regulatory issues, this

can be named process barriers. However, the three main initial barriers classification adopted in this study could be narrowed as: (technological related barriers, people related barriers, and process related barriers). This classification could direct the e-business deployment barriers investigation support the research objectives and help to answer the research questions.

2.4.1 E-business barriers in Libya

E-business in Libya appears to have only recently begun and there is little information available in the existing literature (Kartiwi *et al.*, 2013; Akeel *et al.*, 2013; Sharkasi and Wynn, 2011). E-business provides many benefits across a wide range of business processes and transactions. For example, e-business applications can improve information and knowledge management inside an organisation, can reduce transaction costs, and increase the speed and reliability of the business process. They are also effective tools for improving external communications and quality of services for established and new customers. Beyond a certain level of connectivity (e.g. PC, Internet access, on-line information), not all organisations will necessarily achieve the benefits of e-business, simply because some organisations may stay within the traditional business processes and in these cases, ICTs/IS maybe not bring any large benefits. Thus, e-business policies will affect the deployment and use of e-business including those designed to expand and improve the quality of ICTs (e.g. network infrastructure), legal and regulatory environments, foster technological deployment, and stimulate a business environment.

Currently there is a growing awareness in Libya of the competitive advantages that can accrue as a result of e-business enabling an organisation to out-perform its competitors, resulting in its increased adoption (Rhema and Miliszewska, 2014). Therefore, some businesses now have a global presence such as oil companies in Libya (Akeel *et al.*, 2013), the financial sector (Sharkasi and Wynn, 2011), and university sector (Bakeer and Wynn, 2015). Ahmed *et al.* (2013) argue that barriers to adopt e-business services are first: infrastructure barriers including inadequate plan, low internet penetration in the country. Second: political barriers, which refer to the unstable management and positions of a particular organisation. Third: social barriers, which include the lack of information on e-business, lack of senior management knowledge in the IT sector and related regulation.

However, there is a lack of adequate websites, which are not good enough, and the implementation costs make organisations in Libya unwilling to develop e-business to the next level (Kenan *et al.*, 2012). Such issues can hinder organisations moving forward to the next stages of growth. In the study about the adoption of accounting information system in Libya, Khalil and Zainuddin (2015) argue that e-business could be established when there is greater access to physical infrastructure, adequate research, and development, and proper policies and guidelines are put in place. Otherwise, all these can be achieved only when there is adequate support from the government. To conclude, the classifications of e-business deployment barriers in Libya could include the human factors, technological factors and process factors such as policies and regulations. For this research, these factors are highlighted as the most important issues to e-business in Libya, and make up the focus of this investigation.

2.4.2 E-business barriers in Libyan universities

Kenan (2009) argued that the barriers to e-business in Libyan universities could be grouped into three categories: Management barriers, Technological barriers, Cultural barriers and other barriers due to other factors such as cost, lack of resources, and digital divides. Later, Kenan *et al.* (2013) stated that Libyan universities met several e-business barriers such as; lack of planning for building the human resources capacity, which can be classified as human barriers, lack of effective administration process. Also, lack of effective and practical research contributions regarding related management issues, which can be classified as management barriers, and the lack of e-business facilities (e.g. internet connection and networks), which can be classified as technology barriers (see Table 2.4). In a similar context, Artemi and Ajit (2009) argued the barriers of e-business systems among the educational institutions in Libya include a lack of ICT infrastructure, lack of qualified personnel and resistance to change. This can be classified as technology, human and culture barriers. In general, Libyan universities not only face common barriers such as: lack of training, lack of internet availability, resistance to change, and lack of experience in the use of the net amongst university stakeholders, but they also face additional barriers to its development and growth of e-business. Number of key studies examples related to e-business deployment barriers in higher education sector in Libya are presented in Table 2.4.

Table 2.4 Barriers related to e-business in Libyan universities

Sources	Barriers
Kenan *et al.* (2011); Alzawi and Wade (2012); Kenan *et al.* (2013)	• Lack of motivation effort from the universities, • Lack of interest, lack of encouragements/rewards; • Lack of support • Lack of human resources training • Lack of public capabilities to use e-business technology • Lack of training in technological developments; • Lack of experience in using technology • Lack of e-business strategic planning and vision.
Twatti and Gammack, (2006); Alhawat (2005); Kenan *et al.* (2013)	• Lack of effective administration process • Lack of any effective and practical e-business • Lack of cross-institutional collaboration • Lack of necessary facilities for e-business applications.
Artemi and Ajit (2009); Rhema and Miliszewska (2010); Alzawi and Wade (2012)	• Lack of access to specialized online databases • Low speed of internet connection • Lack information quality • Lack of e-business system availability • Insufficient networks and systems infrastructures • Difficulties in overcome initial implementation problems • Lack of skill in the English language.
Elzawi (2015); Kenan *et al.* (2015)	• Lack of Clarity of available information • Difficulty use of the process • High cost of internet connections. • Lack of management and leadership among the universities.

However, the barriers listed in Table 2.4 present significant differences in the views of e-business barriers, and shows that the authors focus was on the technological view. For example; barriers to the potential use of the Internet for university learning and teaching. The majority of the above studies focused on exploring the barriers to ICT and internet applications in Libyan higher education. However, the barriers of effective administration process and lack of motivation was also present as barriers from the management and process view. The view relating to the human and people skills also revealed, for example; a lack of skill in the English language and related human resources training. However, these three main views can be useful to support creating barrier classifications in specific categories. For example; the barriers classification related to people's skills (e.g. proficiency in the English and training), technological barriers (e.g. insufficient networks and systems infrastructures), and organisational and

management barriers (e.g. problematic processes and the lack of management and leadership among the universities).

Based on the definition of e-business adopted in this research and the nature of each barrier, more barriers will be discovered and creation of e-business deployment barrier categorisation match the view of e-business definitions will be formed. Thus, e-business deployment barriers classification presented in this research could help generate a wider view on e-business deployment in Libyan universities.

2.5 Heeks' Design–Actuality theory

2.5.1 An introduction to e-business theories and models

This section will review the models related to e-business and present existing models designed for western technological environments attempting to apply its concepts to the developing world. Therefore, it is important to review a number of commonly used models and theories related to e-business deployment research as a benchmark for seeking to develop an innovative model for assessing e-business in Libyan universities. Hence, a number of issues will be highlighted and identified from the previous study, the significant factors of e-business model can be discovered supporting the development of an e-business deployment model, with clear components such as e-business barriers and drivers. In addition, the model should provide better support for understanding e-business based processes.

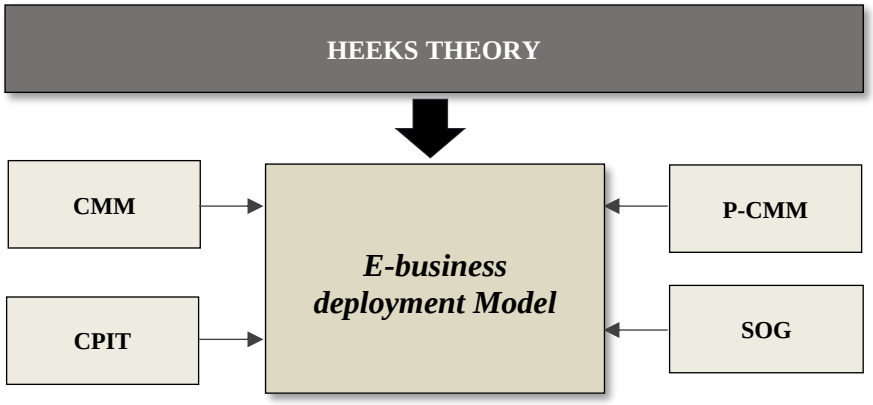
Table 2.5 lists a number of e-business related models and theories that will be discussed in this study.

Table 2.5 E-business theories and models used in current study

NO	Model	Sources
1	**Design–Actuality Gap Theory**	Heeks (2002)
3	**Connect-Publish-Interact-Transfer CPIT model**	Taylor and Murphy (2004)
4	**Stages of growth (SOG)**	Prananto *et al.* (2003); Marshall *et al.* (2005)
5	**A Capability Maturity model for (CMM)**	Paulk *et al.* (1993); Rosemann and De Bruin (2005)
6	**Business Process Maturity models BPM**	Hammer (2007); Röglinger *et al.* (2012)
7	**People Capability Maturity model P-CMM**	Mukherjee (2013); Zhang (2015).

It can also be argued that certain items are appropriate for current circumstances within Libyan universities. By combining the models listed in Table 2.5, a developmental framework can be made to evaluate and assess e-business deployment levels within

universities in Libya. Figure 2.1 illustrates the models that will be reviewed and discussed in this section.



CMM	Capability Maturity Model
CPIT	Connect Publish Integrate Transfer Model
P-CMM	People Capability Maturity Model
SOG	Stage of Growth Model

Figure 2.1 The Reviewed models

Following the review and discussion of e-business related models, a new model of e-business deployment will emerge, where critical influences on e-business deployment in universities in Libya can be highlighted for practical use in e-business deployment investigation processes.

2.5.2 Design–Actuality Gap Theory

Nicolian *et al.* (2015) argue that the failure of e-business deployments is still considered a significant challenge for organisations in the developing world. Therefore, highlighting the main possible scenarios that occur during e-business deployment initiatives is important as a way of improving results. The Design-Actuality Gap model developed by (Heeks, 2002) was based on: the match or mismatch between e-business designs and actual organisational reality in terms of e-business use. The model explains the ways in which this Gap can be bridged through organisational changes and developments in developing countries. It therefore provides guidance on generic ways in which the achievement of e-business developments in developing countries can be increased. Heeks (2002) argues that reaching an appropriate decision on e-business depends on the organisation's capacity to perform the transformation strategy in place. Henceforth, these organisations analyse several dimensions to see which best suited the capacity of that particular e-business. The model was useful to investigates and shapes the understanding of what drives success or failure in e-business deployment (Heeks,

2002). Based on Heeks's Model, three main scenario of e-business deployment initiative outcome has been identified as illustrated in Figure 2.2:

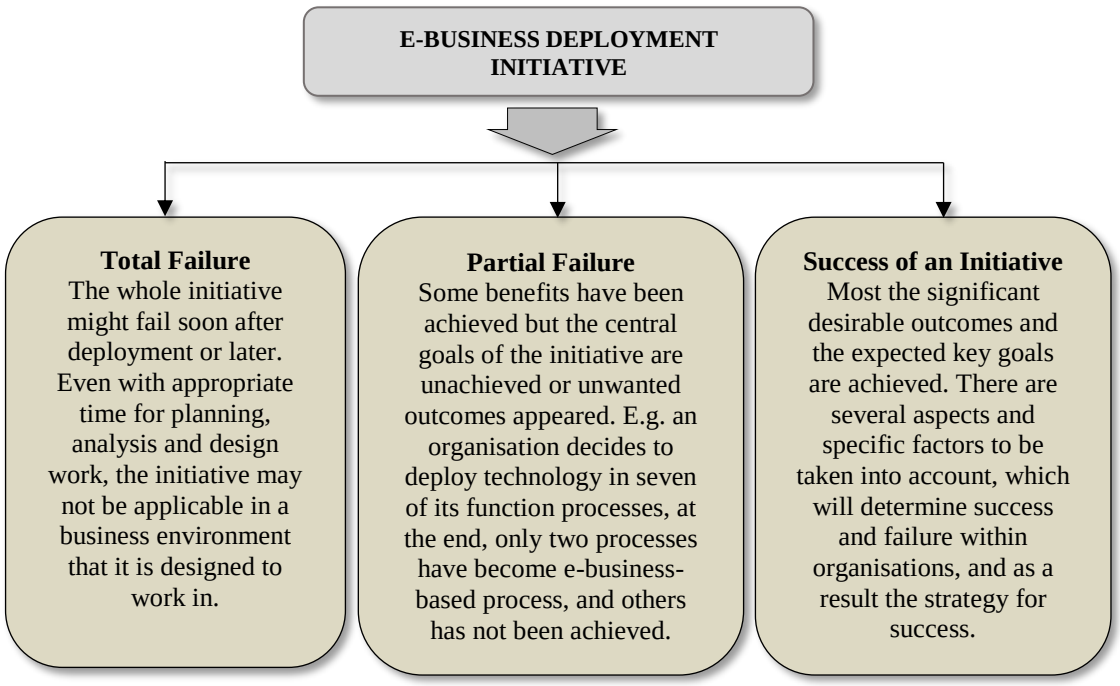


Figure 2.2 E-business deployment outcome scenarios
Source: adapted from Heeks (2002)

It could be useful to use as a blueprint for e-business pathway progression and base point guiding e-business development plan. This could be adopted as a strategic path to assists in identifying needs of e-business progression (Heeks & Bailur, 2007), and adopted to provides guidelines to the necessary requirements for e-business deployment success in universities in Libya. Therefore, attention is required for the most important elements that can bring about positive results in e-business deployment initiatives. However, Heeks's model conceptualised the basis of the problem as a gap between expected professional knowledge (design) and the current real circumstances (actuality) of the organisation. Based on Heeks's theory, current circumstances can lead to a failure of e-business deployment because of the lack of knowledge leading to unrealistic goals being set.

2.5.2.1 Heeks transformation dimensions

Heeks's model could be adopted in this research as a direction plan for e-business deployment with a considerable focus on the significant subjects that need to be addressed. Heeks's model presents multi-dimensional assessment of the current and future conditions in an organisation's attempts to use e-business. These dimensions are illustrated in Figure 2.3.

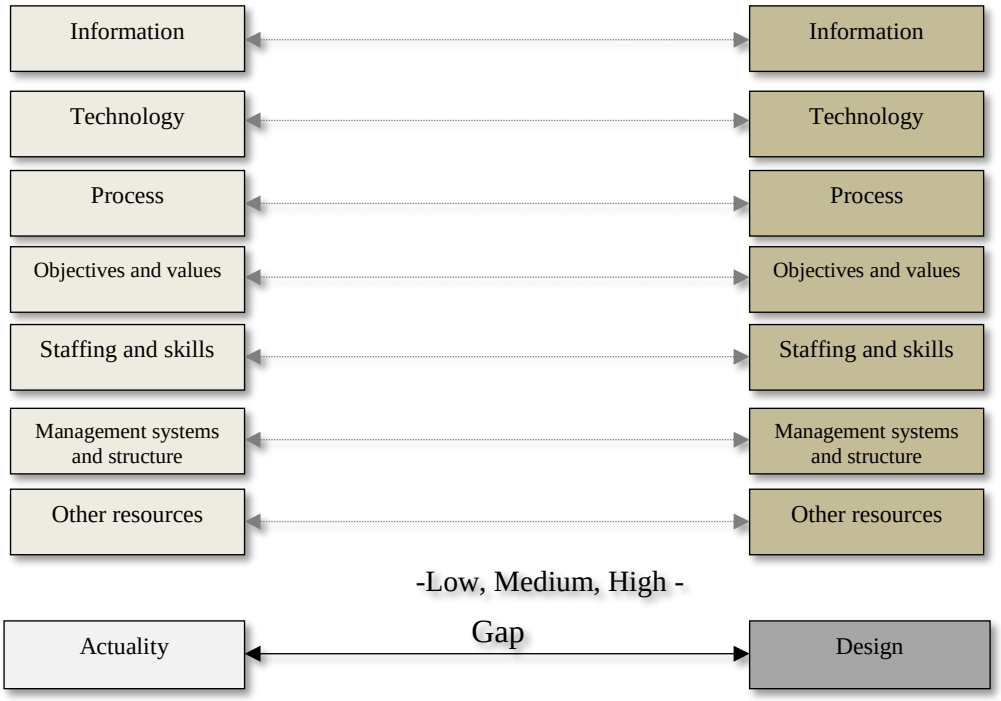


Figure 2.3 Design-actuality gap dimensions

Source: Adapted from (Heeks, 2002)

Heeks (2002) pointed out that the theoretical ideas behind this model have led to seven significant dimensions of design–actuality Gap. The gap between design and the actuality of each of the dimensions can be assessed and rated (e.g. Low, Medium, and High) as illustrated in Figure 2.3. These seven dimensions are:

1. Information (e.g. data stores, data flows, etc.)
2. Technology (e.g. both hardware and software)
3. Processes (e.g. activities of users and others)
4. Objectives and values (e.g. culture and politics are revealed)
5. Staffing and skills (e.g. human capabilities, awareness, etc.)
6. Management systems and structures (e.g. organisational structure, etc.); and
7. Other resources (e.g. time and money, etc.)

For example, it is comparatively easy to assess the level of an organisation's existing technology, which is called "the actuality". Therefore, the model is based on an assessment of the match or mismatch between current actuality (which refers to where an organisation is now) and systems at a future design (which refers to where the design intends to develop the organisation to) (Heeks, 2002). However, practically every single organisation could have a different version of actuality and each has a dedicated need for their design, which makes different requirements necessary.

According to Heeks, case studies could demonstrate the model's dimensions and highlight critical dimensions for each case, which can generate a model that could be helpful in practice in a broad range of contexts. During the transition process, changes can be demonstrated and stability between design and actuality can be maintained. If there are signs of success, adaptation between design and actuality can be applied to the processes of deployment models in order to achieve sufficient decision making in reality.

Based on the above discussion, e-business deployment among organisations in the developing world need a specific designed e-business deployment model to meet their business requirements and work environment. According to Murphy (2002), e-business requirements in developing world organisations are mostly related to technology (e.g. electricity, systems, communications and existing information); processes and management methods; and people (e.g. employees' skills, capabilities, abilities and awareness of e-business deployment). However, only focusing on one concept is not sufficient for organisations to formulate their e-business development process, because of the fragmented needs and requirements within the organisations (Chaffy *et al.*, 2011). The strategic considerations and actions are crucial for organisations to implement e-business successfully and have continuous improvement (Chaffy, 2011). Thus, for e-business deployment in universities in Libya, applying Heeks' model could help to shows the key drivers and barriers as well as key players in the development process and development priority.

2.5.3 E-business deployment dimensions

Existing studies mainly relate to the countries of Jordan (Al-Mobaideen, 2009); Egypt (Agag *et al.*, 2013); e-business in Latin America and Sub-Saharan Africa (Okoli *et al.*, 2010), and Libya (Alzawi and Wade, 2012) are generally conducted from a very limited singular perspective (e.g. technological dimension). More recently, for example (Heeks, 2002) a number of dimensions have been involved (e.g. social, organisational and culture). Thus, from these studies, common dimensions could be observed, where initially these dimensions can be adopted as representatives of e-business deployment dimensions defining multiple related e-business aspects driven form these studies. Table 2.6 presents number of studies and related e-business deployment and related dimensions.

Table 2.6 E-business dimensions

REFERENCES	DIMENSION-1	DIMENSION-2	DIMENSION-3	DIMENSION-4
Attaran (2004)	Technology	Process	People	
Saleh and Alshawi (2005)	IT infrastructure	Process	People	**Work environment**
Heeks (2002)	Technology	Process	People	**Structure**
Taylor and Murphy (2004)	Technology	Process	People	**Perceived Impact**
Hanafizadeh and Ravasan (2011)	Technology	**Policy**	Human Resources	**Business environment**
Soliman and Janz (2004)	**Pressure**	**Cost**	**Management support**	**Trust**
Zhu *et al.* (2006)	Technological	organizational		**Environmental**
Delone and Mclean (2003)	Systems	**Information**	People	**Services and benefits**
Gurumurthy *et al.* (2013)	Technology	Processes	People	
Williams and Leask (2011)	Technology	Processes	People	

	Importance for the study
	Exclude from the study

From the studies listed in Table 2.6, there is some contrast in arrangement about the significant dimensions related to e-business, but they are mostly narrowed to three basic dimensions: people, process, and technology, which this research will look to develop. Through further investigation into each of these dimensions, their impact on e-business deployment among universities in Libya will be analysed. However, given the Libyan universities, the perspectives given by these dimensions could be considered as a base point of e-business deployment. For example, they have the potential to integrate technical information, business processes, organisational resources and the issues related to human resources as well. Therefore, more research related to the relationship between these three dimensions in the design phase and actuality will be piloted. These three dimensions (Process, People, and Technology) have been derived from previous studies conducted through a number of examined case studies. These dimensions' transformation is illustrated in Figure 2.4.

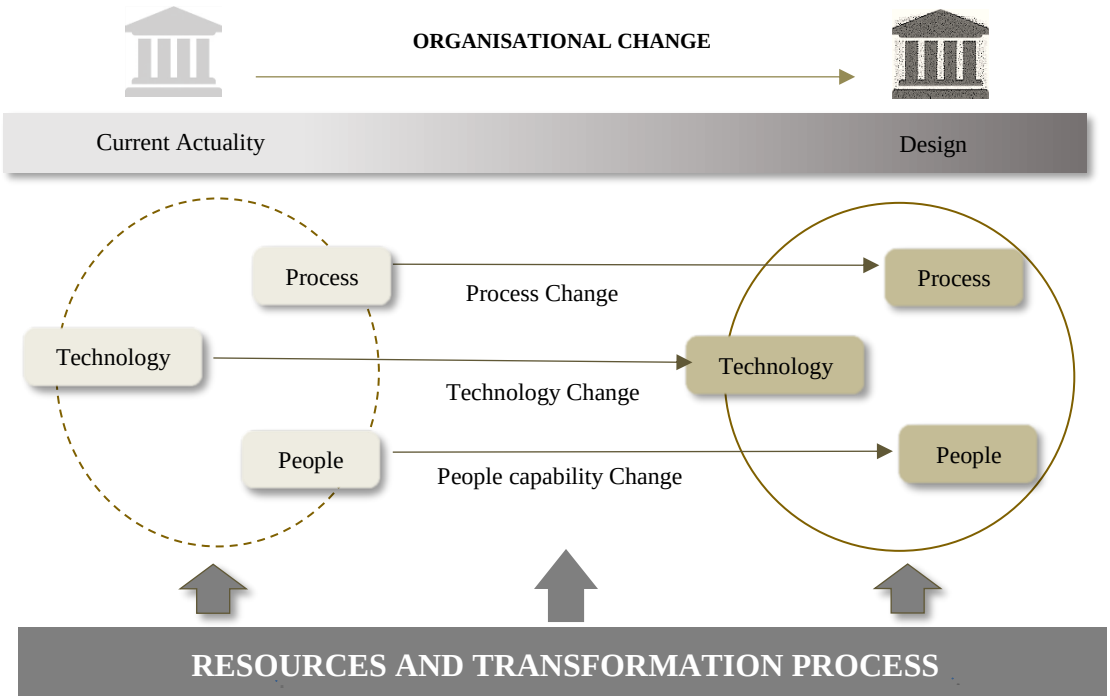


Figure 2.4 The key e-business deployment dimensions

Source: adapted by researcher from Heeks (2002)

Following Heeks model, the focus will be on reducing the gap between the dimensions of People, Process and Technology, as this will be essential in discovering the elements that will guide the assessment of e-business deployment levels in each dimension.

2.6 The Technology dimension of e-business deployment

ICT plays a vital role in e-business; it supports organisations by taking significant roles in business processes such as creating new needs, and development of new services (Ndou, 2004). Chaffey (2007) indicates that the fast development of technology and related information systems applications can support organisations to highlight e-business plans and introduce relevant tactical development activities. Therefore, the development of e-business approaches has become a focus for business development plan (Heeks, 2002; Choi *et al.*, 2016). This section will discuss number of technology adoption models that could provide a significant support to a comprehensive e-business deployment model in this research.

2.6.1 Deployment Ladder model (DTI)

UK government in the 1990s developed the Department of Trade and Industry (DTI) model in (Martin and Malay, 2001). It assumes that organisations that have newly implemented internet for their business subsequently move to wider e-business adoption. This model therefore founded on the idea of using internet technology in

business development highlights the transformational aspects of technology. The main transition phases are: e-mail, website, basic e-business, advanced e-business, and the transformed organisation (see Figure 2.5).

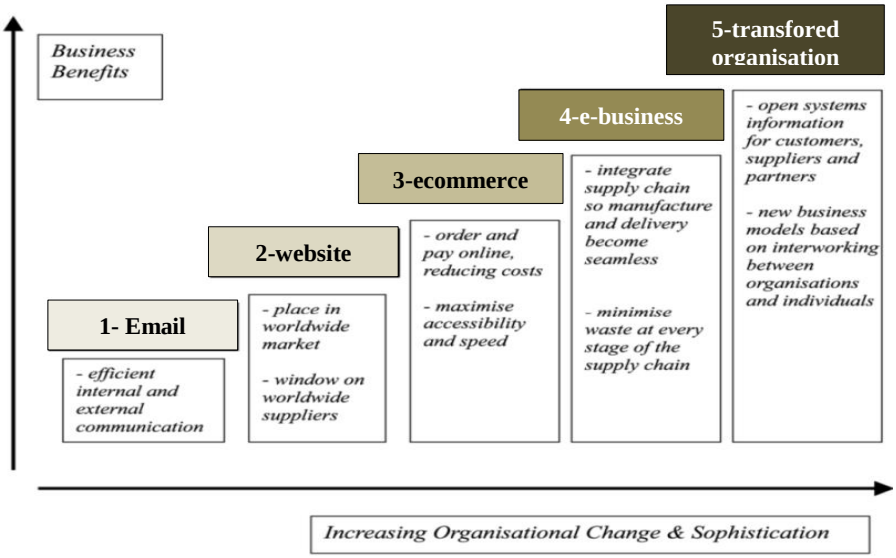


Figure 2.5 DTI model

Source: adapted from Martin and Matlay (2001); Tylor and Murphy (2004)

The stages of the DTI model start from the use of e-mail and progresses through website development towards e-business process leading to the direction of new business model based on technology adoption (Chaffey, 2007). The first two stages represent the understanding of basic ICT applications such as usage of email and website communication management and publishing information about the organisation online. The third stage involves initial e-business application and online interaction between the organisation and related stakeholders, but their processes and technology are still not integrated or overlapped, which will be applied in the fourth stage where the advanced e-business allows organisation's business process to integrate and overlap. In the final stage, the processes and technology are incorporated and represents the transformed stage, which allows shared information and services.

The DTI model has been widely used in e-business research, and has been evaluated and criticised. For example, Martin and Matlay (2001) argued that the model lacks clarity in terms of the interpretation of organisations' business process patterns. However, based on the DTI model stages, the achievement of the transformed level will involve superior technology in the final three stages, incorporating a wide range of changes (e.g. systems, process and people skills). Taylor and Murphy (2004) criticised the model for being a linear progression, representing a simple technology step that could only indicate a single direction for e-business applications use, with its failure to

arrive at the top of the ladder being due to a lack of support for e-business success. In the case of handling several organisation dimensions, the model would not be suitable for interpreting an organisation's business process (Xu *et al.*, 2005).

However, whilst the DTI model maybe too linear failing to describe the complex and non-linear business processes, it could be useful for providing a basic description of the analytical level of internet applications deployment in organisations. The DTI model represents a simplistic level of technology deployment, but still can be useful for assessment of e-business in the early stages of technology deployment. Therefore, the research suggests that the DTI model could be a useful when applied as a simple indicator of basic internet application deployment in Libyan universities.

2.6.2 The Connect-Publish-Interact-Transfer (CPIT) model

The CPIT model was developed as a more practical way to view and interpret patterns of e-business practices amongst organisations that the DTI model failed to provide (Taylor and Murphy, 2004). The CPIT model examined the impact of e-business practices upon an organisation main business process and activities (Sharkasi and Wynn, 2011). The CPIT model represents four stages that assess e-business deployment and related practices within organisations' business activities and processes. The first stage is "Connect", which refers to engaging basic e-business applications for better technological infrastructure (e.g. internet for information gathering, and e-mails for messaging). The second stage is "Publish", which refers to the publishing of the organisations' information using online technologies. In this stage, publishing is still a one-way process and one where there is no interaction between the organisation and stakeholders (e.g. a static website uses for publishing information about an organisation). The third stage is "Interact", where there is a two-way process; at this stage, an organisation launches a business activities environment that allows interaction online tools with stakeholders (e.g. dynamic website that provides accessibility and flexibility for submitting application forms and online orders). The final stage is "Transform", where an advanced e-business process stage goes online, and e-business technology applications are used for an organisation's business to transform its business processes. The stages of the CPIT model are illustrated in Figure 2.5.

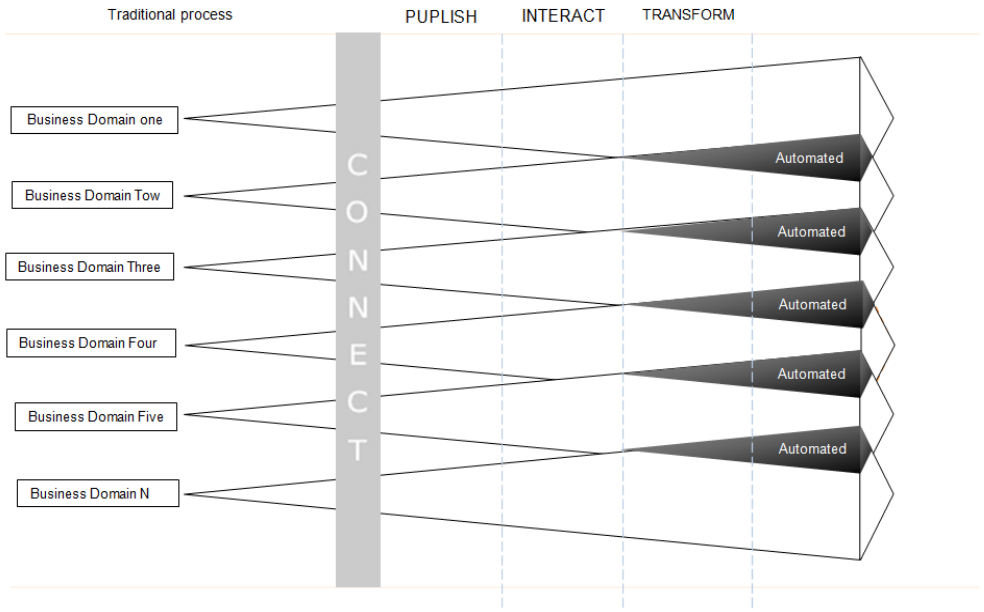


Figure 2.6 The Connect-Publish-Interact-Transform (CPIT) model
Source: adapted from Taylor and Murphy (2004)

According to Taylor and Murphy (2004) when organisations engage in e-business, four activities must be taken into consideration: linking to the internet; use of catalogue web pages; establishment and use of transaction capable websites; and transformation of their business process and operations by deployment of fully integrated back office computing linked to their web applications. The CPIT model has been used successfully in a number of organisational studies in the developed world where the infrastructure is considered more developed and reliable than in the developing world (Taylor and Murphy, 2004). Hamilton (2003) argues that adopting the CPIT model could be supported by complete alteration and adjustment of the organisation's business model. The CPIT model broadly analyses the steps of e-business and highlights how the progression of process deployment cooperates and interconnect with each other. Taylor and Murphy (2004) stated that the influence of the CPIT model lies in the possibility of making key changes in the organisation, specifically in the transform stage where an organisation's business processes will probably be redesigned around an e-business approach.

The model has been conducted in studies in the UK to assess the level of e-business across an organisation (e.g. Taylor and Murphy, 2004; Lau *et al.,* 2010; Wynn *et al.,* 2013). However, in developing world, the barriers to e-business deployment, for example, weak infrastructure is a serious limiting factor to e-business and digital access, thus many organisations have prevented from adopting e-business. In this case, the

CPIT model could be useful as a tool for organisations' attempting to deploy e-business by assessing the degree to which the organisation is engaged in e-business applications and practices, and can be applied to support the stages of e-business deployment, but not in the early developmental stages where the connection to the internet is designed to be exist in CPIT model (Olayinka *et al.,* 2016). Thus, the following models will discover and construct other techniques to assess e-business and its related factors, and to define the requirements of e-business and its dimensions, which could help to highlight e-business deployment progression concerns.

2.6.3 Stages of Growth models

In the 70s, Stages of Growth (SOG) was developed by Nolan (1973) who brought with it a series of debates and arguments on the validity and viability of the stages concept in the area of IS. Further studies have indicated that the SOG model is useful and widely adopted by academics and a practitioner to describe the development patterns of organisational IS (Benbasat *et al.*, 1980; King and Teo, 1997). Similarly, number of studies suggest that organisations experience stages of growth during their e-business deployment process (Martin and Matlay, 2001; Daniel et al., 2003; Rao et al., 2003; Taylor and Murphy, 2004). However, Nolan stages raised critical concerns as it lacked empirical validation and the proposed SOG model lacked detail and explanation, making it hard to be verified and validated empirically (King and Kraemer, 1984). More recently, with the emergence of the internet and e-business, several stages of growth models have been formulated to describe the various phases involved in moving towards greater sophistication with respect to the use and management of IS/IT in the new e-business environment (e.g. McKay *et al.*, 2000; Prananto *et al.*, 2003). Although empirical validation of the concept of SOG models is limited, various stage models have frequently been used to support understanding of increasing maturity of e-business in IS a study.

Later, the concept of SOG became a deeper approach for e-business deployment assessment. For example, Prananto *et al.* (2003) investigate the progression of e-business maturity development and applicability of stages concept in organisations to explaining their progression. Using multiple case studies, the authors explore the issues and challenges experienced by organisations when moving forward with their e-business initiatives, and establishing the applicability of the SOG for e-business models in mapping the e-business progression faced by those organisations. The SOG has been useful to measure the motivating or inhibiting factors for e-business development in

organisations. Also, Rao *et al.* (2003) introduced a stage model with definitions of each stage, as well as the considerable drivers and barriers related to each developmental stage. Thus, a wider aspect of SOG models could support the understand of factors affecting e-business deployment in organisations.

Rao *et al.* (2003) argues that e-business deployment can be classified into four stages, these stages are "Presence", which involves the display of organisational information through a one-way communication channel that gives contact details to future business views; at this stage, there is normally a lack of integration between internal and external processes. The second "Portals": This represents the introduction of two-way communication engaging with requests and orders (e.g. online stakeholders' record management). The third is "Transaction integration" which emphasised by the features of the previous two stages and integration of organisational processes such as financial transactions. The fourth "Enterprise integration", which is about complete integration of business processes with no special features distinguishing old and new business models. However, as the model focuses mainly on an internet ladder and does not consider the particular circumstances that affect organisations in the developing world, these four stages are not wholly applicable. This makes it difficult for organisations in the developing world to adopt it. It has been supported by Later, Molla and Licker (2005) who extended the stage model by arguing that developing world organisations are known to progress in e-business development based on six stages of classification as illustrated in (see Figure 2.7). Molla and Licker classification presented in the Figure 2.7 are simple and emphasise the interpretation of e-business deployment stages in organisations in the developing world with clearly empowered web and internet applications and related systems. The SOG model stages are illustrated in Figure 2.7.

Stage	Definitions
Stage 6	Integrated Web: that is a website integrated with other back-office systems allowing most business transactions to be conducted electronically.
Stage 5	Transitive Web: that is providing online services such as customer service.
Stage 4	Interactive Web presence: that is accepting queries, e-mail, and form entry from users.
Stage 3	Static Web: that is publishing basic company information on the Web.
Stage 2	Connected to the internet with e-mail but no website.
Stage 1	Not connected to the internet, but no e-mail.

Figure 2.7 Stages of Growth model
Source: adapted from Molla and Licker (2005)

The model assess the level of deployment of e-business technologies and business activities enabled by these technologies in organisations in developing countries, starting from conditions of low level e-business (e.g. no internet), such factors widely affecting organisations in the developing world. The next stage is focused on the connected internet towards web applications deployment and use of e-mail. These stages could help to show the process of providing online services (e.g. customer service) supporting the web integration with other back-office systems allowing online business transactions. The model also explores the implementation and planning of a range of e-enabling hard and soft technologies: electronically performed business functions and the overall maturity of e-business practice.

However, SOG model, was criticised by Parker and Castleman (2009) because of its simplistic way of defining e-business deployment in the advanced stages, where it is necessary to manage the complex nature of e-business applications integration in an organisation. Although developmental stages are displayed in a linear way, the model does not suggest an organisation should complete one stage before reaching another. Within the development, stages there are developmental processes including number of critical change elements that run in parallel, but at different rates. Therefore, there is a need to consider the development of organisational processes with the transformation of the growth of e-business technology applications. With the combination of the CPIT

model, and the Stage of Growth model, both can be useful in understanding the e-business process growth and maturity. The technology changes elements as illustrated in the Figure 2.8.

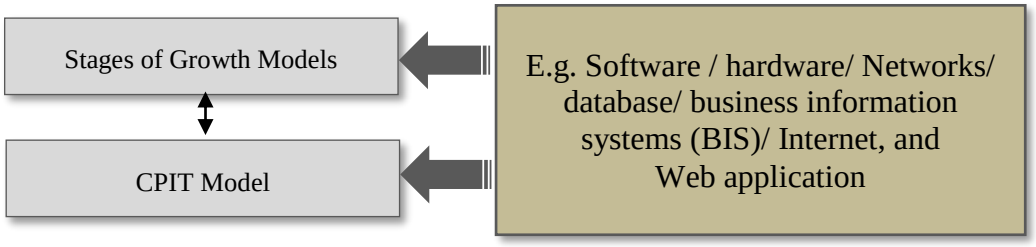


Figure 2.8 Change element of Technology assessment

2.7 The Process dimension of e-business deployment

Christiansson (2011) argue that business processes define the organisation's ability and potential to provide effective and high quality services and solutions. Processes influence organisation's performance, service delivery and make administrative support available for service assistances, and simplify the categorisations of actions designed to transform inputs into outputs. The emerging of business process management role in the overall e-business design was originally appeared from the information systems; that is, everything had to be programmed, even storing, and recovering data. Later, broad functionality connected to users' interaction (e.g. forms, buttons, graphs, etc.) was transferred to tools that can automatically generate user interfaces.

In the mid-1990s, process management systems focused on automating workflows with little support for process analysis, process flexibility, and process management (van der Aalst, 2013). Process management systems provide much broader support, for example, by supporting simulation, process intelligence, case management, and so forth. However, the process management became much more varied and there is no agreement on management systems and core process capabilities. In 2013, a process management issue has become a mature discipline, and its significance is acknowledged by practitioners (e.g. users, managers, consultants, and software developers) and academics (van der Aalst, 2013). Melao (2009) argue that organisations often integrate e-business redesigning their processes, and the process changes without truly understanding how the process works can lead to costly mistakes, helping to create conditions that make it difficult for staff to work effectively, and in general create problems.

According to Okrent and Vokurka (2004), process mapping helps to define the flow of information; it can show the interdependence of the different process steps, the different

tasks within the process and it reveals the kind of decisions that could be made. Similarly, Bradford and Gerard (2015) argue that the mapping of the business process could help represent the process visually and identify problem areas and opportunities for process improvement. It provides a common understanding of the entire process, its specific roles, and the contributions of process participants. This information aims to provide basic guidance on the principles of process mapping, and help to represent a useful method for evaluating e-business deployment. More detail on the process role and its influence on e-business deployment will be discussed in the in following sections.

2.7.1 Process mapping

There is a vital need to increase the success rate of e-business deployment and implementation of related applications (e.g. ERP implementations) to support organisations to benefit from the significant features of e-business technology (Al-Ashaab, 2010). Rosemann and vom Brocke (2015) argue that process mapping can help to provide rich detail about the tasks performed in a given process and who participates in the process. It also can show how technology is employed in executing the tasks, and may show how various systems and applications interact with each other in performing various subtasks. In addition, process maps may contain other information such as time consumption, metrics, resources, etc. Wynn *et al.* (2013) indicated that process mapping is a significant method that can provide a clearer view of the functionalities of the deployed e-business and its availability and utilisation in organisations for appropriate assessment.

Abdolvand *et al.* (2008) argued that organisations that attempt to deploy e-business may need to redesign their business process. During the deployment of e-business, the process mapping approach is used to identify the business processes; it is also used as a point of reference for improving or changing the required process. For example, it can help to clarify what is missing in these applications, or what needs to be replaced. This change should not only focus on top level process functions, but also needs to examine how the lower level activities are managed day-to-day, by looking at how activities are planned, communicated, organised, monitored and controlled (Hammer, 2010). It demonstrates the essential inter-relationships between the organisation's processes. Therefore, process mapping is able to clearly define the current processes in chart form, identifying problem areas such as bottlenecks, capacity issues, delays, or waste

(Rosemann and vom Brock, 2015). Once identified, it provides a solid basis on which a solution can be developed, introducing a new plan for an improved process.

In this research, the use of process mapping approach for e-business development it requires the participation of e-business users in the universities. In line with the usage of top-level mapping of some case studies, process function maps will also be employed in this study to discover the deployment of e-business applications, systems, and related dimensions along with associated sub-processes and development of e-business in the universities in Libya. This aims to help the assessment of existing implemented e-business technologies in Libyan universities. The main business processes and sub-processes of the universities will be identified, the e-business applications deployed on processes in different universities will be shown, and subsequently some positive approaches to ensure the success of deployed e-business technologies will be reviewed.

2.7.2 Business Process Management (BPM)

Business Process Management (BPM) consolidates objectives, frameworks, methodologies and tools, which have been proposed in a number of approaches, including Process Reengineering, modelling, and Business Process Automation. Harmon (2014) states that organisations have been modifying old business processes making them compatible with new e-business, and improving techniques for how work gets done via business processes. However, the importance of understanding process features, and more specifically the activities that include them, is about understanding how these process can be measured and managed. Hammer (2010) argues that BPM is a comprehensive system for managing and transforming organisational operations, based on management approaches engage analysis of business processes with the roots of an organisation. In regard to process maturity aspect, Rosemann and De Bruin (2005) argue that the concept of maturity has been proposed in the management approaches as a way to evaluate the state of being complete, perfect, or ready and excellence of growth or development. The authors stated that BPM relies on good systems and structural change and, even more importantly, on cultural change. However, BPM is considered as a new way of managing an organisation's reliance on process architecture, which captures the interrelationships between the key business processes, the enabling support processes and their alignment with the organisational goals and policies (Van looy *et al.*, 2011). Harmon (2010) stated that anything that encourages people to focus on defining, improving, measuring and managing business process is good for an organization attempts to deploy e-business in their processes.

In this research the Libyan universities process dimension and associated change elements will be explored focusing on the essentials model derived by new technology that gets process ready with the required skills to deliver real e-business-based process performance improvements. A number of models have been constructed to measure the maturity of process. The common model of process measurement and improvement in the field of new technology adoption is Capability Maturity Model (CMM). Further details on CMM model will be discussed in the following section.

2.7.3 A Capability Maturity Model (CMM)

CMM model was developed by the Software Engineering Institute at Carnegie Mellon University (Paulk, 1993; Paulk et al., 1993). The model was originally developed to assess the maturity of software development processes and is based on concepts of immature and mature software organisations. The CMM model has had a widespread influence and has been applied to the evaluation of e-business infrastructure management, enterprise architecture management and knowledge management. The CMM consists of a group of "key practices" which are divided into five stages representing the levels that organisations should go through on the way to becoming e-business mature. The CMM is the most widely used maturity model in application to software engineering field. De Bruin et al. (2005) argue that maturity is an indication of the collective impact of the capabilities on a given aspect of the organisations. The maturity then represents a scale of incremental improvements, developing from a less to a more mature or effective level (Iversen et al., 1999). The CMM five maturity stages are illustrated in Figure 2.9.

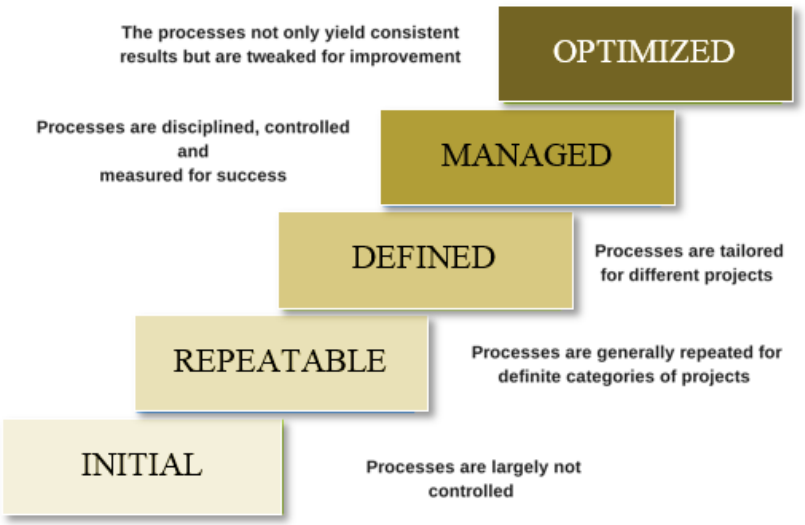


Figure 2.9 CMM model stages
Source: adapted from Curtis *et al.* (2009); Ngwenyama and Nielsen (2003)

However, in the structure of CMM, each maturity level contains change elements that specify a number of key practice, which should be implemented in order to achieve a set of goals. For example, as illustrated in Figure 2.9, in the Initial stage organisations establish very few processes managed by ad hoc individual effort, where at the Repeatable level organisations establish foundations for the development process: the development team can then repeat the process based on their previous experience. Some of the issues that organisations face at this stage are potentially being connected to new e-business applications (e.g. software). In the next Defined stage, the model has a more complex structure in the ways that it defines the levels of process maturity, where each maturity level contains key process areas, which classify the issues that must be addressed to achieve a maturity level. The change elements are used to indicate whether the employment and establishment of a key process area is effective, repeatable, and fixed. The process is considered changeable based on number of change elements that indicate process maturity.

In regard to the benefits of CMM, Hsieh *et al.* (2002) argued that organisations could potentially gain positive benefits by carrying out a learned and documented process in detail. Thus, to adopt the CMM model, organisations such the universities are supposed to use the CMM model by first assessing their maturity level and then establish a specific plan to get to the next level. However, many organisations fail to conform as prescribed to the CMM (Hsieh *et al.*, 2002). Process documentation benefits aim to support organisations to minimise uncertainty and changeability in their processes. However, Ungan (2006) argue that in most cases process documentation becomes more difficult as the level of detail increases. Thus, understanding the maturity levels and required measurements that allow focus on the characteristics of e-business is important to avoided expensive and inappropriate e-business deployment processes. More details on the use of CMM models in higher education sector will be discussed in the following section.

2.7.3.1 CMM model in the University sector

Investigations have been conducted focusing on maturity models in education leading to business process maturity models being discussed from different perspectives (e.g. focus on the developing of CMM models in education sector, for example, Marshal and Mitchell (2009) developed a CMM model for E-learning maturity, the model reviews a software development process, which focuses primarily on a technological dimension,

however, the model does not address the issues related to the deployment processes. Bass (2010) explored the development of an e-business maturity model in educational institutions in the developing world, this aimed to provide guidance for technology infrastructure development and create a reference model for the necessary progress phases to ensure the efficient use of these resources. Thus, models used in higher education processes are positively based on a CMM model with various proposals, which are expected to facilitate process maturity in different business areas.

Da Silva *et al.* (2010) stated that the CMM maturity model ensures essential components that include one or more disciplines and describe an evolutionary improvement path from undeveloped or ad hoc e-business processes, to mature, controlled processes with improved efficiency. Moreover, previous studies explore the interconnection between process improvement in higher education and use of CMM model in higher education process to build generational approach to student engagement practices (Duarte and Martins, 201; Nelson *et al.*, 2014). These studies provided key areas for process maturity development as well as the methodologies and evaluation techniques to assess completion requirements to effectively place an organisation at a certain level of maturity. In this research, a development of process maturity model will be conducted by adapting CMM model for existing universities' processes in Libyan universities. The research will provide and suggests CMM which will support e-business deployment in universities in Libya. The CMM aim to help universities in evaluating and improving their business process maturity. The adapted CMM involve five stages that provide assessments of both the maturity of the current process, as well as highlighting process improvements. The model will be adapted for guiding and assessment activities that involve interviewing participants such as staff members and managers in universities in order to gather information about the e-business processes.

2.7.4 People Capability Maturity model (P-CMM)

The People Capability Maturity model (P-CMM) helps organisations successfully address their critical people issues (e.g. users of e-business in the organisation). The model was proposed in July 2001 by Carnegie Mellon University Software Engineering Institute (SEI). P-CMM is based on Human Resources processes containing categorised levels, to effectively attract, develop, organize, motivate, and maintain social skills within organisations. The model has been employed in several organisations and used as a guide to the advancement of employee's skills and capability improvement (Doss and Kamery, 2006). The people's skills and experience is important for the significant

changes demanded by e-business (Zhu *et al.*, 2006). In this regard, Curtis *et al.* (2009), suggest that P-CMM, which consists of five maturity levels, contributes to continuous individual capability improvement, coupled with team development, performance growth and human resources improvement, and can help to evolve an organisation development plan (See Figure 2.10).

The P-CMM applies process maturity models practices for managing and developing an organization's employees (Curtis *et al.*, 2009). As illustrated in Figure 2.9 each maturity level provides a basis for continuous improvement and equips the organization with increasingly powerful tools for developing the capability of its employees. The stages of development highlight awareness and employees' capability and enable further effective improvement. Whereas CMM focuses more on process maturity development, Sawyer (2004) states that the P-CMM is more of a practical pursuit that supports a CMM approach to developing an individual's performance.

Maturity Level	Focus	Process areas
5 Optimizing	Continuously improve and align personal, workgroup, and organizational capability	Continuous employees' innovation, organizational performance alignment, continuous capability development.
4 Improvement	Authorized managers with controlled roles, employees abilities integration with management performance	Mentoring organizational capability, performance management, skills-based practices, empowered workgroups, and skills and abilities integration.
3 Defined	Better skills Developed employee's abilities and workgroups, and align with E-business process and objectives.	Involved workgroup development, practices and skills development, employees planning and capability analysis
2 Managed	Managers start taking responsibility for managing and developing their people.	Allocated training and development, performance management, work environment, communication and coordination, staffing.
1 Initial	Ad hoc skills, uncoordinated practices applied by employees.	

Figure 2.10 Process Areas of the People-CMM
Source: adapted from Curtis *et al.* (2009)

The P-CMM is an effective approach that supports organisations in improving their employee's skills related to e-business deployment and use, and managing practices of process development (Curtis *et al.*, 2009). The stages of P-CMM can best be described as path from provisional, uncoordinated practices to a more mature and controlled process. This continuous growth of managerial knowledge and technological skills of the employees leads to a more mature e-business performance. P-CMM includes five maturity levels representing a different level of

organizational capability for managing and developing employees. Table 2.7 describes the key P-CMM maturity stages.

Table 2.7 The key P-CMM maturity stages

STAGE	DESCRIPTION
Initial	Employees' practices performed in this maturity level are based on provisional skills without coordinated practices being applied. There are no process areas at initial level, which lead to unreliable or uniformalised structured organisations. Employees in this stage are usually formulating progressions described in the next maturity level.
Managed	Managers begin performing basic human resources management practices such as allocating job roles, managing performance, and making changes to repeatable process management. The organization starts to focus on the people in unit process and sub-process level to ensure that they are able to meet their work commitments; training is recognised as a key action in this stage. In addition, organisations start to develop people's capability to manage skills and performance. The development areas at managed level are allocation of job roles; communication and coordination skills; improvement of performance management and launching of training activities.
Defined	At this stage, the organisation classifies and develops the knowledge, skills, and process capabilities that establish the employee's abilities required to perform its business process activities. The organization develops standards of professionalism based on well-understood employees' abilities. In achieving maturity level 3, the organisation develops the management capability of their employees based on the strategic advantages of e-business capability. The process areas at maturity level 3 are skills analysis, employee planning, ability development, business development, skills-based practices, and workgroup development.
Predictable	This is the point at which an organisation's employees have capability management based on their skills-based processes, meaning that the organization can exploit the opportunities afforded by defining employees' abilities in the previous level. The organisation starts measurement and sharing practice and experience of activities. At maturity Level 4, the organization has the capability to estimate its performance and capacity for work. The process areas at maturity Level 4 are ability integration, authorised workgroups, skills-based resources, performance management, organisational capability management, and mentoring.
Optimizing	People in the organisation are focused on ongoing improvement of their capability and the organisation's employee practices, and are able to share practices with employees from similar organisations. At maturity level 5, the organization continuously improves its capability and arranges alterations for managing its employees.

Source: adapted from Curtis *et al.* (2009)

However, as discussed earlier, according to Heeks (2002) model, people of organisations (e.g. employees) are essential factors in a successful e-business deployment. Thus, based on the above discussion, organisations with a variety of skills and individual capabilities (e.g. Universities) could also adopt P-CMM for their people's skills and capability development plan. The P-CMM could be an appropriate to adopt in this research, with some adaptations to meet the specific needs for Libyan university contexts. The model and associated levels will be integrated in the stages of the estimated e-business deployment model in this study.

2.8 Research Gaps Analysis

The previous review of literature revealed a number of research gaps. While the deployment of e-business in the higher education sector has provided many opportunities for universities to improve their services, performance and achieve competitive advantages, the literature revealed a number of research gaps. For example, in developing world, it has brought about a number of challenges that organisations in the higher education sector must overcome in order to achieve effective use and deployment of e-business. Compared to e-business literature in other sectors, there is a lack of the content on e-business deployment studies and models in Libyan universities, and the development of such models have not been widely discussed. This research is the first step towards bridging the current gap and exploring why the higher education sector in Libya has been slow in deploying e-business.

There is an essential need to explore the level of e-business deployment in Libyan universities, which could help to support these universities to achieve the e-business stages they want to attain in the future. There are little interpretive research that attempt to understand and interpret how the e-business deployment in Libyan Universities can be explained. As a result, universities in Libya is struggling to formalise e-business assessment which may appear to be invaluable when they attempt to develop or change their process or services, as well as whether the maturity of their people, processes and tools can successfully deliver e-business deployment process. This research attempt to provide clarity on where these universities are and where they could go, using a specific e-business deployment model that can help them to deploy e-business based process and services, and able to allocate their current e-business resources. However, given the high failure rates of e-business deployment initiatives and the huge direct and indirect costs of such failures, there is a managerial requirement for empirically tested frameworks that enable officials to understand how best they could develop and implement e-business deployment initiatives in their organisations including people's skills and business process improvement which are significantly involved in e-business deployment processes.

However, to encourage the wider deployment of e-business, several research initiatives have been completed or are on-going. This research will provide a review of prior research work gaps in several areas. For example: the different approaches to identifying the benefits resulting from e-business implementation; identifying e-business potential and measuring e-business performance; tools to assess e-business

dimensions' capabilities and universities' readiness to benefit from e-business applications; and the strategic consideration for e-business deployment using various approaches (models or frameworks) for developing and applying e-business deployment initiatives. Each type of e-business dimension gap could require a different approach, and they may be prioritised very differently. Therefore, more research is still required to help the Universities in Libya to identify the barrier gaps, their root cause, and the solutions that can overcome them.

The research will help to indicate e-business deployment gaps, starting with current conditions of e-business, which lists the processes and characteristics universities seek to improve, targeting and focused on a specific process, depending on the university's outlined target objectives. The future design condition of e-business will outline the target situation the universities want to achieve. The research will develop a model which help universities, in particular in Libya, to plan, implement and provide successful e-business deployment initiatives, overcome barriers and avoid or minimise e-business project failures. The research also attempts to help reduce the literature gap in the field of e-business deployment in the higher education sector, and discover the possible e-business deployment solutions that can be applied to fill the gap between the current and future e-business deployment situations in universities, in particular in Libya.

2.9 Summary

Throughout this chapter, several e-business aspects were discussed. The E-business definition adopted in this research was highlighted followed by a discussion of the application of the e-business concept in organisations. The chapter reviewed the studies that emphasised e-business barriers that hinder the e-business deployment. It also reviewed the barriers to e-business deployment in the universities in particular universities in Libya. The chapter highlighted the factors, which delayed the development of e-business deployment in the universities, and how these barriers can play an important role in establishing an appropriate model for e-business deployment. Then, a number of e-business models included the Heeks model, which introduces critical e-business dimensions (Technology, Process, and People) adopted in this research. The DTI, CPIT and SOG models also reviewed to discover the technology dimension role in e-business, the CMM models emphasised the role of process maturity and identify how can be assessed. The role of people in e-business was also discussed, and the P-CMM model presented to focus on the current people's position in terms of

skills and management capabilities. These models also were discussed and shows that no longer enough just to focus on technology in e-business deployment as presented in CPIT and DTI models; it is now necessary to include various relevant aspects of organisational change progress such as business process management. Therefore, a combination of these discussed models can offer a significant focus on universities' e-business improvement. The next chapter will discuss the development of the conceptual e-business deployment model and establish the analysis tool for e-business deployment components and maturity levels in the universities in Libya. This will allow a better insight into how to create a successful e-business deployment in universities in Libya.

Chapter 3 The e-business deployment conceptual model

3.1 Introduction

Chapter 3 outlines the e-business deployment conceptual model which is developed in this research as a conceptual framework for analysis of case study findings. Section 3.2 presents the conceptual framework and discusses the main dimensions and elements of this framework. The discussion of e-business models and related dimensions in chapter two supports the development of an e-business deployment model in the context of Libyan universities. This framework will demonstrate the progression of the critical e-business change elements as a guide to understand and analyse e-business deployment levels. Section will discuss the stages of developed SCALE model and the three main e-business deployment dimensions, and show insights on how SCALE model will generate a successful e-business deployment maturity levels tool. Section 3.3 discuss the e-business development priorities which help to guide resource allocation and decisions making, and explained the implementation SCALE model to identify the factors that influencing e-business deployment among Libyan universities. Section 3.4 present SCALE model application, which describe the successful replication process that can provides scientific e-business deployment knowledge through the demonstration of the SCALE model. Finally, section 3.5 present the strategic benefit of SCALE model for planning, management, and assessment of e-business performance, which reflect the importance of prioritising and guiding e-business development decisions in university processes.

3.2 The Conceptual Framework

The stage of growth concept is recognised as creating a better understanding of the actuality of e-business in the university. As discussed in chapter two, e-business dimensions are viewed as having specific characteristics but a common location. Based on the reviewed models in chapter two (e.g. CPIT, SOG, CMM, and P-CMM) and understanding the influence of each e-business dimension on e-business deployment maturity, each of the discussed models have provided an explanation of the growth of e-business deployment from different features and views. The literature review discussed the role of these models in e-business deployment based on the essential purposes of each model. These foundations underlined the motivations to adopt these presented

models (e.g. role of technology, process, and people dimensions) in e-business deployment model development process. Thus, the current research will discover how these models can clarify steps in developing a specific model for e-business deployment and related maturity growth in Libyan universities. However, the evidence from the discussed models indicates that there are three emerging e-business deployment dimensions which have a significant influential link to adaptable stages of growth models. The dimensions that emerged were technology, process, and people (Heeks, 2002). The models showed growth of e-business at different stages and configurations at different times, which suggests that there is no agreement yet on the limited number of growth stages or how they are related. These stages concepts are illustrated in Figure 3.1.

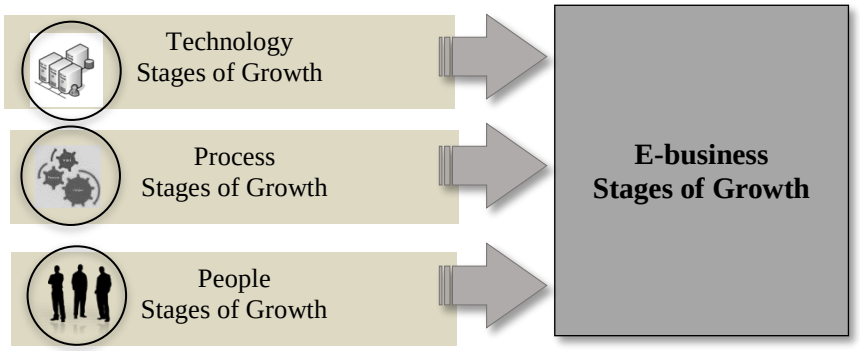


Figure 3.1 E-business deployment stages of growth
Source: adapted from Da silva *et al.* (2010).

The e-business deployment model developed in this research will aim to describe the progression of e-business deployment at the universities process level, and help to overcome e-business deployment limitations by developing specific stages as indicators to highlight the level of e-business deployment based on the three key dimensions adapted from Heeks (2002). The illustrated stage of growth of the three e-business dimensions involves the SOG model concept to show maturity levels of e-business in each dimension. These stages include a number of e-business change elements that emerged from the literature review, to guide the e-business stages progress and growth across the developed model.

3.2.1 E-business change elements

The categorisation of e-business dimension was clearly support the inclusive view of e-business deployment at UOMS. These e-business deployment dimensions directed by the number of change elements and their concepts reflect the features of e-business deployment that will be investigated. In this research, these change elements are acting

as features responsible for development of e-business deployment progression connecting with the three dimensions of e-business deployment adopted in this research (technology, process, and people). These elements and associated findings support the evaluation of the participant's views. During the research process, the main e-business deployment change elements have a significant influence on determining the possible changes on e-business deployment levels. The e-business deployment dimensions with associated development of change elements will be adopted to direct the findings presentation as well as directing the findings analysis in this research. However, the existing e-business maturity reference models indicate which change elements could be presented at each level of maturity and what are the practices to should be followed in each of them, but do not indicate how they can or should be implemented to achieve the improvement of processes within the university. The explanation of the change elements is illustrated in following Tables 3.1, 3.2, and 3.3).

Table 3.1 Change elements of technology dimension

DIMENSIONS	CHANGE ELEMENTS	DESCRIPTION
 **Technology**	Desktop application	The existence of software and other applications (e.g. MS office, excels, and use of spreadsheets).
	Hardware	Equipment and related devices used in everyday business completion that supports the flow and processing of information in the university (e.g. PCs, laptops, telephones lines, scanners, printers etc.).
	Networking	The telecommunication infrastructure used for data exchange and sharing (e.g. local network which includes cabling, hub, bridge, switch, router,).
	BIS	Business information systems either developed inside the university or outsourcing with related applications (e.g. financial and personal systems, payroll systems and related database).
	Internet	The existence of Internet availability and use of associated applications for daily process and work (e.g. communications, online transaction and email exchanges).
	Web-applications	The existence of websites and related services conducted by university process through and related web applications (e.g. online forms and integrated web based BIS).

Table 3.2 Change elements of process dimension

DIMENSIONS	CHANGE ELEMENTS	DESCRIPTION
 **Process**	Ability to perform	This is about the universities' process practice and describes the process performance ability and business environment by involving university's existing resources and structure with an associated individual's efforts. The conducted universities procedures and roles can support key process performance for day-to-day work. It is not necessary to take documented or standardised process and activities. The process assessment focuses on practices. The process focus on steps to ensure that the activities are completed in a way based on repetitive practices of what is usually implemented to launch a process ability that is currently available.
	Documentation	A number of university's process have been document and show clearly the relations between the activities, personnel, information, and the objectives in a given process workflow. The process has identical inputs, outputs, and operations in each step, and guides document for business process performance are published or distributed between process practitioners (e.g. employees and managers) that can reference to ensure agreement and understanding. A set of university's process has been defined and present how to be performed by following a structured approach. Thus, documented process now can be well understood, managed, and able to control.
	Standardisation	University process management activities are now documented, regular, and integrated into a family of standard processes for the university and guided towards the design, development, and deployment of automated processes. University's process and related sub-processes are clear and associated tasks are well defined. Processes are well categorised and understood, and are described in standards, procedures, tools, and methods and successful. Standardised processes now are used to establish a consistency across the university process and focus on establishing and improvement of set of standard processes over time according to base guidelines.

Source: prepared by the researcher based on Jang and Lee (1998); Ungan (2006)

Table 3.3 Change elements of people dimension

DIMENSIONS	CHANGE ELEMENTS	DESCRIPTION
 **People**	Technological skills	An extent of e-business applications (e.g. MS word, internet use and IS systems) familiarity rather than a depth of knowledge. These skills are likely to include the individual's knowledge in the use of e-business applications (e.g. desktop applications, BIS, networking, emails, and data exchange, etc.).
	Management skills	Concerning an individual's capacity to deal with day-to-day administrative processes, and understanding the information flow process, tasks and roles are assigned to supervisors and individuals. Shared range of teamwork skills on process performance to practical understanding of e-business performance and related and management and functions.
	Training	The availability of appropriate training programmes provided either in or outside the university. The existence of a training plan and related resources that support the achievement of e-business deployment.
	Teamwork	Employees share a common understanding of e-business-based activities and related management functions. There is ability to improve information sharing and related development of team experience. The university's employees are aware with the potential knowledge gained by team engagement; they have skills of managing groups and coordinating their roles in related processes. Existing group cooperation is supporting e-business deployment and performance among the university's process.

Source: prepared by the researcher based on Curtis *et al.* (2009)

The assessed change elements will feed the model to provide detailed level of e-business maturity stages and recommendations on how to improve university's e-business capability. It also helps to compare their e-business level with other universities, or other parts of their university. This can help universities to follow and monitor their management practices (e.g. establish documented process), which they use to perform their process activities. Understanding these elements can help the universities evaluate their e-business, allowing them to define their important required improvements and investments in e-business, as well as to assess their e-business applications (e.g. BIS, websites, etc.) process automation and associated benefits.

3.2.2 SCALE E-business deployment model development

The theoretical framework, which will be developed within this study, should realize the following requirements in relation to e-business deployment arrangement: first, to enable each university to identify its current state of maturity and capability, and taking into consideration any future requirements. Second, using the same model will enable each university to compare itself with other universities. Third, to suggest achievable improvement road maps that universities can follow to improve their levels of e-business capability and maturity, and fourth, to provide information about a university's e-business readiness to allow the Libyan government and policymakers to determine whether they are prepared to join national e-business deployment initiatives, and to construct improvement programs in preparation for future initiatives. The focus on the three Stage of Growth Model (SOG) concepts adopted in this research is illustrated on Figure 3.2.

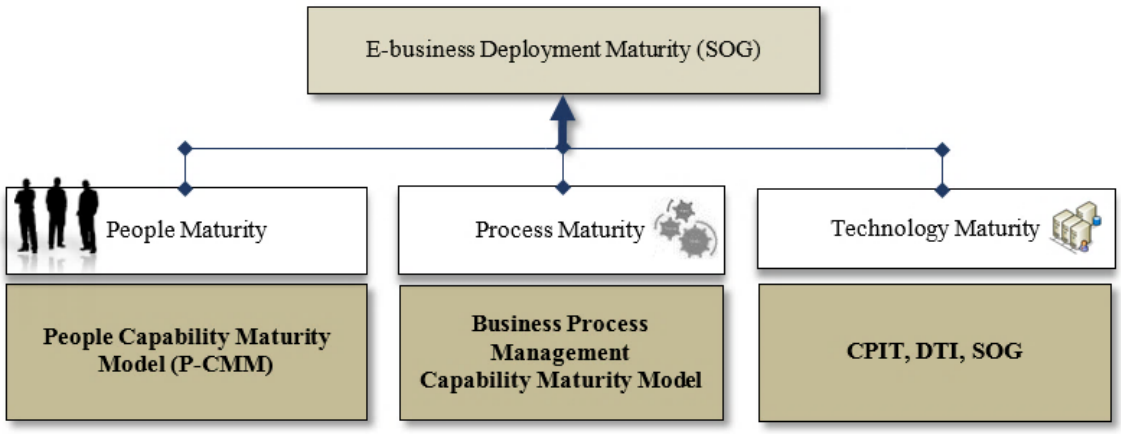


Figure 3.2 E-business deployment maturity models concepts

The SOG helps to highlight the required indicators of the three e-business deployment dimensions namely: People, Technology and Process to assess their actual capability and maturity levels. Also, exploring its impact on conduct e-business deployment activities within the university processes. Therefore, the development of these three maturity concepts generates potential e-business deployment settings in universities in Libya. The concept however, will require an appropriate adaption based on the actual e-business circumstances in the targeted universities. The multiple dimensions of maturity now show various e-business capabilities, which can be assessed and able to develop interlinked sages between these three dimensions. Once the model is implemented effectively, these stages enable effective performance for university's process such as generating interconnectivity networks, which can improve the efficiency of managerial processes. However, according to e-business definition adopted in this research (Chaffy, 2002), e-business is far more than just using technology but also will often involve a process and joins people interaction to provide different university services. Therefore, technological change should be go together with by organisational change including upgrading people capabilities (e.g. capital training to operate new technologies and applications), business communication, process redesign, and implementation, it is essential to understand how all these dimensions can interact with each other. These activities assist in coordinating the e-business maturity position and guiding resources allocation (Da Silva *et al.,* 2010).

3.2.3 SCALE model's architecture

The SCALE model -so-called because of the five stages involved – Start-Connect-Access-Leverage-Enterprise (as presented in Figure 3.3) developed for e-business assessment and evolution. The definitions of what each stage suggests and needs to move up from one stage to the next act as a guide to the comprehensive plan of e-business deployment by the exploring and assisting the actual conditions of the three e-business dimensions in the university. The SCALE model consists of/comprises five maturity levels, contributing to universities' continuous improvement capabilities, performance growth and technology enhancement. Driven from chapter two, the SCALE model is a three dimensional model namely People, Technology and Process, which delivers a progressive approach to the maturity of e-business, and capability, which in itself allows universities to define and support the process of e-business improvement.

For example, the CPIT model references ICT governance and defines how the movement progresses to a high-level of integration between ICTs; this idea could be expanded in the SCALE model to assess the capability and maturity of e-business levels and structure from the technology dimension. The assessment tools also from the CMM models help to provide maturity levels of university's processes, and understand how these processes can be deliver a roadmap for e-business improvement. The SCALE model is structured around three main e-business dimensions, for each key domain there is an incremental measurement scale based on a scores of maturity are ranging from very low to very high; and drive activities required for supporting transformation from lower stages to more advanced stages of e-business maturity. The five stages of SCALE model are illustrated in the Figure 3.3.

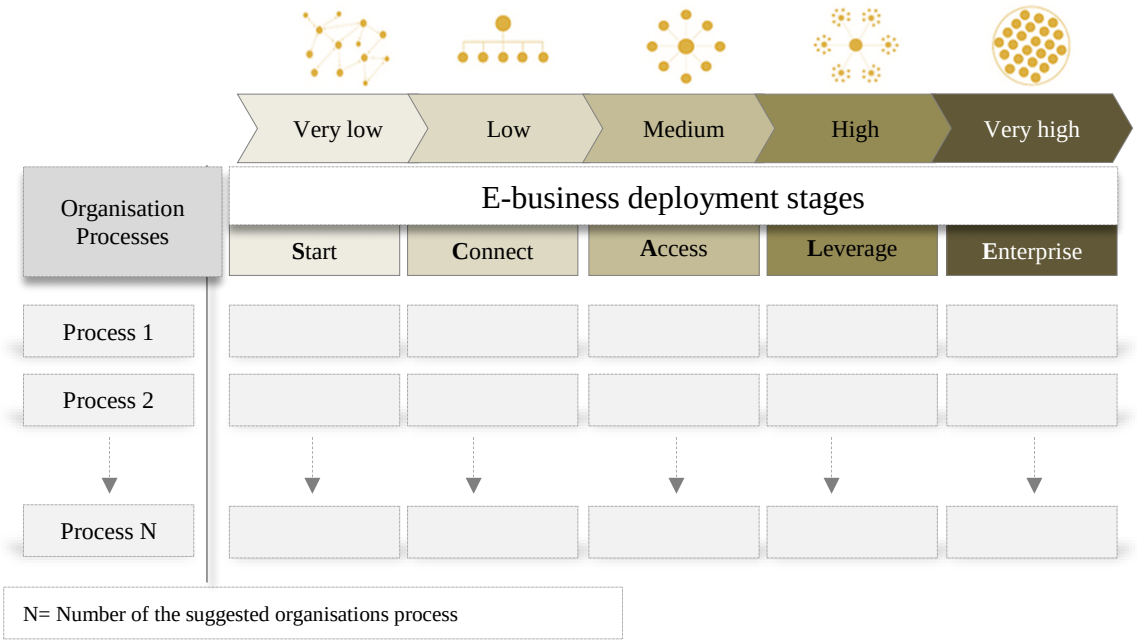


Figure 3.3 SCALE model Stages

This research study will apply SCALE model for an assessment and analysis of the context of e-business deployment in Libyan universities, along with a view from university process managers. The SCALE model is a guide to assess and improve e-business deployment activities within the universities process in Libyan universities, in order to increase e-business capability and improve related management processes. The model aims to help universities in Libya successfully address their e-business deployment issues.

Each stage of SCALE model will include a number of change elements, which represent levels of e-business deployment in each process. The SCALE model also will be applied to assess e-business deployment in Libyan universities and highlight the gap

between e-business dimensions in order to identify their impact on e-business development capabilities. Figure 3.4 explains the implementation of the SCALE model, which helps to define the required e-business development and identifies the activities which could guiding prioritisation and associated progression for e-business improvement required to support universities' resources allocation.

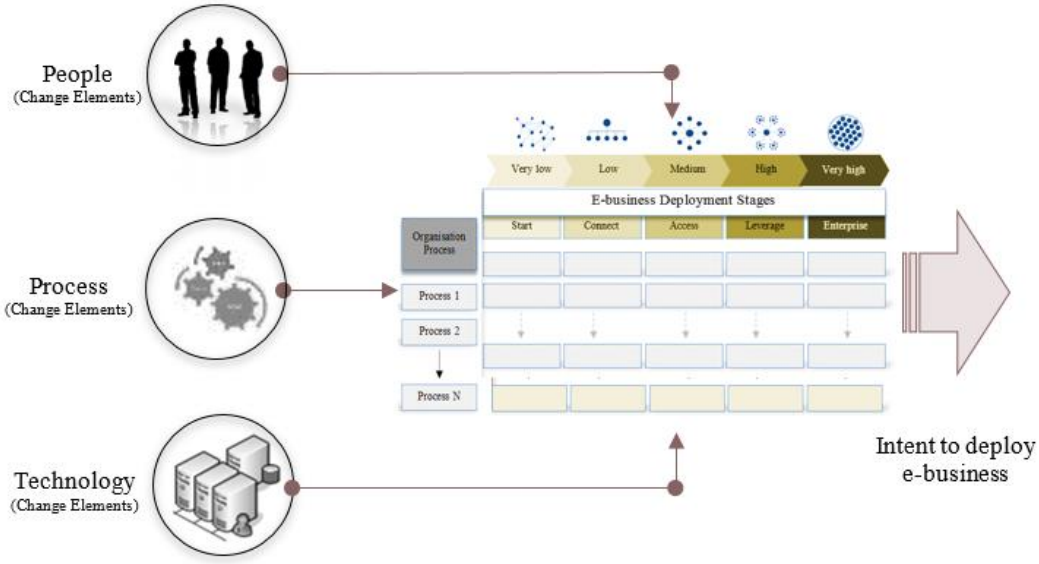


Figure 3.4 SCALE model implementation

Moreover, the development of e-business by using SCALE model is guided by the change elements in each dimension, which ensure and highlight an appropriate measure to support assessment of e-business dimensions' capacities and performance. The SCALE model should link these change elements with a clear e-business deployment implementation process, and focuses on contributing to control of the three e-business deployment dimensions, namely; people capabilities, integrating an individual university's processes, and implementing e-business tools together to achieve maximum benefits from effective e-business deployment in the universities.

3.2.4 Prioritising specific areas for e-business development

As discussed by Heeks (2002), organisations in developing countries still fail to realise the benefits of e-business. Thus, the SCALE model will avoid developing complex change elements of e-business dimensions, because this can lead to difficult description of e-business performance. The adopted change elements for the three e-business deployment dimensions (process, people, and technology) will support the analytical process and help to define the progression of the e-business deployment process. For example, the change elements of technology will indicate the level of e-business deployment from the technology view, where the change elements of the people

dimension will indicate the level of e-business deployment from the peoples and related capabilities view. These elements will help to assess the actual levels of e-business deployment and ensure what drives or prevents these e-business levels in universities' process from being unaddressed. Here the development priorities and guide resource allocation decisions can be defined.

In this research, the SCALE model will be used as theoretical framework for to identify how e-business can be deployed in the universities in Libya. Furthermore, the benefits of setting a target for the considered e-business improvements can sometimes be difficult to achieve, but it can be reduced into smaller targets to make the movements easier to manage. Thus, e-business review will be conducted by the SCALE model to simplify the evaluation of e-business levels, related process performances, and support priority decisions in e-business development for the most important university processes according to the decision-makers. By doing this, the transition from the current levels of e-business to the targeted level of each of the three e-business dimensions will help to decide which factors of e-business dimensions need greatest attention for development and which can be placed on hold. In addition, the evaluated university structure will help to decide which units will be selected for improvement. However, although little research has focused on the practical usage of e-business deployment models in analysing the progression of e-business within the university, the stages of the SCALE model will be useful in assisting and providing a cost effective roadmap of progressively mature and sophisticated e-business deployment initiatives. The SCALE model provides further insight into the value of the stages in explaining the evolution of e-business deployment levels at the university, as well as supporting the targeted levels of cost effective improvements based on the circumstances of each university. For example, the assessment of three e-business dimensions in the student's record management process could lead to prioritising development only in one of these dimensions, which will be reflected in the budget assigned to this.

3.2.5 SCALE model implementation

The perspective addressed in this research supports the overall idea of an e-business deployment management process. Figure 8.2 illustrate the SCALE model implementation process. The SCALE model is a framework, which can be used for assessing e-business capabilities and can be used to help generate e-business strategies and monitor their implementation. In general, there are significant differences in the views of Libyan universities as regards the potential use of e-business applications for

management and services purposes. Based on the SCALE model, this study proposes several solutions to reduce the level of barriers displayed by some universities in Libya to the wide deployment and use of e-business and the implementation of the e-business deployment strategy. What was somewhat surprising was that none of the universities' responses mentioned e-business as a way to avoid the limitations of their culture. This framework offers an in-depth understanding of problems in utilisation and deployment of e-business, compared with the perspectives of individuals employed at Libyan universities. Technological solutions are not likely to be a quick fix for all educational management or problems and issues, since it is generally known that technological solutions alone do not significantly improve process management in universities in Libya.

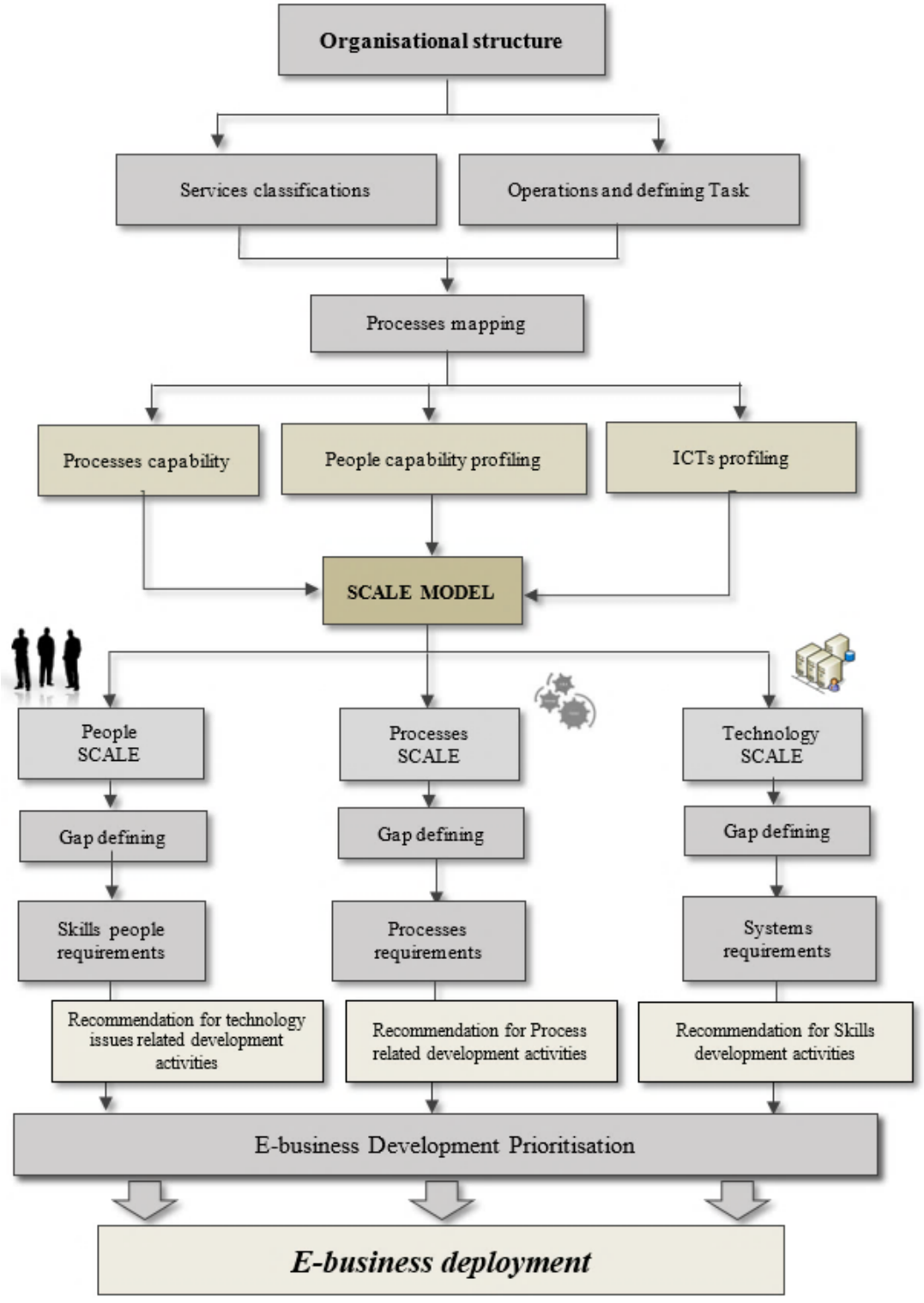


Figure 3.5 The SCALE model implementation

3.2.6 The SCALE model application

A successful replication of a SCALE model provides scientific e-business deployment knowledge because it demonstrates that the model outputs can be repeatedly generated and thus the original results were not an exceptional case. After a replication, the gained

knowledge and gathered data can be used by the model replicator as a tool to improve their research agenda (Yin, 2015). However, in addition to these benefits, a SCALE model replication can also aid the process of model validation, and in developing a shared understanding of modelling. Model validation is the determination of whether the implemented model agrees to and explains some phenomenon in the real world. During the model replication process, if differences between the original model and the replicated model are discovered, it may be the model was not correctly implemented. However, more details on benefits of model replication and related validation issues will be discussed in chapter four (research methodology).

3.3 Summary

This chapter has presented the development of the SCALE model based on the e-business models and the various related dimensions (e.g. technology, process, and people) found in the literature. Based on these dimensions, the SCALE model emerged focusing on e-business maturity and deployment from different perspectives: Technology, Process and People dimensions. Built on these e-business models and related dimensions, this section discusses the origin of e-business deployment models development and the potential benefits You could provide more specific examples throughout of engaging in e-business deployment for universities in Libya. This chapter reviewed the development of the elements of the maturity concept developed for this research that has led to the SCALE model development in universities and included the contributions towards an understanding of the change elements and related implementation processes. Later, a conceptual framework was developed guiding to address the gap between the differing stages that technology, process, and people. The challenges previously outlined can be surmounted through increased and improved efficiency and effectiveness combined with innovative applications of e-business, leading to more strategically oriented approaches for planning and management, whilst there are multi-dimensional aspects that could be addressed. Finally, the SCALE model and e-business dimensions related to operational levels and end-users were discussed. Assessment of e-business performance reflects the importance of prioritising e-business development and is helpful in guiding resource allocation decisions in university processes. The next chapter addresses the methodology used in this research.

Chapter 4 **Research Methodology**

4.1 Introduction

This chapter introduces the research methodology and concepts of methods adopted in this research to reveal how data were collected, what analysis was performed and how the model was developed. The epistemological and ontological positions of the research paradigm are provided as well as some of the ethical considerations required for qualitative research. The chapter considers the research design and the nature of primary and secondary data collection, which consisted of a pilot study, questionnaires and in-depth semi-structured interviews. The chapter will review the qualitative/interpretative research paradigm conducted in this research to explore the deployment of e-business and associated perspectives in a number of case study Libyan universities. The chapter also includes a description of how the researcher conducted the questionnaire and interview to for data collection and results analyses. The method of analysis for the qualitative data and reasons for the case-studies selection will be given, along with the choice for research methods as dictated by the thesis questions/ objectives. This chapter concludes by explaining the analysis approach for the research empirical data.

4.2 Research Philosophy

Saunders *et al.* (2011) stated that researchers could identify the research methodological approach to be followed by assessing the knowledge claims brought to study. The main objective of any research is the development and creation of new knowledge based on data collection and analysis along with careful observation (Yin, 2015). Hence the knowledge developed is usually new knowledge in a particular field based on what exists and what is investigated. Research philosophies that are adopted in a research procedure aims to investigate the reality and the nature of the knowledge that has been developed in a logical manner. This knowledge clarified by Creswell (2013) who simplified philosophical concerns as the nature of that knowledge (what it is, ontology) and the development of knowledge (how we know it, epistemology). Saunders (2011) stated that ontology and epistemology were two major ways of thinking about research philosophies. Other researchers also emphasised the importance of ontological and epistemological considerations in research. As this point, it is necessary to better define ontology and epistemology. **Ontology** is about the theory of entities and concerned with the assumptions in conceptual reality and the question of existence apart from specific objects and events (Fellows and Liu, 2015). Traditionally, ontology deals with question

such as “what is the nature of being” (Saunders, 2011). **Epistemology** is concerned with the question of what is (or should be) regarded as acceptable knowledge in a discipline (Walliman, 2006). It is about the the study of knowledge and is concerned with questions related to knowledge conditions or sources.

The particular central issue in this context is the question of whether the social world can and should be studied, Thus, one of the key aims of this research is to discover and evaluate the knowledge, opinions and understanding of e-business deployment issues in universities in Libya. Thus, in this research the philosophy is based on an epistemological position that depends on the understanding of the day to day process that takes place in a particular university as the opportunity for e-business deployment is being considered. In this case, understanding processes involves getting inside the world of those generating it (Yin, 2013). The day-to-day process practices and the language used to describe them will support understanding of the factors that affect e-business deployment in the universities.

4.3 Research Approach

Broadly speaking, a research approach can be classified as quantitative, qualitative, or a combination of the two (Silverman, 2010). Research approach can provide the overall direction for the research, including the processes by which the research is conducted. Saunders *et al.* (2009) present the research process in the form of an “onion” (see Figure 4.1), in which the methodological aspects with regard to the research problem lie in the center and thus several layers have to be “peeled away” before coming to a central position. In this research, these layers are an important aspect in determining the research approach for a particular study. Research onion developed by (Saunders *et al.*, 2009) supports the argument of the research strategy and its application that could be adopted in this particular research study. Greater analysis of the research strategy elements given above will be discussed in the following sections.

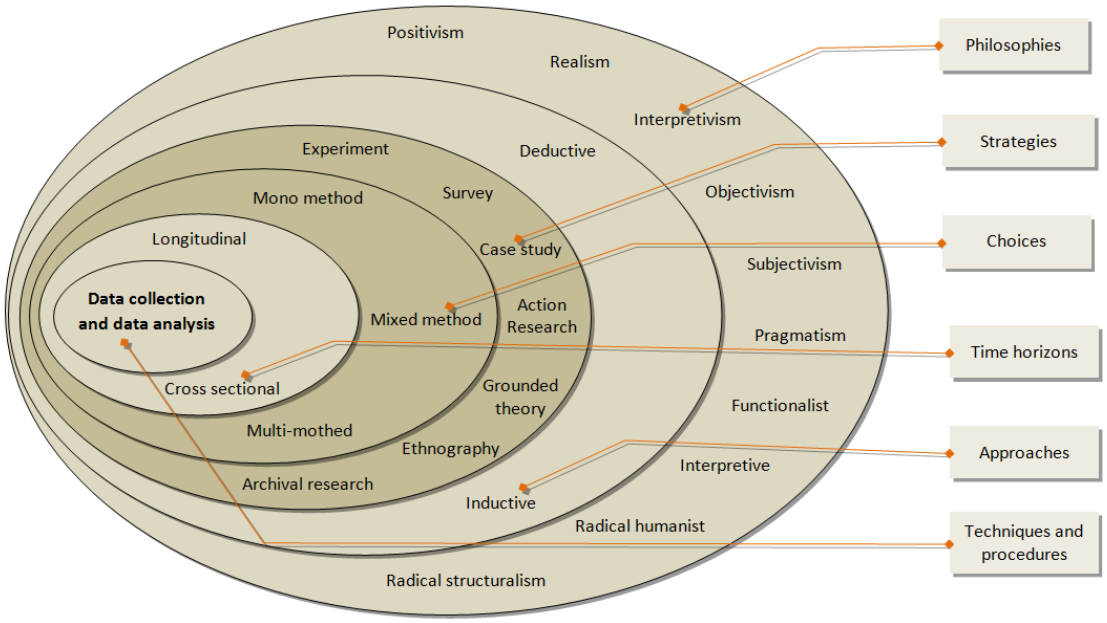


Figure 4.1 The Research Process Onion

Source: Saunders *et al.* (2009, p.108)

(The elements highlighted by orange lines are relate to this study)

However, variances understanding of reality, and understanding what is the knowledge, has led to the establishment of two classical research philosophy schools which are: Positivists and Interpretivists (Creswell, 2013). **Positivism** philosophy guided by a hypothesis to develop or use of an existing theory; the hypothesis is then tested and established leading to the development of a new theory based on research (Venkatesh *et al.*, 2013). Quantitative method is normally applied for the positivism study. **Interpretivism** philosophy research identifies and understands human experience in context-specific settings using the qualitative and naturalist ideas. Interpretivist tries to understand and explain the observable facts (Lukka, 2014). A brief comparison between positivism and interpretivism can be seen in the following Table4.1.

Table 4.1 Positivism Vs Interpretivism

Approaches	Concepts	Methods
Positivism	Social Structure	Quantitative
	Social facts	Hypothesis
Interpretivism (Phenomenological)	Social Construction	Qualitative
	Meanings	Hypothesis generation

Source: Saunders *et al. (*2009, p. 119)

Saunders *et al.* (2009) argue that the research positivism epistemological position is a position that adopts the philosophical standpoint of natural sciences to the study of social reality. Researchers using interpretivism undertake to describe, interpret, and

understand a situation from the perspective of the scientist (Yin, 2011). There are a number of philosophical rules associated with interpretivist research, for example, some forms of interpretivist research indirectly assume that social action is significant and that we discover meaning rather than negotiate or construct it (Yin, 2011).

In this research, the observable fact is the deployment of e-business in the public universities in Libya. Thus, the research adopted interpretive philosophy as it tries to explain the observable facts of e-business deployment in context specific situations. The context specific situation is the public universities in Libya (e.g. UOMS, UOST and UOSB). This research work uses more of the philosophy of interpretivism.

4.3.1 Inductive and deductive research

4.3.1.1 Deductive research

Deductive research refers to the logic of drawing conclusions based on given facts (Yin, 2015, p. 93). Hence, this type of method suggests the collection of a great number of facts, from which conclusions can be drawn. In other words, a number of given facts do not need to be proven, and the conclusion should not be thought of as really new, but only presented in a new form which is more or less inherent in the already given information. Moreover, the deductive research starts by the development of a theory and hypothesis to finish with the design of a research strategy to test the hypothesis. The focus of a deductive approach to research is to explain causal relationships between variables that call for the collection of quantitative data and statistical tools for relationship testing.

4.3.1.2 Inductive research

Inductive research takes advantage of observation and data collection to answer research questions in order to establish rules and theories (Yin, 2015, p. 21). In an inductive approach, the data are collected before being analyses in order to develop a theory. Inductive research is usually undertaken to gain an understanding of the meanings or perceptions that human have about the phenomena studied. Therefore, as the current research is based on data that is collected through qualitative methods of data collection, the research study adopted inductive strategy approach for arrangement of data collected using the questionnaires and interviews. Hence the objects of this research aim to understand and analysis the deployment of e-business and related factors to develop an appropriate model for e-business deployment in Libyan universities. The overall objective of the study cannot be satisfactorily fulfilled through

quantitative research, since it is rigid. This research adopts a qualitative and interpretive approach since it needs flexibility. The researcher has undertaken a further case study with multi cases of three universities has studied the current process, e-business progression, applications, and current e-business positions and potential plans with regard to e-business deployment in these universities. More details on case study will be discussed in section 4.6.

However, as it has been identified that this research study will apply an inductive approach and qualitative interpretivist philosophy, based on the research strategy onion, the research will follow case study strategy and applying multi method tools for data collection. As the data collection was conducted only once, the time horizon is a cross-sectional. For data collection (section 4.7), the study uses multiple-sources of evidence which include an open questions questionnaire, open semi-structured interviews (Myers and Newman, 2007) conducted with different key process managers in the universities cases who managing and control the day to day process and related activities, and document analysis (e.g. university annual reports and BIS systems reports). Table 4.2 displays the main characteristics of the quantitative and qualitative approaches.

Table 4.2 Research approaches characteristics

	Quantitative Approach	Qualitative Approach
Focus of Research	**Scientific and quantity**	Native setting (field focused) and quality
Role of Investigator	Researcher as a subjective observer	Researcher as a key instrument of data collection
Research Design	Predetermined, structured	Flexible, emergent
Sample	Large, representative	Small, theoretical
Data Collection	Inanimate instruments (tests, questionnaires, surveys, computers)	Researcher as primary instrument, interviews, observations
Mode of Analysis	Deductive data analysis	Inductive data analysis
Findings	Precise, but narrow	Comprehensive and holistic

Source: adapted from Yin (2015)

4.4 Qualitative research design

Yin (2009) argues qualitative research is used when the subject matter needs to be more clearly understood or defined before it can be measured, such as newly developing social phenomena. The qualitative research offers deeper understanding of a phenomenon that maybe set within the participants' personal knowledge or understanding of themselves. When the subject of study is containing multipart elements not favorable to quantitative methods then qualitative research is appropriate (Yin, 2011). For example, this is helpful to collect information from individuals or groups that have particular role in society. According to Ritchie *et al.*, (2013) the

characteristic of qualitative methods include samples that are small in size and purposively selected on the basis of most important criteria, and data collection methods usually engage close contact between the researcher and the participants allow for developing issues to be explored. In addition, the data features required for answering the research questions need to be very detailed information, rich and general. Thus, the data drives to full description and create recognize patterns analysis of e-business deployment or develop explanations (Ritchie and Lewis, 2013).

According to the aims of this research, and the focus on providing an in-depth and interpreted understanding of the e-business deployment by interacting with participants to know their capabilities and perspectives about e-business in the selected universities. The qualitative study was adopted. The study will explore e-business deployment issues in local universities in Libya, its involve serval aspect and dominions which need in depth investigation and data collection form people involving n the everyday work conducted by the university process. Thus, qualitative research is an appropriate approach for the current study, which can provide this interaction and the sample of the selected universities, are small. Therefore, a qualitative research was adopted and was judged by its validity in its application and interpretation. More details on validity will be discussed in the research validity section 4.9.

4.5 The research methodology in the study

In the adoption of a particular research methodology, this study primarily uses the qualitative research methods. The gathering of the data is qualitative, as is the analysis of the research. The data collection was conducted in Libya and the three universities considered for this study are (UOMS, UOST, and UOSB) as these are the only universities that offered to participate in the research work during the pilot study. In order to investigate the deployment of e-business in Libyan based universities, questionnaires were administered on, and several one-to-one interviews were conducted as demanded by the progress in the research work. More details on case study design have been followed in this research will be presented in section 4.6.

4.6 Case studies

Collis & Hussey (2003) consider the case study as an ideal methodology when a holistic, in-depth investigation is needed and when there is a lack of knowledge. Based on the discussions above, it is clear that the case study method is an appropriate method to generate relevant information from the chosen universities. The rationale behind

using this method for gathering data is that it enables the researcher to take an in-depth look into the processes, resources, policies and the major factors and tasks that are involved in studying the deployed e-business with relevant use and policies, which may involve of differences or similarities between the selected universities being studied. The theoretical view and the proven methods by which e-business deployment are understood by each university in the context of its own resources, dimensions, geographic considerations, barriers and several other influences. In this scenario, the case-study method of data collection is seen to be most relevant to the overall objective of the research study. However, according to O'Connor (2012), the main key categories of case studies are exploratory, descriptive and explanatory. The exploratory study labels questions or hypotheses used in a subsequent study to help the researcher understand the problem; the descriptive study provides a detailed analysis of a specific trend and its context, including discussions of the monitored conditions. The explanatory study seeks to explain why situations happened or particular results are established.

However, given details, data and information required for analysis, the primary research of each university has been carried out by the use of the data collection tools of process mapping and system profiling, which have been discussed in terms of their meanings, relevance, data generation and contribution to the overall objectives in Chapter 2. In this background, this study focuses on the selection, usage, and assessment of e-business dimensions in the case study universities aims to understand the phenomena studied following qualitative method, large amount of data and information are required to establish in depth understanding and analysis on e-business deployment studied. Thus, for this study, an exploratory study has been used to define research questions and to gain deeper knowledge about the chosen research area and its existing problems.

4.6.1 Reasons for adopting the case study methodology

This research used the case study method because that method is the best suited to exploring and understanding the deployment of e-business and their impact on universities in Libya. This method allowed the researcher to investigate the pattern of data of e-business from university documents, which offered detailed information about various aspects of the use and deployment of e-business, both current and past. Using a case study also allowed the researcher to discover managerial performance in the real-life context in which current university process and events follow. In this way, the researcher was able to ask 'how' and 'why' questions about the purposes of a social

phenomenon in e-business process without interfering or controlling in its performance. Such a method is well supported by other conducted research, it is the most widely used qualitative research method in IS research (Sharkasi and Wynn, 2011; Akeel et al., 2013; Olayinka *et al.*, 2016; Bakeer and Wynn, 2014), it is well suited for understanding the interactions between IT-related innovations and managerial contexts.

Yin (2011) supports the use of a single case study because it provides an appropriate methodology for studying the phenomenon in the context in which it follows. Case study research offers a unique, revelatory or critical case in support of or against a well-formulated theory. Therefore, case study methodology is the most appropriate when a complete, in-depth description and investigation are necessary. Thus, the case study in this research is conducted to address the purpose of explanation: what is to be explained and the criteria by which the explanation will be judged successful. Hence, the selection of the case study was the most suitable, and this method was adopted for the following reasons:

- The subject under investigation was a public universities use e-business applications;
- There was a high possibility that a rich process, structures, and decision-making that were to be a part of the research questions would be present;
- The phenomenon was broad and complex;
- Data in this case study method was collected by multiple means including interviews, document analysis and questionnaires;
- The existing body of knowledge was insufficient to document underlying questions;
- An in-depth investigation was required.

Therefore, as our research focuses on e-business viewpoints in universities and the focus of research has shifted from technical issues to managerial processes and interactions between technology, process and people, the case study methodology is particularly well suited in this situation. The case study approach enabled the researchers to explore the queries in the e-business deployment context (technology, process, people and relational elements), the models used, e-business characteristics and maturity measurements, all of which provide valuable and critical insights. The approach was particularly relevant to this research as it allowed for understanding developing relationships with many e-business views as well as providing a good

understanding of essential e-business dimensions' relationships to e-business deployment outcomes in the universities in Libya.

The developed model in this study (SCALE model) is used for assessing and evaluating the e-business in the case study universities based on the gathered data and information during this study. The model may also be useful for Libyan organisations in industries other than the higher education sector.

4.6.2 Multiple cases study

Multiple cases are used for more than one case and the context of research within them. Yin (2012) argue that using multi cases can support the in-depth understanding of the phenomena studied by providing large data and drive to rich information analysis of each setting as a single element or across multiple ones. Thus, observing similarities or differences in these cases or contexts is considered a significant aim of the research. Thus, this research is following a multiple case study approach to provide in-depth understanding of e-business deployment and associated influences in universities in Libya (Yin, 2008) as illustrated in Figure 4.2. The declaration of the research methodology based on multiple cases study design tactic illustrated in Figure 4.2 was chosen because multiple-case study process design can support all case studies with a set of questions to aid in the preparation of the interview and as a guide for any following discussion (Yin, 2009).

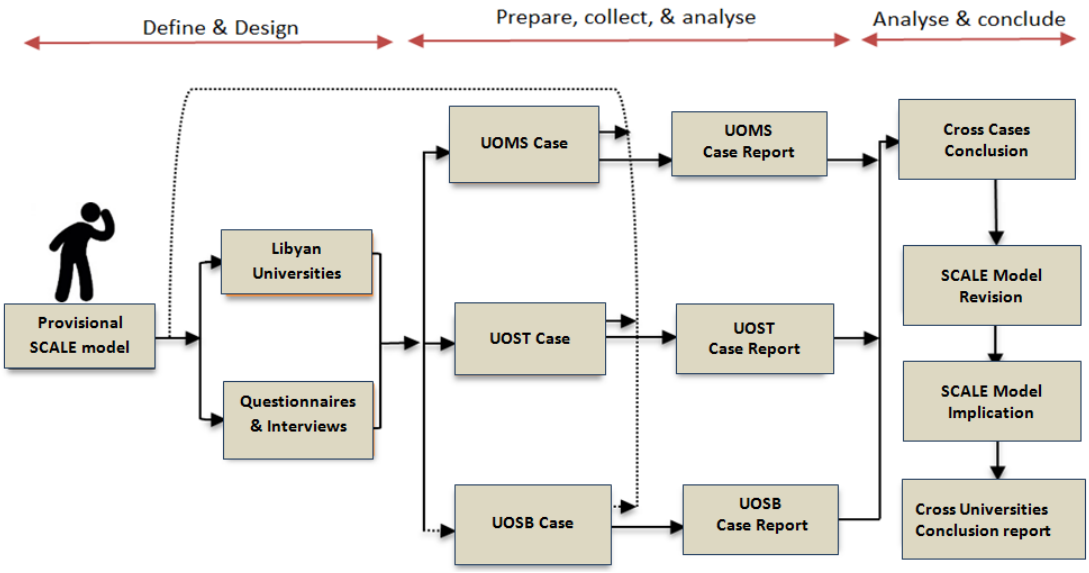


Figure 4.2 The declaration of the research methodology based on Yin's multiple-case study design followed in this research

UOMS, UOST and **UOSB** are the selected Universities cases

SCALE model is referring to the stages: Start Connect Access Leverage Enterprise

Source: Yin (2009, p. 57)

However, the researcher applied some flexibility in the way the survey was undertaken to allow for more interactions that could reveal more about the existing circumstances in the universities (Fletcher *et al.,* 2015). the research model developed in this inquiry identified five different stages in e-business deployment. Within each of the five stages of the deployment process, multiple cases of e-business formation were required in order to capture the dissimilarity of the impact of each factor, which helps to produce analytically generalisable results; this process is known as literal replication (Yin 2009). This approach also delivered a deeper understanding of the issues facing universities by being closer to the participants, and allowing interaction by conducting interviews and using a questionnaire survey to contribute to data collection. The university key processes senior managers (e.g. IT manager, human resources manager and finance manager) are key participants.

4.6.3 Background of the case study universities

A rigorous judging method was chosen as a way of selecting universities to participate. Initially, a list of details of intended universities was received by email. However, due to the geographical constraints in Libya, only universities from the North-West and South of Libyan were considered. These universities were contacted and agreed to participate in the data collection. Ultimately, three universities were selected to take part in this research; these are the UOMS, UOSB, and UOST. Questionnaires and case study interviews were carried out between December 2014 and February 2015. The description of each case study of the participating universities is presented in Table 4.2.

Table 4.3 Overview of case study universities

University CODE	Established	Region	Students number	Academic staff	Non – academic employees
UOMS	1983	North-East	16206	1002	416
UOSB	1983	South	19224	665	380
UOST	1989	Middle-North	10811	561	313

4.7 Data collection

Several sources were used to collect and develop the data for analysing the research literature review; these included the University of Gloucestershire library, EBSCO library, Google search engine. A search of the library's database was performed to find relevant scientific articles, with keywords such as e-business, deployment, barriers, and strategy. The data collection was a process of selecting, focusing, simplifying,

abstracting, and transforming the data into researcher-written notes or records. In this research study, the data collected was organised by leading key process managers who participate in the study. The data collection was carried out through questionnaires (see appendix 4), interviews followed by telephone interviews to deliver a clear foundation for further analysis. The use of multiple data collection methods known as triangulation (Yin, 2012) is considered useful when using case studies. Yin (2015) argues that using various sources of empirical materials provided the rigor and range of understanding to fully address the research questions in the case study. The methods used in this research for gathering information are questionnaires, open and in-depth semi-structured interviews, and documents analysis. The primary data source was open questionnaires and semi-structured interviews. Interview quotes, due their richness and description, are used in this research to highlight case features. This section outlines the methods adopted for this research. The following section will discuss the data collection tools adopted in this research.

4.7.1 Sample selection procedures

In every research design, the justification for choosing the sample and its size is important. The reliability of a sample depends on how well it represents the features of the complete research population; these samples are considered representative of the population if the analyses made using the researcher's sampling units produce results similar to those that would be obtained had the researcher analyses the entire population. In this section, a sample methodology and the size of population of a public universities case study are identified and justified. The characteristics of the sample are also provided. Thus, the characteristics of the key participants can be summarised as follows:

- They are the core source for university process knowledge and practices;
- They are at a high level of decision-making concerning e-business and related activities;
- They are the managers who are responsible for clarifying the direction of process and their e-business deployment priority. They are sometimes the end-users of the e-business systems being implemented; and

In the public Libyan universities case study, the sample includes of 6 key process managers at a high level of process management who responsible to answer the questionnaires and could participate later in the interview sessions. Yin (2015) states

that the logic and power of purposeful sampling lies in selecting information-rich cases from which one can learn a great deal about studied issues that are important to the drive of the research's in-depth study. The research study therefore involves a small sample of key process managers and number of IT professionals who held the knowledge on e-business to provide relevant information needed. However, a sample derived through such sampling methods is called a purposive or judgment sample. This means that from the key participants sample contributing in this research, only those who clearly displayed interest in problem-solving issues and were likely to provide relevant rich data for extending emergent theory were chosen. Purposeful sampling is ideal for exploratory, qualitative and case-based research. The selected rich information helps in addressing the key research questions.

4.7.2 The questionnaire

Questionnaires have previously been used to help develop measurement tools and provide guidelines in research across a wide variety of research domains (Heeks, 2002). According to Yin (2013), a questionnaire consists of a number of questions in relation to the subject of the research, whereby answers are expected to be provided to the questions for the research to achieve its aims and objectives. The questions should always be clear and easy to understand and should be included on one form. Yin explains that the questionnaire can be presented to participants in one of four ways:

1. by mail in which case an interview is necessary after completion
2. by telephone
3. by hand
4. by the internet, either through a website particularly designed for this purpose or e-mailed.

The primary research conducted for this study consists of questionnaires distributed to the three local universities. The purpose of developed questionnaire is to examine the current e-business undertaken by universities in Libya and assess relevant key dimensions with associated change elements that were identified in the literature review for more in-depth case study analysis. In addition to collect data on the deployment of e-business in the universities cases, the current process policy and other related information. The subjects included in the questionnaires will be categorised as follows:

- **University technology**: To explore the deployment and use of information systems and adopted strategies. To explore the university's information system

implementation and to find out the different types of BIS systems usages and deployed in the university and how they are supporting process activities.

- **University people**: To explore the deployment the technological and managerial skills and capabilities of people in the university in relation to e-business.
- **University processes**: To explore the university's main business processes as well as sub-process.
- **Problems and Challenges**: To address problems, issues and challenges that the university might have with their currently deployed e-business and strategies implemented.

The data collated by questionnaires (includes open questions) aims to support development of the conceptual e-business deployment model for universities in Libya. Thus, based the research questions and in the light of prior studies (e.g. the benchmarking study of DTI, 2001) the questionnaires were developed. The DTI benchmarking instrument uses a DTI model to analyses the growth of an organisations whilst also analysing its performance and management, then assenting on an improvement strategy (DTI, 2001). This makes it particularly relevant and useful because the research also was adopted stage of growth models at the top level process mapping. It could also be adapted to go beyond the standard narrow definition of e-business to include all information system deployment at process level. The questionnaire was first designed in English, and then translated into Arabic, which is the language spoken and written in Libya. Before the final copy of the questionnaire, the researcher's supervisors in the University of Gloucestershire reviewed drafts.

4.7.3 Interviews

One of the most important techniques of data collection is the interview method (Yin, 2011). It is an interaction involving the interviewer and the interviewee, the purpose of which is to obtain valid and reliable information. Interviews may take several forms: open-ended, structured and unstructured, focus group, in-depth, mail and phone (Anderson and Holloway, 2014). In this research case study, semi-structured, open and in-depth interviews with phone interview follow-up were conducted with eight key process mangers from different levels of universities process. In the semi-structured interview, the researcher participated with interviewees in their natural setting such as in their local office (e.g. in UOMS case). A semi-structured interview was developed specifically as one of the instruments designed for this qualitative research. It was a combination of a personal interview and reasonably wide comments of real e-business

deployment situations in the university case studied. The unstructured interview method was useful for providing an oral history, where one or more participants were asked to report on the daily process and events, and how these processes are progressed.

The interviews were very advantageous. They were useful in obtaining a large amount of data within a reasonable time especially guiding to a telephone conversation where follow up interviews and extended information was provided (e.g. in data collected from UOST and UOSB cases). Using different informers allowed for a wide variety of information to be gained from a number of e-business deployment dimensions and related themes (e.g. barriers and strategy). There was also the opportunity for direct follow-up questions by phone calls for extended necessary explanation. This in turn led to the in-depth interviews that allowed participants to answer with their opinions and experiences in their own words. Finally, conducting interviews gave the researcher greater control over the interviewing conditions, as the respondents received direct questions related to the e-business deployment topic and related research questions, which provide too much information. Interview questions were designed, corrected and developed throughout the different levels and progress of study, based on the research questions and conceptual framework.

The length of interviews ranged from 40 minutes to 1 hour for each conducted interview with selected participants. IN UOMS case, the in-depth interviews were taken in the form of an individual interview (face-to-face) and data was gathered through written notes and audio recordings, which this researcher believes provides for information that is more valid. Where in the case of UOST and UOSB the in-depth interviews were taken in the form of phone conversation interviews and data was gathered through recording the phone conversation and later downloaded in the computer for audio transcripts and quotations editing. The researcher did not face any difficulty in finding participants to take place in the study. In terms of the interviews, the targeted participants were able to appreciate in the interview and give their experience about the studied topic in their universities. This is largely due to assistance from the key managers in the studied universities cases, which provided all the necessary materials and contacts as well as the facilities and time required to conduct this research. In this research, the identity of the interviewees will be established and the name of the interviewed universities would be coded. In the telephone interview, the sessions will be recorded on a digital voice-recording device.

4.8 Data analysis

The data analysis was conducted through examining three different university case studies, considering plans for e-business deployment. A qualitative analysis of the empirical data was performed in relation to theoretical SCALE model to find matches and alterations. A summary of results was made in relation to the research questions. The analysis of the data collected from the three case studies was undertaken manually by using spreadsheets. Principally, the analysis process was applied to the fundamental data developed through the responses to the questionnaires followed by personal interviews with the participants in the study, and from documents and constructed knowledge made during meetings. The research findings analysis method is founded on the summarized progress illustrated in Figure 4.3.

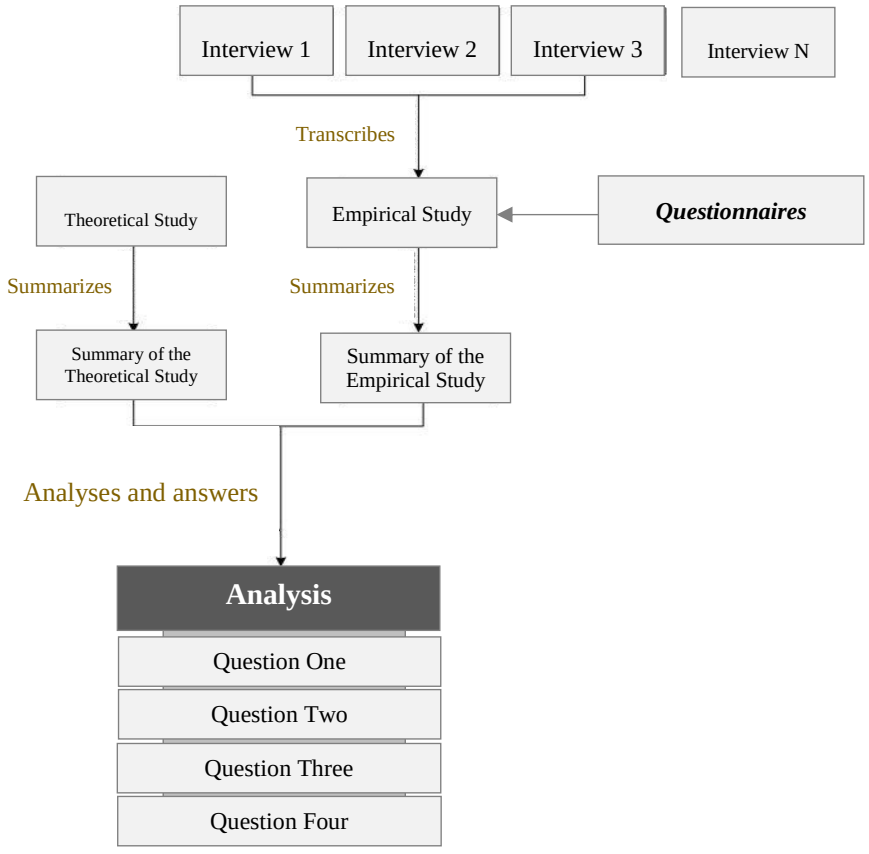


Figure 4.3 The applied analysis method

The aim of collecting and analysing data were to discover and understand the extent e-business deployment in universities in Libya; the role of e-business deployment and its related factors in improving university's e-business development, and the important of influences that can support e-business deployment. The interviewers believe is important to simply assess existing data and support e-business deployment building on current knowledge. Consequently, the text would need to be subjected to an in-depth

analysis to derive understanding and meaning of each university's interpretation of e-business deployment.

4.9 Research Validation

Validation of the research follows throughout a research process, from the time of designing research questions to presenting the research analysis and findings. To understand the meaning of validity in qualitative research, four applicable paradigms are used as criteria for judging the quality of this qualitative research design (Yin, 2015). The paradigms are construct validity, internal validity, external validity and reliability, and are addressed in some detail in the following subsection. Construct validity is described as a way to establish an operational set of measures for the concepts being studied so that objective judgments are used to collect the data (Yin 2011). In this research, the researcher has developed a specific types of e-business dimensions (technology, process, and people) and associated changes elements that are to be studied and demonstrate that the selected assessment of these elements do indeed reflect the specific types of e-business deployment levels and change that have been taken. The construct validity can be improved by using multiple sources of evidence (triangulation); establishing a chain of evidence and having the key informants review the draft case study report (Yin, 2003).

However, to strengthen the internal validity (credibility of findings) of this research, the triangulation evidences was followed to increase the validity of evaluation and research findings, Yin (2009) consider triangulation as an important methodological issue in qualitative approaches to control bias. In this research, the triangulation method was used as supported by (Yin, 2003) and involves using multiple methods to collect sources of data (Questionnaires, interview, and documents analysis). The researcher believes that it is important to provide context that satisfies the reader with the results and description presented in a coherent and reliable manner. Moreover, the words and ideas used by the participants must truly be seen as theirs through faithful interpretation. Thus, quotes from interviews have been used to present their exact words, and the participants were encouraged to re-listen to their answers and read the notes made at the time of interview (Taylor *et al.,* 2009). In addition, participant selection can have added to the study's validity, as the people questioned were the most knowledgeable people in terms of e-business in their process and describing their own experience toward e-business deployment.

Researchers use the concept of external validity (generalisability) to refer to whether a study's findings can be generalised beyond the study, that is, the external validity of applying results to new cases settings, the analysis relies on analytical generalisation and SCAEL model must be supported and tested through replications of the findings (Yin, 2015). As a result, if the replicated SCALE model produces different outputs than the original model then that raises questions as to which outputs linked more to real world data. If the replicated model's outputs are closer to the real world data that suggests that, the replicated model is more valid than the original model. Moreover, SCALE model replication was progressed in this research and forces the researcher to examine the validity of the SCALE model by checking the original mapping between the existence e-business environment in the universities and the conceptual model.

The researcher uses a case study of selected local public universities in Libya in its usual setting as the source of data. The researcher attempts to describe and interpret e-business situation as they are. Thus, the researcher acts as the human instrument of data collection, uses inductive data, and describes the features of each setting (e.g. the universities, participants, and research procedures) to gain a full picture of the case study undertaken, not only from the researcher's perspective but also from the reader's perspective. The researcher uses a multiple case supported by questionnaires, interviews, notes and live comments of participants, which aim to discover e-business deployment. Such methods describe an interpretive character, providing meaningful credibility to the research. In addition, considerations have been taken into account to improve the overall generalisability Thus SCALE model applications were involved in the application of the SCALE model in three cases (UOMS, UOST, and UOSB) for findings replication. Replication forces the model replicator to examine the validity of the model by re-evaluating the original mapping between the real world and the conceptual model, since the replicator must eventually re-implement those same concepts.

4.10 Summary

This chapter critically analyses the research methods that are adopted for use in this research work. The chosen research strategy to accomplish the aims and objectives of this research work was discussed and presented. It presents the concept of case study in research. In addition, it discusses questionnaires and interviews as tools for gathering data in this study. The methods of data collection were also discussed. Thereafter, the chapter discussed the qualitative research, in which a methodological approach was

adopted to guide this research. Based on the research questions and nature of the undertaken study, reasons for selecting the research design and the chosen case study were provided. The three selected local public universities in Libya provided an opportunity to better understand the e-business deployment views in public universities in Libya, and the findings could be applied and used to guide other higher education institutions or organisations. Units of analysis were adopted according to the research questions addressed, research context and research design. Hence, all the core units were included: e-business deployment dimensions and related components (e.g. change elements and barriers). Various techniques used to collect data: documents analysis, questionnaires and semi-structured interviews supplied rich information to understand e-business deployment initiatives. As with this research, relevant validity and ethical issues were also addressed. The chapter discusses the ethical considerations on what ought to be done and what ought not to be done during the research work. The limitations of the adopted methodology were briefly discussed, indicating further opportunities for using multi-case methodology in the future. The following chapter – Chapter Five – presents the empirical survey findings of this study. The fifth chapter also provides a clearer view of the e-business dimensions and barriers to e-business deployment and other relevant information that is relevant to the investigation of the deployed e-business and associated guidelines in the case study universities.

Chapter 5 The Case Study Results

5.1 Introduction

This chapter presented a description of the cases which represent the e-business deployment within the Libyan universities and implemented by UOMS university in Libya. The objective of this description is to understand the main underlying e-business factors which affect the development and implementation of e-business in the UOMS. However, the results of e-business deployment at UOMS case study processes which has been conducted in this research will be presented. These are: Human resources process HR; financial process FP; Students record management SRM; Teaching and learning process T&L; Information management process INFO; and Estates; ands and planning process EL&P. The description of e-business deployment in each process included an explanation of the actual status of e-business implementation, the key barriers resulted, the people's, the implementation strategies and steps, the main obstacles encountered, the resources u skills, and finally the level of e-business deployment. Each e-business deployment description concluded with presentation conducted on the data obtained from the processes and the outcomes have been incorporated in networks and helped the development of the findings. These findings are the result of the within cases analysis. In the next chapter, the researcher will present the other two universities cases findings generated from the cross cases analysis.

5.2 UOMS Case

UOMS was founded in 1984 with more than 15,000 students. Since the first graduating class of 1987, more than 19,000 students have graduated from the different faculties of UOMS and over 980 teaching staff members teach at the university. Currently UOMS is composed of 13 faculties: faculty of Islamic Studies, faculty of Sciences, faculty of Information Technology, faculty of Arts, faculty of Education, faculty of Economics and Political Science, faculty of Law, faculty of Medicine, faculty of Dentistry, faculty of Pharmacy, faculty of Nursing, faculty of Agriculture and faculty of Engineering. As a pilot study, the interview phase began with an informal set of interviews conducted at UOMS. The university participated in stage 1 of interviews whilst the researcher was on site; these interviews were arranged after the second questionnaire had been circulated on six key university processes because of process mapping (discussed in section 5.4). Participants in UOMS welcomed further scheduled follow-up interviews; as a result, the

main interviews were followed up by a series of telephone conversations with two of the participants.

5.3 Details of case study participation

The case study took place between October 2014 and February 2015; six respondents participated in the questionnaire survey. The questionnaire was grouped into four categories based on the three e-business dimension aspects (technology, process, people) in addition to barriers to e-business deployment. The questionnaires were distributed in the key six processes of the university. Then four interviewees provided a valuable insight into the direction of this research project. The interviews were conducted in two stages, the researcher followed-up the semi-structured interviews, which were aimed at addressing the 'why' and 'how' of certain e-business deployment activities, with two telephone interviews (see Table 5.1). All interviews were digitally recorded in all three case studies. The researcher also took notes relating to issues raised during the interview and telephone conversations. This was to aid further analysis regarding the content of those issues in relation to the circumstances of the universities taking part in this study. UOMS participants' details are presented in Table 5.1.

Table 5.1 Questionnaires and interviews: participants' details at UOMS

University	Questionnaires		Interviews	
	Process	**Participants**	**Stage I** Participants	**Stage II** Participants
UOMS	HR	Administrative affairs manager	IT Manager Auditing Manger HR Manager SRM Manger	IT Manager HR Manager
	FM	Financial audits manager		
	SRM	Head of university registration		
	T&L	Director of graduate studies		
	INFO	Director of information centre		
	EL&P	University projects manager		

The interview structure was amended to avoid confusion or irrelevant questions being provided to the participant's during the pilot interview process. At the end of the data collection, information gathered from the participants had reached saturation point from the interviews undertaken. At the end of each interview, a summary of the notes taken were transcribed and saved, also the recorded interviews were uploaded into the computer for further data analysis.

5.4 Process Mapping

Table 5.5 highlights the key processes and sub-processes among the Libyan universities, prepared by the researcher and adopted in the current research study.

Table 5.2 Libyan universities key processes and sub-processes

Process-1	**HUMAN RESOURCES PROCESS**	
Sub-process	Non-Academic records	Management of staff (non-academic) personal records and related administrative activities.
	Academic records	Management of university academic staff records and related secretarial activities.
	Administrative & Archive	Managing incoming and outgoing letters, prepare relevant administrative documents, and save and categorise administrative documents
Process-2	**FINANCIAL MANAGEMENT PROCESS**	
Sub-Process	Stores& procurement	Set up and manage documents for university's procurement activities, managing warehouse
	Auditing	Focus on reviewing of financial documents and related procedures and approval of exchange and payment process in the financial management department
	Treasury management	Funds management and cash flow, and salaries payment. Follow-up and supervision expenses, and communicate with banks and coordination of delivery of funds to the beneficiaries.
Process-3	**STUDENT RECORDS MANAGEMENT PROCESS**	
Sub-Process	Study and Exams	Supervision and ensuring the implementation of the school regulations, and follow-up the examinations, students' results, and management of student records from the beginning of study until graduation.
	Graduation	Administration of graduation certificates, graduation ceremony management and archiving of graduation data and records of graduates
	Registration	Supervise the organization and follow-up of new student's registration in universities. Issuing the students' IDs, guidance study and examination information with their registration data
Process-4	**TEACHING AND LEARNING PROCESS**	
Sub-Process	Classrooms and Study Management	Managing the classrooms, timetables, lectures schedules, and course management. Supervising the deployment of educational materials and progress study reports in universities.
	Library	Supervision in the library, for example, borrowing books, scientific journals, organisation and categorising of books, and follow-up requests for new publications.
	Communication and Interaction	Manage the communication between students, professors and departments related to the functioning of the educational process within the university and its departments. Providing resources for circulating the lectures scientific materials and ensuring its accessibility to all students.
Process-5	**INFORMATION AND DEVELOPMENT PROCESS**	
Sub-Process	Networks Development	Coordinating and follow-up network development and installation in the university, prepare the necessary reports and assessment requirements for network maintenance and deployment.
	Systems Development	Managing the requests of the required business information systems in the university, and building it either internally or by hiring an external agency. In addition to maintenance of the available BIS.
	Web application Developments	Manage all business development events via web applications, and develop a means of communication between stakeholders and the university service. Managing the web applications and related servers and databases. Supervising the contracts with internet service providers.
Process-6	**ESTATES, LOGISTICS AND PLANNING PROCESS**	
Sub-Process	Estates and Land Management	Coordinating the university's property management and follow-up requirements in terms of buildings, land, and shops within the university campus.
	Planning	Preparation of reports and plans for maintenance, development, and construction projects in the university. Prepare tables of quantities, pricing and financial costs of these projects.
	Logistics and transportation	Managing the transportation services, fuel distribution, loading and unloading of supply goods. The arrangement of university hotel accommodation and meals for delegation visits.

Table 5.2 highlighted the university's key processes, based on process mapping which was conducted on UOMS processes and sub-processes. In each process, three dimensions were examined with their related e-business change elements. As the three Libyan universities were following the same management systems and structure, the key process and associated sub-process will be replicated to all cases used in this

research. Assessing the three e-business dimensions (technology, process, and people) in the above processes and sub-processes will be a guide to determining the levels of e-business deployment. In addition, they will help to discover the barriers preventing these e-business processes from being adopted in daily work. The findings with regard to e-business deployment in these processes will be presented in the following sections.

5.5 Technology dimension results

Based on the conducted empirical study and its collected data the findings with regard to e-business deployment within the university's processes and related sub-processes from the technology view are presented here. The process mapping activity guided the gathering of data on the technology deployment level. The results will be described in the following sections based on technology dimensions in each key process area.

5.5.1 Human resources process (HR)

According to the findings of existing e-business technology and its utilization in the HR process, basic e-business systems (e.g. MS Word, Excel, and Windows) were deployed and used. These technologies were adopted for HR data and information preparation and processing. A number of hardware elements (e.g. computers, printers, and scanners) were also deployed in the HR offices, and related data was stored in external memories such as flash memories and portable external hard disks. In terms of the computer networks, computer networks had been implemented and deployed in several HR offices, but these networks were not integrated with the internal computers. The HR network was isolated from other devices, which prevented HR processes from being interconnected to external e-business systems and applications. On the other hand, a number of business information systems (BIS) were deployed. For example, HR processes, which were, adopted three BIS systems: Academic Records Management System; Non-Academic Personnel Records Management System; and Archiving System. These BIS systems were developed inside the university through the ICT team using MS Excel, Visual Basic, and SQL, except for the BIS used in the academic record management process, which was outsourced to specialised professional agencies, as illustrated in Figure 5.1.

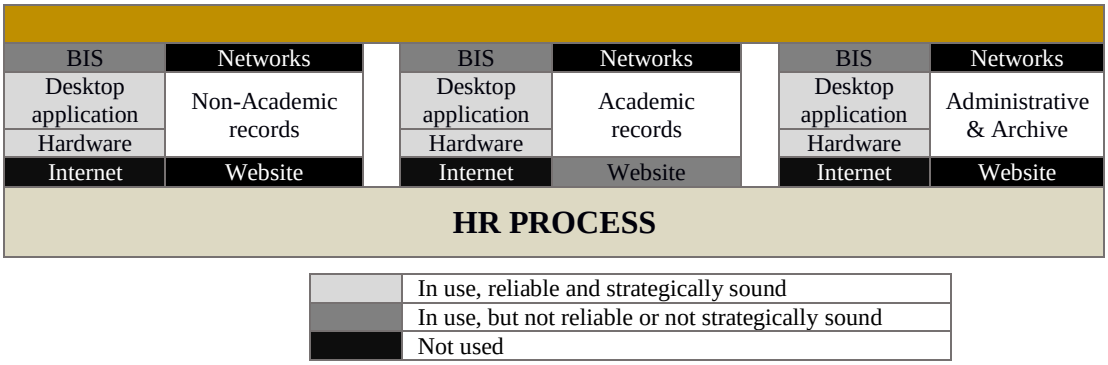


Figure 5.1 Technology deployment in the HR process

These BIS systems were still not operated in an integrated way and they were still running separately. Concerning the internet availability, the internet speed was not reliable enough to conduct e-business applications for HR processes and associated applications, and internet applications were not available. However, the HR department used the university website to publish basic HR information. The website was providing web applications such as HR online forms associated with academic records enquiries (e.g. new employment application and vacations) but there was no integration between the website and internal systems. At the time of data collection, the university's HR processes were not able to rely on the website-based services.

5.5.2 Financial management process (FM)

The financial management process was also grouped into three main sub-processes. From the collected data, the situation of e-business systems deployment was also established. The financial process mainly used several e-business tools and applications, ranging from utilization of basic e-business (e.g. MS Word, Excel, and Windows) for the purpose of data, to information processing and coordination. There was an appropriate level of deployment and use of e-business related hardware devices (e.g. computers, printers, and scanners). Furthermore, UOMS had adopted five business information systems (BIS) for FM process management; these were archiving system, National number system, Payroll system, Students grant system, and the financial account system. These systems were outsourced; they managed and generated information and statistical reports for different financial activities (e.g. daily, monthly, half-yearly and yearly). However, there was a simple integration operating in the internal systems; for example, BIS systems in the treasury management and auditing sub-processes had basic interconnection, but this was limited only to data tracking and checking through supporting data exchange with other computers allocated within the

sub-process. The assessment of technology deployment in FM is illustrated in Figure 5.2.

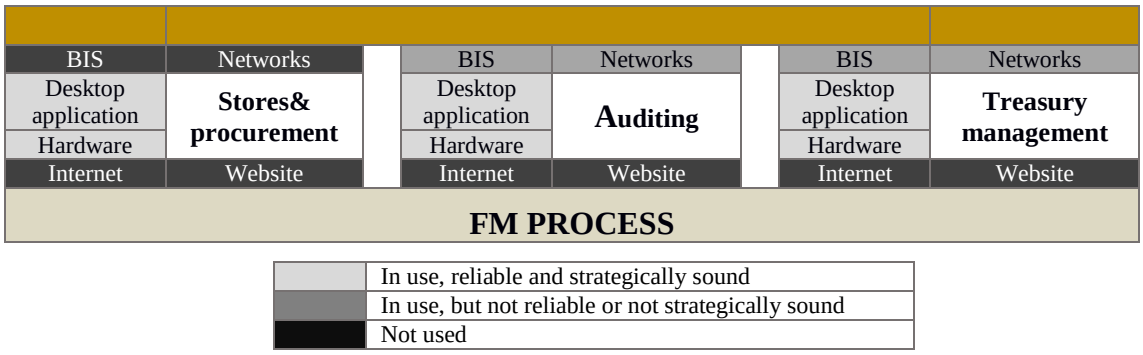


Figure 5.2 Technology deployment in the FM process

However, as illustrated in Figure 5.2, the BIS system in the procurement sub-process was isolated. Internal university computer networks were installed and deployed across the FM offices, but simple applications were adopted (e.g. linking two or more computers for data entry to BIS systems). Furthermore, FM data and information were stored in databases, flash memories, and external hard disks. About the internet and web applications, a number of website activities were adopted (e.g. publishing information, uploading documents and online forms). However, there was no integration between the website and internal FM systems. The FM process currently still cannot rely on the website services. When internet connection is not available, there is still a personal ad-hoc use of internet applications such as personal emails and social media accessed from personal mobile phone connections.

5.5.3 Student records management process (SRM)

The student records management (SRM) process focusses on student management activities, such as registration, study and exam issues, and graduation information management. For this research, the SRM process was mapped and e-business systems were outlined. The SRM process used a wide-range of desktop applications (e.g. Windows, MS Word, and Excel); these applications were installed on much of the deployed hardware (e.g. PCs and Laptops) for student records data processing and administration. Four BISs were implemented in the SRM process; these were: Student grants management system, Graduation system, Study and Exam system, and Registration system. These systems had been outsourced by the university to different external suppliers. The systems generated, tracked, and managed information and statistical student records reports. For example, in the Art College, the SRM process used a barcode system to enter student data into the registration system to streamline

SRM process. Furthermore, a LAN computer network was deployed, which supported data and information exchange within the SRM process; however, it was only used for some activities. There was a sign of integrated systems, for example, in the Engineering College registration process; there was an interconnection between the existing registration system and the basic web applications provided via the online portal. The portal was developed inside the university to support online practices for module registration to allow student access to the registration system using their user name and password; the students were only able to make limited alterations to their registration data. The results of technology deployment in SRM are illustrated in Figure 5.3.

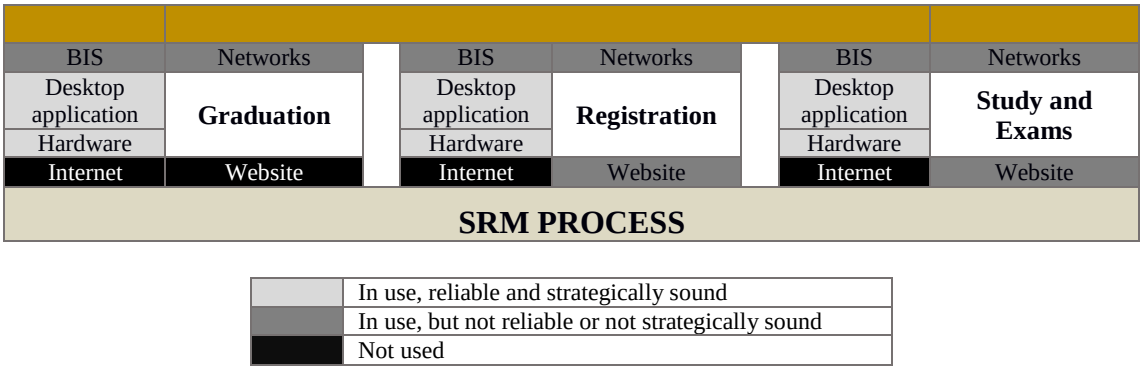


Figure 5.3 Technology deployment in the SRM process.

Though there were levels of web integration, the systems were still not reliable for adopting wide-ranging SRM e-business tasks and activities. As the BISs in the SRM process were still isolated, this prevented SRM processes at the colleges from using online SRM registration systems. Student data and information in some cases was stored in a database, but normally it was recorded on paper-based work documents, local hard disks, flash memories or external hard disks. However, with regard to present results, the UOMS website was not adopting SRM applications and related activities except for graduation results and some online application forms. The internet speed was not reliable for e-business activities and was often not available, meaning there were no mature online SRM process operations.

5.5.4 Teaching and learning process (T&L)

The Teaching and learning process was characterised by three sub-processes. The process was mapped, and technology deployment states were presented. The results show an appropriate level of desktop applications deployment (e.g. MS Word, Excel, and Windows) used for arranging and processing documents. In addition, an appropriate number of computers, printers, data projectors, and scanners were deployed and adopted in the classroom and department activities and management. This hardware was used

for teaching and supporting the delivery of lectures as well as for managing classrooms and timetables. However, the T&L process relied intensively on desktop applications. No e-learning systems were deployed, and activities such as the management of lists of students, lecture materials deployment, time table arrangements, and classroom and lecture management are mostly still manually controlled with the support of desktop applications. Projectors adopted in the classrooms are linked to network connections in the labs and research centres, but those computer networks were not used for data and information exchange activities. A number of colleges adopted an internet connection (e.g. IT College and Engineering college), but the internet was still inadequate on terms of reliability and speed. The students were therefore mostly still reliant on their personal mobile internet services to access the university's online resources (e.g. online information). The results of technology deployment in T&L process are illustrated in Figure 5.4.

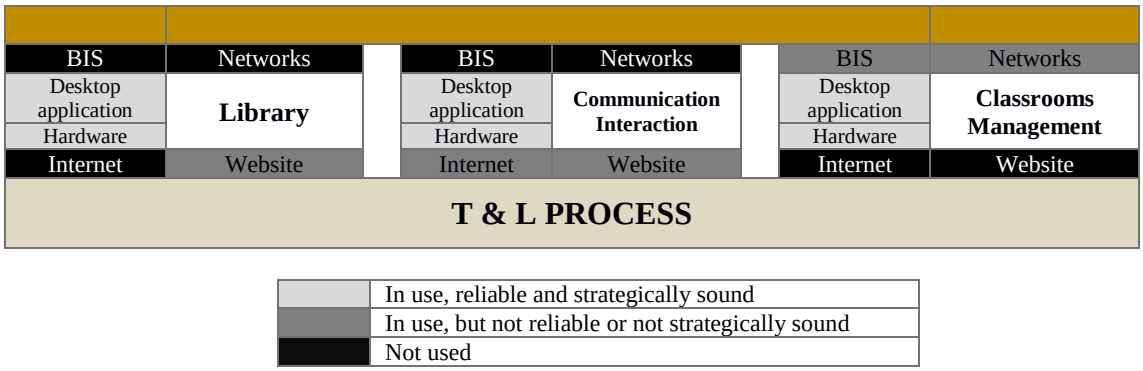


Figure 5.4 Technology deployment in the T&L process

As illustrated in Figure 5.4, the internet connection was not reliable enough to adopt e-business services in the T&L process. In terms of website and web applications, basic online information was published about T&L; for example, in the library, book catalogues were published on the university website, but not integrated between the internal applications and online book interface portal. Thus, the students were able to search for books or journal articles online, but then needed to visit the local library site to complete the borrowing process. The communications and interaction practices between the teaching and learning participants relied mainly on personal face to face communications or in some cases a phone discussion (e.g. between professors and students or employees). It was noted that there was a rise in the use of social media applications (e.g. Facebook and Skype) for arranging communication and interaction activities. Facebook was used, for example, for publishing news and update information relating to teaching and learning activities and lecture materials (e.g. in IT college). Finally, the internet connection was still not reliable or stable; however, there were not

many users of internet applications, which was a positive base for e-business development.

5.5.5 Information and development process (INFO)

The information and development process is focused on e-business development, related systems and applications deployment in the university. The university ICT department is responsible for gathering and tracking the university's data and information needed for those developments, and facilitating communication between the university's internal sections and external service providers. In the study the information and development process was also mapped, finding a high deployment and range of desktop applications (e.g. MS Word, Excel, PowerPoint, Photoshop, and Windows), in addition to several web desktop applications (e.g. Photoshop, Macromedia, Fireworks, Adobe Premiere, and Dreamweaver) to support web applications and develop multimedia systems. Appropriate hardware was also deployed (e.g. Computers, printers, laptops, IPads, routers, and scanners). Web development applications (e.g. PHP, HTML, and WordPress) were intensively used for the university's website development, mainly for improving and managing the university website content. Furthermore, BISs were developed (e.g. an archiving system using MS. Excel). The results of technology deployment in INFO process are illustrated in Figure 5.5.

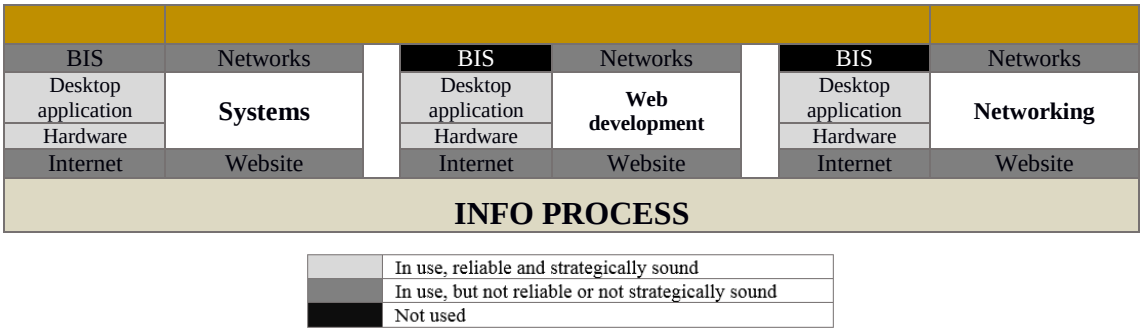


Figure 5.5 Technology deployment in the INFO Process

As illustrated in Figure 5.5, a computer network was deployed and used to support data and information exchange. The university is networking team, mostly to facilitate internet connection deployment within the university's departments and offices, installed it. In addition, web-application was also adopted to deploy and manage online forms and content management. The INFO process used social media such as Facebook and YouTube for communication and marketing and to facilitate interaction between students, staff, and employees inside the university. Moreover, a LAN network was

interconnected into a number of computers and printers to be used for process units. The LAN was being monitored and followed-up using simple applications by appointed units and practitioners, and relied on personal ad-hoc skills and basic network diagnosis tools for maintenance tasks. Servers had been provided and allocated, but were not being used for e-business activities or services. Thus, data were stored in different ways (e.g. paper-based documents, flash memories, local hard disks, and external hard disks). The internet connection was regularly available and accessible, used for web access, searches, and updating the university's website. INFO process implemented emails applications, and providing personal university email (e.g. name@misuratau.edu.ly) for university staff.

5.5.6 Estates, logistics and planning process (EL&P)

Estates, logistics and planning process was classified into three main sub-processes, which covered the activities of supervising university land, buildings, maintenance facilities and maintenance management. This included preparation of technical data and reports for university landscaping development projects, construction project management including designs and implementation plans for the university's services. Based on the process mapping and collected data, the researcher conducted e-business systems profiling of EL&P. The results showed low levels of technology deployment and utilisation. While desktop applications, in particular MS Word, MS Excel, and AutoCAD were adopted for organising data and information in planning and estates–land management, these applications are used mainly for information processing such as Excel sheets for listing required materials. There was no use of these applications for the logistics transportation activities management. The assessment of technology deployment in INFO process is illustrated in Figure 5.6.

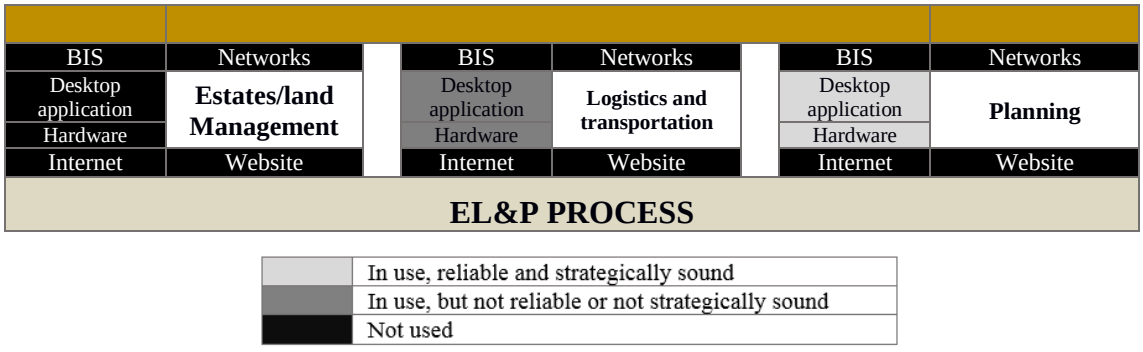


Figure 5.6 Technology deployment in the EL&P process

As illustrated in Figure 5.6 a wide range of hardware was being deployed and utilised in logistics and transportation, but there was no use of BISs or web applications.

Furthermore, despite the existence of the desktop applications and hardware, no IS systems were adopted or used, and no computer network was deployed or adopted in the process activities, leading to a lack of integration and interconnection between the existing computers. Moreover, EL&P depended mostly on paperwork for data and information management and storage, in a few cases there was storage in flash memories or on hard disks. The EL&P process did not adopt any web applications. There was limited use made of personal of mobile internet connection from personal devices, which helped with web searches and access to social media. At the time of data collection, the process completely relied on manual processes and e-business deployment was at the lowest level of use compared with the university's other processes. Based on the collected data, the relationship of technology change elements to e-business deployments in UOMS are summarised in Table 5.6.

Table 5.3 Technology change elements in UOMS

HUMAN RESOURCES PROCESS						
	Desktop applications	Hardware	BIS	Internet	Website	Networks
Non-Academic records	√	√	√	x	√	x
Academic records	√	√	√	x	√	x
Administrative and Archives	√	√	x	x	x	x
FINANCIAL MANAGEMENT PROCESS						
	Desktop application	Hardware	BIS	Internet	Website	Networks
Procurement	√	√	√	x	x	x
Treasury	√	√	√	x	x	√
Auditing	√	√	x	x	x	x
STUDENTS RECORDS MANAGEMENT PROCESS						
	Desktop application	Hardware	BIS	Internet	Website	Networks
Study and Exams	√	√	√	x	√	√
Registration	√	√	√	x	√	√
Graduation	√	√	√	x	x	√
TEACHING AND LEARNING PROCESS						
	Desktop application	Hardware	BIS	Internet	Website	Network
Classrooms/study Management	√	√	x	√	x	x
Communication Interaction	√	√	x	√	√	x
Library	√	√	x	x	√	x
INFORMATION AND DEVELOPMENTPROCESS						
	Desktop application	Hardware	BIS	Internet	Website	Networks
Networking	√	√	x	√	√	√
Web-development	√	√	x	√	√	x
Systems	√	√	√	√	√	√
ESTATES, LOGISTICS AND PLANNING PROCESS						
	Desktop application	Hardware	BIS	Internet	Website	Networks
Estates/land Management	√	√	x	x	x	x
Logistics and transportation	√	√	x	x	x	x
Planning	√	√	x	x	x	x

5.6 Process dimension results

Having reviewed the university's structures, its process features will be presented next. This involved process mapping, and information was gathered from the participants who were managing the selected process to produce and deliver university services. The participants helped to define how the UOMS process was run and how they shared their engagement in the university process and service operations. However, a broad view of business processes in UOMS helps to reveal the extent of the existing deployment of the process and each is presented in the following sections.

5.6.1 Human resources process (HR)

The system performance was on an ad hoc basis, and no fully documented processes were discovered. Furthermore, there were signs of mature process management. With respect to implementing the process, this was undertaken by designated individual managers and employees. Moreover, there was no process analysis conducted on a regular basis. The process was not documented, but could still be understood by the managers and a number of employees. For example, the academic record management followed an undeveloped management process, with no standard integration between HR operations and record management. There were signs of e-business-based processes beginning to emerge, such as the simple practice of e-process web applications, publishing HR forms, and applications. In general, a number of processes were running in the e-business approach, but not designed or developed based on defined regulations or standardisation. The current HR process was undocumented and controlled by individuals based on a structured process previously put in place by the university. It was performed on an 'as-needed' basis in response to a specific input requirement. The decision process was given to individual managers, and there were no channels by which to examine the process on a regular basis. However, procedures in HR processing were able to determine the required process, and to perform, produce and deliver services. Put simply, a number of e-business processes were supported backed by current e-business systems.

5.6.2 Financial management process (FM)

The FM process is characteristically considered an important process. The process essentially performs internal financial activities. There was an indication of practical and mature management activities indicated in the FM procedures, backed by teamwork effort. A progress report on the analysis process and process tracking FM was

conducted on a regular basis. For example, there were defined activities, progress reviews and clear functions that were assigned in the Treasury Management sub-process. For example, the auditing management system essentially followed basic management and structured activities. There were no integrated standard FM processes. However, a sign of e-business based process was emerging, in particular the Treasury Management activity dealing with salaries payment. In addition, there are some indications that e-process practices were being established on web applications for publishing process input resources, such as the forms published on the website. In general, a number of FM sub-processes were running in an approach to e-business deployment, but they were not planned or developed based on defined regulations or standardised activities. The FM process was virtually unwritten and organised based on a pre-arranged structured process approach. They are performed on a repetitive basis and respond to a specific individual input requirement and the decision process is normally given to top managers. However, to some extent the procedures were able to input FM process, and were likely to be performed in a traditional management style. The processes have the ability to run functions, produce and deliver services and ultimately were supporting and enabling a number of significant e-business systems based on the current existing BIS systems.

5.6.3 Student records management process (SRM)

The SRM process was responsible for processing student records and any related enquires. In the three sub-processes, it had a good level of documentation, but a basic, isolated process was indicated. However, there was also some indication of practical processes in the registration, study and exam sub-process, which showed a number of improvement procedures with respect to the effort to enhance e-business–based process deployment. The progress of the process allowed for some analysis on a regular basis. The process faced a challenge of conflict of engagement between the functions of departments, for example between the study and exam process and registration process. These undefined roles prevented the process from becoming a standardised procedure. For example, the graduation sub-process was following basic management, which led to unstructured activities, no integration or a lack of overlapping with other SRM processes. There was however an indication of an e-business-based process emerging, in particular in the registration sub-process. This process was developed to support student data collection and application form management. The SRM process adopted was not based on defined standardisation plan activities. Currently, the new process is

unwritten and was prearranged based on the university's structure. The process followed fixed repetitive procedures formed to response to specific inputs, and the activities were found to be fundamentally sound and to have the ability to perform in the basic traditional management way. In addition, they also had the ability to create functions and deliver student services. Ultimately, the SRM process was able to support and enable a number of basic significant procedures to be performed based on the available e-business infrastructure.

5.6.4 Teaching and learning process (T&L)

The T&L process is classified into three sub-processes to reflect the overall performance of the process functions and roles. The process was found to be isolated and mostly performs tasks based on the progress of individual students, which indicates practical e-business procedures. In addition, the library management sub-process followed basic ad-hoc management, but based on unstructured processes. The process showed improvement with respect to the effort to employ enhanced processes based on e-business (i.e., library management). The SRM process, however, was hampered by a lack of regular analysis; for example, in classrooms and study management process, the activities and functions followed an approach of basic observations, with communication and interaction being vaguely defined in the absence of documented and standardised practices. Designated staff and students could manage the process individually. It became apparent that process rights and roles engagement were not clearly implemented and there was an absence of definitions for processes and roles. However, an indication of an e-business based process was found, in particular, in the communication and integration processes. Library services with their preparation for communication activities for online applications were under development. In general, it was able to perform simple operations in the traditional way of education procedures and management. It also had the ability to manage functions, generate tasks, and deliver student services. Ultimately, initial support enabled a number of basic significant e-business based L&T processes, which were generally adopted by the e-business approach for a number of sub-processes, but not based on a defined and explicit plan for regulation and standardisation development.

5.6.5 Information and development process (INFO)

The INFO process was involved in a number of roles such as university data observation, control, and development. The process was partly documented and had

merged with other university processes. The process managing the procedures depending on defined roles, tasks, and functions, presenting a number of clear functions, and could be understood. Furthermore, the emergence of e-business-based procedures was indicated, which reflects a level of integrated processes. In order to manage the process, clear roles and tasks for e-process practice had been established. However, the existing process was undocumented, but acknowledged and controlled by teamwork, mainly based on the university structure. The internal decision process was given to the ICT manager as well as appointed process partners. In general, it can be noted that INFO processes were mostly adopted and implemented in e-business based management following a development procedure for defined roles, tasks, goals, and standardisation. The process procedure was able to determine and operate the assigned tasks, roles, and functions. Fundamentally, the INFO process was able to effectively perform and had the ability to produce the intended estimated outcomes. It was able to support and enable process for e-business based development procedures for the existing e-business settings.

5.6.6 Estates, logistics and planning process (EL&P)

This process demonstrated an ad hoc, undocumented progression and was found to be isolated from other university processes. The processes managed often depended on individual effort, with no defined process, but clear functions were implemented. The EL&P process was unclear, difficult to track, and was essentially based on poor performance, for example in the logical and transport management sub-process. No integrated processes were indicated, but some e-business-based processes emerged in the planning sub-process and the basic practice of conducting work by managing roles and tasks was adopted. Generally, the process was unwritten, undocumented, and still controlled by individual efforts based on a university structure. No designed and planned process for regulation and standardisation was found. The current process was performing simply in a traditional style of management. As a result, the process was struggling to determine tasks, roles, and required procedures. Fundamentally, the process was able to perform adequately, but did not have the ability to produce the intended estimated outcomes. Based on the e-business settings, it clearly was not able to support or enable process development for e-business activities. Based on the collected data and the results, the status of process change elements related to e-business deployment in UOMS are summarised in Table 5.7.

Table 5.4 Process change elements in UOMS

HUMAN RESOURCES PROCESS - HR			
	Structured practices and Ability	Documentation	Standardization
Non-Academic records	√	x	x
Academic records	√	√	x
Administrative and Archives	√	x	x
FINANCIAL MANAGEMENT PROCESS - FM			
	Structured practices and Ability	Documentation	Standardization
Procurement	√	√	x
Treasury	√	√	√
Auditing	√	x	x
STUDENTS RECORDS MANAGEMENT PROCESS - SRM			
	Structured practices and Ability	Documentation	Standardization
Study and Exams	√	√	x
Registration	√	√	x
Graduation	√	x	x
TEACHING AND LEARNING PROCESS - T&L			
	Structured practices and Ability	Documentation	Standardization
Classrooms/study Management	√	√	x
Communication Interaction	√	x	x
Library	√	x	x
INFORMATION AND DEVELOPMENT PROCESS			
	Structured practices and Ability	Documentation	Standardization
Networking	√	x	x
Web-development	√	x	x
Systems	√	x	x
ESTATES, LOGISTICS AND PLANNING PROCESS			
	Structured practices and Ability	Documentation	Standardization
Estates/land Management	x	x	x
Logistics and transportation	x	x	x
Planning	√	x	x

5.7 People dimension results

5.7.1 Human resources process (HR)

People in HR were not employed according to their qualifications or curriculum vitae details, which take into account the skills and experience of the required employees. Usually, employees dealt with day-to-day management procedures using their own personal skills and abilities, giving guidance to related administrative decisions. Furthermore, regarding the training provided for skills development, this appeared to be uncoordinated and did not provide a sound basis for a successful development plan. Thus, people were not gaining the required level of knowledge about the importance of

information systems in their work, and issues of e-business deployment in their departments. In addition, the employees did were not receiving the required information related to essential applications and technological issues. In general, employees in the HR process had the managerial capabilities that enabled them to deal with the daily procedures, as well as the ability to get their administrative work done, often in a traditional, repetitive way. The HR process showed significant interest in attempts to develop e-business skills, however, employees showed concern for adopting and using e-business systems in transferring to upgraded or new applications. In some cases, the managers demonstrated resistance to change, which often prevented the department's systems from being e-business based. In addition, HR managers were keen to keep information within their administrative positions.

5.7.2 Financial management process (FM)

In the FM process, understanding the university budget and cash flow issues is important. Such understanding leads to employees gaining a clear awareness and knowledge of the importance of FM improvement. In this study, employees were found to be often employed based on their qualifications and experience as well as a requirement to fill FM roles. However, there was a lack of job description that defined the required skills and experience necessary for e-business development. Employees in FM had the ability to deal with day-to-day management and supervisory processes relating to financial decisions according to each case. A small number of employees received training for financial skills development. There was no formulated training development plan that stipulated the required improvement in the FM department. Due to the undefined strategy for skills and knowledge development, employees were not attaining the estimated skills to prepare them to supervise enhanced e-business systems, such as online payment and transactions. For potential emerging problems in IT, employees still sought assistance from the ICT department to manage FM hardware or software problems. The FM managers had a good level of knowledge on managerial practices, information sharing and teamwork skills. In addition, they recognised the importance of adopting e-business methodology and practise of advanced information systems in their departments. They had gained a level of e-business skills, in particular, of the use of BISs, database and communication via social media, but they still had no knowledge of e-business management and technological development issues. In general, employees in the FM process had good management capabilities that enabled them to deal with day-to-day occurrences, together with the ability to get their administrative

work done efficiently, often in both traditional and contemporary business practice. Significant interest was shown in efforts to develop e-business management skills, but was lacking the use of web application and online request process such as online payment. This lack of web applications management skills and awareness was significant when trying to create a successful FM department.

5.7.3 Student records management process (SRM)

Employees managing SRM processes recognised the importance of the potential benefits of e-business for SRM systems. For example, in the engineering and information technology colleges, there was indication that employees had gained the ability to utilise technology and e-business skills to improve the SRM system. Other processes, which helped improve SRM, were well-defined job descriptions and correct task assignments. Employees had the ability to use e-business systems and applications to develop reports that supported the decisions made by staff and transfer them onto a student's record. There was a lack of training for development strategies and the existing skills were not based on a planned development project. Furthermore, there was no dedicated e-business team to take care of the existing e-business applications, which could be adopted within the process, and no appointed member for e-business operations development. Even with their existing knowledge, employees were still relying on assistance from the ICT team as well as outsourcing for e-business applications and process development. However, managers had a good level of managerial skills and experience. For example, some employees had fifteen years of work experience in the SRM division. Employees recognised the significance of e-business deployment and the deployment of e-business applications, but there was an indication of resistance towards accepting new systems for SRM. In general, employees in SRM had basic capabilities that enabled them to deal with the day-to-day records management, along with the ability to manage services in a traditional way and in some cases follow an e-business approach, in particular using web portal applications in the registration process and using BIS for study and exam management. The employees expressed a willingness to embrace more e-business development and management skills, along with web application skills.

5.7.4 Teaching and learning process (T&L)

T&L processes have varying degrees of e-business potential in teaching and learning procedures. For example, in the engineering and information technology college

students and employees had a good level of knowledge and technological skills, higher than other university colleges such as the art and education colleges. In addition, the staff had the ability to use technology applications in their work and lecture preparation. However, there was no defined job description that supported skills and experience for teaching purposes. There was evidence of a general ability to deal with day-to-day teaching and learning management activities, and use technological tools for decision making. However, no sufficient training and skills development was provided based on a clear development plan; instead, it was based more on the employee's ad-hoc skills. Due to the challenge of adopting e-business applications and related systems for the T&L process, no e-business appointed team was indicated and there was no assigned employee for IT-based process and activities development. They still relied on assistance from the ICT department. Even with a small degree of knowledge, employees were still seeking assistance from the ICT team for the university's T&L application and process development. The managers generally had a good level of managerial knowledge and skills and had the ability to work within a team. Both employees and academic staff appreciated the significance of e-business applications deployment, and they had gained the necessary e-business skills for managing and using desktop applications, BIS, database and communication via social media. However, there was a lack of knowledge on e-business and technological strategy. In general, employees had the capabilities to enable them to manage routine teaching activities, and the ability to deliver their lectures in a traditional style. In some cases, they were following an e-business approach, in particular using web portal applications and social media for the online teaching management and communications process. In general, there was significant attention paid to efforts to provide improved development for employees' e-business management and web application management skills and to increase the awareness of their significance.

5.7.5 Information and development process (INFO)

Employees in this department were considered the most knowledgeable administrative employees in the university. Their skills were mostly located in the IT department, where employees have a high degree of knowledge about the importance of e-business deployment and related applications implementation. They already had some of the ICT practices and skills that support transitions from traditional management to an e-business approach. Employees in INFO showed enthusiasm for using their e-business skills to develop e-business applications and for improving other university processes.

There was evidence of ability to use desktop technology applications and web development, web design, graphic design, software development, database management, and network design and management. However, as in other departments, staff employment was not based on a well-defined job description; instead, task assignment was based on the employees' skills and knowledge. Employees had the ability to deal with information management and archiving systems, generate reports, and support decision-making. Furthermore, there was a level of e-business skills development training which enhanced the employees' e-business ad-hoc skills. These skills were not based on a pre-determined strategy. There were positive signs of e-business teamwork; for example, sharing skills and knowledge regarding existing e-business applications and processes within the university. Moreover, the INFO managers and staff understood the importance of e-business deployment and the use of e-business applications. Due to the undefined skills and lack of a knowledge development plan, there was no clear e-business skills that could be managed to allow employees in INFO to work on a comprehensive e-business deployment plan. Therefore, there were challenges to be faced in management skills relating to networking and web development sub-processes that could otherwise have been supporting the adoption of e-business applications and related systems. In general, employees in INFO had gained enhanced capabilities that enabled them to deal with everyday e-business management and related problems. The INFO employees were making progress in developing the university's web portal application and adopting social media for online services and operations.

5.7.6 Estates, logistics and planning process (EL&P)

With regard to 'people capabilities' in EL&P, there was evidence of a low level of knowledge regarding e-business and the importance of related e-business application deployment and implementation. In addition, e-business skills within EL&P were not able to support e-business transitions. Employees indicated a low level of motivation towards e-business interests, and no indication of expanding their e-business skills for e-business improvement. However, there was a basic ability to use simple desktop applications such as MS Word, MS Excel, and AutoCAD, but only in the planning sub-process, and not for using BISs or web applications and tools. Furthermore, there was no training for e-business skills development, and no teamwork control for e-business-based processes. Moreover, recognition of the importance of e-business deployment and related applications was not evident, due to the absence of training, knowledge and

related skills. Challenges appeared within management skills relating to Estate/land management and Logistics and transportation sub-processes. In general, no e-business development plan was found to exist, and as a result, the department was not able to deal with the emerging e-business management approach. The low level of ability to manage and follow an e-business approach generated a lack of motivation to develop employees' skills and knowledge regarding e-business along with the adoption of BIS or other web applications for online services and communications. The employees' capabilities deployment status in UOMS is illustrated in Table 5.3. Based on the collected data, and presentation of results, the status of People change elements in relation to e-business deployment in UOMS is summarised in Table 5.8.

Table 5.5 People change elements in UOMS

PEOPLE CHANGE ELEMENTS IN HUMAN RESOURCES PROCESS				
	Teamwork	Managerial Skills	Training	Technological skills
Non-Academic records	√	√	x	√
Academic records	√	√	x	√
Administrative and Archives	√	√	x	√
PEOPLE CHANGE ELEMENTS IN FINANCIAL MANAGEMENT PROCESS				
	Teamwork	Managerial Skills	Training	Technological skills
Procurement	√	√	x	√
Treasury	√	√	x	√
Auditing	√	√	x	√
PEOPLE CHANGE ELEMENTS IN TEACHING AND LEARNING PROCESS				
	Teamwork	Managerial Skills	Training	Technological skills
Classrooms/study Management	√	√	x	√
Communication Interaction	√	x	x	√
Library	√	x	x	x
PEOPLE CHANGE ELEMENTS IN STUDENTS RECORDS MANAGEMENT PROCESS				
	Teamwork	Managerial Skills	Training	Technological skills
Study and Exams	√	√	x	√
Registration	√	√	x	√
Graduation	√	√	x	√
PEOPLE CHANGE ELEMENTS IN INFORMATION AND DEVELOPMENT PROCESS				
	Teamwork	Managerial Skills	Training	Technological skills
Networking	√	x	√	√
Web/development	√	x	√	√
Systems	√	√	x	√
PEOPLE CHANGE ELEMENTS IN ESTATES, LOGISTICS AND PLANNING PROCESS				
	Teamwork	Managerial Skills	Training	Technological skills
Estates/land Management	x	x	x	x
Logistics and transportation	x	x	x	x
Planning	√	x	x	√

5.8 Summary

This chapter has presented the study's findings on e-business deployment across dimensions, with an exploration of e-business deployment levels. It aimed to address which critical change elements help to promote the success of e-business deployment projects in the university. This section summarises the findings that reveal each of the important change elements of (Technology, Process and People) required in order for the university to use e-business, and specify the degree of their importance for successful deployment. The findings for the Technology dimension present a progressive indication of desktop applications and hardware deployment and their significant impact on e-business deployment success. The four change elements had indications of inadequate deployment of e-business, thus they affected plan success. In terms of the Process dimension findings, the processes studied had a positive impact because they could be structured and had the ability to perform, whereas the two other change elements had a negative relation to successful deployment of e-business. They had a weak or no impact on project success. Finally, the People dimension findings indicated that the teamwork, managerial and technological skills to deal with basic e-business applications had a reasonable impact on e-business deployment success, but the other two change elements, training and technical appointed elements, had a weak or no impact on e-business deployment project success. The next chapter will focus on the analysis and explanation of the results and their relation to each other, and will seek to discover their influence on the move to e-business transformation.

Chapter 6 The analysis of e-business levels within the cases

6.1 Introduction

This chapter will examine the progression that Libyan universities require towards implementing an effective e-business deployment process. This chapter will focus on UMOS and will investigate factors that could affect and progressively influence e-business deployment outcomes and show the opportunities to improve e-business deployment at UOMS and more widely in Libyan HEAs given the results. Data analysis will illustrate the level of e-business deployment so that it answers the research questions, while interpretation focuses on studying the data for meaning and implication (Yin, 2011). A SCALE model has been developed which can be used to improve e-business deployment, as illustrated in the case of Libyan universities. Firstly, to address the principal research questions of the study presented in chapter one, the e-business concepts are discussed and then the implementation of the SCALE model is reviewed, followed by suggestions for how to improve e-business deployment based on interpretations of the results. A significant aspect of the analysis concentrates on the primary sources and subjects of this study, with regards to the most frequently reported technical and managerial issues affecting the deployment of e-business within Libyan universities. Lastly, a number of key recommendations will be made for the universities, their related project managers, and senior decision makers.

6.2 Analysis of findings at UOMS based on the SCALE model

The purpose of the SCALE model is to illustrate the maturity level of e-business deployment at the three Libyan universities surveyed. The SCALE model involves three e-business deployment dimensions (People, Process, and Technology) in five level ranges between the low levels of deployment (Start) to the highest level (Enterprise). For each of the e-business deployment dimensions adopted in this research, there are change elements, which form the characteristics of e-business deployment levels. The SCALE model will be applied to assess e-business deployment levels in each of the three e-businesses dimensions in the three universities. The applied SCALE model with the associated evaluation stages in each process is illustrated in Figure 6.1.

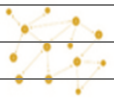
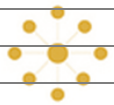
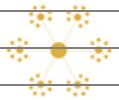
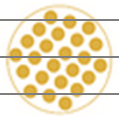
	Very low	Low	Medium	High	Very high
	E-BUSINESS DEPLOYMENT STAGES				
University Process	Start	Connect	Access	Leverage	Enterprise
HR process					
FP process					
SRM process					
T&L process					
INFO process					
EL&P Process					

Figure 6.1 SCALE model stages

The evaluation of e-business deployment will reveal the e-business maturity stage of each process individually; this will reflect the condition of e-business deployment in each university, and range from very low to very high. This will illustrate the progression needed for each stage in order to achieve the targeted level of e-business deployment.

6.3 The definition of SCALE model stages

The SCALE model is concerned with the general approach to e-business deployment in Libyan universities. The initial conduction of the model proposes that the evolution of e-business deployment begins at the Start stage, which is marked by the change elements of the three e-business deployment dimensions in the university, with an emphasis on practical applications to e-business deployment growth. Each stage represents a further development of the e-business deployment, which will be highlighted and realised from the empirical data collected in this research. However, it is possible that some processes will develop faster than others will: this limits the ability to judge overall process progress in a university, and prevents moving on to the next stage. During the conduction process of e-business model, it was performed that there was need for extended control of the earlier stages with needs for greater coordination. With more control on the three dimensions of technology, process and people a shift arises from uncoordinated management of e-business dimensions to planned management and coordination of comprehensive e-business resources in the universities. Here the integration of various e-business solutions evolves. The Tables (6.1, 6.2, and 6.3)describe the stages of the SCALE model in each dimension, clarifying the growth of e-business maturity at each stage, which will be conducted in this research.

6.3.1 Technology dimension stages

Table 6.1 The definition of technology dimension stages

E-business Levels	Technology Dimension					
	Change Elements					
	Hardware	Desktop app	Networking	BIS	Internet	website
Start						
	There is limited Access to telephones and few uncoordinated standalone technologies in use (e.g. PC, laptop) restricting the information shared by individual. There is a lack of organized or structured information for users. Limited connection availability and no computer networks are implemented. The university has not yet established a website and online resources are not available.					
Connect						
	Telephones are found in most departments and are frequently used. There is more focus on computers and desktop applications, (e.g. MS word), hardware devices (e.g. printers), and the introduction of local network deployments. Employees use these technologies in their work, but it is not used for electronic communications or data and document sharing. Only a few BIS systems have been adopted built on MS Excel and used for limited purposes such as preparing simple data lists and spreadsheets. These BIS systems are not connected via the networks. Limited internet is available, but not often used for everyday work processes. could be used by individuals for social media and personal email exchange. No system integration exists in the department, but there is unplanned limited deployment of e-business applications, e.g. a website, which is static and occasionally updated. There is a variety of university based or private internet access in use, including internet from personal mobile phones, which is still not adopted for everyday work processes. There is keen motivation towards investment in technology infrastructure and BIS systems.					
Access						
	There is an initial investment in hardware, software, and BIS systems at departmental level (e.g. SRM system, Payroll systems, and Personal record management systems etc.) for information and data processing. Offices have now started to use networked computers for internal file sharing and basic applications (e.g. data entry). There is widespread implementation of networks, including multi-point Access devices (e.g. Wi-Fi). The university process started deployment of internet facilities at departmental levels, and drive the university's static website to host and deploy resources (e.g. online documents, catalogues, and forms), but these web-based applications are still not integrated with the internal systems. There are emerging of further applications (e.g. Servers) in place to support information storage, sharing, and systems integration. However, there is still a struggle to coordinate the integration process between internal systems. The university website now supports online applications (e.g. student's application forms and online result linked to database systems), and use of social media applications (e.g. Facebook) for sharing online materials is common practice.					
Leverage						
	Widespread networks drive the use of multi-user systems incorporated with central databases. The university started achieving proficiency enhancements through					

	widespread investment in e-business technology applications (e.g. enabled-web BIS systems) for better information management within the university's internal processes. For this reason, the university started a development of the web-portal, which is able to combine and integrate the internal and external processes and networks. This combination allows the deployment of wider Access to systems and applications both internally and externally (e.g. on-line SRM system). The university process and related departments now enter into two-way communication and interaction between users (e.g. staff, employees and students) and applying corporate web-based systems allowing them to make some changes (e.g. records auditing and data changes by students). A widespread adoption of technological channels such as personal emails, servers, and databases across the university offices supports everyday process sharing and functions. Online services and a range of interface applications (e.g. online registration and e-learning systems) are emerging.
Enterprise	
	Computers in offices are fully networked and integrated within university's BIS systems. Different office locations are connected to each other through external networks (can be extended nationally or internationally). There is widespread use of data warehousing, servers, web portals, extranet, and intranet applications, and a range of integrated online application packages, which are incorporated with BIS systems and play a significant role in governing the university's total information. E-business based systems are employed and expended (e.g. Web-based courses and testing, video streaming, course delivery to distributed locations). The university information and data, which is now structured and coordinated, plays a key role in supporting and improving university's process operations. There is controlled and supported access to systems via the external web-portals, which allow the university to coordinate, exchange data and information with business partners. The intensive adoption of internet applications and the internet is accessible by the majority of university members. All contact details (e.g. e-mails, office numbers, and website addresses) are now available on the university website.

6.3.2 Process dimension stages

Table 6.2 The definition of process dimension stages

E-business Levels	Process Dimension		
	Change Elements		
	Ability to perform	Documentation	Standardisation
Start			
	Processes tend to be driven in an ad hoc way; it is not defined and typically disorganized, uncontrolled and undocumented. This delivers confused or unstable processes. The success of process performance outcomes is likely to depend on individual efforts. Process transactions are carried out in person through paper-based systems.		
Connect			
	The process is repeatable, possibly with regular results (e.g. managing information on a student's records). The process is still self-controlled and unlikely to be rigorous, but where it happens, it may help that current process continue during times of high work pressure in the unit levels, where initial introduction of control at a departmental level has emerged. For example, the students' registration process starts to identify e-business related practices using available technology, but these processes are still not well defined or documented, which drives poor coordination. They are keen however to describe the procedures which drives process documentation and further coordination. Number of process started the establishment control at the departmental level, but the information about process documentation and requirements have been recognised.		
Access			
	There is initial documented and established process plan, but few defined and documented processes are in place. For example, student application forms and new module registration are managed and coordinated under standard, identified processes, and are in place to support stability of process performance across the units and departments. There is an early emergence of internal process automation governed by available e-business technology (e.g. BIS systems). The university process characteristically started modelling end-to-end business processes, and the everyday work became focused on improving important specific processes (e.g. online process for student registration and related management and coordination activities). At this stage, the process responsibility has been defined and assigned but maybe not fully followed. Thus, process performance stability might not be achieved (e.g. e-learning process). There is process documentation with respect to e-business based activities, but still requires an appropriate design. The university starts to implement some process changes considering issues of rights, responsibilities, and information about services. The process starts to manage a number of online activities, and supports important user interaction (e.g. alteration and change of a student's record data).		

Leverage	
	The university process management started to identify ways to adjust or adapt a number of e-services (e.g. online payment) in flexible ways to achieve process alignment and process automation. The process management is controlled and supports transactions with strategic focus on process capability in respect to available technology (e.g. BIS, external networks, and Internet and web-portals). A number of key process integrations are now in place, with the introduction to process control providing information sharing and management capability. A number of designed key processes are now in place, and others are for re-designing (e.g. online students' results process, study and exam process). Individuals now keen to transfer to online services instead of paper-based process. The emerged processes have been redesigned around e-business (e.g. online registration in SRM process, procurement, and inventory management in FM process). Process transactions may be accelerated using e-business applications (e.g. electronic mail), plans for the process standardisation and regulation have been recognised but not yet achieved.
Enterprise	
	The process has started to have an influence on the university structure, where it intends to change or redefine a number of process management practices. There is widespread use of automated processes and integrated systems. The university process has become keen towards being one incorporated processes and most services and related process are now controlled and performed electronically. These process are monitored through tracking systems (e.g. online payment systems, self-controlled student records, and e-learning registration systems). There is a continuous spread of shared processes involving external partners (e.g. other universities) remote processes from different sites and locations. The process focuses on the automation and integration between internal and external processes. There is a focus on plans for continual process performance development through the backing of both incremental and innovative technological changes and improvements. The practice of university processes at departmental levels and their structure is now reformed and combine a number of these processes, which can be shared with other university process (e.g. online library and online e-learning process).

6.3.3 People dimension stages

Table 6.3 The definition of people dimension stages

E-business Levels	People Dimension			
	Change Elements			
	Management skills	Technological skills	Training	Team work
Start				
	People within the department communicate using telephones as a main tool for process management. At the unit level, the individuals' e-business skills are limited and everyday practices are based on the ad hoc skills of using ICT and associated management. There is no reflection on good people management. No training is provided, and individual's skills are usually gained outside the university. There is no formal coordination of people in the university process and no specific roles for mangers in leading these activities. In addition, employees are not employed based on their technical background, or based on their knowledge or specific criteria for defined tasks. A number of employees in the university have low levels of management experience. In general, there is a lack of organisation of responsibilities, roles, and teamwork, and employee's performance is unacceptable for e-business practise. Most people are following management activities based on paper work.			
Connect				
	The university started introducing people coordination at departmental level. The initial coordination is based on units and related groups. Managers take responsibility for coordinating, managing, and developing people practices with respect to e-business, and collecting information about the areas of professional development and training requirements (e.g. PCs, Internet, and Software). There is an initial defined communication environment adopted from employees and some e-business related expertise issues (e.g. process automation) at the departmental level, but still based on personal motivation rather than any official coordinated plan. The appointed administrators start to recognise the required skills and related training needed by staff. This training progression is usually not well coordinated. There are a number of employees who start to develop their technical and managerial skills so they can perform their tasks. This initial drive to enhance communication skills in the university units and departments will improve management performance and emerging teamwork activities. While people are generally still able to perform their everyday work, there is still a major need for skills improvement to practice e-business within their processes.			
Access				
	Managers in all processes are now coordinate employees at departmental level. Management roles and responsibilities are well defined (e.g. Student Records managers, Human Resource managers and Information Technology managers). An introduction to e-business practices and operative management with human resources improvement becomes essential to university processes and operations. There is ability to govern and manage the department is based on managerial skills, and employees' knowledge of their jobs. Communication practice between employees allows knowledge sharing at departmental level, driving interaction between university departments (e.g. HR process and FM process). The university defines required training plans and introduces workgroup development and management practices.			

	Employees' capability starts to become monitored, where tasks are supervised and allocated. Job description design processes are recognised as being important. Employees' technical skills are becoming a source of reasonable advantage and attract investment opportunities for the university. There is coordination between e-business practices and IT departments that support information management and the growth of e-business skills. University employment opportunities now consider technical skills as desirable for potential staff.
Leverage	
	Managers are appointed to support electronic services functions (e.g. information management manager, e-business deployment manager). At this stage, staff usually hold higher education degrees (e.g. bachelor and masters) and have gained management skills and knowledge from their previous practices and training courses. There is greater shared technical knowledge between the university process and employees from different departments (e.g. online application management). Continual teamwork development within university departments is also an important activity for improvement of individual skills, and shared team-based coordination for e-service delivery and activities. There is extended staff with management practices, with skills of systems administration and e-business based process coordination. There are employees responsible for arranging the collection of data and launching information into the university process for e-business performance. Through various university departments and units there is now greater confidence with e-business practices and applications, a where employees in IT department take responsibility for specific skills development (e.g. webmaster, and database administrator).
Enterprise	
	There are e-business deployment and development plans, which links the university processes with university policy involving e-business planners who develop strategic e-business deployment plans. The university has people skills and capability development plan linked to -business deployment projects. The focus of people skills is driven towards the 'know-how' of e-business and related infrastructure deployment plan, which are now considered a central requirement to the university transformation strategy. There is a much greater focus on the significance of university capability management, and university has a skilful senior team management (STM) focusing on university e-business strategy development. Special roles and responsibilities emerge (e.g. Chief Information Officer (CIO) and e-business strategy manager). There is continuous development and control of personnel, teamwork development planning, and support for employees' e-business performance alignment. The required decision-making tools are established (e.g. information analyst, and web-based reports creation).

6.4 Analysis of e-business in UOMS

Based on the established SCALE model, an assessment of current e-business deployment dimensions and resources was conducted at UOMS. The analysis will be categorised according to the three e-business dimensions. The outcome of the analysis results will be presented and discussed in the following sections.

6.4.1 Technology dimension analysis

The e-business deployment levels in the three dimensions are presented and analysed across UOMS processes. Based on the initial SCALE model assessments, the range of

e-business deployment levels was between the Connect and Access stages. The INFO, SRM, and FM process reached Access stage, making good progress in terms of e-business applications use and deployment in particular BIS systems, whereas the HR, T&L, and EL&P processes attained the Connect stage. This process was considered to have the lowest recorded level of technology deployment and use in UOMS. However, there was still use of technology in these processes but not in regular use and still use in an uncoordinated way. Based on SCALE model assessment results, the technology deployment levels at UOMS are illustrated in Figure 6.2.

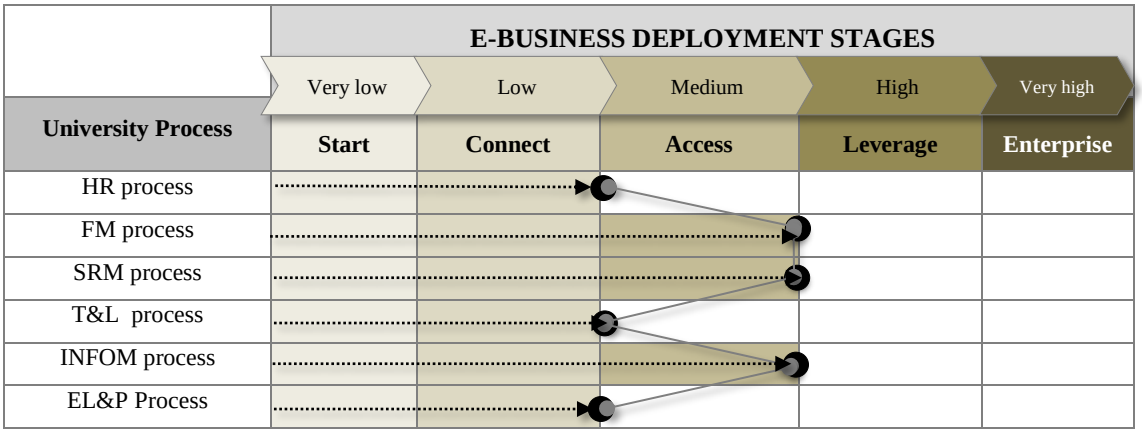


Figure 6.2 Technology dimension maturity levels at UOMS

No system integration or central database was adopted in UOMS process, thus, all university processes remained at the Access stage.

6.4.2 Process dimension analysis

The SCALE model describes the recognised UOMS processes, highlighting the process change elements, which reflect the ability to perform, process documentation, and standardization. These elements were employed to support highlighting process deployment levels, and were examined to ensure that UOMS processes were motivated to adopt e-business based progress. According to the data collected, UOMS processes are managed both manually and automatically. For example, in the SRM process, a flowchart was made to track the students' admission and registration applications, as illustrated in Figure 6.3.

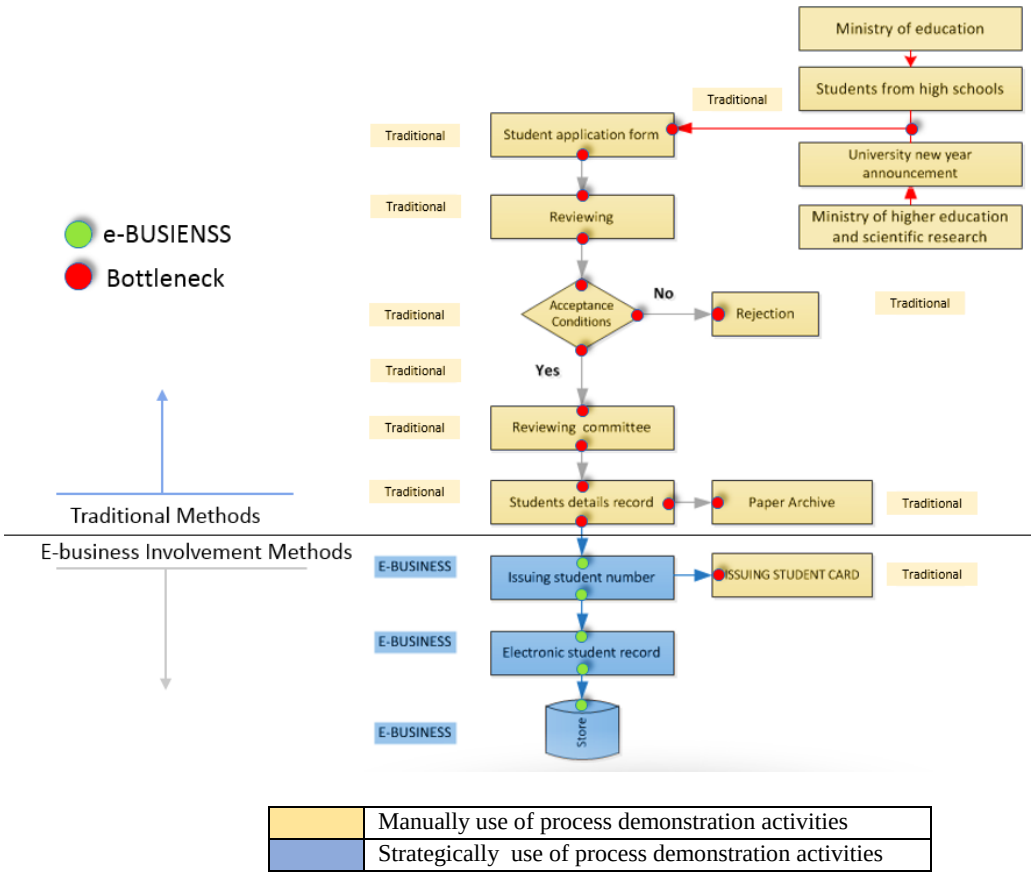


Figure 6.3 Student registration process flowchart at Students Record Management process

The flowchart tracking system helps to indicate the performance of the SRM and demonstrates the influence of task and dimension changes at each step, as illustrated in Figure 6.3. During the follow-up process, manual and automated processes were defined. However, no process documentation was identified, and it became evident that the SRM process was still performed manually. However, there was evidence of e-business progress adopted in some SRM activities, such as issuing student numbers and creating student records. The processes were showing more development, whereas at the start they were performed manually. Based on the initial assessments by SCALE model, the range of e-business maturity level was assessed and recorded. The FM and INFO processes achieved Access stage, which was the highest process maturity level at UOMS. The reason for this level of progress was the importance of the data and information they depended on in their administrative processes, which mainly had a sensitive impact on the university's decision-making (e.g. payroll sub-process). The e-business deployment level in the HR, SRM, and T&L processes was recognised as being at Connect stage, whereas the remaining EL&P process were at the lowest level of process dimensions' deployment, the Start stage. The demonstrations of the process deployment dimension levels are illustrated in Figure 6.4.

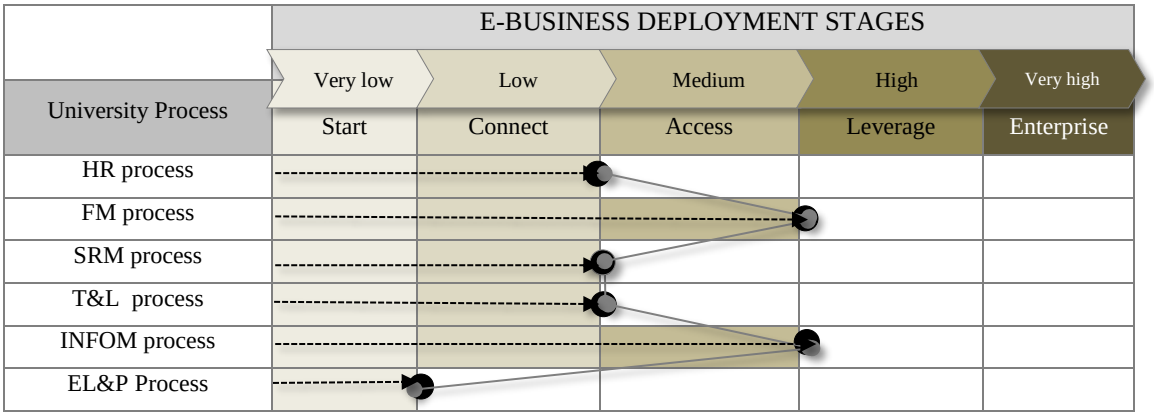


Figure 6.4 Process dimension maturity levels at UOMS

However, the key element of process deployment was recognized by process documentation, which was still limited in UOMS processes. This was preventing the progress of some processes to the next stages.

6.4.3 People dimension analysis

This SCALE model describes people efficiency deployment, as identified and approved at UOMS. As stated in chapter five, the people efficiency maturity dimensions include managerial skills, training, technological knowledge, and teamwork activities. The researcher carefully gauged these dimensions as aspects linked to employees' efficiency. Based on the initial assessment by the SCALE model, the range of these efficiency levels was recorded and it illustrated that at UOMS these processes ranged between the Start and Access stages. However, the level of staff's e-business capability and skills in HR and T&L process were at the Connect stage. The people capability at FP, SRM, and INFO processes was found to be at the Access stage, which is considered the highest capability levels and deployment in UOMS processes. The lowest capability level was noted in the EL&P process; it was the employees' lowest capability maturity level, which only achieved a Start stage. The people capability and skills associated with e-business are illustrated in Figure 6.5.

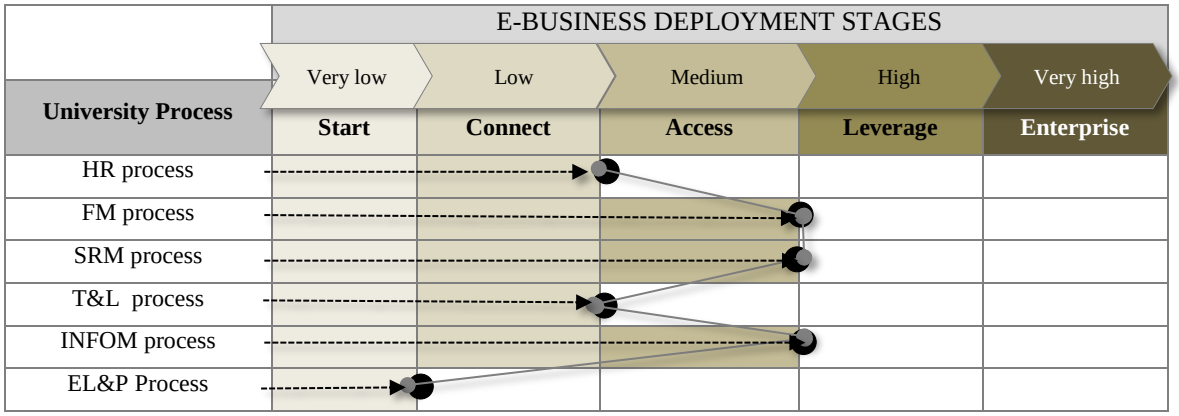


Figure 6.5 People capability maturity levels at UOMS

From the outcomes of the SCALE model, there were several important and interesting points related to e-business improvement in UOMS. For example, the people capability in INFO process attained a higher level of e-business skills, whereas the lowest level was indicated at EL&P. This finding sheds light on the reasons for the existence of such differences, as well as the influences that could be causes of stages gap (e.g. process documentation and people skills). These influences were behind some of these processes in obtaining improved stages, while other processes in the same university did not enjoy the same opportunity to be at the expected stage (e.g. T&L). By reviewing the results of the questionnaires, the next section will look into a number of the most important factors and reasons for the difficulties faced the three e-business deployment dimensions in UOMS processes, which limited the potential use and deployment of e-business. Thus, suggested improvements concerning e-business deployment enhancement can be provided. However, taking into account the results described above, they suggest that the UOMS processes have not been able to fully use the potential development of e-business that is currently available.

6.5 Barriers to e-business deployment at UOMS

The purpose of this section is to identify barriers to the deployment of e-business in the UOMS, and then to develop a plan for achieving a greater degree of e-business deployment in the Libyan university sector. This can be achieved by exploring key barriers that hamper the progression of e-business deployment to advanced levels within the university. Thus, plans for e-business progression improvement may play a crucial role in overcoming or reducing such e-business deployment barriers. However, in UOMS processes, a reason for low-level e-business deployment levels can be related to inadequate e-business deployment initiative plans. Based on the results, barriers to e-business deployment suggest multiple dimensions and approaches need to be developed

for a comprehensive progressive plan, which takes into consideration these e-business dimensions. Based on the SCALE model indications, the barriers were classified into three key categories, which will be discussed in the following sections.

6.5.1 Technology barriers

From the collected data, it is clear that UOMS were facing continual e-business challenges in its processes. For example, it had been indicated that the electricity supply was unstable, which can affect the sustainability of adopted e-business processes. In addition, the processes indicated it was a challenge to access internet services. Internet Connection was also unstable, and its availability in some processes, such as INFO, was not reliable enough for adopting managing processes and applying e-business implementation. There was no evidence of reliable suppliers that were able to accommodate university size requirements (e.g. internet services) which could help to build web applications by delivering a reliable and stable supply together with maintaining internet reliability. This is supported by the following observation:

> *"There is a difficulty in finding a reliable internet provider contract. Our internet Connection is irregular and internet instability does not encourage the university to deploy e-business services.*" **(IT manager)**

In addition, the limited bandwidth reduces the capacity to handle electronic data and Libya has poor telecommunications infrastructures. As such, these unreliable networks can only be used for simple data exchange activities. Furthermore, the lack of network reliability prevents the university campus and departments from being connected and resulting to reduced e-business activities (e.g. information sharing and communication). This would help limit the transformation to e-business based process. The different geographical locations of the university campuses limit the adoption of integrated communication, and together with the high cost of infrastructure, implementation prevents the existing university infrastructure from incorporating information and data exchange. This is supported by:

> *" The university campuses are located in many geographical locations, currently, it is expensive and difficult to link the campuses in one main data exchange channel, but we are thinking about adopting cloud technology that can support the university's communication."* (**IT manager)**

However, the university was in the process of developing a web-portal for academic and administrative purposes, such as student's results published online through a web portal. The IT team were uploading the results database to the university website so the

students could access this using their student number and password. However, these web applications were not integrated with internal BIS. In addition, there was a lack of server usage that limited the applications integration and support across the university, which can be considered as a barrier. For example, the interior systems in FM, T&L, and HR processes were still not working in integration with the university's website. The technology-based barriers to e-business deployment in UOMS are summarised in Table 6.4.

Table 6.4 Technology deployment barriers at UOMS

Technology Barriers
• Lack of reliable networks and internet Connection • Lack of external networks technology such as WAN. • Lack of web application and emails usage. • Lack of networks and digital data exchange systems. • Lack of sufficient capability services and integrated website • Lack of networked servers and database. • Lack of Communication Infrastructure and implementation. • High cost of e-business systems deployment, implementation, and maintenance. • Lack of local professional agencies for e-business technology implementation. • Lack of electronic data gathering and sharing events. • Lack of e-business or ICT deployment strategy.

Moreover, the university's lack of allocated financial support for e-business improvement is a direct result of the existing telecommunications and networks infrastructure remaining underdeveloped, reflecting a significant barrier to the effective deployment of e-business services.

6.5.2 Process barriers

As UOMS processes (e.g. INFO, FM, and SRM) were more likely to be using BIS, it was easier for these processes to use simpler tools (e.g. MS Office). In this case, data was often stored in different physical locations, in different folders on different computers; thus, using such a fragmented approach, storing and retrieving data was an extremely difficult job to undertake. The interviewees believed that this approach made the information hard to track. Moreover, it is problematic to get the authority to redesign the existing process for updating. It was stated that:

> *"The process and management regulation is not flexible enough to be re-designed to meet e-business interests; we have to follow the process which has been assigned by the Ministry of Higher Education for the universities' management*.**" (HR manager)**

Therefore, the employees continued to rely on traditional methods. However, in order to overcome these obstacles, they need to reassess their "we've always done it this way" approach, enabling the implementation of new systems. This barrier was expressed when the UOMS was considering ICT infrastructure improvement, and during the interviews, it was shown that:

> *"The administrative process for getting permission to develop ICT infrastructure like internet is very complicated, in our university we may need to be involved in a long time process to get permission for this."* **(IT manager)**

Furthermore, the absence of defined job roles, which may require ICT competence, increased the complexity of assignment tasks and managing rules under the context of pre-determined purposes. While the process could still be performed, there was a lack of documentation on process operations and management, and the activities in the departments and units were based on a set of repeatable processes. For example, the HR manager said that:

> *"The process is understood, but we do not use jobs description cards, and I believe in some cases its causes a lot of work to get satisfactory outcome results in performing process operations and management within the University units, we should develop the process and related assigned rules***.**" **(HR manager)**

The process could be understood, but it was still not documented and no standard indication of input and output progression was followed using pre-determined and recorded activities. The process was still able to produce outcomes based on individual efforts and repeated activities, although in some cases it caused a conflict of responsibilities and accountabilities. This issue was revealed by the following observation:

> *"Our university faces problems of function overlap, for example, between the study and examination processes, and registration section, also there is always repetition of work and delay of the expected deadlines. We do not have rigorous written process documentation."* **(SRM manager)**

UOMS processes are characterized and understood, but procedures and performing methods are not defined in basic terms. This lack of documentation is considered a barrier to e-business deployment, which prevents UOMS processes from following a

clear documented and controlled management approach. In this section, the SRM manger revealed that:

> *"In many cases, work rules, policies, and operating procedures are not clearly formalised and followed, the process still depends on the people experience in the units and departments providing the required services based on personal effort.* "(**HR manager**)

The lack of process standardisation will influence the growth and deployment of e-processes. Another barrier to process deployment mentioned in the interviews was the universities' geographical locations. This showed there is a need for clear strategy, including process deployment, to ensure university services were flexible and easily performed: It was indicated that:

> *" It is a serious challenge that the university campuses do not have deployment strategies and ICT guidelines to direct process delivery of its services; its challenge is to progress this process in the absence of clear deployment strategy***." (IT manager)**

The lack of stratagem to guide e-business based process improvement is considered a key concern. In addition, the university and related department's policies and regulations were experiencing a series of amendments. This political change reflected barriers that prevent the development of stable prearranged processes. Therefore, university initiatives are important in the deployment of e-business and other ICT applications. The process barriers are illustrated in Table 6.6:

Table 6.5 Process barriers to e-business at UOMS

Process Barriers
• Complicated administrative process for ICT development • Lack of Process standardisation • Political and Governmental Barriers • Lack of Documentation • Lack of process knowledge and Access. • lack of shared processes activities • Lack of process support and collaboration. • Lack a vision for process development engagement. • Lack of process development strategy. • Instability of University management style, and • Lack of defined process and services catalogues.

6.5.3 People barriers

Given the individual needs along with a request for team skills for e-business practices, it is evident that the barriers people faced were an issue. This affected the willingness of people to adopt e-business process at UOMS. It was revealed that the employees' concerns relating to changes in undertaking their work led to the impression that those jobs would be lost once technology took over. For example, one respondent stated:

> *"It's difficult to adopt activities needed to fellow e-business progression, because people are fearful of change, and they believe that this will cost them via loss of process control which can lead to a desire for information dominance. They believe that such a change might affect their positions and power in the management process that they enjoy at present."* **(HR manager)**

In terms of motivation towards e-business deployment, UOMS has made progress developing some e-business applications within the ICT department, but there is still a lack of motivation towards guiding e-business applications to their employees, and a lack of interest from the university management. For example, staff members who prefer using traditional teaching methods resist change to their current way of teaching. There is no enforcement from the university management to adopt these new methods. It was asserted that:

> *"Students often use technology for information searches and communication; the changes in the use of e-business applications is hard for employees, and it's also a challenge for the faculty members who like to use traditional teaching tools.***" (T&L manager)**

Fear of the unknown can also delay e-business development. The majority of the UOMS employees graduated from university, but most lack ICT training. Based on the data collected from the questionnaire and interviews, it became evident that there was a significant lack of skills on ICT applications and management in many processes, and the potential value of ICT and the internet applications was not appreciated. In addition, while English is the main language for the use of ICT and e-business applications, users in UOMS do not have the required knowledge of English, which therefore limits them from using the Web in their work. Thus, language skills were indicated as a barrier preventing UMOS from obtaining available services and applications developed in English. Therefore, language has been identified as a barrier that hinders both access to information and the internet and participation in e-business systems management. It was stated that:

> *"English language and useful ICT skills training and improvement are important; it helps our staff to become computer literate in their process. People at the university would have to be comprehensively trained and developed before they could benefit from the advantages offered to them by the e-business applications and activities.* **"(IT manager)**

Furthermore, the absence of any appropriate training prevented the employees from getting the required support for the adopted e-business applications. This hindered them from accepting work on upgraded or new adopted IT systems. Moreover, the findings indicated that the training provided was failing to effectively respond to the requirements necessary for improving e-business and management skills. The lack of e-business expertise in the field of e-business and information systems applications was preventing the university from adopting the desired e-business applications, and forming an appropriate strategy for e-services development. Subsequently, this delayed the university implementing plans. The basis for this delay was attributed to the lack of financial commitment.

> *"We cannot keep expert people in the department. Low salaries and lack of financial incentives mainly discourage knowledgeable people from staying and working at the university. They have offers from other institutions and companies which offer them better opportunities and give them higher salaries."* **(IT manager)**

The audit manager at UOMS stated that the existing university budget was apportioned to spending on specific areas. He indicated that they do not have authorisation or possess the power to overcome these restrictions. As a result, this negatively influenced the ability to allocate financial resources for e-business deployment, as there was no budget reserved for this purpose, and thus no financial resources available for requested development projects. The summary of People barriers is presented in the Table 6.5.

Table 6.6 People barriers to e-business at UOMS

People Barriers
• People fear of using technology • Lack of necessary training activities • Lack of enforcement • Lack of professional staffing and job description • Lack of expertise and professionally qualified people. • Resistance to change • Lack of professionals in e-business strategy. • Lack of manager's motivation. • Lack of awareness of e-business benefits and activities. • Lack of managers' knowledge and interest • Lack of employees' authorisation in allocating a budget for e-business development

The understanding of barriers to e-business deployment in UOMS can help to establish a successful e-business deployment process. Examinations of these barriers suggest the actions that need to be taken as part of an e-business deployment plan. This could require modifications and alterations to the university's internal structure and processes to facilitate an e-business deployment initiative. Currently, the internal processes, people skills, and systems need to be upgraded, and the change request is necessary to make a successful e-business change. The e-business deployment plan will help to indicate the steps need to be taken to assess the current situation and evaluate the risks. Prioritising e-business improvement can also be considered to allocate the available budget in specific process areas for effective e-business development project. Based on the data collected from UOMS, a number of barriers to e-business deployment were indicated. The barriers showed in Figure 6.6 need to be addressed and considered during the deployment of e-business initiative in the university.

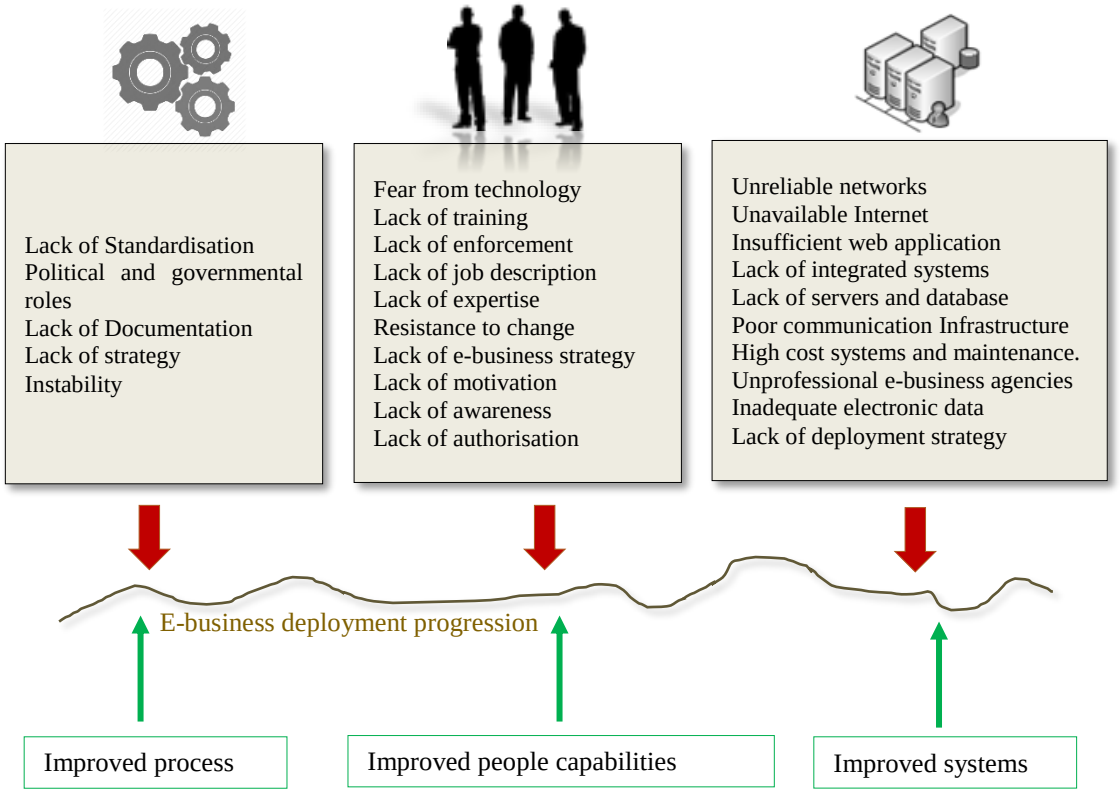


Figure 6.6 Barriers to e-business deployment in UOMS case

Through highlighting the important process at the UOMS, this helps to reveal the priority of e-business development in the specified areas, which leads to effective e-business improvement. However, the transition from the current e-business level to the targeted e-business stages in each the three e-business dimensions will guide decision makers to consider and focus on which process improvement should be considered, which e-business dimension need a direct development attention, and which other factors need to be placed on hold. The review of university structure will help to decide which part can be selected for this improvement. The stages of SCALE model will be useful in assisting and providing an effective roadmap of progressively mature and sophisticated e-business deployment initiative. Thus, in order for the university to create a cost effective e-business deployment, the current and potential involvement in e-business has to be considered.

6.5.4 UOMS e-business deployment progression

The SCALE model provides further insights into the assessment of the stages in explaining the evolution of e-business deployment levels at the university, as well as supporting the targeted levels of process improvements as illustrated in Figure 6.7.

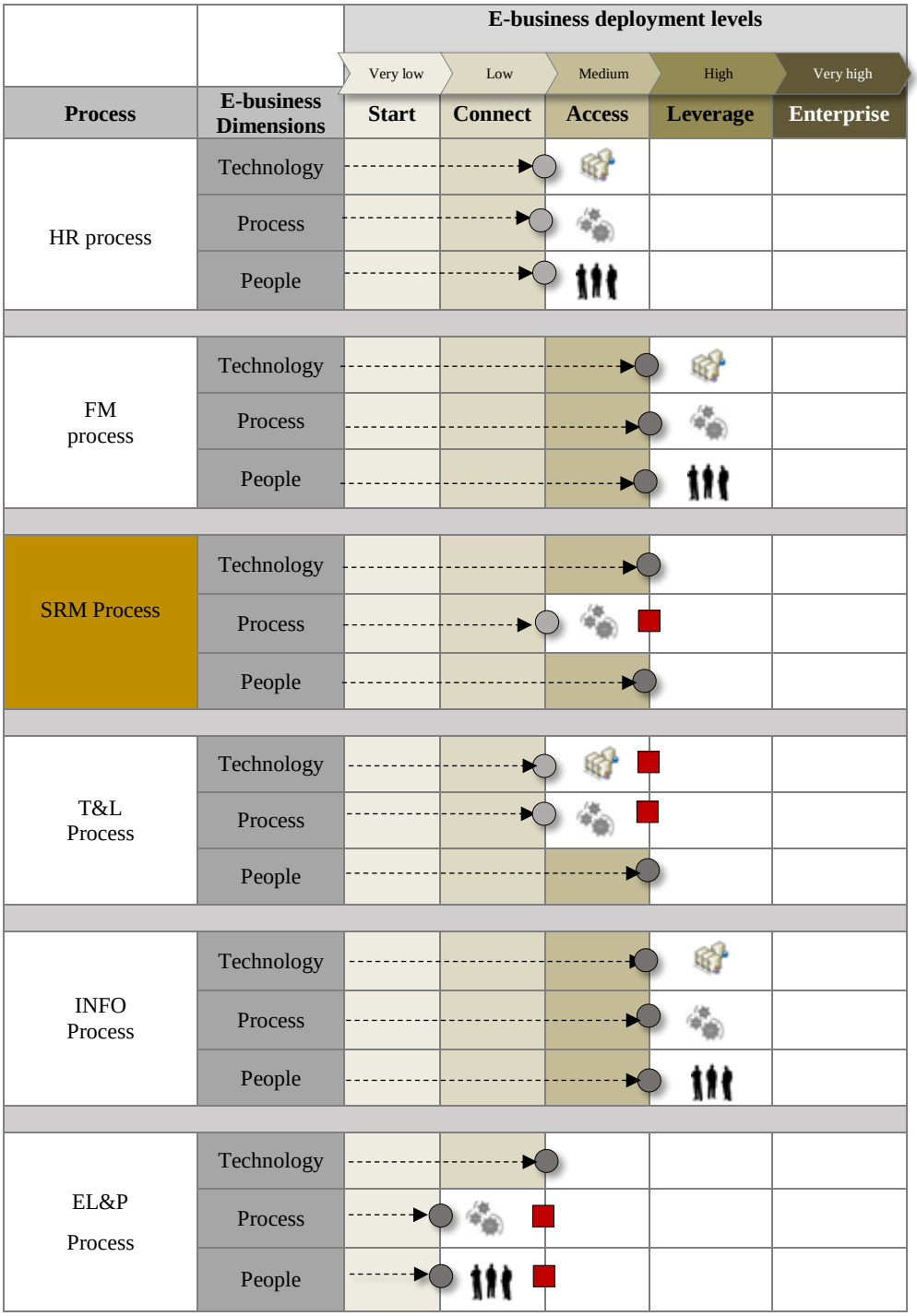


Figure 6.7 E-business deployment progression at UOMS

Current e-busienss level Initial targeted e-business level

The university should know the available evaluation techniques for targeted e-business deployment in each dimension. E-business deployment plan can be implemented to recognise the required development. The plan should include the requirements outlines the investments and prioritisation needed to achieve the desired e-business application portfolio. The indication of the most important process in the university could be

decided by the university decision makers, then e-business deployment levels in this process will be highlighted at three e-business dimensions. In the case of UOMS, the SRM process was highlighted as the most important process. Within the SRM process, the SCALE model assessment results indicated that the lowest e-business deployment level was in the process dimension. Thus, the improvement of e-business in the SRM process will concentrate on process dimension enhancement. The SCALE model assessment result will also help to guide harmonisation level between technology, process, and people at SRM process. This will help the SRM process to achieve an effective level of e-business deployment at the given stage. The SCALE model stages supports setting of the accurate targets, which lead to requires e-business dimensions' performance improvements only in the critical areas on the highlighted university process. However, the importance of an advanced e-business deployment plan has become pressing; the university requires improved understanding of e-business based management and a focus on the interactions created between e-business deployment dimensions.

6.6 Summary

This chapter focused on the description and analysis of data collected for the UOMS case study. This chapter determine the levels of e-business deployment in UOMS, and then discuss the barriers faced by the university in their e-business deployment implementation. Progression on establishing planned e-business deployment for UOMS was deliberated. The results indicated that the SCALE model provided an explanation on the different levels of e-business deployment at the university process level. The model can assist the university in identifying its future e-business deployment initiatives. Moreover, the results revealed that the SCALE model does have a useful and practical significance in assisting UOMS, and can generate discussion on "what critical progression is needed" and "what needs to be done" in order to achieve the maximum benefits of e-business deployment in future and improvement support. The SCALE assessment for the three e-business deployment dimensions shows potential support to help university to determine the targeted levels of e-business improvement. Finally, although the study has, in this chapter, been aimed at UOMS, the SCALE model can be applied to other universities in the Libyan context. This will require an examination of more cases. Thus, the next section will expand the research using the SCALE model to investigate the improvement of e-business deployment in UOST and UOSB.

Chapter 7 **Validation of The SCALE model**

7.1 Introduction

This chapter examines the application of the SCALE model to other Libyan universities, which are used as case studies to test out and validate the SCALE model design derived from research at UOMS. Two universities were selected for the SCALE model application and to measure the levels of e-business deployment in these two universities. The aim is that the model can be used for e-business deployment in Libyan universities as well as in universities with similar environments in general. The SCALE model can be used as a tool to progress other research studies. The two universities cases conducted in this chapter were UOST and UOSB. The chapter will focus on the initial mapping for the six university processes; each replicated process contains a number of sub-processes -similar to the mapped processes in the UOMS- to reflect the e-business activities and information flows within the university process. The SCALE model will be conducted to assess current levels of e-business deployment in the processes, as well as assess the operation capabilities of processes and sub-processes. Finally, the results of each university process mapping will be discussed and analyzed. The general results of e-business deployment progression levels at UOST and UOSB will presented.

7.2 UOST Case

In the case of UOST, six questionnaires were distributed to staff working in the six core university processes. The questionnaires were sent by email to the director of the postgraduate studies who coordinated and managed the questionnaire distribution amongst the UOST process managers. Later, the first official interviews were conducted with the T&L manager and the IT manager. The details of the UOST participants in questionnaires and interviews are summarised in Table 7.1.

Table 7.1 Data collection methods and participants from UOST

		Participation Method	
Process	Position	Questionnaires	Interview
HR process	Director of staff members affairs	√	x
FM process	Head of financial audit	√	x
SRM process	The university registrar	√	x
T&L process	Director for graduate studies	√	√
EL&P process	Manger of personnel affairs unit	√	x
INFO process	Director of the information centre	√	√

However, due to difficulty of communicating with other participants in the university, it was a challenge to secure more interviews with other participants. The responses from those participants stated that there were no new issues other than those that had been reported.

7.3 UOST findings

7.3.1 Human resources process (HR)

The HR process used desktop applications (e.g. Word, Excel, and Windows) associated with hardware distribution (e.g. computers, printers, and scanners). The BIS systems had been developed at the university through the IT team's use of VB 6.0/Sal, except that one BIS system in HR process (academic record management system) was outsourced. There was a local computer network installed in a number of HR offices; however, this was not sufficiently implemented, and the computers were not interconnected. Data and information were still carried out manually using paperwork, but in some cases stored on flash memory and external hard disks (e.g. in academic record data). The university developed a website, which was used to publish basic information and a number of online forms. The website was not integrated with the internal networks and computers, which prevented the university from relying on the website services to provide efficient e-business based activities. The website faces technical problems in terms of the speed of browsing. There was limited internet accessibility because the internet connection was unreliable and not always available to all employees and students. In addition, the internet speed was not sufficient to adopt HR processes, management and applications. Their use of basic internet applications such as emails for information exchange on HR services, and the technology used in HR was not integrated with other technology adopted by other UOST processes.

7.3.2 Financial management (FM)

The financial management process used a range of e-business application (e.g. MS Word, Excel, and Windows), and relevant hardware (e.g. computers, printers, and scanners). There was only one BIS adopted in financial activities, named the financial system. The system managed and generated statistical information reports - monthly, quarterly, half-yearly and yearly. The BIS was outsourced by the university to a local systems provider. The process used BIS system developed using MS Excel for auditing and treasury management activities. However, these BIS systems were limited to data monitoring and occasionally used for printing reports or tracking financial records. The BIS was still isolated from other e-business technology within the FM process (e.g. no networks was connected) which limited the reliability of these system for completing e-business activities in financial process. A local computer network was also deployed; however, it was not used for the management of financial processes, nor for computer interconnection or to enable data exchange. The FM process used the university website only for publishing basic information and providing FM documents (e.g. online administrative forms) for various financial resources and enquiries. No integration was presented between the internal hardware and website. This prevented the FM process from benefiting from the available potential website services. There was limited internet access, which was mainly used for personal applications such as connecting to social media and email. The internet access was mostly obtained through personal mobile internet connection (e.g. mobile phones), which were not used for FM process management practices. The electronic data and information were stored in local hard disks or external hard disks and flash memories.

7.3.3 Student records management (SRM)

SRM process used a wide-range of e-business applications (e.g. MS Word, Excel, and Windows), and associated hardware devices were also deployed (e.g. computers, printers, and scanners) for student records data processing and supervision. Two BIS systems were adopted by the SRM process, one in the study and exam sub-process (Study and exam system), the second was used for postgraduate records management (Postgraduate system). Both systems were developed internally by the university IT department. The BIS generated and handled information and statistical demands for SRM reports and managed the student records, including module registration and results. However, no networks were deployed to support the electronic data and information exchange. In addition, there was some personal use of web applications on

the university's website, where the internet usually supported reliable web based activities and services. The university website was used for information deployment and online forms. However, a computer network was implemented in some offices, but it is still unreliable for the adoption of e-business application. This limited SRM adoption and the use of networked systems and sharing of electronic data. Work was still largely paper-based, but some electronic student records and information were stored in hard disks and flash memories. The current technology deployment in SRM was still not able to deliver sufficient e-business services and was not managed by effective e-business activities.

7.3.4 Teaching and learning (T&L)

The university adopted desktop applications (e.g. MS Word, Excel, and Windows) as well as a number of computers, printers, data projectors, and scanners, which were used in classrooms and offices for teaching and learning purposes. The university was attempting to adopt e-learning systems (e.g. Moodle), but they still relied on desktop applications for day to day teaching and classroom management activities such as arranging timetabling using Excel sheets and MS Word, and no e-learning system was engaged in T&L process. The majority of T&L activities, such as the management of student lists, lecture materials, timetables, and timetabling were still manually organized on desktop applications. A local computer network was also implemented and wireless network was deployed in offices and classrooms for internet access; but there was no indication of it being used for data and information exchange support. For example, the postgraduate department used WIMAX (Worldwide Interoperability for Microwave Access) technology to connect internal users to internet. However, the internet connection was limited and not available on a regular basis, it is still unreliable for adopting teaching and learning applications. The T&L process adopted online library management processes and published few online books and catalogues for library materials, but borrowing could still not be done online. Therefore, students still needed to go to the library site to use the borrowing procedure. Communications between T&L internal users were conducted using a social media application (e.g. for course materials information), which still mainly relying on personal or phone communications. However, no integration was indicated between the internal applications and the university website in T&L process. At present, website capability cannot be adopted for T&L process and activities.

7.3.5 Estates, logistics and planning (EL&P)

Similar to the EL&P process at UOMS, the EL&P process at UOST still did not rely on e-business technology in their activities management. Typically, the processes relied on traditional ways of managing their day-to-day tasks. Moreover, there was a very low deployment and use of e-business applications. For example, a small number of desktop applications were used, which were deployed with associated hardware devices (e.g. limited number of computers) used to print letters and to save documents of events and work. Desktop applications, based on Excel sheets, were used in the EL&P sub-process, which was mainly used for information processing and arrangement of required materials for building or university maintenance projects. No BIS systems were indicated to be used in this process and no local computer networks were installed or used. Furthermore, the internet and the website were also not adopted or used by the EL&P process. Therefore, the lowest level of e-business application and use was found in the EL&P process.

7.3.6 Information and development (INFO)

The INFO process was managed and supervised by the university's IT department. They managed the university's information flow and deployment, and ICT development. There was a provisional plan for e-business development, which was based on an established university project for ICT development in 2012. This project attempted to implement optical fiber cable for the university's internal communications and data exchange as a first stage of e-business development. There was a wide use of desktop applications (e.g. MS Word, Excel, PowerPoint and Windows), computers and network devices were adopted. The IT department established the university web-portal using web contact management system (CMS) technology, and supervised university website update events. In addition, the IT team as part of the INFO process developed the majority of BIS systems used within the university processes. The process used a basic BIS system developed using MS Excel for archiving activities that held the university's academic and administrative information. Moreover, a computer network was implemented to support data and information exchange within the INFO management process, but was still not interconnected with the university's other departments and units. The network engineers were still reliant on basic personal skills for networks and maintenance tasks. The university's website was used for publishing and collecting the university's data and information. Whilst servers had been provided, they are still not involved in the website activities. The INFO process also supervised infrastructural

improvements, supported internal communications and assisted with internet connection across the university. Internet services were available and used for online university information publishing activities, together with adoption of university emails (name@su.edu.ly) for communication and information sharing. INFO process data was stored manually in the form of paperwork, and in some cases stored in local hard disks or flash memories. The general technology dimension findings in UOST and the status of relative change elements are illustrated in Table 7.2.

Table 7.2 Technology change elements at UOST

HUMAN RESOURCES PROCESSES						
	Desktop applications	Hardware	BIS	Networks	Website	Internet
Non-Academic records	√	√	x	x	√	x
Academic records	√	√	√	x	√	x
Administrative and Archives	√	√	x	x	x	x
FINANCIAL MANAGEMENT PROCESS						
	Desktop application	Hardware	BIS	Networks	Website	Internet
Procurement	√	√	x	x	√	x
Treasury	√	√	√	x	√	x
Auditing	√	√	x	x	x	√
STUDENTS RECORDERS MANAGEMENT PROCESS						
	Desktop application	Hardware	BIS	Networks	Website	Internet
Study and Exams	√	√	√	x	x	x
Registration	√	√	x	x	√	x
Graduation	√	√	x	x	x	x
TEACHING AND LEARNING PROCESSES						
	Desktop application	Hardware	BIS	Network	Website	Internet
Classrooms/study Management	√	√	x	√	x	x
Communication Interaction	√	√	x	x	x	√
Library	√	√	x	x	√	x
INFORMATION AND DEVELOPMENT						
	Desktop application	Hardware	BIS	Networks	Website	Internet
Networking	√	√	x	√	√	√
Web-development	√	√	x	x	√	√
Systems	√	√	√	x	x	x
ESTATE, LOGISTIC AND PLANNING PROCESSES						
	Desktop application	Hardware	BIS	Networks	Website	Internet
Estate/land Management	x	x	x	x	x	x
Logistics and transportation	√	√	x	x	x	x
Planning	√	√	x	x	x	x

7.4 UOST Analysis

7.4.1 Technology dimension analysis

Based on the SCALE model analysis conducted on the UOST overall findings, desktop applications were at the highest level of e-business deployment across the UOST processes, followed by hardware and devices deployment. In terms of BIS deployment (see appendix I), there were only two BIS utilised with the SRM and FM processes. The rest of the processes used Excel spreadsheets for employee records management, not databases. There was evidence of use of internet applications, limited to email exchanges and information distributions, but still not adopted to a degree where e-business applications could be progressed upon; it was also unreliable. The university website was developed by the university IT team, at and was used for the dissemination of online forms. However, the website applications were still not effectively used and still received a low level of application deployment. Following these results, the cross sectional range of e-business deployment level based on 'technology dimension' deployment can now be defined. The initial assessment of e-business deployment levels in the INFO, FM and SRM processes was highlighted at the Access stage, and HR and T&L processes were characterized as being at the e-business deployment Connect stage. EL&P process had the lowest technology deployment level at the university, being at the Start stage. The demonstration of SCALE ranges for the 'technology dimension' deployment levels is illustrated in Figure 7.1.

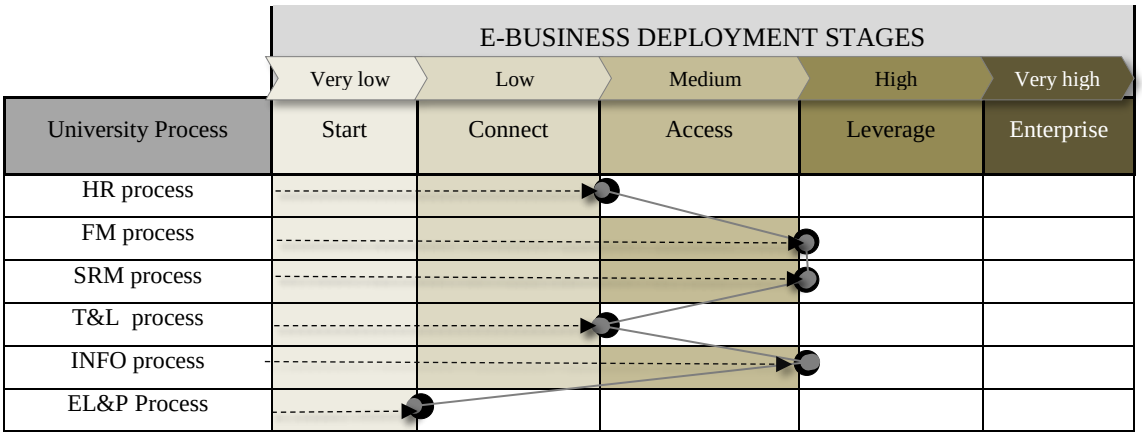


Figure 7.1 Technology deployment levels at UOST

The above analysis suggests that desktop applications, associated computers, and hardware were used and deployed effectively in all the university processes. BIS systems were used in the FM and SRM for administrative management, having been

developed by IT team at the INFO process. The use of internet and networks was limited, and the website was used for simple e-business applications such as online forms and information deployment. However, no systems integration was indicated, which was one of the reasons behind the low level of e-business technology and application deployment within the university.

7.4.2 Process dimension analysis

The results highlighted that there were documentation activities in a number of UOST processes and these were deployed inside the university. For example, the university processes guide (see appendix II) describes the process performance and activities management, which were published online. The process capacity was able to manage and support the performance of the university's day-to-day procedures. The general process dimension findings in UOST are illustrated in Table 7.3.

Table 7.3 Process change elements at UOST

HUMAN RESOURCES PROCESSES			
	Structured practices and Ability	Documentation	Standardization
Non-Academic records	x	√	x
Academic records	√	√	x
Administrative and Archives	√	√	x
FINANCIAL MANAGEMENT PROCESS			
	Structured practices and Ability	Documentation	Standardization
Procurement	√	√	x
Treasury	√	√	x
Auditing	√	x	x
STUDENTS RECORDS MANAGEMENT PROCESS			
	Structured practices and Ability	Documentation	Standardization
Study and Exams	√	√	x
Registration	√	√	x
Graduation	x	x	x
TEACHING AND LEARNING PROCESS			
	Structured practices and Ability	Documentation	Standardization
Classrooms/study Management	√	x	x
Communication Interaction	√	√	x
Library	√	√	x
ESTATE, LOGISTIC AND PLANNING PROCESSES			
	Structured practices and Ability	Documentation	Standardization
Estate/land Management	√	x	x
Logistics and transportation	√	x	x
Planning	√	√	x
INFORMATION AND DEVELOPMENT MANAGEMENT PROCESS			
	Structured practices and Ability	Documentation	Standardization
Networking	√	√	x
Web-development	√	√	x
Systems	√	√	x

However, the processes were managed both manually and automatically. For example,

in the HR, FM and SRM processes, a progress guide book had been generated to describe the associated activities and required actions for users and employees' requests to perform the processes, as well as the process input and output that had been determined and transcribed. Thus, understanding the process documentation supported the university to manage the majority of their process administration and work in a clear way. The results indicated availability of process documentation, which were developed according to the university's ICT development activities, supervised by the IT department. Furthermore, most of the key processes were documented as well as associated services and the applications required guiding the university users. Based on the initial analysis of SCALE model, the highest level of e-business deployment was highlighted in the SRM, HR, FM and INFO process, which was the Access stage. The SRM process was documented and published on the website to guide the students' activities (e.g. first time admission requests, statement of grades and transfers from one college to another within the university). In addition, the INFO process adopted ICT improvement events guided by IT development project. This project was established to support the university e-business based process. Furthermore, due to the less documentation process in the teaching activities, the T&L process has achieved Connect stage. The lowest process capability and deployment was identified at the ET&P process, which was placed at the level of Start stage. This is because the lack of process understanding was considered as a challenge of e-business use in this process. Demonstration of the process deployment levels is illustrated in Figure 7.2.

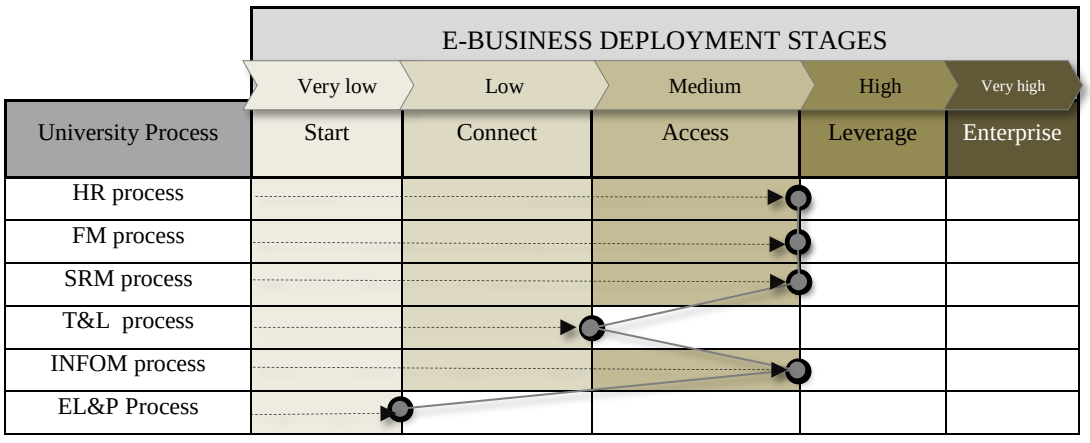


Figure 7.2 Process deployment levels at UOST

The above SCALE analysis indicates that the majorities of the university processes were able to be performed and could be conducted to create the required outcomes. The HR, INFO and SRM process were conducted using documentation activities managed

by the IT department. The process operation received e-business support based on ICT development projects, which led to better process performance across the university departments. However, according to SCALE model assessment, process integration was not present and lack of process documentation was highlighted at EL&P process, which was a challenge that limited progress in e-business transformation to the next stages.

7.4.3 People dimension analysis

The status of people dimension change elements at UOST are demonstrated in Table 7.4

Table 7.4 Status of people change elements at UOST

PEOPLE'S STATUS IN HUMAN RESOURCES PROCESS				
	Teamwork	Managerial Skills	Training	Technological skills
Non-Academic records	√	√	√	√
Academic records	√	√	√	√
Administrative and Archives	√	x	√	x
PEOPLE'S STATUS IN FINANCIAL MANAGEMENT PROCESS				
	Teamwork	Managerial Skills	Training	Technological skills
Procurement	√	x	√	√
Treasury	√	√	x	√
Auditing	√	√	x	x
PEOPLE'S STATUS IN STUDENTS RECORDS MANAGEMENT PROCESS				
	Teamwork	Managerial Skills	Training	Technological skills
Study and Exams	√	√	x	√
Registration	√	√	x	√
Graduation	x	x	x	x
PEOPLE'S STATUS IN TEACHING AND LEARNING PROCESS				
	Teamwork	Managerial Skills	Training	Technological skills
Classrooms/study Management	x	x	x	√
Communication Interaction	x	x	x	x
Library	x	√	√	x
PEOPLE'S STATUS IN LOGISTIC AND PLANNING PROCESS				
	Teamwork	Managerial Skills	Training	Technological skills
Estate/land Management	x	x	x	x
Logistics and transportation	x	x	x	x
Planning	√	x	x	√
PEOPLE'S STATUS IN INFORMATION AND DEVELOPMENT PROCESS				
	Teamwork	Managerial Skills	Training	Technological skills
Networking	√	x	√	√
Web/development	√	√	√	√
Systems	√	√	x	√

People capabilities at UOST were also evaluated using the SCALE model. People capabilities were directed by e-business deployment change elements related to the people dimension. Employees' coordinated actives were indicated at the departmental level, which reflected teamwork engagement. Managers were taking responsibility for coordinating, managing and developing employees' practices, and collecting the

required information on the areas of necessary skills and training. However, people's e-business skills were still limited, and there was indication of personal e-business skills development and motivation involved UOST process (e.g. in T&L process). The people training and skills development were shown to be supporting employees' technical and management abilities and aimed to increase motivation towards technology adoption. However, while the required workforce for e-business activities was highlighted, no management practices and job description tools were presented. No employee capability was analysed or monitored, which had an impact on necessity capability and people skills. Based on the SCALE assessment results, the available people capability change elements have been indicated. The highest people capability level was indicated in three processes, FP, SRM and INFO, which highlighted the capability of e-business deployment level at Access stage. The level of people capability at the HR and T&L process achieved the Connect stage. During the data collection, the university was providing training activities to improve people capabilities in HR process, but the T&L process still had not progressed. Similar to process and technology deployment levels, the remaining ET&P process results were at the lowest people capabilities levels achieving a stage of Start stage. The people capabilities dimension and its associated e-business deployment level is shown in Figure 7.3.

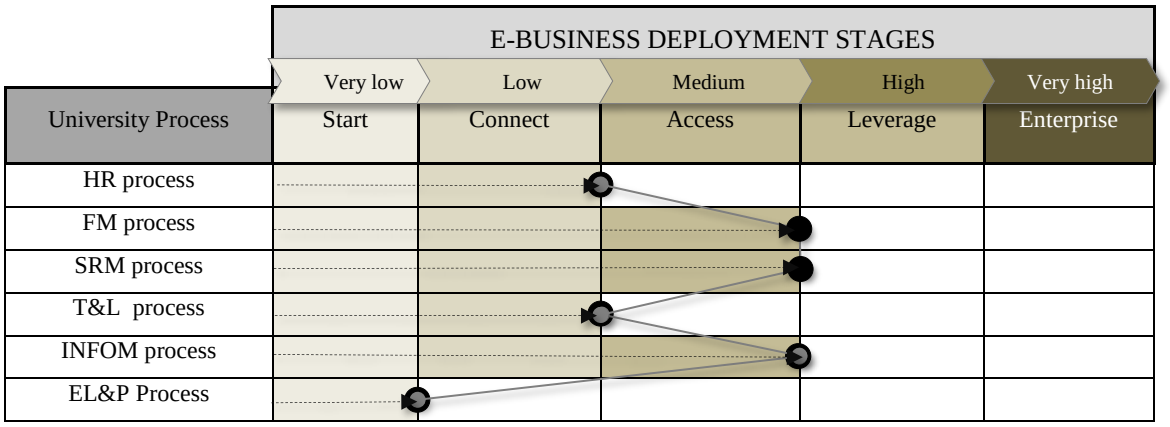


Figure 7.3 People capabilities deployment levels at UOST

Teamwork was indicated due to the existing management skills leading to process and people cooperation. The SCALE model demonstration showed that the training element was not effectively arranged, the T&L process manager who reported that the employees were able to perform their processes activities supported this, but this was not through skills gained on the training development events provided by their departments. The levels of e-business deployment guided by people change elements were mostly management and technical skills elements. The e-business improvement

still needed planned training activities, which were considered as a key to the e-business deployment challenge. The planned training activities should be considered in all the university processes, which support e-business skills and lead e-business stages transformation to better levels on SCALE model.

7.5 E-business deployment barriers at UOST

7.5.1 Technology barriers

Collected data indicated that the use and deployment level of technology typically was still in basic applications. Even with the majority of UOST and its offices being in one geographical location, the network implementation and related internet facilities were poor. A lack of ICT infrastructure implementation was indicated, which kept the internet services and connections unstable. In addition, there was limited internet access for the majority of university members, where is only accessible to a small number of employees in the departments (e.g. IT department). For example, the postgraduate department implemented wireless network for limited internet connection to be used by number of employees through a password and for an information search. However, an interview with the T&L manager revealed that the unreliable infrastructure barrier limited the university's adoption of advanced applications required for e-business activities, such as online SRM applications. This view is supported by the following statement:

> *"The internet is not always available, and it is not reliable for adopting e-services, we cannot rely on this technology to be used for e-business based applications and management at present, the connection is always unstable. We cannot use it for wide application now. "(***T&L manager)**

Because the existing level of networking was not capable of providing interconnection between university and departments, there was still a low level of network deployment. A lack of network reliability and dependability continued to limit the university process from being usefully interconnected, which had a negative impact on the deployment of e-business. Furthermore, as only a few numbers of BIS systems were deployed, a lack of strategic implementation was indicated. One reason given was the lack of professional e-business application suppliers, which affected BIS systems' quality and integration. However, because the majority of colleges and departments were located in one campus at UOST, the potential of digital communication and systems deployment should be easier. There was a lack of application integration and networked systems,

which was revealed by the IT manager. This has clearly had an impact on the exchange of digital information using the existing infrastructure. This was supported by:

> *" Most of our schools are based on one site, but we still do not find it easy to share and exchange digital data inside the university. I can see that we need to improve the interconnection between our internal applications, and currently we are developing ICT strategy which includes the development of the university's internal networks."* **(IT manager)**

The university website supported the development of a number of web-portal applications and activities (e.g. online forms), which were provided for both students and staff. However, the website was still not sufficient and faced difficulties such as low speed making it unusable, along with a lack of web application integration with internal systems. It mostly centered on online forms in PDF files uploaded to the website and available for download by students or employees. A lack of integrated online applications was revealed, and the university website faced technical challenges in adopting an integrating information systems. In addition, the existing telecommunications infrastructure faced a lack of reliability and trust, considered unsuitable for e-business purposes. The T&L Manger revealed that:

> *"We have not faced problems with budget and financial resources to support e-business assets so far. However, I believe that we need a university e-business implementation strategy for extending the investment in technology based on a strategic plan. The ICT systems and applications need to be improved, and I think they should be redesigned to be used for the operations management of teaching, and e-learning application."* (**T&L manager)**

The university is currently trialing optical fiber implementation, which is considered as the first phase of e-business infrastructure improvement managing by IT department, and the next stages will focus on deployment of e-business applications and BIS implementations in the key university process and services. Based on the exploration of collected data and their clarification of e-business deployment, the technology barriers that influenced the effective deployment of e-business activities and services can be summarised in Table 7.5:

Table 7.5 Technology barriers to e-business at UOST

Technology barriers
• Lack of reliable and stable internet • Lack of professional e-business application and implementation workers • Lack of adequate and unusable web-portal services • Poor of telecommunications infrastructure • Lack of networked systems and e-services application • Lack of electronic archive

7.5.2 Process barriers

According to the questionnaire results, the university data was stored in different ways, such as folders on different computers and external hard disks. Even with the existing levels of documentation, the multiple ways of keeping data still had an impact on the university processes documentation. The interviews revealed that a high level of process documentation was present. A number of processes, however, were still driven by ad hoc efforts, where processes are not sufficiently defined and typically disorganised, such as the EL&P process. In addition, the majority of repeatable process transactions were carried out in person through paper-based systems. Moreover, it was revealed that:

> *"The process and management regulation is not flexible enough to be re-designed to meet sufficient e-business requirement, we have to follow the process that has been assigned by the ministry of higher education for the universities' management. So far, it's been hard to get authority to redesign the existing university processes."* **(T&L manager)**

Therefore, the employees were relying on the traditional way of managing their daily work. Moreover, employees were fearful about change and resisted it. They believed it would change the way they have always done it their work. This barrier was expressed during the ICT infrastructure improvement activities, and it was supported by subsequent interviews:

> *"The administrative process for getting permission to develop ICT infrastructure like internet is very complicated, in our university we may need to be involved in a long term process to get permission for this…people do not have the motivation to change how they are performing the process at present."* **(IT manager)**

Furthermore, the absence of a job description, which regulated the efficiency of individuals, increased the misunderstanding of some process performances in a number of process activities. This caused mismanagement of task assignments and rules management. However, process performance could still be performed and the activities

in the departments and units were based on a set of repeatable processes. It was revealed from the interview that:

> *"Most of the process is understood, we are telling people what their tasks are, but we do not use job description tools. I believe it requires hard effort - in some cases to get satisfactory outcome results in preforming process operations and management. The process and related assigned rules need more improvement work.*" **(T&L manager)**

The process and the objectives could be understood, and the majority of the processes were documented, but no standardization was indicated. Furthermore, poor commitment processes and associated responsibilities were also indicated, there is a lack of clear process and associated services catalogues in some activities. From an interview, it was revealed:

> *"We sometimes face problems of functions conflict and similarity; for example, in logistics and transportation services management, there are uncoordinated, repeated, and uncontrolled activities that cost delay and weak management of the estimated required time."* **(T&L manager)**

According to the collected data, a summary of the process barriers that are keep e-business deployment delayed in UOST were identified including the following:

Table 7.6 Process barrier to e-business at UOST

Process barriers
• Lack of defined e-business process and application • Lack of process knowledge • Lack of e-business process strategy • Lack of standardized activities • Lack of university management instability, and • Lack of defined process and services catalogues

7.5.3 People barriers

The university faced challenges from a lack of information being provided to people on ICT and available services. The university provides training programs, but the required training programs were not delivered in a qualified and suitable form to support the present needs and systems. For example, these training activities were not driven form planned e-business deployment, instead it was suggested by process mangers based on their personal beliefs. In addition, there was a lack of responsiveness to the potential

benefits of e-business deployment and related applications, and no clear implication appeared on daily work. T&L manager revealed that:

> *"I supervise a number of training requests, I believe that this training is not enough, and the university needs to provide more skills improvement activities that can respond to the needs of the present day-to-day work. The provided training is not providing the necessary outcomes in terms of people capabilities*." (**T&L manager)**

The results of the questionnaires suggest that the training provided was not designed to meet the requirement of e-business applications. There was no training plan supporting the required skills for e-business, in particular, the sections of language and ICT skills improvement. The senior management still lacked ICT knowledge. This was supported from the interview with T&L manager who revealed that the poor ICT skills limited people's feeling towards transferring to e-business skills. The T&L manager reported that:

> *"Training the local personnel is not a solution for junior people in the ICT section as they are managing information systems and web application improvement activities. However, the fear of transferring to e-business applications and tools keeps the practices of e-business to levels less than are needed."* **(T&L manager)**

There was a lack of personnel familiarity with e-business applications and lack of training activities. This indicates that a respectable training plan is becoming more essential. In terms of language skills, the university was providing English language training, so the language was not considered as an e-business barrier. The summarised people barriers at UOST are presented in Table 7.7.

Table 7.7 People barriers to e-business at UOST

People barriers
• Lack of e-business application practice • Lack of people commitment and motivation • Lack of electronic information available • Lack of support for e-business deployment application and usage • Lack of employee allocated for electronic data collection • Lack of professional staffing and job description documented cards • Lack of qualified people to use e-business process and application • Fear from changing the way of work in many cases in particular old employees • Lack of sufficient training activities outcomes

7.5.4 E-business deployment progression levels at UOST

The interview with the director of graduate studies at the UOST, together with the interview with the director of the IT department, suggested that both SRM and HR processes were the most important administrative processes that established value at UOST. Therefore, the analysis given by the SCALE model aids the university to understand the priorities of their e-business deployment and needed improvement. This will require a number of steps. Most of UOST processes enjoyed a level of e-business maturity. Due to the use of process documentations in the UOST, the development progression at UOST process showed the important required of e-business improvement in the overall UOST processes. Figure 7.7 illustrates the general state of e-business deployment levels in the UOST processes.

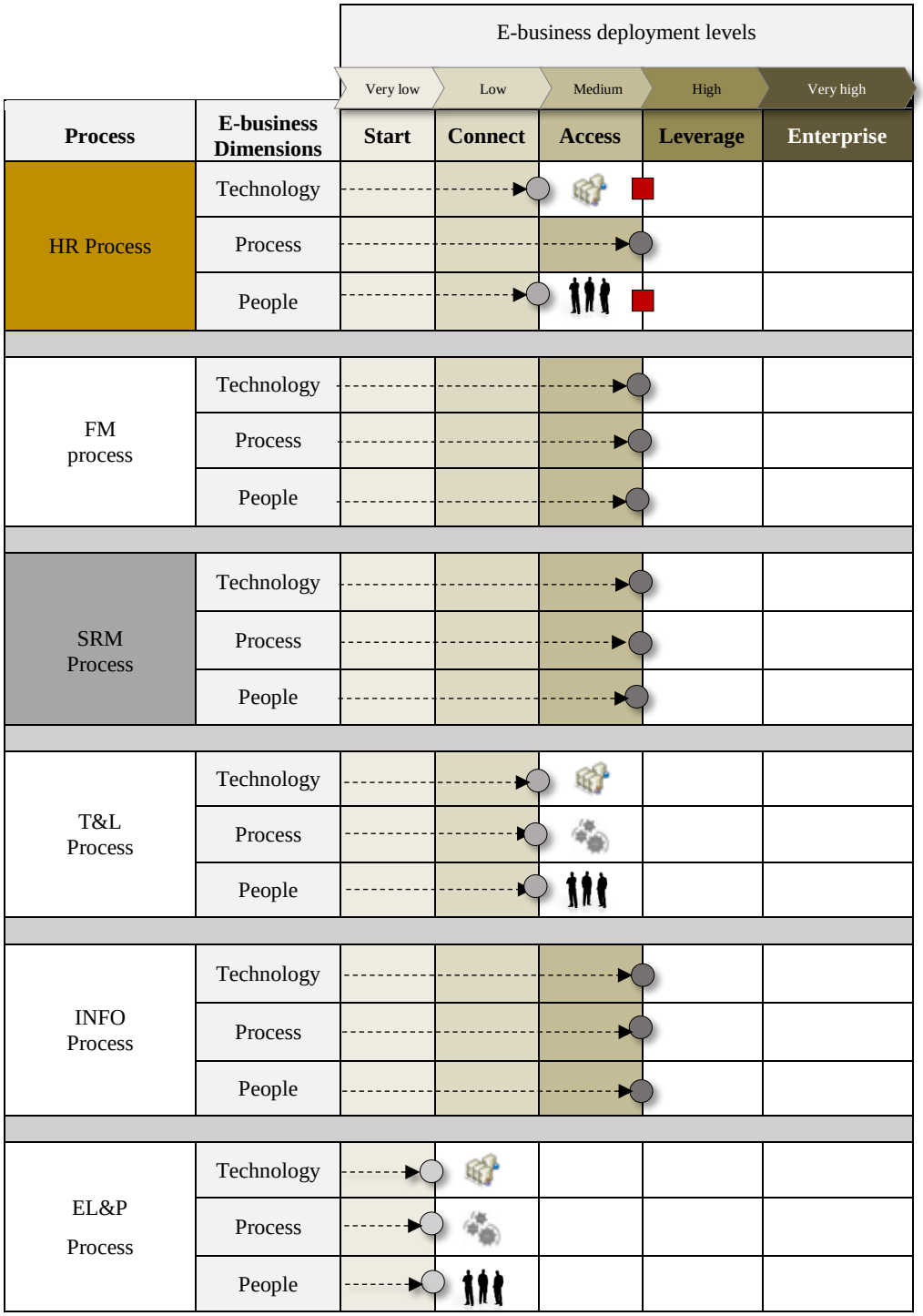


Figure 7.4 E-business deployment progression at UOST

Current e-business level | Initial targeted e-business level

Based on SCALE model analysis results illustrated in Figure 7.4, the level of e-business deployment is indicated. The most important processes for UOST were also highlighted by the university process managers, which were SRM and HR processes. Thus, for example, in the HR process, due to the process documentation levels indicted, there was focus on process development, and the e-business improvement priority was being

given to the focus on technology and people dimensions. Thus, the University needs in future to focus on relations that can create the merging of e-business deployment dimensions at the same level in Access stage and innovative e-business deployment plan should involve investment decision in technology applications such as BIS systems, together with people skills development incorporated with documented process at this stage. However, the interviews revealed that such changes are not easy to make and UOST still faces challenges from undefined and unclear e-business development plans. Thus, SCALE model was providing a direction to the UOST to define their needs and make the correct decision about where the improvement steps should focus in the present. The e-business deployment progression illustrated in Figure 7.4 brings to the attention the importance of e-business deployment plan arguments. The university should think about its e-business improvement plan and focus on collaborations, which can be created by harmonizing the e-business deployment dimensions at the same stage in SCALE model. The analysis of UOST case showed that SCALE model was able to provide the principles of such changes, and highlighted the requirements needed for a clear detailed e-business deployment plan in the university.

7.6 UOSB Case

This section focuses on e-business deployment in the UOSB case. Similar to the two previously discussed university cases, UOMS and UOST, six questionnaires were sent by email to the UOSB, six key process managers were selected to participate in data collection from the university, and all questionnaires were answered, though some not in full. An interview was conducted with the IT manager in order to discuss the absence of information and data from the received questionnaires. The IT manager was selected as he was leading IT development projects in the university. It was a challenge to secure interviews with other participants, due to problems of communication. In addition, some of the participants made comments in the questionnaires expressing that they had no additional information to add to what had previously been provided. Thus, based on the collected data from the field study, the details of the questionnaires and interviews undertaken with the participants are summarised in Table 7.8

Table 7.8 Questionnaires and interviews participant details

		Participation Method	
Process	Position	Questionnaires	Interview
HR process	Director of staff members affairs	√	x
FM process	Head of financial audit	√	x
SRM process	The university registrar	√	x
T&L process	Director for graduate studies	√	x
EL&P process	Manger of personnel affairs unit	√	x
INFO process	Director of the information centre	√	√

Initial mapping for the six university processes was conducted; each replicated process contains a number of sub-processes similar to the mapped processes in the UOMS and UOST cases. The process mapping helped to reflect the activities and information flows within the university process. The responses from the employees involved in performing those processes also revealed a number of e-business issues, which indicated use and barriers to e-business in UOSB. The SCALE model was used to assess and give the current e-business deployment of these processes and assess their application and operation capabilities in supporting processes and sub-processes. The results of process mapping will be discussed in the following section.

7.7 UOSB findings

7.7.1 Human resources process (HR)

At UOSB, the HR process used a range of e-business technology to manage and perform their day-to-day activities. For example, the data was collected manually and prepared using software packages such as MS Word or Excel spreadsheets. The process still relied on a high degree of manual and semi-manual processes, which lead to lack of information sharing. Desktop applications were used to manage day-to-day enquiries (e.g. staff changes) and to recollect the classified details from people in the university (e.g. staff and employee's records update). The BIS system used in the HR process was developed by MS Excel to manage employee records in the academic records management sub-process. This system issued reports when employees' personal details and related academic information such as publications and lectures were required; the reports were provided upon request and annually, based on an Excel sheets stand-alone system. The HR process deployed a number of hardware units (e.g. printers) and computers but no integration or networked systems were in place. The process also installed a local computer network, which was implemented in a small number of HR

offices. However, the UOSB was managing activities to implement a fiber optic network within the university campus, however, HR process had still not benefited from the potential advantages provided by such technology. Its processes still carried out the majority of data and information manually on paperwork, but there was some electronic data stored in flash memories or on computers (e.g. data of academic staff records). Due to the poor university website design, the HR process had not adopted or used possible web applications on the website for process management. The website was inactive most of the time. However, there was internet provided by the university, but UR process accessibility was not possible and no internet applications were adopted. Finally, the technology used in HR was still basic and could not be used for e-business based procedures.

7.7.2 Financial management (FM)

The FM process deployed and used e-business technologies such as MS Word and Windows, which were installed on a range of computers, and also engaged a number of printers and scanners. The FM activities implemented one BIS system named 'financial system' for the purpose of salary management, which was outsourced. The system managed and generated information and statistical reports - monthly, quarterly, half-yearly and yearly. In addition, the auditing and treasury management used a BIS system, which was developed using MS Excel for managing their procedures. However, the system was limited to a list of data and was occasionally used for issuing reports about records in FM process. The BIS system was still not reliable to be used for complete e-business based procedures in FM process. Furthermore, local computer networks were also implemented but not used for system and computer integration activities. The FM process also did not use the available fiber-optics networks, which were deployed and connected to the local network. Moreover, no data exchange or information sharing was employed by these network technologies. Regarding website usability, no website applications were available and no integration was presented between the internal computers and hardware in the different processes. This prevented the FM process from getting potential benefit from e-business applications and services could be provided by the website. The internet was available, but was still not being used in FM process management practices and work procedures. It is only adopted for running basic social media applications or email. Finally, electronic data and information was usually stored in a local hard disk or flash memories.

7.7.3 Student records management (SRM)

SRM processes used of wide-range of e-business (e.g. MS Word, Excel, and Windows), where computers and hardware devices were also deployed for records and data managements. However, there was limited deployment of computers in this process. The SRM process had been developed and used e-business systems for student records management. In particular, one BIS system was used and named 'Student Study and Exam system'. This generated and handled information for SRM results, registration and student details reports. However, the SRM still relied on manual preparation of student details records and module registration, which was undertaken on paper before processing onto the system. There was local network connectivity, which interconnected with the university fibre optic network deployed in the university. In the SRM process, the fibre network was only used for providing internet access, but no data or information was exchanged using this technology. The process did not use the university web for SRM events and management. However, there were still difficulties using e-business in the SRM process; for example, the internal networks were deployed to support internet connection access in the SRM offices, but not used for electronic data and information exchange or communication.

Due to the weakness of university's website, the SRM services were still not provided online. The university signed a contract with a local internet services provider for internet services, which make the internet usually available with a speed of 12 MB. Even with internet access, the SRM still was not using online applications or web services. Therefore, e-business applications in the SRM offices were still isolated and only a limited number of SRM activities were being networked and integrated. No enabled web system was installed, nor was there electronic data sharing. The information in students' records was regularly managed via paper-based work and stored on hard disks and flash memories. The current technology deployment in SRM still needs substantial improvement to be able to deliver sufficient SRM procedures or services based on e-business deployment.

7.7.4 Teaching and learning (T&L)

The T&L process was adopting desktop applications (e.g. MS Word, Excel, and Windows) and a number of computers, printers, data projectors, and scanners were being used for classrooms management. Most T&L procedures such as student list management, lectures information and timetables were arranged manually by desktop

applications, and then entered onto BIS system to manage these procedures. The IT department in UOSB developed the BIS system used in most of the academic departments. The system mainly issued a number of reports such as lecture details, timetables, classroom management, and academic office activities. However, no e-learning systems or an online activity for teaching and learning purposes had been adopted. The university is still relying on a number of desktop applications for day-to-day teaching procedures; for example, using PowerPoint and MS Word. The local computer network was implemented in a number of classrooms and labs, but it was not using teaching and learning data sharing and exchanges. Internet connection was accessed by people in the colleges and departments, but could only be used for activities such as information searches and simple communication (e.g. social media).

The activity of internal communication between students and teachers was mainly based on face-to-face contact or the use of telephones in some cases. However, a number of students were using social media for communications with their teachers, for example, using social media for access to distributed online lecture information and materials, for which generally they used their own personal mobile internet connection. Furthermore, the library management processes still relied on the traditional management system; no e-library system was adopted for searching books or journals, and the students still needed to visit the library to borrow or collect books or other research related resources. The T&L process was linked to the fiber optic network, but still there was no indicated integration between the internal computers and e-business applications that could be used in T&L activities. At present, there was an emerging e-business infrastructure adopted in T&L, but the process still could not be based on the reliability of the internet for T&L procedures.

7.7.5 Information and development (INFO)

The INFO process is coordinated by the university's IT department, which managed the university’s information flow and deployment, and supervised UOSB ICT development projects. There were indications of e-business level and ICT development activity managed in this process. For example, the INFO process was attempting to deploy several e-business applications across the university campus to support the university's internal communications and data exchange. It had already implemented a fiber optic network in the university campus, which could support the use and adoption of advanced of e-business based applications such as integrated systems. Currently, the main e-business application adopted in this processes was based on desktop applications

(e.g. MS Word, Excel, PowerPoint and Windows), and a number of computers and devices such as scanners and printers were deployed. In the INFO process, a number of BIS systems had been developed based on request from the other university processes; for example, they developed SRM systems for study and exam detail management. They also deployed local computer networks to support e-business activities such as information exchange within and between all UOSB processes.

However, there was no interconnection or integration between the computers and systems, which were deployed in other departments or units and should have been used in all UOSB processes. In 2015, the IT department started developing a university web-portal, but no e-business based services or applications were yet available. The networks, moreover, were still not reliable to be used for adequate INFO process management techniques. Furthermore, the network engineers were still relying on basic personal skills for network diagnosis and maintenance tasks. The Internet connection is available and used in the process for online information and data search. The internet is also used for university email exchanges with external partners, but during the conducting of this research, the emailing system was not working due to technical difficulties. The e-business development project was still under progression, and no e-business improvement or advanced use results had been presented yet.

However, the INFO process was making progress towards a development of e-business applications and process improvement, but there was evidence that the INFO process still faced many challenges that limited the university processes from deploying e-business smoothly. The INFO process data was mostly still manually carried out, but there was electronic data that were stored in local hard disks or flash memories. Finally, the necessary improvements of e-business in UOSB were not well designed and there was no developed clear ICT plan, which limited the university and INFO process from enjoying the potential benefits of e-business.

7.7.6 Estate, logistics and planning (EL&P)

The EL&P process used very basis desktop applications or hardware in their activities, and relied on traditional ways of managing (e.g. only one computer used in this process). There was a lack of e-business procedures and applications deployment in the three EL&P sub-processes. In the EL&P process, the deployment of telephone landlines and one computer with desktop applications represented a limited e-business deployment. No hardware devices were used for day-to-day process procedures, such

as printing or documents scanning. The process used desktop applications based on MS Word only, and did not use Excel sheets or other applications. No BIS systems or networks were implemented or used, and no internet or web applications had been adopted. The website was also not active. The EL&P process were highlighted as the process with the lowest use of e-business applications and activities. The barriers to adopting and using e-business will be discussed in detail in section 7.10. The findings of the technology dimension and change elements deployment in UOSB are summarised in Table 7.9.

Table 7.9 T**echnology change elements at UOSB**

HUMAN RESOURCES PROCESSES						
	Desktop applications	Hardware	BIS	Internet	Website	Networks
Non-Academic records	√	√	x	x	x	x
Academic records	√	√	√	x	x	x
Administrative and Archives	√	√	x	x	x	x
FINANCIAL MANAGEMENT PROCESS						
	Desktop application	Hardware	BIS	Internet	Website	Networks
Procurement	√	√	x	x	x	x
Treasury	√	√	√	x	x	x
Auditing	√	√	x	x	x	x
STUDENTS RECORDERS MANAGEMENT PROCESS						
	Desktop application	Hardware	BIS	Internet	Website	Networks
Study and Exams	√	√	√	x	x	x
Registration	√	√	x	x	x	x
Graduation	√	√	x	x	x	x
TEACHING AND LEARNING PROCESS						
	Desktop application	Hardware	BIS	Internet	Website	Network
Classrooms/study Management	√	√	√	x	x	x
Communication Interaction	√	√	x	x	x	x
Library	√	√	x	x	x	x
ESTATE, LOGISTIC AND PLANNING PROCESSES						
	Desktop application	Hardware	BIS	Internet	Website	Networks
Estate/land Management	x	x	x	x	x	x
Logistics and transportation	√	√	x	x	x	x
Planning	√	√	x	x	x	x
INFORMATION AND DEVELOPMENT						
	Desktop application	Hardware	BIS	Internet	Website	Networks
Networking	√	√	x	√	x	√
Web-development	√	√	x	√	√	x
Systems	√	√	√	x	x	x

7.8 UOSB Aanalysis

7.8.1 Technology dimension analysis

Based on the SCALE model analysis, the findings revealed that desktop applications were the main e-business application used and deployed across the UOSB processes.

Computers were the main e-business tools used with software applications such as Windows. However, in the case of UOSB, a common use and deployment of technology was highlighted, but the use and deployment of internet was indicated to be at different deployment levels. For example, the SCALE model highlighted that the use of internet application was very low, in particular it was used for limited email exchanges or access to social media rather than for development website purposes and was not reliable. It was not adopted at the level where the process was able to provide e-business based applications. The university website was still under development by the university IT team, and it was not in use, which prevented the website applications from being adopted in all UOSB processes for applications management and procedures, and had received a low level of deployment. In terms of BIS deployment, three BIS systems were deployed in T&L, SRM and FM process, which showed progressive levels of e-business deployment in UOSB processes, but no integrated online or web application was presented. The rest of the UOSB processes used Excel spreadsheets for employee records management. Following these results, the range of e-business deployment levels based on the technology dimension and related change elements can now be defined as illustrated in Figure 7.5.

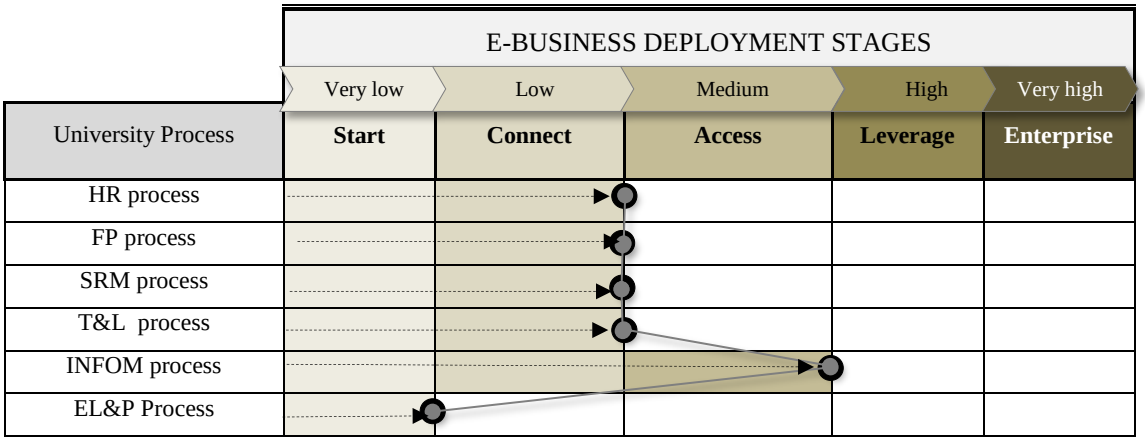


Figure 7.5 Technology deployment levels at UOSB

The results presented by SCALE analysis in Figure 7.5 shows that UOSB relied entirely on desktop applications, computers and hardware devices for process management. The use of BIS systems is still limited and developed using MS Excel. Furthermore, even with internet availability, the UOSB website and web portal applications were still weak and needed more improvement. With regard to the fiber optic network implementation, the university was not using this technology sufficiently, and it needs more focus on interconnected network and the implementation of e-business applications in all UOSB process. The e-business application such as online data exchanges and on-line forms for

data collection also was not performed. The university infrastructure was still weak, which limited the integration between the current deployed infrastructure components such as networks and e-business applications and kept the use of e-business applications in an isolated manner. In general, as signs of emerging practices of BIS systems and web activities, the initial assessment of e-business deployment in the INFO process was indicated at Access stage. The HR, FM, SRM and T&L processes were performing at the Connect stage, and the EL&P process showed lower e-business deployment, which was indicated at the level of Start stage.

7.8.2 Processes dimension analysis

According to the SCALE model assessment, at the present, the UOSB process was able to determine a set of rules but had no established documented process guide. Moreover, the UOSB divisions had the ability to share a number of essential processes controlled by top management in the departments, such as cooperation between the HR and FM process with regard to personal records preparation and management. The general view of process and related change elements finding in UOSB is summarised in Table 7.10.

Table 7.10 Status of process change elements at UOSB

HUMAN RESOURCES PROCESSES HR			
	Structured practices and Ability	Documentation	Standardization
Non-Academic records	x	x	x
Academic records	√	x	x
Administrative and Archives	√	x	x
FINANCIAL MANAGEMENT PROCESS FM			
	Structured practices and Ability	Documentation	Standardization
Procurement	√	x	x
Treasury	√	x	x
Auditing	√	x	x
STUDENTS RECORDS MANAGEMENT PROCESS SRM			
	Structured practices and Ability	Documentation	Standardization
Study and Exams	√	x	x
Registration	√	x	x
Graduation	√	x	x
TEACHING AND LEARNING PROCESS T&L			
	Structured practices and Ability	Documentation	Standardization
Classrooms/study Management	√	x	x
Communication Interaction	√	x	x
Library	√	x	x
ESTATE, LOGISTIC AND PLANNING PROCESSES			
	Structured practices and Ability	Documentation	Standardization
Estate/land Management	x	x	x
Logistics and transportation	x	x	x
Planning	√	x	x
INFORMATION AND DEVELOPMENT MANAGEMENT PROCESS I&DM			
	Structured practices and	Documentation	Standardization

	Ability		
Networking	√	x	x
Web-development	√	x	x
Systems	√	x	x

According to the collected data, the USOB has an established plan for ICT development, but no process documentation was indicated or taken into consideration. For example, no process had been indicated as the most crucial in need of improvement, and any process improvement was chosen at random. This disorganization has the potential to lead to process improvement misunderstanding, which as a result, will prevent the university from having the ability to perform daily administrative work based on e-business. The INFO process had a number of improvement plans for e-business applications, but no documentation of a significant action plan of e-business development project was found. However, the UOSB process capacity was able to support the day-to-day procedures following traditional means of management based on employee's efforts, and manual management. Based on the SCALE model results, a number of automated process procedures were highlighted. For example, in the FM process, personal records were managed using BIS system for employee salary management procedures, but this was conducted with low level of process documentation. The FM process defined a number of activities, which were required to be performed by the employees, the process input, and output had been determined and transcribed, but no fully automated process and regulation was indicated. The UOSB processing abilities for basic e-business practices (e.g. use of desktop application) were also presented. For example, the HR, SRM, T&L and INFO processes all achieved process deployment level at the Connect stage. These processes had the ability to perform day-to-day procedures, and other processes (e.g. FM process) were able to achieve a level of documentation. However, the FM process was highlighted as the highest e-business process capability deployment level, at the Access stage. There was still the problem of process re-engineering; for example, INFO process frequently used e-business applications for managing data flow, this emerged e-business activity indicated required process redesign activities. The SCALE analysis results are illustrated in Figure 7.6.

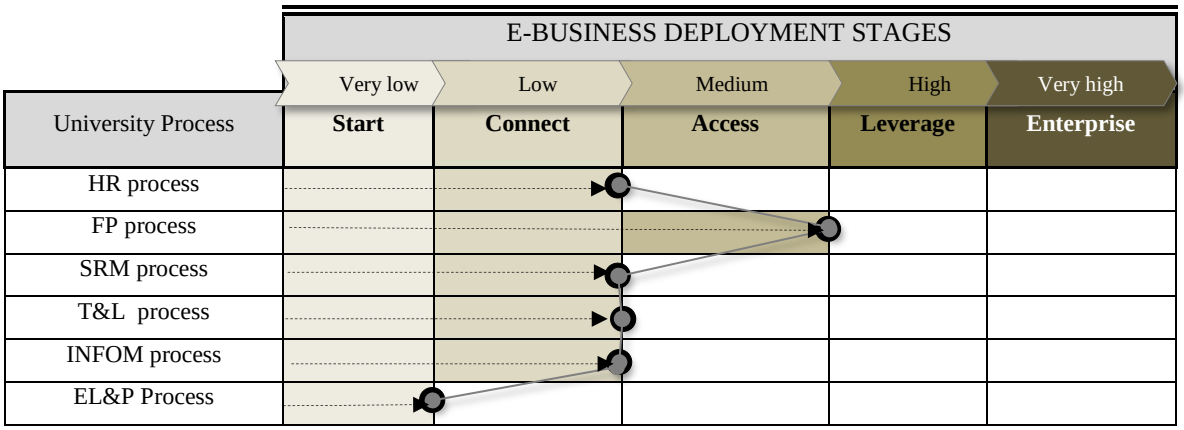


Figure 7.6 Process deployment levels at UOSB

Figure 7.6 directs the level of e-business deployment according to process change elements in UOSB university processes. The UOSB had agreed an e-business development project to support process automation, but no process documentation was considered in this plan. The EL&P process achieved the lowest level of deployment, and showed a low capability for performing everyday work and achieving the required outcomes, which was shown by e-business deployment level at a Start stage. The SCALE model assessment indicated that no adequate process documentation and integration was implemented. In addition, the model identified that that a number of process barriers were having a significant impact on the e-business deployment progression, which was also shown through the SCALE stages within the university process. In general, the UOSB process appeared still not to be understood by process performers in the university as well as is hardly able to process everyday procedures based on e-business manner.

7.8.3 People dimension analysis

People capabilities were presented based on the e-business deployment change elements relating to the people dimension. The results indicate that individual skills of management and technology were present, emerging and coordinated at departmental level. The process managers took responsibility for coordinating, managing and developing employees' skills and practice commitments, and collecting data on the areas of required skills and training. There was an indication of positive cooperation between employees in the university units and departments, which established teamwork activities, but no team participation had been formally organised. The status of people change elements and capabilities in UOSB is summarised in Table 7.11.

Table 7.11 Status of people change elements at UOSB

PEOPLE'S STATUS IN HUMAN RESOURCES PROCESS				
	Teamwork	Managerial Skills	Training	Technological skills
Non-Academic records	√	√	√	√
Academic records	√	√	√	√
Administrative and Archives	√	x	√	x
PEOPLE'S STATUS IN FINANCIAL MANAGEMENT PROCESS				
	Teamwork	Managerial Skills	Training	Technological skills
Procurement	√	x	√	√
Treasury	√	√	x	√
Auditing	√	√	x	x
PEOPLE'S STATUS IN STUDENTS RECORDS MANAGEMENT PROCESS				
	Teamwork	Managerial Skills	Training	Technological skills
Study and Exams	√	√	x	√
Registration	√	√	x	√
Graduation	x	x	x	√
PEOPLE'S STATUS IN TEACHING AND LEARNING PROCESS				
	Teamwork	Managerial Skills	Training	Technological skills
Classrooms/study Management	x	x	x	√
Communication Interaction	x	x	x	x
Library	x	√	x	x
PEOPLE'S STATUS IN LOGISTIC AND PLANNING PROCESS				
	Teamwork	Managerial Skills	Training	Technological skills
Estate/land Management	x	x	x	x
Logistics and transportation	x	x	x	x
Planning	√	x	x	x
PEOPLE'S STATUS IN INFORMATION AND DEVELOPMENT PROCESS				
	Teamwork	Managerial Skills	Training	Technological skills
Networking	√	x	√	√
Web/development	√	√	√	√
Systems	√	√	√	√

The SCALE model revealed the people capabilities and abilities in the UOSB process as presented in Table 7.11. However, from the results presented in Table 7.11, it seems that the employees' skills and abilities were facing several challenges; for example, employees were avoiding the use of technology for data collection or information management. The university provided a number of training opportunities to improve employees' technological skills and management capability, but their performance was not as predicted. In addition, personal motivation was involved in some processes, as in the INFO process, but most employees' ICT skills were still limited. The university established a training plan to support a number of employees and expand technical and management skills, but unfortunately, due to financial constraints this was facing challenges in deployment. In addition, employees in the university mostly relied on their personal efforts in communication procedures except in the EL&P process, where the skills and efforts interaction was very low. The demonstration of the people capabilities dimension and its associated e-business deployment level is shown in Figure 7.7.

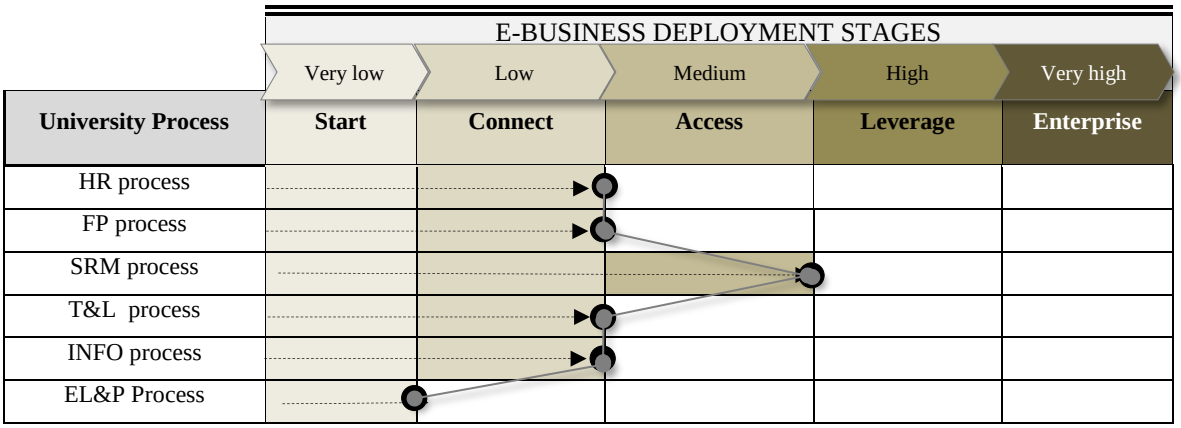


Figure 7.7 People capabilities deployment levels at UOSB

Based on the SCALE model assessment results, the highest people capability levels were indicated in the SRM process, being at the Access stage. Employees in the HR, FM, T&L and INFO processes practiced a number of e-business applications that helped them to gain an e-business capability level, which has been highlighted at the Connect stage. The remaining ET&P process exhibited the lowest levels of people capabilities, at the Start stage. The above chart highlights the enhanced people capabilities in process performance, as illustrated in Figure 7.7. It shows that management and technical skills were the most experienced and applied people change elements, where teamwork was uncommon, but there was indication of shared skills and practice in the HR, FM, SRM and INFO processes. However, the SCALE model analysis revealed that the training dimension was not effectively conducted at the university due to finance issues. Even though employees were able to perform their day-to-day procedures, it was not based on their skills obtained from the training plan. Employees had gained a number of skills through experience, working in the university over the last few years. However, the majority of the skills had been attained outside the university. In general, based on the existing employees' skills, the individuals' ability to perform procedures indicated their support for the university when attempting to conduct any e-business based procedures across the university. A clear plan for essential training and skills, however, still needs to be considered. The SCALE model results suggest that people capability is a significant challenge, which needs to be considered in order to move to the next stages of e-business.

7.9 Barriers to e-business deployment at UOSB

7.9.1 Technology barriers

The data collected by the questionnaires and interviews indicates a number of barriers to

technology deployment, which limited UOSB processes' potential to deploy e-business. Some processes retained a low level of e-business use. There university's campuses geographical location was highlighted as a barrier to e-business, because UOSB university had a number of campuses deployed in remote locations, which creates a challenge to develop e-business infrastructure and adopt associated applications. However, the collected data revealed that UOSB tried to deploy fiber optic network in the main campus where the university and main departments are located, attempting to link the UOSB campuses with the main university campus. The IT manager reported this:

> *"The university campus locations create problem for us in adopting e-business. In 2010, we implemented a fiber optical network to sort out this issue, but some campuses and offices located outside the main campus are still not connected by this technology. There are a number of departments located in the main campus that are connected now, and it is still expensive to connect the remote campuses in this network."* **(IT manager).**

The high cost of internet subscription was also revealed as a challenge for e-business deployment in the university. Thus, the university was in a contract with Libyan Telecommunication Technology (LTT) for supplying internet services for the main campus, but the other departments, which are located off campus, were using two-way satellite technology to get internet services. However, the challenge added to the slow speed of the internet was that the power supply was not stable, which make the internet services inefficient and unreliable. The IT manager stated that:

> "*We signed a contract with LTT Company to get internet services, but sometimes the internet is disconnected due to the instability of the electricity. In addition, the money to pay the annual subscription fees is sometimes not available. Some departments have tended to use satellite services to get internet through direct contracting with agencies specializing in this technology. The money is a serious issue."***(IT manager)**

There was still a lack of applications and interconnected systems implemented to this network. The university website was not active, there was a lack of experience, and professional skills necessary to develop, deploy and implement web applications and online services. This was highlighted by many participants in the questionnaires and supported by the interview with IT manager who revealed that the changeable process for IC development arrangement was a barrier preventing the university to adopt e-business applications required for e-business processes, such as online SRM applications.

*"The website is not improved and mostly not available, and it's not reliable for adopting e-services. Currently we cannot rely on this web portal technology to be used for e-business applications. We have servers, but we do not use them for web applications now. "(***IT manager)**

Furthermore, the existing level of network connections was not able to provide interconnection across UOSB campuses and departments. There was a low level of network use, because of the lack of network reliability, which prevented the university processes from being usefully interconnected. Moreover, even with a number of BIS systems developed in-house by the IT team, these systems were still limited to a number of functions that limited their use and deployment. Thus, the lack of BIS system implementation has been indicated as barrier to e-business, the IT manager who stated reported this:

"I believe that we own and implement the best university technology infrastructure compared with other universities in Libya, but we still do not use a good level of e-business applications such as BIS systems and internet applications. This also limits integration and networked systems activities." **(IT manager)**

In terms of the website deve

lopment and use, the UOSB faced a problem of website use and online applications deployment. The poor website capability limited the use of online applications such as online forms. The unreliable internet connections also limited the motivation to develop web applications. However, even with the limited effort of ICT development activities, the existing telecommunications infrastructure in UOSB still lacked a reliable deployment plan, which also considered being a barrier to appropriate e-business deployment. The IT manager revealed that:

"Since 2010 we adopted an infrastructure development project, I believe that we made an effort to adopt university ICT implementation project for investment in potential e-business based applications. However, we needed an appropriate development project plan for systems and applications improvement." **(IT manager)**

Currently, the university was conducting optic fiber, which was used for internet deployment, but the university faces a lack of financial support and planned procedures focusing on e-business application deployment. Most participants indicated that the barrier of budget to develop e-business was considered an important barrier to UOSB.

This was supported from the interview with the IT manager who stated that:

> "*We faced problems with budget and financial resources required to support e-business development and provide the necessary technology assets, such as good infrastructure and internet."* (**IT manager)**

Based on data collected, the technology barriers that affected the effective deployment of e-business procedures and services can be summarised in Table 7.12.

Table 7.12 Technology related barriers to e-business at UOSB

Technology barriers
• Lack of allocated financial resources e-business development. • Lack of experience and professional development and implementation of e-business • Lack of adequate and availability of web-portal services • Lack of telecommunications infrastructure management. • Lack of networked systems and e-services application • The wide geographical locations of university campuses • Lack of good e-business deployment plan

7.9.2 Process barriers

The UOSB's processes can perform day-to-day work, and most requests can still be completed, mostly based on traditional procedures requiring paper-based records keeping. However, no descriptions of input or output processes were defined or required for the university's processes management. According to the questionnaires results as well as interview with the IT manager, the lack of process documentation was highlighted as the most significant barrier to e-business deployment related to process dimension. At the time of data collection, the university processes documentation activities were nonexistent. The interview revealed that the UOSB did not adopt process documentation practices. However, even with IT development project adopted by the IT department, the processes were not considered as part of this project activities. However, the IT manager who stated that highlighted the important process documentation:

> *"Most university processes are managed based on the self-experience of the employees. We have managers with 10 years of experience, I am sure process documentation is important for the IT development, but our employees still rely on their experiences to control the processes. We have not started process documentation yet."* **(IT manager)**

All processes were motivated by the efforts of the individuals working in them, as there was no documented process to refer to. However, the procedures are mainly carried out through repeated routines via paper-based processes. It was also indicated that regulations were not flexible, and process redesigns had not been implemented. For example, in the university IT development project, the IT team did not make process mapping and analysis in order to simplify their needs for sufficient e-business based process. The IT Manager revealed that:

> "*Till now the process that was assigned by the university has been followed, based on the university organizational structure, but no process guidebooks have been formed or deployed, and I do not think that we are authorized to make the necessary change."* **(IT manager)**

Due to the limited number of authorisations for the universities in Libya to redesign their processes, together all the universities in the case study also were finding it difficult to get authority to redesign their existing university processes. This situation could lead to limitation of e-business deployment as the need to change processes could emerge. Moreover, there was a degree of employee concern about their desire to manage and coordinate process based on the implemented technology, which was considered as a change resistance barrier. The IT manager supported this:

> *"During the ICT infrastructure improvement activities process, we noted there was a barrier to process change, we do not have a documented plan for process tracking or flowchart. In addition, many employees still have a concern about process change, which creates a resistance from their side to adopting the new way of managing the process. The university may need to enforce a number of process redesigns to meet its e-business needs.***" (IT manager)**

Furthermore, a lack of job descriptions kept the process control and performance capabilities reliant on the efforts of individuals, which increased irregular outcomes and created a confusion of process performances. Therefore, complete university processes were still based on a set of repeated routines controlled by individuals. It was revealed from the interview that:

"There is a lack of process understanding, people know what their tasks are, but no job description has been adopted, and in some cases process outcome is not performed and hardly managed, such as in Estates, Land and Planning process." **(IT manager)**

No processes regularity has been indicated, and a conflict of authorities in some process management and responsibilities is considered as a barrier to process performance. In some cases, this can result in a lack of clear process and procedural understanding. This was highlighted by most of the UOSB participant and supported by the interview with IT manager who revealed that:

"Of course, there is a challenge of process performance and related meanings, people still understand the process based on their experience, and this causes a conflict of authorities, which for example, can delay the work that needs to be progressed in the estimated required time. I agree that the processes need to be clear and defined." **(IT Manager)**

Based on the research results derived from the questionnaires and interview with the IT manager at the university, the summary of process barriers that were delaying e-business deployment in UOSB are summarised in Table 7.13.

Table 7.13 Process related barrier to e-business at UOSB

Process barriers
• Lack of process improvement commitment • Lack of process knowledge. • Lack of clear process deployment strategy • Lack of process documentation • Lack of process improvement practice involvement • Lack of standardized activities. • Lack of university management instability, and • Lack of defined e-business process and application

7.9.3 People barriers

The majority of the participants highlighted that the UOSB University provided a number of training programs to develop people's skills and capability. However, the training outcomes had had no significant impact on changing people's skills and their performance. There was a lack of a well-designed and sufficient training policy. In

addition, there is a lack of ICT information provided to employees in process performance. The IT manager who reported that has supported this:

> "*Our university provides a number of training plans, but no clear implication appeared on day-to-day work. I believe that people need more well-coordinated training events to extend the skills, which can respond to the needs of e-business technique. The training provided is not meeting our estimated outcome of people capabilities.*" (**IT manager)**

The interest to the potential benefits of e-business deployment was missing. There was indication of a lack of awareness about the benefits of e-business use in the process management. It has been noted from the questionnaires that the lack of information and training plan limited the support of the required training activities. In addition, there was no commitment shown by the university mangers towards use and adoption of e-business applications. The interview revealed that employees still lacked ICT knowledge, which limited their interest in transferring to e-business based applications.

> *"We face a lack of commitment from people in the university regarding the use of technology, for example, we tried to collect data by using e-business applications, but we discovered that many staff and employee were not interested, because they did not have the required knowledge of e-business skills as well as potential benefits. I believe that we need to have a plan to enforce them to practice the e-business applications provided for this purpose."* **(IT manager)**

The deployment of the university campuses over a wide geographic area had raised the costs relating to improvement and training activities. However, the majority of UOSB departments did not use job descriptions or defined required skills, which led to a lack of professional staff allocation in management positions. The employees in UOSB mostly relied on traditional methods of management, based on their personal efforts and by repeating day-to-day procedures. Together with a lack of knowledge regarding e-business applications and poor training activities plan had affected e-business use in UOSB. IT manager has revealed this:

> *"The people's skills development is very important for our university; these skills still represent a significant barrier to e-business deployment in the university."* **(IT manager)**

The summarised people's barriers at UOSB are presented in the following Table 7.14.

Table 7.14 People related barriers to e-business at UOSB

People barriers
• Lack of e-business application practice • Lack of people commitment and motivation • Lack of electronic information available • Lack of support for e-business deployment application and usage • Lack of employee allocated for electronic data collection • Lack of professional staffing and job description documented cards • Lack of qualified people to use e-business process and application • Fear form change the way of work in many cases in particular old employees • Lack of sufficient training activities outcomes

7.9.4 E-business deployment progression levels at UOSB

According to the decision of the most important process the SCALE model supports the decision of e-business development priority. Figure 7.8 shows e-business improvements in UOSB.

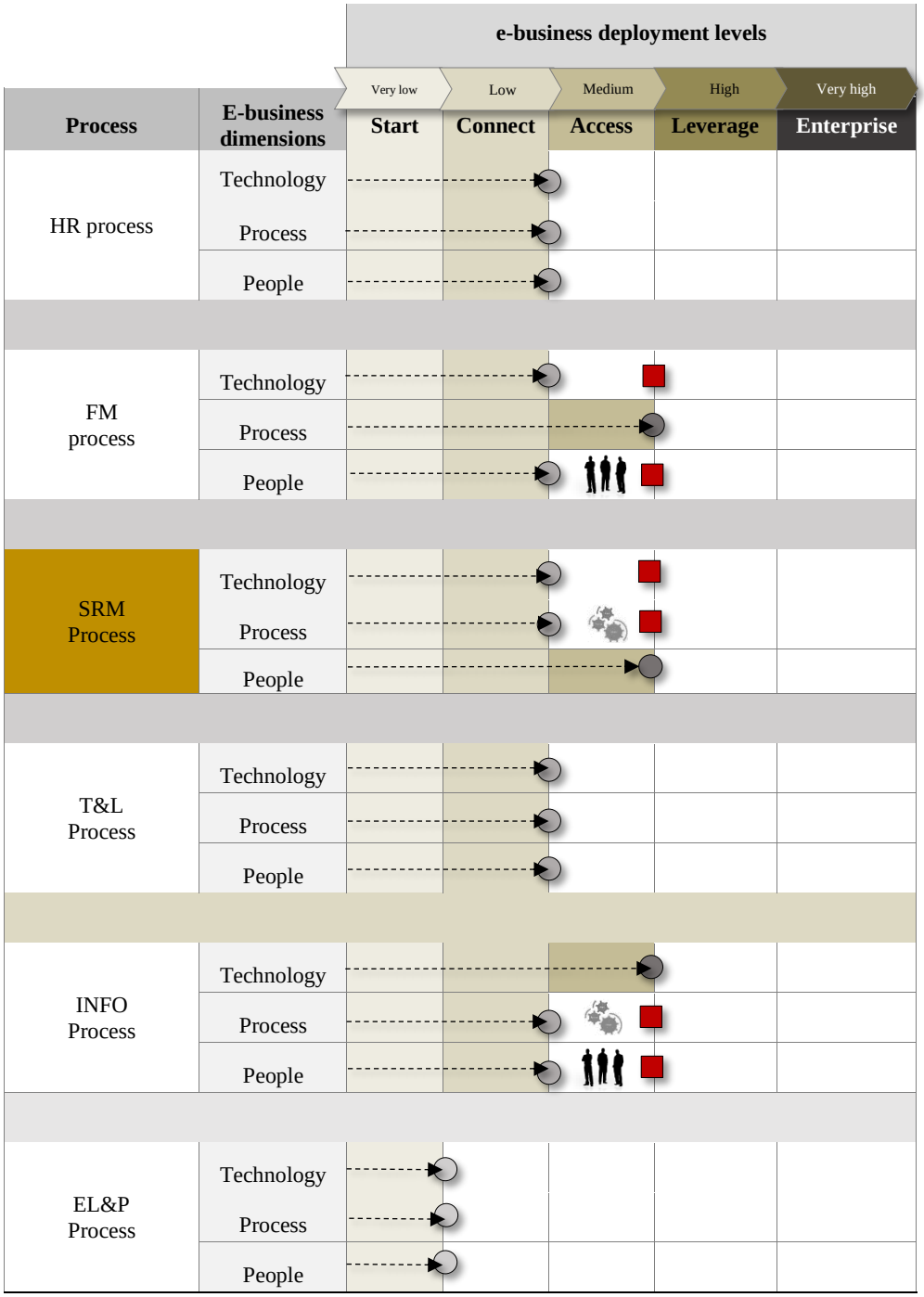


Figure 7.8 E-business deployment progression at UOSB

According to answers from the questionnaires and the conducted interview with the director of IT department at the UOSB University, the university was committed to improve the SRM process. Therefore, the SRM process was now considered a high priority of e-business development in the UOSB. The SCALE model highlighted the required improvement of e-business dimensions, and showed that the maturity of e-business deployment in the three dimensions at SRM process was not at the same stage.

While the technology and process dimensions were indicated to be at the Connect stage, the level of people dominion was at the Access stage. Therefore, the priority of e-business improvement should be to focus on technology and process development. Furthermore, in general, UOSB should think about e-business improvement and focus on interactions created by merging e-business deployment dimensions. An innovative e-business plan is required and investment in technology applications as well as process management re-engineering associated with people's skills development are important in order for the university process to move to better e-business deployment position. Due the low level of e-business deployment at UOSB, the results derived from the SCALE model indicate the need for a new effective e-business development plan. The results drive to important emerging of e-business deployment plan, and UOSB needs to consider merging of e-business deployment dimensions in each process for better e-business progression. The SCALE model provides a tactics progression, which can be applied to coordinate and support the improvement of this process. The SCALE model could be a positive tool to support the e-business improvement and associated priority, which can direct the development of e-business focus on the most important university process selected by the UOSB decision makers. Thus, further investigation will be required on the change elements of each e-business dimensions.

7.10 Summary

The replications of the SCALE made in two case study universities - UOST and UOSB - were discussed and the findings were analysed based on the SCALE model. The section provided a report on e-business deployment in UOST and UOSB, which serves the research objectives. The levels of e-business deployment were discovered, and the barriers faced by the e-business deployment in each university were highlighted and determined. The results show that UOST achieved the higher level of process documentation compared with UOMS and UOSB, which can should enable UOST to establish a number of successful e-business applications. The successful replication of the SCALE model indicates a new tool that can be used for e-business assessment and associated research. Furthermore, the model's replication will support the mode validation process, and develop a shared understanding of SCALE demonstration. It also determines whether the SCALE model is able to explore and explain e-business deployment phenomenon in the real world. The results indicate that the SCALE model provides an accurate description of the different levels of e-business deployment of the university processes. By providing an accurate deployment levels explanation, the

SCALE model has supported the identifying its future e-business improvement priorities. The analysis results revealed that the SCALE model does have a useful way in assisting e-business deployment in UOST and UOSB. The improvement priority concept can guide the universities to achieve advanced levels of e-business deployment and indicates the critical process and required progression for such peruses. The replication also shows that e-business deployment environments among the universities are uniquely defined and different issues motivate and de-motivate e-business deployment in various ways. These are managerial characteristics and view of business deployment, skilled ICT personnel, availability and slow speed of the internet, the cost of setting-up and maintaining BIS and web applications, networks and infrastructure facilities, process documentation, and supervision roles. The results show that although the factors have been widely known to affect e-business deployment in these universities, their impact, interaction, and presentation in the selected universities shows similarities but differences as well. Several influences have been discussed and their impact on the individual university in the sample. Furthermore, the barriers to e-business were generally similar. The three universities (UOMS, UOST, and UOSB) had some degree of e-business applications practices and deployment on their processes. However, the minimum deployment of e-business was highlighted in the UOSB case. The chapter discussed the dimensions' interaction and their influence on the extent of e-business deployment, showing how number of barriers prevents the e-business positions progression. The discussion also highlighted the concerns in e-business development, such as the issue of e-business improvement progression and prioritisation processes in UOMS, UOST and UOSB. The following chapter will present the conclusion and directly answer the research questions.

Chapter 8 Discussion and Conclusions

8.1 Introduction

Having reported on each of the individual cases in the previous chapters, this chapter discusses the cross-case findings from the UOMS, UOST, and UOSB cases and directly addresses the research questions. A summary of each of the university e-business environments is presented in section 8.2, which discusses the level of e-business deployment in the university cases derived from the selected universities. These levels will be linked to judgements and perspectives derived from the literature review. It thus attempts to answer the first research question. Section 8.3 then discusses the barriers and related aspects that affect e-business deployment or non-deployment as revealed from the empirical findings, thereby answering research question two. Section 8.4 discusses the required actions and progression that can guide Libyan universities to achieve a higher level of e-business development and related potential benefits. This involves an explanation of the interaction of e-business dimensions in determining the universities essential development to achieve the higher levels of e-business. This is followed by a review of e-business development with particular focus on the nature of e-business improvement and progression. Section 8.5 discusses the application of e-business deployment theories with respect to the results of the current study followed by the presentation of the SCALE model as an appropriate conceptual and operational model for e-business deployment in universities in Libya. This answers research question four, and is followed by a description of the SCALE model implementation structure. The last section, 8.6, is a summary and conclusion of the chapter.

8.2 Discussion of Research Methodology

The previous chapters 5,6, and 7 present and analysis the results of the empirical study, which consists of two phases of data collection. Phase one involved an explorative pilot study (using a questionnaire) undertaken at UOMS in order to discover current levels of e-business and potential future e-business deployment. Evaluation of phase one with additional details taken into account resulted in phase two being undertaken in three universities (UOMS, UOST, and UOSB). The data was collected from the three participating universities through the processes of questionnaires and interviews. In each case, the key processes were highlighted, where mapping was conducted on both university processes and sub-processes. However, both were examined to gain a better understanding of the participants' opinions on e-business in each university. Also, two

questionnaires were developed during this study. A pilot questionnaire was developed and then distributed in UOMS to validate the questionnaire and this contributed to developing the interview questions. The second was administered after the questionnaire had been revised with a view to collecting additional appropriate data. The questionnaires were followed up by number of interviews. The purpose of the interview questions was to establish the participants' opinion on the necessity of deployment of e-business in the universities. The data collected was organized and constructed around three e-business dimensions: Technology, Process, and People. These data conducted to support this research and answering the research questions. The following section 8.3 will illustrate the fulfilment of the research questions.

However, while this study adopted a qualitative approach based on case study methodology, the findings should be useful as a basis for future quantitative studies. The research conducted case study was able to provide an opportunity to assess the impact of e-business deployment views and aspects in series of events and investigates the issues of e-business deployment outcome. Hence, the research may provide a significant and rational representation of a e-business deployment in local public universities setting. While the aim of this case study is not to provide generalisable findings in the qualitative sense, it was an objective to provide a case description that would be theoretically useful to predicting the success of e-business deployment projects in similar settings, but without actually conducting such a study. However, the result of this study should be considered in light of a number of weakness. For example, some of weakness in the conducted approach is seen as an opportunity for future research under the same theme. The scope of the research was limited to a three cases design of local universities in Libya, and the issue of generalising findings to new situations is a weakness characteristic in the support on limited cases which could emerge in the type of qualitative research study.

The conducted approach is mostly appropriate with small populations and with accessible activities and frequent events over a certain period. Therefore, the participants are unclear as to what extent they can protect the self-interests that are evident in their responses. Moreover, the semi-structured and open-ended interviews used in this study allowed the participants a direct way to discuss issues that they felt comfortable talking about. Given the sensitive nature of this social issue in the workplace and to help to avoid the difficulties associated with people's awareness of being participants in research, a number of procedures were conducted including the

obtaining of confidentiality and ensuring that the researcher's meanings were clear. In this case, the wide variety of documents and sources were gathered that reflect the universities' everyday operations helped to obtain the data that was needed. Finally, inclusion of informal follow-up interviews was considered to develop a greater understanding with participants and, thus, overcome any lack of enthusiasm to enough responses. Finally, it is believed that all methods of collecting data were considered and that those selected worked well, but, the possibility of the case study bias and researcher bias still cannot be ignored.

8.3 Fulfilment of Research Questions

8.3.1 What is the level of e-business deployment in Libyan universities?

The environment of e-business in the selected universities discussed thus far defines the current levels of e-business deployment and what the universities aim to achieve with respect to e-business deployment. For example, UOMS's e-business is mainly used to support a number of management processes (e.g. student records and financial data). The university established an IT department, which has led to the current development of e-business. The main e-business based processes are focused on the use of the MS WORD word processor and MS Excel, and use computers and BIS plus web-enabled applications supporting a number of the university's services. The university also established a website, which assists online application engagement. UOMS's e-business development has benefited from its managers' positive understanding of potential benefits and opportunities of e-business use, assisted by their internal ICT team for maintenance and Web services development issues. However, there was only limited support from the government for assistance in developing e-business in the university. People in UOMS still need a number of management and technical e-business skills improvement, even in the ICT department where the university has adopted a higher level of e-business for performing administrative functions. Based on the SCALE model, the level of e-business deployment in UOMS as a whole can be judged to be at the Access stage, and there is a clear need for an e-business deployment strategy to be formed around the local internal processes.

The deployment of e-business in the case of UOST was in an assisting role to management processes and mainly focussed on the processing of student records and financial data. E-business deployment in the university was defined by the use of a number of e-business applications such as internet and related applications (e.g. e-mails

for communication), which had been the case for many years in UOST. The university developed a website, which was active and had been used for process management for over ten years, the website was improved and adapted to manage and provide a number of online e-business based processes and applications (e.g. online and contact forms). The university had improved the web portal to deploy a number of selected services and to enable connectivity between the university campuses. The university had started providing process documentation and guidelines, a key development in their support for e-business. However, based on the SCALE model, the average level of e-business deployment at UOST can be positioned as being at the Access stage.

UOSB was mainly supporting the use of basic e-business applications (e.g. MS WORD processing and Excel). In terms of the use of BIS, the university had focused on the deployment of BIS for assisting in financial data processing and management. Third-party agents undertook most of the BIS development and implementation used in financial management and SRM processes. The university established an IT department, but the level of staff knowledge in this department was still low. There is no e-business deployment strategy in the university, and e-business could mainly be highlighted in the use of desktop applications and distribution of hardware (e.g. computers) with few using the internet for information searches. The university had not developed a website, which prevented a number of processes being automated or deployed in an e-business manner. The internal human capabilities assisted in a small number of e-business developments in the university (e.g. the implementation of the fibre optic network). The university's local environment provided little assistance in the development of e-business in the university as the employees' experience was limited and no e-business deployment strategy had been established. Based on the SCALE model, the overall level of e-business deployment at UOSB can be considered to be at the Connect stage.

8.3.1.1 The level of e-business deployment in Libyan universities

Based on the SCALE model developed for this research, the level of e-business deployment in Libyan universities was still dependent on desktop applications, computers and a number of BIS systems to define their e-business progression, and furthermore, did not include a dynamic and shared networked process or integrated website application or procedures. The universities had to manage their existing e-business technology resources to develop their e-business applications (e.g. websites) through their internal IT department and staff. The universities provided limited online service facilities on their websites, and had developed a web presence, which was

primarily based on the influence of other universities having one. However, the impact of this issue has to be balanced by the fact the universities were outsourcing some of their e-business tasks to specialised local agencies in order to obtain assistance in developing their website. The universities process performances were partially uncoordinated because of individual effort, and hence, there was predictably going to be differences in their e-business deployment stages. In terms of people skills, a feature that was related to e-business deployment levels in the universities was the readiness of e-business skills and proficiency that could be useful in the design and implementation of advanced e-business based procedures in the universities. However, the limited extent of people's e-business skills had hindered their e-business deployment levels. The level of people's capability was mostly at the Connect stage as they were still relatively basic, and the universities still lacked process documentation, use of web and internet applications. In all cases, the universities required a large amount of process restructuring to enable web-based applications that can provide e-business significance for their university processes and management performance. In general, in future the universities will be required to conduct new e-business deployment plan as if presenting it for the first time. In addition, the geographical location of off-campus departments with poor infrastructure is challenging as their different levels of e-business structures will be difficult to integrate and develop coherently.

8.3.2 What are the barriers to the increased deployment of e-business in Libyan Universities?

The research results show that background barriers to each university provided a better understanding of the particular ways e-business has developed on campus. This section will discuss the progression in e-business deployment in the key Universities and the barriers they faced. Given the results from the empirical field study in the three universities used in this research, a three-tier system will be adopted to analyse the kinds of barriers and problems these universities in Libya face in the adoption of e-business within the university. The barriers were classified into three groups:

- Technology barriers to e-business deployment.
- Process barriers to e-business deployment.
- People barriers to e-business deployment.

Based on the cross case study analysis, the common key e-business deployment barriers in the universities in Libya are presented in the Figure 8.1. The following sections will

illustrate these three types of barrier (Technology, Process, and People related) in more detail.

8.3.2.1 Technology barriers to e-business deployment

- ***Poor ICT infrastructure***

Libyan universities face a challenge in terms of an appropriate e-business infrastructure. Without a widespread and high performing e-business infrastructure, it is not possible to accomplish e-business based processes and related services or applications effectively. The majority of participants from the studied universities believed that the infrastructure capacity at present did not allow them to operate their e-business based processes. For example, in all universities internet speed was insufficient to adopt trustworthy online services and activities. However, most of the participants highlighted that their universities were keen to adopt and deploy a number of e-business based activities and services if internet speed could be improved. Libyan universities still need to invest in e-business infrastructure.

- ***Cost of e-business Implementation***

Libyan universities' campuses are split between various locations, some remote departments are a long way from the main campuses, thus there is a cost challenge to establish a common communication network and provide access to the internet. The cost of developing and accessing e-business infrastructure influences the growth of e-business use and deployment in the universities. The monthly connection cost to the internet is relatively high in relation to the universities' allocated budget, and this may affect the judgement of the decision makers in deciding to deploy e-business based process and services and reduce their capacities for e-business (e.g. on-line activities). It is a given, highlighted by some participants, that a general priority for e-business development in the universities in Libya is to put in place the necessary allocated budget for infrastructure development to create a competitive environment and regulatory framework that will support reasonable e-business services and internet access.

- ***Unreliable Electricity***

The power supply was found to be still irregular in Libyan universities. Nevertheless, the universities were equipped with a number of power generators to operate the current systems used in their process. The participants have shown that electrical energy is important for the development and use of e-business in the universities and unreliability

remains a challenge for the universities to obtain higher level of e-business deployment and implementing e-business applications and to put efforts in achieving sustainability. Thus, any plans to deploy e-business in these universities should include a careful consideration of a reliable electricity power sources or power backup sources.

- ***Lack of networks telecommunication***

The network telecommunication structure in universities in Libya was unreliable; therefore, due to insufficient network infrastructure, the three universities were not yet ready for effective e-business deployment in most of their processes. E-business success relies heavily on an effective, reliable telecommunication infrastructure, which is required to connect various campuses and departments across the university. In the absence of an adequate basic infrastructure, it is possible that the potential advantages of the deployment of e-business in the universities would be adversely affected. Most universities in the developed world rely on effective high-speed connectivity and this kind of network should be a considered by Libyan Universities as an important technology in e-business and would speed up the involvement of e-business processes, improve services, facilitate universities modernisation, and promote efficiency.

- ***Lack of Internet connection and website efficiency***

Libyan universities have mainly adopted broadband internet connection, but it remains unreliable. In addition, the cost of internet access is a significant element of e-business applications in Libyan universities. However, if a greater efficiency can be achieved then this technology could improve the overall on-line involvement for both individuals and processes and encourage them to gain more experience and explore more e-business applications, while encouraging more on-line participation. However, due to the lack resources, the universities in Libya were limited in being able to get reliable broadband connection, which affected the operative use of broadband services. However, the success of effective internet connection and related technologies (e.g. broadband connectivity) would speed up the universities participation and deployment in e-business based processes and improves services.

- ***Poor backup systems***

With many different campuses, Universities in Libya have established separate administrative locations. Connecting and integrating these different administrations is a crucial task. During the analysis stage, it was understood that one of the IT managers' worries was the backup system. Due to a lack of an integrated system between head office and other campus sites the backup system was being separated, and this caused a

loss of information. It was suggested by participants that the web-portal could be considered as an innovative solution in this case.

- ***Interactive On-line Presence***

There was limited communication between Libyan universities and their stakeholders through e-business tools. The internet was still not adequate but could provide channels such as email; and browsers helped to provide information to students, who were also able to collect information and feedback by using online applications, as indicated in UOMS and UOST. While it was possible to order university services after browsing the website, online forms, fax, or phone, typically Libyan universities did not provide e-business facilities that allowed students to use the internet to actually complete the transaction. These processes were thus made by more traditional means such as visiting the campus. However, the lack of a universities active website and related facilities affected the ability to attract online engagement from users. Due to people's lack of specific e-business skills, it was not usual to see coordinated teams with the essential skills (e.g. IS/IT, process-control, language, and so on) developed to manage the e-business deployment activity via an effectively managed e-business plan arrangement.

- ***Lack of e-business deployment plan***

The universities highlighted a lack of e-business deployment plan that should be adopted by top management, which could be a significant barrier to facilitating the appropriate activities and actions associated with e-business use in the universities. However, the universities in Libya require e-business deployment plans that can improve e-business movements, promote effective infrastructure, network services, people's skills, process improvement actions, and e-business applications across different university technological platforms. The development of a reliable e-business deployment plan is considered an important factor for the effective development of e-business for all Libyan universities.

8.3.2.2 Process based barriers to e-business deployment.

- ***Complex administrative process***

As expressed, in some cases, there is a need to improve poor e-business infrastructure. During the interviews, it was revealed that the universities' managerial process of getting permission to develop a number of e-business applications and associated infrastructure (e.g. website and internet) was administratively very complicated. The common feedback from the universities participants highlighted that the agreement and

permission to do such development might take several months. This complexity of process should be avoided and reduced through government support and the development of common national universities' e-business services should be considered. In this case, the development plan and related components should be introduced in advance and should be spread across all universities. Otherwise, it will be complicated if each university has to invest separately in a specific e-business project.

- ***Political and governmental barriers***

The challenge of deployment progress will only be possible if a clear set of guidelines and process policies are provided. This lack of a plan to guide e-business deployment growth in universities in Libya is a major difficulty to the deployment of e-business follow up processes. The lack of government initiatives in the deployment of e-business has had a significant impact on the rise of e-business usage, people training, and guidelines on design and structure for e-business. However, Libyan universities' management consider it is important to have government support, in particular, through telecommunication development projects. This could be provided by outsourcing expertise to offer a range of e-business technological options and an appropriate quality and price of network services (particularly broadband). Thus, government support for various e-businesses based technologies and related services would deliver on high-speed internet access. In addition, common responses from participants revealed that the changes of governance and rules in Libyan universities are considered a serious challenge in decisions associated with creating an environment for the broad use of e-business applications. The conditions in most universities in Libya were generally not favourable to the widespread, cheap and effective use of the e-business and related services such as the internet. The universities had no e-business administration strategy providing plans for a future e-business setting. The absence of a national information policy in universities in Libya is the result of a lack of government involvement in universities' e-business establishment.

- ***Lack of process documentation***

E-business development in universities has been on an ad-hoc basis with individual universities developing their own processes, and the number of activities within these processes remained unclear (e.g. in SRM process). This has been further complicated by a lack of process documentation setting out clearly the lines of responsibility. Thus in a number of universities, responsibilities were not clearly defined, and process progression success or failure depends more on employee preference than on a clearly

defined process management organisation. In addition, the lack of documentation created communication gaps between departments and colleges, especially if processes cross-university departments or campuses sites. The poor process documentation is a barrier to efficiency as users rely on manual data entry, which elevate errors that, in turn, create an additional load for employees. A lack of clear process data and reports on operations means that any improvements to the ad-hoc process are purely guesswork.

- ***Inflexible process support***

Despite the ad-hoc nature by which many universities have, developed e-business there is still an inflexible approach to process support. For instance, a number of universities' processes are not supported by a fixed e-business associated arrangement (e.g. EL&P process) which means that they do not follow the designed workflow. The process relies on arranged and assigned e-business technology (e.g. desktop applications and BIS systems). There is equally a lack of specific university design based processes in the e-business systems used and current systems are not easily adaptable to meet universities changing needs.

- ***Lack of e-business plans***

Strategic process capability was essentially concerned with how e-business processes could be successfully deployed, managed, and controlled. All universities studied faced similar challenges due to a lack of unawareness or misunderstanding of the e-business deployment strategy. This issue was derived from unaligned systems, poor coordination and sharing of process responsibilities. It seemed to have affected the process capabilities, and revealed a lack of governable e-business dimension. The result revealed that Libyan universities lacked a defined e-business deployment plan due to inadequate funds, inadequate e-business resources (e.g. internet), poor human resource skills, and lack of experience. However, the universities recognised that e-business deployment strategy was now a serious part of the universities' services and were actively engaged in improving it.

8.3.2.3 People based barriers to e-business deployment.

- ***Lack of e-business skills***

The personnel who managed everyday processes in local universities in Libya seemed to lack training in the necessary skills to perform e-business based processes. This was due to management not fully understanding the kind of skills required, and the skills shortage in the local employment pool. In addition, universities had little authority to

allocate funds and pay more to employ experts in e-business development, as well as run training for skills and personnel development activities associated with e-business. The results reveal that the lack of interest in e-business skills and training were the main barriers to the deployment of e-business in the universities in Libya; this lack of confidence contributed to the non-deployment of e-business.

- ***Lack of people support***

Online services can reduce the travelling cost of personnel moving between the universities' head offices and related off-site departments. However, one of the participants expressed that their university had the ability to facilitate video conferences, but that personnel did not welcome this e-business format. Thus, one of the barriers to e-business deployment in the studied universities was a lack of staff support for e-business transformation. However, a number of participants believed that people still preferred to follow the traditional forms of communications and interaction instead of using e-business platforms (e.g. online tools).

- ***Lack of commitment***

The results from the interviews revealed that socio-cultural influences in Libyan universities were a barrier to the deployment of e-business. Due to a lack of commitment to change, and to a lack of confidence in technology and online skills and abilities, the university environment remained reluctant to adopt e-business. The commitment of the employees in the universities in respect to implementing online applications and related procedures was a challenge and acted as one of the critical barriers to deployment and use of e-business. There were certain online-based procedures and services already available on a university e-business system, e.g. online forms and email applications. However, employees were still unwilling to change their traditional way of conducting everyday work. Since e-business depends on an employee's commitment and motivation to support its deployment, the employees' did have a significant impact on e-business deployment. The researcher identified that the employees' willingness to change was a significant barrier hindering e-business deployment in some universities.

- ***Lack of Language and online content***

The majority of the participants believed that most people in Libyan universities tend to experience limited access to information on the web because information was usually processed in a language they do not understand, mainly English. Thus, in order for them to best access material they would need to have a working knowledge of the English

language. This is an important factor because it is a gateway into information and knowledge transfer in the digital world, particularly in the development of e-business applications. English is the main language adopted on the Web, and is the primary language used in most Western countries where new technologies originate. Therefore, participants believed that employees in Libyan universities should be aware that improvement in specific foreign language skills is significant. This improvement could lead to improvement in their quality of work and efficiency.

- ***Lack of training***

The universities tended to focus more on attaining the hardware and software needed to support the process management rather than focussing on the potential benefits of a trained workforce. The participants revealed that their universities recognised the need for a skilled workforce in order to implement e-business (e.g. webmaster, web administrator, a database administrator, and/or information specialists) but failed to factor this into their plans, which was why some ere at the Connect stage, as in the case of UOMS and UOST. Although there was some evidence of e-business use (e.g. Internet), the individual experience remained insufficiently developed. This is because training plans in Libyan universities were not supported by sufficient financial justification and funding. As previously mentioned, a lack of financial resources limited training activities, which led to a lack of required skills. Therefore, better training facilities of the employees would be an advantageous solution for Libyan universities. This would be beneficial to the university because the trained personnel would obtain e-business awareness and capabilities on e-business and related processes.

8.3.3 How can Libyan universities achieve a higher level of application of e-business technologies and related information systems and what are the potential benefits?

The discussion on interaction of e-business dimensions and how they determine the extent of e-business deployment in the universities in Libya was based on e-business deployment and the circumstances of usage in each university. A number of universities had achieved practical support for the deployment of e-business (e.g. UOMS), others had provided reasonable standard of support (e.g. UOST), and while others had a much lower degree of e-business deployment benefit (e.g. UOSB). Therefore, it is essential to understand what activities are assisting or preventing the universities to attain or remain at these e-business deployment positions. The discussion is thus based on the degree of e-business utilisation in these universities. For UOMS, the number of available potential users in the university influenced the greater extent of e-business deployment, and

managers need to develop employees' e-business skills. The already existing levels of e-business applications used (e.g. BIS, e-mail, internet, and the active web portal) provided a number of online processes and services. The interaction between these internal technology elements and associated processes and users has resulted in UOMS establishing themselves in an advanced position of e-business deployment compared with the other two universities. In addition, a shared commitment to, and involvement in, e-business processes has significantly influenced the way the university managed a number of their processes and services.

As a result, there were indications of users beginning to trust the use of online applications, enabling a number of processes to be redesigned (e.g. the online student's registration process) to meet the required e-business based management. The research findings support earlier literature (e.g. Heeks, 2002; Alzawi, 2010; Rhema, 2012) which concluded that an e-business deployment strategy could have positive results on e-business deployment. Furthermore, the results of the study also show that the deployment of e-business must accommodate other reasons that depend on the context in which technology is used, the nature of that technology, and most importantly, how the managers of organisations intend to use such technologies in their organisation. Based on the results of e-business deployment in Libyan Universities, a number of recommendations can be highlighted in order to achieve a higher level of e-business and information systems deployment and usage:

- Universities in Libya need a strategic development plan covering all relevant aspects of the e-business required for their market and should take advantage of the other universities' experience in this area. This strategy should be established and efforts made to automate the universities' administration and academic processes.

- A central committee of experts in e-business from other sectors (e.g. Ministry of Communications) should be established, prioritising their work on finding a common plan for e-business deployment activities for universities in Libya.
- The e-business infrastructure efficiency and the establishment of e-business related applications should be enhanced through telecommunication development projects.

- The universities should also be supported to set up e-business based web portals and information services to provide online services to both local

campus based and external users.

- The government should support the universities to attain cheaper internet subscription, so the universities can take advantage of the internet and adopt web portals associated with infrastructure development.

- The universities need to establish e-business based training strategies for human resource development, through providing education and training activities linked to e-business applications, automation processes issues, and the practise of data management and information networks.

- The universities should expand their commitment to employees' participation activities in the exchange of information within the departments, groups, and colleges. This would enhance the skills of the employees, as well as raise awareness of the importance of e-business for individuals and universities.

- The universities should establish virtual e-learning portals and applications as well as training for the e-business based information management.

8.3.4 What is the most appropriate conceptual and operational model for e-business deployment in universities in Libya?

The SCALE model was developed and adopted in assessing the studied universities to understand the status and growth of e-business, using a multi-dimensional conceptual model to allow future progress to advanced stages of e-business maturity. Whilst the progressive development of e-business deployment dimensions was applied to the universities, the Libyan universities revealed that e-business deployment began with desktop applications and the management of a small number of internal processes. This was followed by the implementation of networks, increased number of BIS used, internet, and website establishment to attract university users to be involved in e-business activities. In this study, the SCALE model helped the researcher to understand and describe the current state and position of Libyan universities with respect to e-business deployment; this included an assessment of e-business dimensions' maturity adopted in this study (Technology, People, and Process) as illustrated in Figure 8.1.

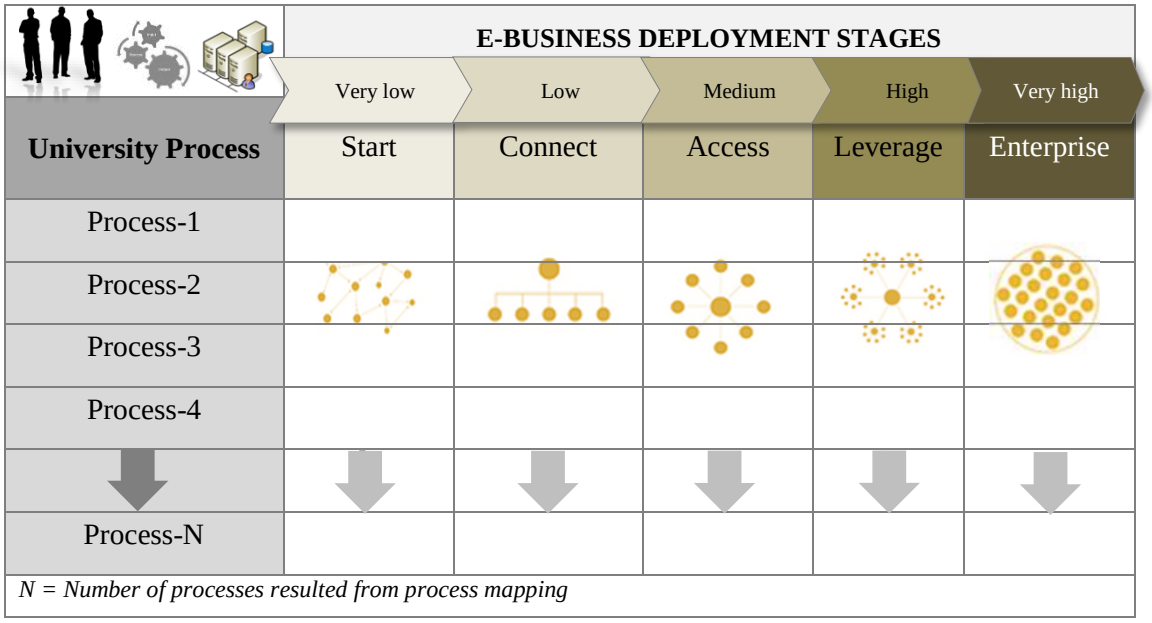


Figure 8.1 The conceptual and operational model for e-business deployment in universities in Libya

An evaluation of the universities' progress with respect to a number of e-business dimensions and related change elements at each stage enabled and supported the path towards maturity, progress, and increasing sophistication with e-business that is represented by the model. SCALE assesses the universities to discover their e-business deployment barriers at their current position. Further, a clear understanding of the current position, together with the prescriptive picture that the model provides, can guide future planning and e-business deployment strategy designs. In addition, the SCALE model could be viewed as a guide to understanding, diagnosing and evaluating the current position as well as providing insights and guidance on future progression and direction in e-business deployment, including the understanding of future benefits.

Given the results from the field studies, there was evidence of a clear ambition at UOMS to move on to the Access stage and benefit from the chance of e-business applications over the internet and related processes including developing people capabilities. The UOMS, UOST, and UOSB (as previously discussed in chapter 6 and chapter 7) were aiming to expand e-business use. Thus, The SCALE model was able to provide a focus for discussion, and provide a frame of reference for developing and measuring tactical deployment over time. Usually, the universities in Libya had e-business facilities (e.g. BIS and internet), which were typically used by individuals; there had hitherto largely been a random approach with few, if any, controls being enforced. It was also recognised that universities would benefit from integrating their

existing e-business applications to support movement towards the Leverage stage on the SCALE model. However, it has clearly emerged that the universities in Libya need to carefully expand their own internal infrastructure and move their internal e-business systems to internet based activities, as well as providing training to develop the associated skills among their staff and conduct a number of process changes in order to automate key activities, which would enable them to reach the Leverage stage.

The discussions with Libyan universities can aid them in providing the e-business improvements required as they interact and make choices on what e-business deployment strategy to pursue. The examples of UOMS and UOST have shown that the first priority to develop e-business has been in those areas that give the university some competitive advantage. For example, UOST reveals typical circumstances affecting many universities in Libya, which had depended on a number of local initiatives to launch their e-business plan but suffered failure due to several barriers and problems as already mentioned. However, the role of each e-business deployment dimension was applied in the analysis of the collected data to define the level of e-business deployment and discover the obstacles facing Libyan universities to e-deploy e-business.

The SCALE model developed in this study was used to discover levels of e-business deployment and help to define a number of aspects that affect e-business deployment in universities in Libya. The model was theoretically derived from e-business deployment literature and other IS related areas (e.g. Stages of Growth). In particular, the model presented three e-business deployment dimensions and associated change elements to focus on answering the research questions. The stages of the model presented the level and the characteristic of the e-business environment and related applications deployment in the selected Libyan universities. The model assists the researcher in discovering the managerial aspects associated with process management and understanding their link to e-business deployment. The model guide enabled an investigation of the barriers to e-business deployment in Libyan universities and highlighted how the e-business dimensions interact to determine the level of e-business deployment. Furthermore, the SCALE model is a movable and flexible approach which assesses information related to each e-business dimension and associated elements in Libyan universities. Thus the e-business deployment dimensions provide broad categories of e-business deployment that are mutually reliant on each other and which,

when synthesised, achieve e-business deployment and associated characteristics from the whole spectrum of the model. In this manner, the research model has been very useful in achieving the aims of this study as well as answering the research questions.

8.4 Main **Contribution to knowledge**

The core of this thesis is the development of an e-business deployment model for local public universities in Libya to guide their e-business deployment processes and implementation. The main contributions to knowledge of this research is detailed below:

- The research developed a strategic e-business model to help university decision makers (e.g. IT directors or senior managers) to develop, define, execute and review e-business deployment plans. The research developed e-business deployment model to help university decision makers (e.g. IT directors or senior managers) to define, develop, implement and review their e-business deployment process. The SCALE model aided the universities to identify priority areas for e-business development, which then reflects positively on cost and budget management for e-business deployment initiatives.
- The SCALE model identified e-business deployment stages among the specific universities involved in the case studies and defined gaps and problems existing in their e-business deployment and use. It indicated that changes must be considered in order to increase the e-business deployment in the case study universities. All these changes must be specified in the universities' e-business plans.
- This research identified the research approaches that have been employed in an attempt to help local universities in Libya to improve their e-business deployment, and define current and future direction actions required in carrying out e-business infrastructure to derive maximum benefit from its investment in technology.
- The research identified essential e-business factors such as how ICT and management skills are crucial with regard to process operations, e-business capabilities and resources. It indicated that universities were aware that the deployment of e-business could be improved through better staff training, more involvement and commitment of senior management, improved process streamlining (through process automation, documentation and process

reengineering), and recognition of e-business benefits by managers within the university. It provided recommendations for universities regarding how to use and benefit from the e-business deployment model.

8.5 Research **Limitations**

Although this research has achieved its aim and answered the main research questions, there are some limitations which presented in the research methodology process. A qualitative approach was chosen as most appropriate for conducting the research and findings, and has been justified in this chapter. However, a number of issues and limitations were faced such as: collecting and analysing data in this research takes long time and difficult in terms of personal effort and cost. Also generalising and extending the final results to include all universities from all regions in Libya is limited for many reasons. For example, the research was conducted in the three universities cases in different geographical area of Libya, which represent an examined limited case studies. Despite the multiple benefits from qualitative research and the information obtained from the gathered data, use of other approach and methods could have helped in identifying more factors and gaining a deeper understanding. Also, using quantitative techniques would provide: e-business deployment rates; statistical assessments; and show the correlation between e-business factors dimensions. Although, this would mean more robust research findings, it was not possible due to time limitations. However, building a SCALE conceptual framework at the beginning helped to reduce the effect of these limitations, the researcher believes that the research results have satisfied the purpose of this study.

Although e-business planning and management have been richly explored in other areas, research of e-business deployment within the context of the university sector is quite new. While this research is a pioneering study in this area, and has contributed to the knowledge and the research domain, it does have some limitations, which are identified as follows:

- The university survey was conducted with key process managers. Although the universities' participants are appropriate representatives of the universities, there were questions over the generalisation of the data to a broader set of universities.
- The questionnaire was delivered by email and most results were collected electronically. Telephone contacts were made to ensure the right informants were reached. Informant bias still exists according to the participants' experience in using e-business applications and their knowledge of e-business

and the associated strategic factors, such as strategy, internal resources and processes.

- The multiple-case studies were conducted with three universities that participated in the study. Altogether, key managers were involved in the case studies. Other universities (private and new universities) were not included in the case studies. Although these universities are appropriate representatives of the sector, there were questions over the generalisation of the data to a broader set of the university sector. It might be very useful to include a broader representation including a greater range of participants from universities that were not included in the case studies.

8.6 Conclusions

This study outlines the key research findings based on the research questions, and aimed to answer the questions related to the extent of e-business deployment in the universities in Libya, and these have been revealed in the context of three universities that participated in the study. The e-business deployment model and extended framework have been developed for Libyan universities, the model has provided explanations for the importance of each e-business deployment stage. There are four key findings of this research. First, an e-business deployment plan is essential to the improvement of e-business practices. Universities that install an IT system without considering the deployment plan are likely to end up with in-house systems or software installation, but not broad deployment of e-business in their processes. Secondly, an e-business deployment plan should consider multi dimensions factors that play significant role to derive maximum benefit from e-business use. Thirdly, an e-business deployment plan should be established to encompass every aspect of university and produce significant changes, not just from a technological perspective, but also the internal organisation's perspective of its management practices, people skills, and processes. Fourthly, it is important to recognise that e-business deployment initiatives are a combined effort; therefore, any developed e-business deployment plan needs to take into account multi dimensions in particular technology, process and people dimensions, and associated internal and the external environments. However, the following conclusions have been formulated:

- The three universities in this study have recognised the advantage of e-business and benefits that e-business deployment can bring. However, a full understanding of significant e-business benefits can only happen when e-

business deployment is done through planned process mapping, assessment and then prioritising.

- The uptake of advanced e-business activities, such as e-learning, online payment and ERP systems, is still limited. The adoption of university-specific e-business solutions, such as student records management and payroll systems, has grown and this suggests a potential large increase in deployment of e-business over the near future.
- University participants involved in this study were aware that the improvement of e-business was connected with the university resources, processes, and people capabilities. The process managers, in particular IT managers, attempted to manage changes related to these issues, and made efforts to reduce the gap associated with e-business implementation. Nevertheless, progress in such practices varied between the different universities. Staff e-skills development has been highlighted widely across the universities as an important factor in improving e-business deployment. Process transformation was slow because the current practices still focused on adjusting technological solutions to fit into the current business activities. Furthermore, increased effort was required aimed at process documentation and integration. Process standardisation is still a long way from being adopted. Finding the right people with both professional and IT skills was critical in helping the universities to improve and establish e-business.
- The university participants were aware that appropriate e-business deployment plans or policies were required. The IT departments have developed a variety of technology deployment tactics to support corporate process areas, but most of these activities were defined according to technology applications or were focused on in-house system implementation. A successful, university-wide, broad planned e-business deployment solution was missing. As a result, the long-term direction for e-business deployment was not clear and available defined activities were only to address a number of current university process needs.
- A considered e-business deployment model was developed to provide a holistic approach to help the universities in Libya deploy and implement e-business. The SCALE model was developed to addresses the issues necessary for e-business deployment and implementation, such as guiding universities to assess their e-business deployment levels and required procedures, and positioning

technological systems, processes and people e-business stages within development plan.

- The SCALE model enables university decision makers to include multiple components in their e-business deployment plans and carry out balanced e-business development. The SCALE model facilitates a progressive approach for the universities in Libya to develop and review e-business deployment planning and implementation through exploring defined e-business stages. The model can assist universities in Libya to better allocate and utilise their available ICT resources and take better advantage of e-business.

This chapter addressed the research questions and discussed a number of related issues. It finds that all three universities in this study are lacking the necessary e-business deployment strategies, they lack staff ICT skills, and there is a lack of process guidelines and infrastructure that would enable widespread usage of the related applications. At present, the universities follow basic approaches allocating proposals of e-business systems implementation that lack analysis of procedures and its impacts, and also a lack of defined opportunities and potential of this new way of performing processes in e-business based. Although the universities have made some investments in e-business applications such as developing BIS for student records management systems and Payroll, the issue is that these systems are still completely isolated and not integrated with the current e-business application. The particular challenge that faces e-business deployment strategy is the lack of understanding of strategy and the inability to connect strategy formulation and implementation, which has an impact on the success of e-business deployment applications. Further, the universities' administrative and political instability have had a negative impact on the establishment of e-business deployment strategy by affecting political favour towards resources deployment. People working in universities also sometimes resist such proposals and make e-business strategies difficult to implement. In spite of the fact that the necessary conditions for supporting the e-business applications usage are not in place in most Libyan universities, the extent of deployment is still in a weak position hampered by a ranges of barriers, which include the unavailability and/or unreliability of infrastructure, the absence of government e-business deployment policy frameworks, the lack of required applications such as internet connections, websites and people's capabilities, and unfamiliarity of possible users about the beneficial potential of e-business. The level of availability of ICT hinders deployment and the use of e-business applications. Despite

the current limitations with the existing infrastructure and other related conditions and issues, e-business could be an extremely beneficial tool in Libyan universities; the Libyan government needs to be prepared to demonstrate that they have the political will to support the universities to remove the barriers that currently stand in the way of widespread e-business deployment.

8.7 Future Research

The following recommendations are made regarding future research work:

1- Extend the research to investigate the impact of a wider range of factors such culture factors in implementing SCALE e-business deployment model within the university setting.

2- Replicate the case study to other universities to examine their e-business deployment and to study their e-business practice and extend the understanding and roles of e-business deployment dimensions and associated barriers.

3- Explore e-business performance of universities' end-users via quantitative methods within a much larger sample of university participants. This would provide interesting points of comparison to the conclusion derived from the interpretation of the qualitative data. The findings could strengthen or suitably limit the generalisability of this research.

4- Extend the application of the SCALE model with organisations in other industries to compare the findings in order to identify similarities and differences in terms of the three e-business deployment dimensions adopted in this research. This would also reveal other critical factors in e-business deployment.

There is a need for more interpretive case studies to further understand and characterise the development of e-business in universities. There is need for further investigation into the role of government in the development of e-business in universities especially in Libya. Such studies could offer insight to government policy makers providing e-business deployment guidance. This study calls for further investigation on aspects of failure or lack of e-business deployment initiatives in universities.

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Appendices

Appendix I: Technology and Systems

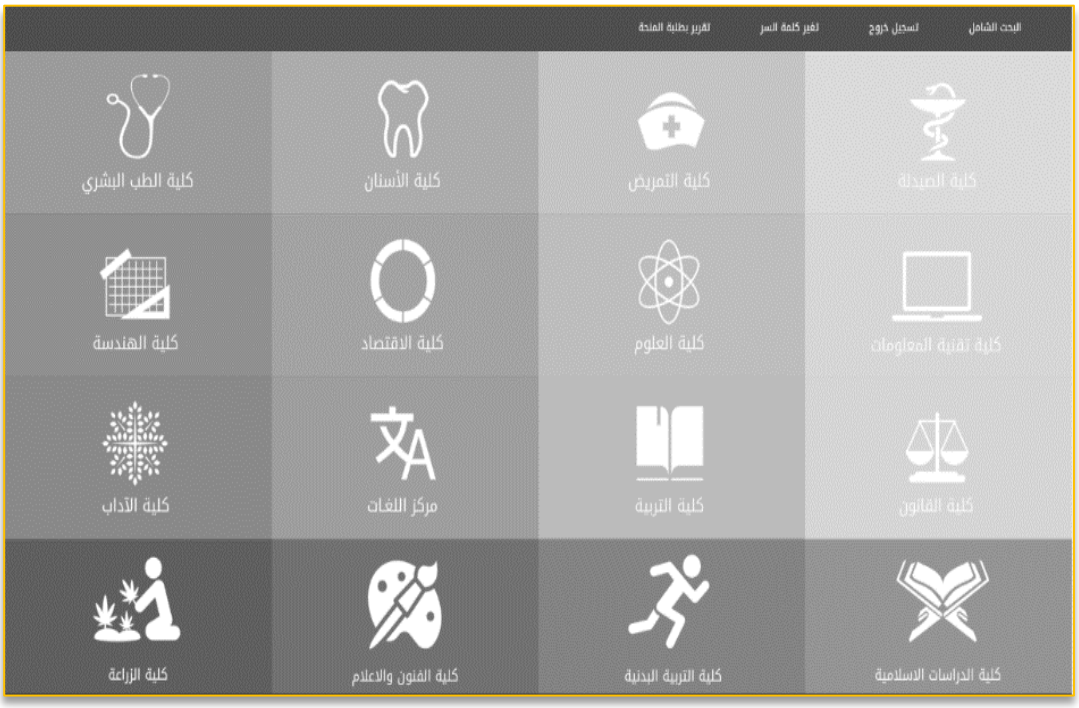
UOST: The main menu of new student's registration system interface

UOST: Student records management system interface

UOST: Post graduate system interface.

UOMS: Archive system interface

UOMS: students record management system interface

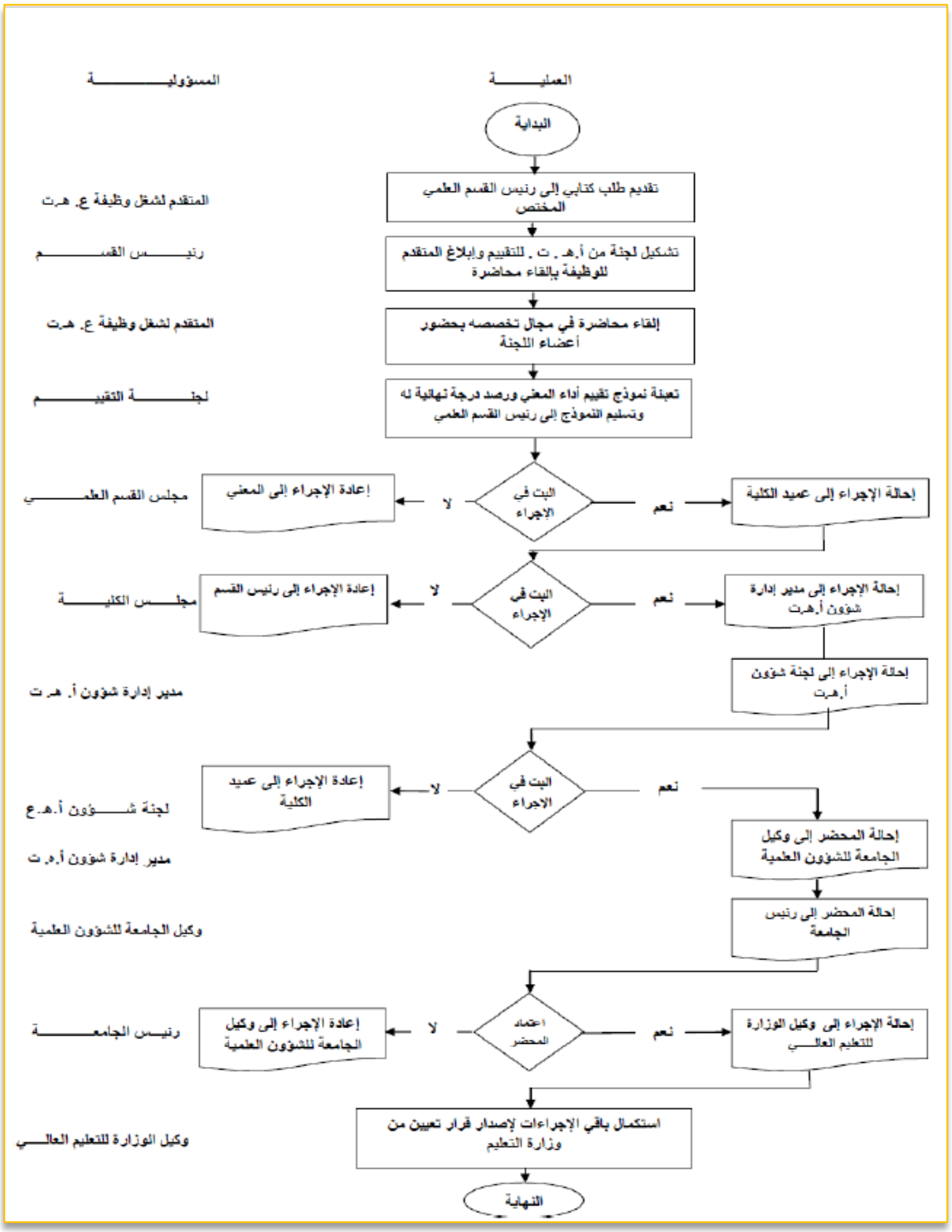


UOMS: Archive BIS system interface

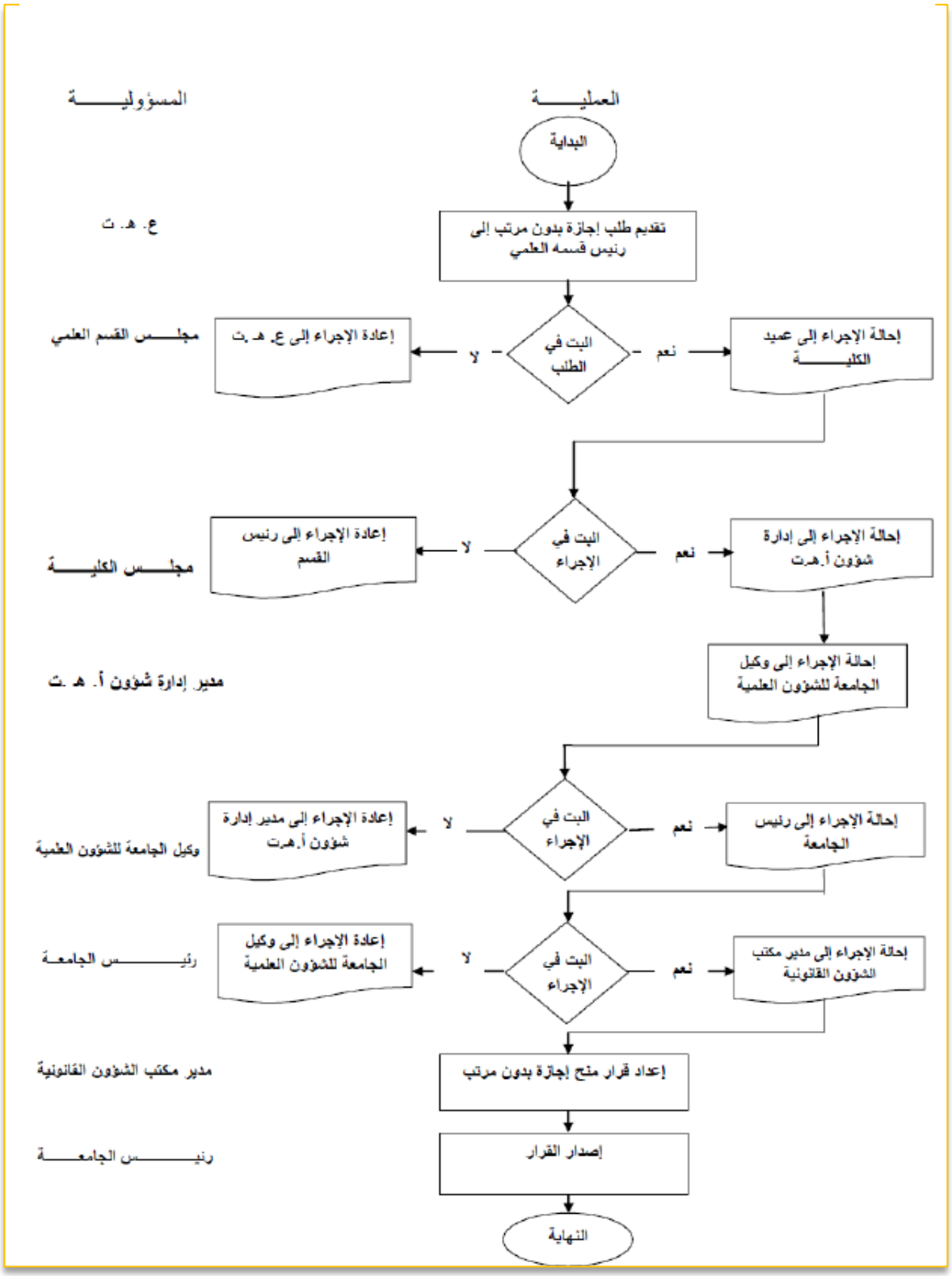
UOMS: Payroll system interface.

Appendix II: Process

Documented new academic staff registration process in UOST



Documented academic staff leave without pay process in UOST



Appendix III: Questionnaires

University of Gloucestershire

Informed Consent Form:

Questionnaire on e-business deployment in universities.

Brief: The aim of this questionnaire is to investigate the extent of e-business deployment and use within the Universities in Libya.

The questionnaire is split up into different sections and each section is explained in more detail at the start. If you have any queries regarding the questions, do not hesitate to contact me for clarification on s0512098@connect.glos.ac.uk

The questionnaire will take approximately 20-25 minutes to complete and all responses and report results will be kept confidential.

Thank you for taking the time to respond. Your help is very much appreciated.

I confirm that these are accurate responses provided by the undersigned.

Participant Name and Signature:

_____

Date:

_____

Section A: University Overview

This section contains questions aiming to find out more about the university itself and how it operates.

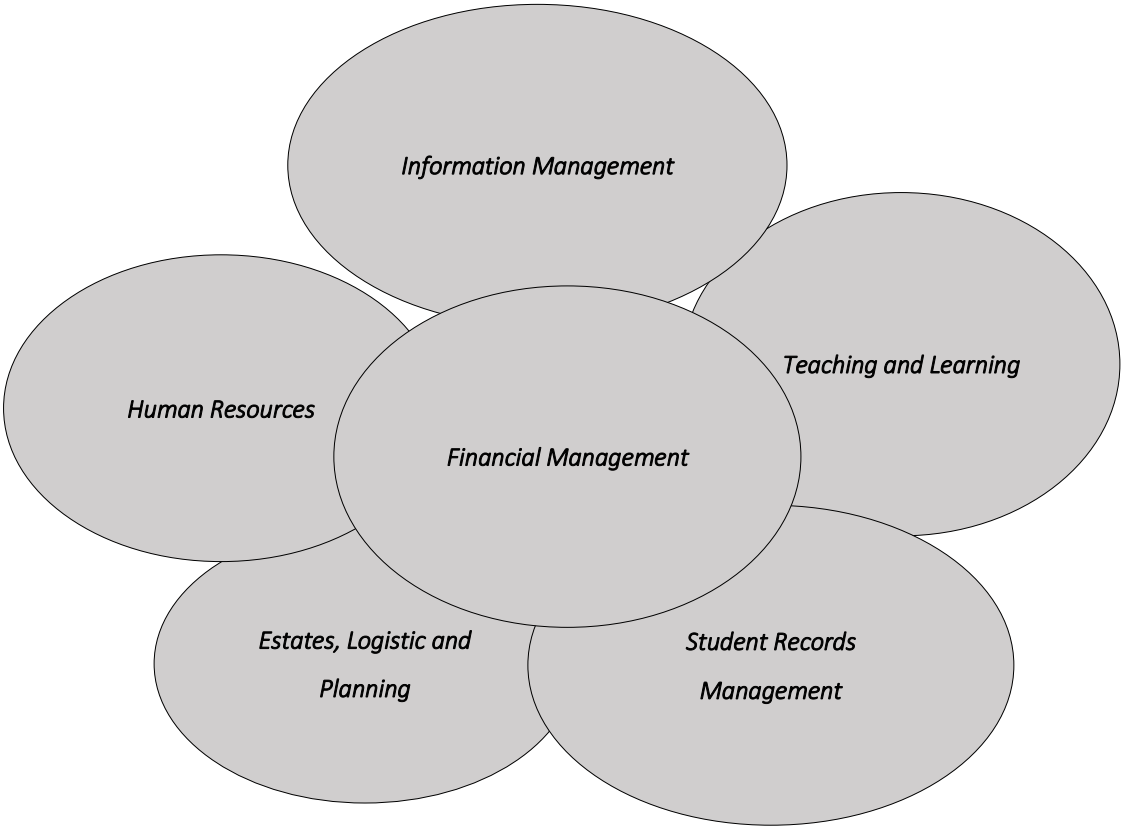
Q1	Does the university have a three to five-year plan that sets out its main objectives over that period? If not, then what do you consider to be the main objectives for the next few years?
	Please briefly state

Section B: Summery on e-business technology

This section contains questions aiming to investigate more information on the e-business architecture at the university as well as mapping infrastructure in place and the work tools and methods used.

Q2	Does the University have a primary location where the servers are held?	
Q3	Does the current network infrastructure meet the requirements of the process or do you believe improvements could be made in the future to ensure the requirements are better met?	
Q4	Do any of staff have off site access to the systems resources and if they do, how do they access them?	
Q5	In your opinion, is the funding invested into the University's Information Systems appropriate in order to establish university's e-business effectively?	
	Yes	
	No	
Q6	In your opinion, does the university have the necessary staff to successfully maintain the current systems architecture?	
	Please briefly State	

Q7	Below I have drawn what I believe to be a map depicting the processes at the University. Do you believe this is accurate and can you amend or add to it where required?



Comments:

Section C: University's systems, applications and level of integration

This section contains questions that aim to investigate the systems applications used within the University as well as how they integrate with one another.

E-Business: "*'All electronically mediated information exchanges, both within an organisation and with external stakeholders supporting the range of business processes."* *E.g. Wherever a computer is used by anyone within the university to process information.*

Q8	Below is a list of business processes I believe the university conducts. Can you name the applications/systems used in each process in as much detail as possible?

This Table contains a grid that aims to assess the extent of e-business technology deployment within the University. I have listed what I believe to be the processes of the University down the left hand side. Where possible, please fill in the grid stating which section you believe each process falls into and which system is used in that Process.

	Start	**Connect**	**Access**	**Leverage**	**Enterprise**
For Example…	Computers, MS Word, windows, Excel, and printers	Static website , Networks use and Business information systems,	Tow-way Website, emails and online applications	Web-enabled systems and database	Integrated Internal and external systems
Human resources					
Financial management process					
Student records management process					
Teaching and learning process					
Information and development process					
Estates, logistics and planning process					

Q9	Are any of the systems integrated or synchronised at present? If so, please state how they are integrated or linked and how this helps the process to better meet its objectives.

Q10	Are there any future plans to integrate or synchronise e-business systems?
Q11	Do you use website for your process; if yes, does the university website synchronise with the internal e-business systems e.g. updating student records when it is updated online?
Q12	To your knowledge, are there any software applications that have been developed internally?
	If there are, what they are used for?
Q13	Are you able to update data in real time across all systems or can this only be done using one system?
Q14	As the University manages records, data accuracy, security and consistency is importance. Do you believe there are any weaknesses with regards to data accuracy or consistency across the university?
	If so, please state in which area the problem lies.
Q15	Would you consider the current systems to be an web-enabled system or a number of separated different systems working together?

SECTION D: Sample of Technology Dimension Questionnaires TECHNOLOGY ASSESSMENT AT UNIVERSITY CASE		
	Question	Please specify
Q **1**	Is there a plan of three to five years for e-business deployment among the process? Please specify	
Q **2**	In your opinion, in the next three years where should e-business applications be	

	deployed? Please explain
Q **3**	Currently and in the past, do you think the financial support is suitable to support e-business deployment in the process? Please clarify
Q **4**	Do you use servers in the process?
Q **5**	Do you use web portal in the process activities and services? If yes, How?
Q **6**	If you use website, is it integrated with the internal systems? Please describe
Q **7**	Do you use networks in the process activities? Please define
Q **8**	Do you think the university infrastructure can support process activities to use e-business?
Q **9**	Do you use database in the process management? Please specify
Q **10**	Do you use any business information systems in the process activities? If yes, please list it.
Q **11**	Does these systems are interconnected? If yes, how?
Q **12**	In your opinion, what is the critical challenge hindering deployment and use of e-business applications in process? Please describe

Q **13**	Do you use the electronic data format for process management? Please define
Q **14**	Do you think the data used are accurate to be used with e-business process? Please describe
Q **15**	Do you use e-forms for data collection? Please describe
Q **16**	Do you classify data to related tasks? Please describe
Q **17**	How you store data? Please specify
Q **18**	In your opinion, what is challenges hindering the use of e-business and electronic data? Please specify

SECTION E: Sample of Process Dimension Questionnaires **PROCESS ASSESSMENT AT UNIVERSITY**		
	Question	Please specify
Q **1**	Does the process use control list to describe who performed, when in the process, and how executed? Please explain	
Q **2**	Do you have written process description? Please describe	
Q **3**	Do you think the university process is clear and defined? Please specify	

Q **4**	In your opinion, do you expect resistance of change when transfer from traditional process to e-business based process? Please explain
Q **5**	Do you use job description cards system for employment? Please specify
Q **6**	Do you have a process deployment and management strategy in the university? Please clarify
Q **7**	Is there future plan for the process to be managed in e-business manner? Please explain
Q **8**	Are there any e-process activities? Please specify
Q **9**	In your opinion, what is the challenge prevent the process from not being e-business based? Please clarify
Q **10**	In your opinion, what are significant needs for the department to deploy e-business related process? Please describe

	SECTION F: Sample of People Dimension Questionnaires **PEOPLE ASSESSMENT AT UNIVERSITY PROCESS**

Question	Please specify
Q **1**	Is the process manager a member of university senior management team SMT? Please specify
Q2	Do you receive related info process training or development programs from the university? Please specify
Q3	Who is responsible of training development in info process? Please specify
Q **4**	Do you think e-business can improve the university process? Please explain

Q **5**	Do you think skills of people who works in ICT department can support success transfer and deployment e-business in the university? Please explain
Q **6**	What are the most recognized skills of employees in the process? Please specify
Q **7**	Do you think employees can effectively manage day-to-day process? Please explain
Q **8**	Do you think employees can effectively manage day-to-day process? Please explain
Q 9	In your opinion what is the important requirement to deploy e-business in your department and other university process? Please describe
	In your opinion, what is the challenge prevent the people in your department from not using e-business? Please describe