REQUIREMENTS FOR REDESIGNING THE INTERFACE OF IRAQI E-GOVERNMENT PORTAL

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REQUIREMENTS FOR REDESIGNING THE INTERFACE OF IRAQI E-GOVERNMENT PORTAL

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Abstrak

Kebanyakan negara telah menyediakan perkhidmatan kerajaan secara atas talian. Namun, Iraq masih mencari peluang baru menuju ke arah perkhidmatan atas talian tersebut. Inisiatif bagi menceburi perkhidmatan kerajaan atas talian atau disebut kerajaan elektronik (e-kerajaan) tidak menunjukkan hasil yang memuaskan. Walaupun e-kerajaan telah tersedia, pelanggan masih memilih kaedah tradisional, atau memasuki sistem atas talian melalui laluan yang tidak diiktiraf. Melalui cara tersebut, pelanggan dianggap tidak menggunakan portal e-kerajaan. Beberapa faktor telah dikenalpasti sebagai pengaruh kepada kelemahan portal e-government sedia ada; di mana reka bentuk paparan hadapan bagi portal adalah salah satu dari faktor yang menyebabkan pengguna tidak tertarik untuk melayari portal melalui laluan yang sempurna, iaitu melalui muka hadapan yang diiktiraf dan selamat. Sebaliknya, pengguna terus mencapai modul yang diingini melalui laluan pintas. Dengan itu, kajian ini meyimpulkan bahawa tahap 'mudah' rekabentuk interaksi pada paparan muka hadapan portal e-kerajaan sedia ada adalah lemah dan tidak menyokong pengalaman pengguna. Usaha menjawab persoalan-persoalan tersebut memerlukan kajian ini mencadang satu set elemen bagi portal e-kerajaan Iraq bagi memastikan ia diterima baik sebagai berguna dan mudah digunakan. Kajian ini menamakan prototaip yang menerapkan elemen yang diperoleh dan disyorkan sebagai Iraqi e-government portal (Ie-gP). Sehubungan itu, matlamat kajian ini adalah ditetapkan untuk mengusulkan satu set elemen yang membuatkan Ie-gP berguna dari persepsi pengguna. Bagi menyempurnakan matlamat tersebut, tiga objektif telah dirangka: (1) menentukan elemen antara muka bagi halaman hadapan (front office) Ie-gP, (2) untuk mereka bentuk dan membangunkan front office bagi Ie-gP, dan (3) untuk menilai tahap kebergunaan dan mudah menggunakan front office Ie-gP. Analisis perbandingan, pembangunan prototaip, dan kajian eksperimental telah dijalankan bagi mencapai matlamat kajian. Dapatan umum menunjukkan bahawa Ie-gP telah mendapat persepsi yang baik dari pengguna terhadap aspek kebergunaan dan tahap mudah untuk digunakan. Justeru, sumbangan kajian yang utama adalah elemen yang menjadikan front office bagi Ie-gP mendapat persepsi yang baik dari pengguna dan prototaip yang dibangunkan.

Abstract

Many countries have provided their government services to the people online. However, Iraq is still looking for opportunities to implement the online technology for their government services. The initiatives to venture into online government services, or called electronic government (e-government) have not shown good return. Although the e-government is available, people still prefer to work on traditional way, or enter into the e-government modules through improper channels. Hence, they are viewed as not using the e-government portal. Many factors were identified influencing the disadvantages of the existing e-government portal; nevertheless the design of the front office is not making users attracted to enter into the portal through the proper home page. In contrast, the users tend to go directly to the module they intend to. Hence, his study deduces that the user interface of the front office of the portal was not usable, not supporting user experience. This study proposes a set of elements for the Iraqi e-government portal to ensure that it is perceived usable in terms of usefulness and ease-of-use. This study develops the prototype that incorporates the elements as Iraqi e-government portal (Ie-gP). Therefore, the aim of the study is to propose a set of elements that make the Ie-gP usable from users' perception. To accomplish that, three specific objectives are formulated: (1) to determine the interface elements for the front office of Ie-gP, (2) to design and develop the front office of Ie-gP, and (3) to evaluate the ease-of-use of the front office of Ie-gP. Comparative analysis, prototyping, and experimental studies are used to accomplish the objectives and aim. General findings show that Ie-gP is perceived useful and easy-to-use. The main contributions of this study are the elements of usable e-government portals for Iraqi context and the prototype of the usable portal called Ie-gP.

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List of Abbreviations

Ie-gP	Iraqi E-government Portal
ICT	Information and Communications Technology
IT	Information Technology
GIP	Government Information Portal
E-SERVICES	Electronic Services
MOU	Memorandum of Understanding
MOI	Ministry of Interior
MMPW	Ministry of Municipalities and Public Works
UN	United Nations
MMS	Multimedia Messaging Service
3G	Third Generation
GPRS	General Packet Radio Service
G2C	Government-To-Citizen
G2G	Government-To- Government
G2B	Government-To-Business
G2E	Government-To-Staff
EG	E-Government
UML	Unified Modelling Language
GUL	Graphic User Interface
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure
UTF-8	Unicode From Universal Character Set + Transformation Format -8 Bit
MB	Megabyte
DIT	Department of Information Technology

HTML	Hypertext Mark-up Language
IEEE	Institute of Electrical and Electronics Engineers
AVI	Audio Video Interleaved

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CHAPTER ONE
INTRODUCTION

1.1 Introduction

This chapter explains the e-government in general and the services provided through the Internet. It also provides the definitions of front office of e-government portal. Besides, it discusses the background and current state of e-government portal in Iraq.

1.1.1 E-government

E-government has become one of the essential foundations in recent modern society (Alfawwaz, 2011). It represents an important part in economic, social, and political development of the country (Al-Taie & Kadry, 2013). As part of Information and Communication Technology (lCT) infrastructure, it assists in knowing the aspiration of the government as well as offering various services (Al-Khafaji, Shittuline & Osman, 2012). This allows various transactions to be available online, which is referred to as e-government. The e-government portal is composed of two parts, front and back office; particularly, the front office serves the clients, while the back office functions to deal with records (Durickovic & Kovacevic, 2011).

1.1.2 Front Office

The front office, as it connects the system and the users need to be user-friendly. It should support users' tasks at its best, well-tailored to the needs of the users, appropriate to the context of use and the environment, as well as be aesthetic to the users (Sharp, Rogers & Preece, 2007). Based on that, it should serve as an online service center and citizen engagement tool at the same time (Abdulwahida, Mutalib, Affendi, Yusof & Alib, 2014; Cook, 2000; Thomas & Streib, 2003).

1.1.3 Portal

Government Information Portal (GIP) is the original concept of e-government. It is the core of e-government and is an important interaction channel between the government and people (Chen, 2010). It is agreed by Maheshwari et al. (2007) and Li (2011), who found that a portal is built for publicizing government information. It is an important channel that improves public achievement, efficiently reduces the management cost, and enhances the regulatory capability and the level of community service. It is an important channel that improves public achievement, efficiently reduces the management cost, and enhances the regulatory capability and the level of community service. It is a one-stop service center that is focusing, converging, mixing and norming the decentralized sectors, the chaos of the administration, and complex process in the portal. It is not only supplying general public services for the community, but also an essential window of the many users with government for interaction essential platform.

1.1.4 Background of Iraqi E-government

The Iraqi e-government has started to put initiatives into establishing its e-government since more than ten years ago, Iraqi e-government was an initiative taken as a result of the war since 2003 (Al-Dabbagh, 2011). With the help of the United Nations, in June 2004, it was appealing to the international community to help the new Iraqi government in creating the foundation of its e-government (Sabah, 2014). It was the initial step for the creation of a powerful e-government, to support the reconstruction of the infrastructure of the country (Abdulwahida, Mutalib, Affendi, Yusof & Alib, 2014).

1.1.5 ICT in Iraq

The ICT in Iraq provides a link between the public sector and the private sector in an effort to improve and enhance communication in Iraq and contributes to global companies (Kakbra & Sidqi, 2013). The Iraqi ICT infrastructure is a general public-private relationship attempting to enhance ICT in Iraq (Lect & Hasan, 2010). The projects being applied by the Iraqi ICT Connections will help enhance schools, create jobs, and improve productivity (UN, 2012). According the survey conducted by the United Nations in 2012 that progressed in the completion of e-government in Iraq has been slow. Hence, the Iraqi e-government portal has been ranked 137th in the world (UN, 2012). That means, there are weaknesses in the current Iraqi e-government portal.

1.2 Problem Statement

Technically, a portal stands on back office infrastructure, helped by its front office design. Both parts should complement each other in ensuring that all functions work well and users fell happy to use. With regards to that, this study focuses on the front office of Iraq e-government portal. Iraq has shown a considerable increase in Internet connections from 12,500 in 2000 to 2,750,000 in 2008. That means, there is a significant increase in the use of the Internet in Iraq (Heshmati, Al-hammadany & mohammed, 2013). In response to that, it is believed that developing e-government portal that addresses accessibility issues is a key to grow the utilization of ICT. It further leads to the adoption and appropriation amongst the masses (Kettani & Mahdi, 2009).

On the other hand, Ariffin (2009) states that problems could be diagnosed through real-life scenario, existing literatures, or from preliminary study. Therefore, this study

conducted a primary survey in 2014 to understand the real problem regarding the access to Iraqi e-government portal. In the study, a survey that contains questions in Table 1.1 asking about the current portal of Iraqi e-government addressed to Iraqi people in Malaysia. Altogether, 30 participations involved in the preliminary study. They work online for tasks related to passport, election, and others, with age between 20 and 50 years old. Additionally, their expertise varies.

Table 1.1

List of Questions

No.	Questions
Q1	I am using the services for e-government in Iraq.
Q2	I use the e-government services through the portal.
Q3	I am satisfied with the services in the Iraqi portal.
Q4	Portal interface for Iraqi e-government is easy to use.
Q5	I think easy to access to the e- services through Iraqi e-government Portal.
Q6	I think the interface of portal need to redesign
Q7	I access to the e-services for Iraqi e-government through the portal so hard.

Data were collected though questionnaire. In the analysis, the gathered data were classified based on five–point Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree and 5 = Strongly Agree) (Mahmud, Hussin, Othman & Dahlan, 2010), as exhibited in Appendix A. The results are shown in Figure 1.1 and Figure 1.2.

This study adopted the above questions in order to determine the proportion of the use of e-services provided by Iraqi e-government through the portal. In addition, it explains that the user satisfaction on the existing portal is very low and that the current portal needs to be re-designed by adding a set of important and influencing features to make it easy to use and useful.

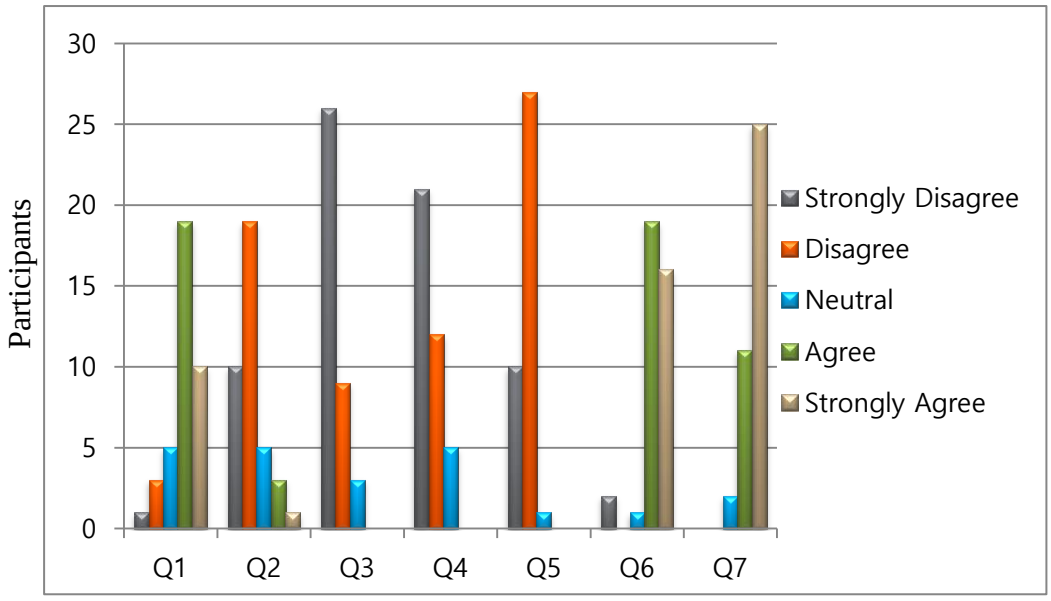


Figure 1.1: Analysis the Result of Preliminary Study, 2014

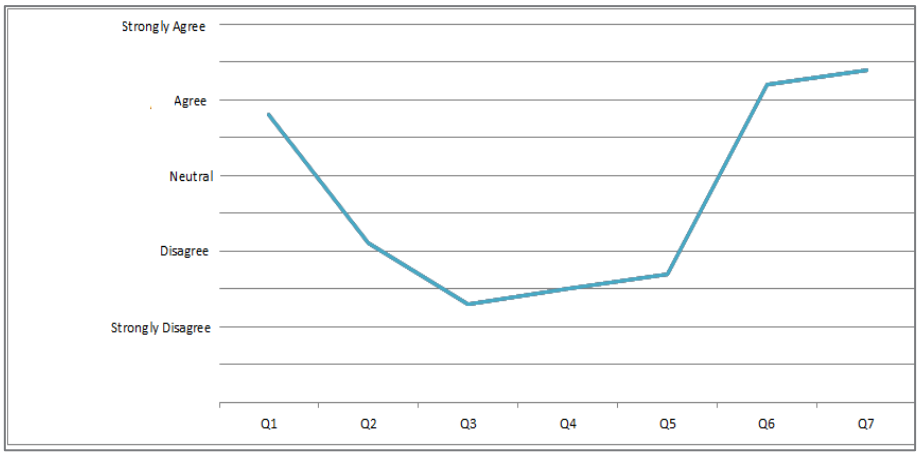


Figure 1.2: The Average of Result for Preliminary Study

Referring to Table 1.1, together with the results in Figure 1.1 and Figure 1.2 (particularly for Q1, Q2, Q4, and Q5), it could be understood that the access of Iraqi e-government portal is low as detailed in Chapter 4. In this case, improper links refers to going directly to the e-services without getting into them through the main portal. This is worrying because they could bypass the security feature. More importantly, the users miss much information provided in the main portal. E-Government portal have to be secure at various levels or stages in the e-government (Saldhana, 2007) as

well as a successful e-government structure should be completely able to do everything they want to do with their government through one e-government portal (Al-Taie & Kadry, 2013) .

This explains that the front part of the portal, which connects the users with the portal is not helping the users to perform their tasks (Sharp et al., 2007). Hence, although the functions are working well, the interaction styles must be well designed too (Dix, 2009). In short, quality measurement for e-government portal is very important for the improvement of user satisfaction from web portals (Magoutas & Mentzas, 2009).

It was found that 75% of the online services still need to be equipped in the Iraqi e-government portal (Al-Khafaji et al., 2012; UN, 2012). It is believed that when more features are made available in the e-government portal, the access will be higher, more frequent, and by more citizens. Figure 1.3 exhibits that in current situation (Q3-"I am satisfied with the services in the Iraqi portal"), 87% of the respondents are not satisfied with the e-services available in the portal.

Also, to increase the access, the interface of the portal needs to be re-designed so that it is easier and more intuitive. The portal should enable the users to select, analyze, interact, and download materials any time. Also it should be in trilingual (Arabic, Kurdish, and English) so that it is usable by all interested parties (UN, 2012; Al-Taie & Kadry, 2013). This is deduced through the answer of Q6 – "I think the interface of portal need to redesign".

The functions in a portal are designed to search, classify the data at three levels of complexity: (1) information publishing and linking of existing web sites, (2) single agency transactions, and (3) transactions requiring integration of multiple agencies

(Gant & Gant, 2002). Such guideline should be mapped in the Iraqi governance so that the portal could have better quality, more accessible and useful (Choudrie, Ghinea & Weerakkody, 2004). Especially, because the current portal for Iraqi e-government is not secured, not easy for use and it is need to enhance (Iraqi Portal, 2014; Al Athmay, 2013). Besides that, Figure 1.3 explains that the rate of citizen who use e-government services directly and the rate of use of the e-services through the portal are very small.

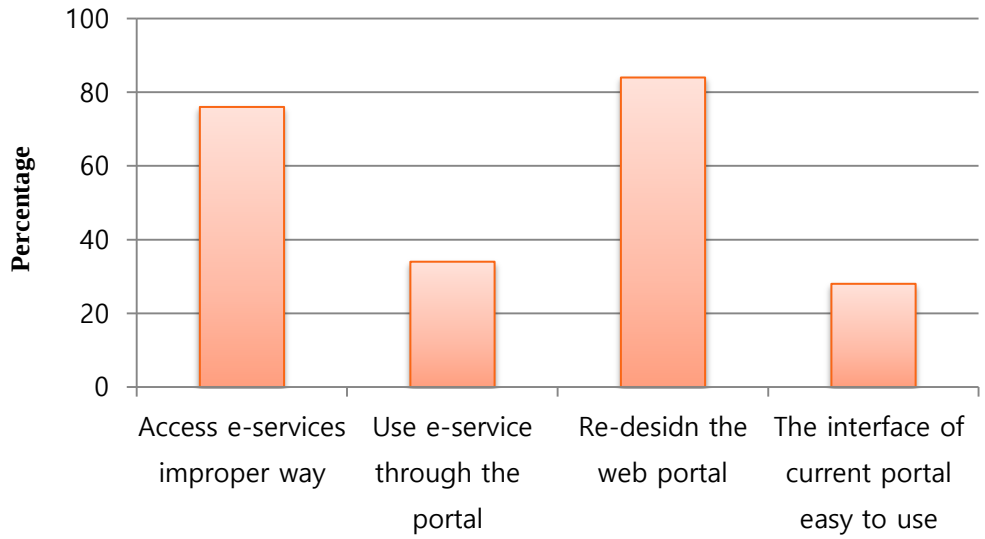


Figure 1.3: Preliminary study – low access to Iraqi portal

As a conclusion, the preliminary study reveals that the user interface of the front office of the Iraqi e-government portal needs to be redesigned to support user tasks. This study believes that the unfriendly user interface leads to the low access of the Iraqi e-government portal. This is because they are not satisfied with the user interface. Hence, this study takes the initiative, to redesign the requirement for the user interface of the Iraqi e-government portal.

1.3 Research Questions

Based on the problem discussed in the previous section, the completeness of this study aims at answering the following research questions:

1. What are the interface requirements and features that attract users to access the Iraqi e-government portal?
2. How to design the interface of the Iraqi e-government portal?
3. Is the new Iraqi e-government portal satisfied by the users in terms of ease-of-use and usefulness?

1.4 Research Objectives

To solve the problem discussed earlier, and to answer the posed research questions, this study aims at designing the front office of Iraqi e-government portal (Ie-gP) so that it is easy to use and useful. To accomplish that, the following objectives need to be achieved:

1. To identify the interface requirements and features of the front office of Ie-gP.
2. To design and develop the front office of Ie-gP.
3. To evaluate the ease-of-use and usefulness of the front office of Ie-gP.

1.5 Significance of Research

The purpose of this study is to design and implement the Iraqi e-government Portal for use by Iraqi people. The portal should be easy to use and useful. Findings of this study suggest that the Ie-gP is able to support the communication between the government and the society. This will encourage the citizens to get information and communicate with the government through the portal.

The significance of the study to the Iraqi community is outlined below:

1. Ie-gP ensures that the communication among the community members is well-supported and unites all members to help solve other members' problems.
2. Ie-gP allows the society members to communicate with the government efficiently.
3. The society could plan their activities structurally, which saves a lot in terms of financial, time, and energy.

1.6 Research Scope

The e-government portal is divided into front and back office. With regards to that, this study looks into the front office only of the portal. Only perceptions on the usefulness and ease–of–use of the front office of Ie-gP are measured. Particularly, the interface of the front office is within the interest of this study, leaving other aspects for future research. In terms of the users, data will be gathered from citizens in various parts of the country.

1.7 Organization of the Thesis

This thesis proposes the requirements for re-designing the interface of the Iraqi e-government portal. This Chapter establishes the background of the study.

Chapter 2 provides related background and related works on all major research issues covered in the thesis. Firstly, the study briefly presents the e-government portal. Secondly, it focuses on the six models of portals (Malaysia, Korea, Dubai, Punjab, Haryana and Jordan)

Chapter 3 provides the research methodology of this study. It consists of four main phases to solve the identified problem.

Chapter 4 describes a comparison of e-government portals of various countries to identify the basic requirements in the design of the e-government portal. It results in the main features, which have been used in designing the new interface.

Chapter 5 explains the design and development of the prototype by using Object-Oriented approach using UML language and Rapid prototyping.

Chapter 6 presents the result for evaluation the usability of new design of Ie-gP

Chapter 7 discusses the conclusion and future work of this research. In addition, the chapter includes the contribution of this research study and the limitation.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter reviews the literatures related to this study. The models of the front office are explained in detail. It starts with the facts on the use of the Internet in Iraq Also, it explains the concepts involve in this study such as e-government, the technology used and the current state of implementation in Iraq.

2.2 The Use of the Internet in Iraq

As an illustration, in parliament and local governments, their voices are no less than 25% after 2005 (UN Iraq, 2012). This is partly influenced by the establishment of the e-government portal that allows and encourages the citizens to get access to the information (Al Athmay, 2013). However, the involvement of the women in government sector still needs improvement, and the e-government portal still needs to be made more advanced to cater for the timely features (Sabah, 2014).

Generally, the Internet usage intensity in Iraq is influenced by gender, age, educational level, employment, and cost of service, with different levels of influence. As an example, people between 25 and 40 years old use more intensely than those 40 years old and above (Al-Hammadany & Heshmati, 2011). This is a little different than the other countries. On the other hand, Internet café is the most commonly used mode of the Internet use. This implicates that the Internet is accessible by the public pervasively, even though the citizens do not have access to the Internet at home (Heshmati, Al-Hammadany & Mohammed, 2013).

This is partly because the Internet is expensive to be installed at home. Similarly, the promotion is not balanced between urban and rural areaa, which in a way creates digital divides in between (Billon, Marco & Lera-Lopez, 2009). Hence, all those factors should be critically considered when designing for the portal in supporting citizens' needs in accessing the e-government services (Heshmati et al., 2013). Again, the portal could be utilized for communicating and making transactions among the government and citizen. Also, Heshmati et al. (2013) also found that the intensity of the Internet usage in Iraq is influenced by citizens' income, educational level, and the general economic situation in Iraq (illustrated in Figure 2.1).

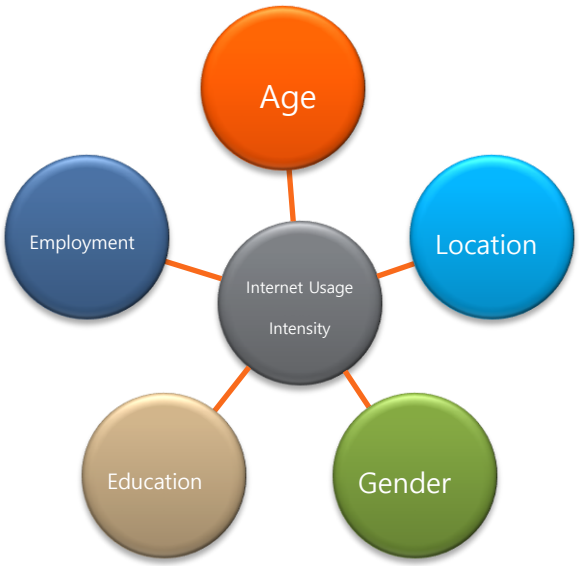


Figure 2.1: Internet Usage Factors (Heshmati, Al-Hammadany & Mohammed, 2013)

2.3 E-government

The phrase e-government is used to explain the use of ICT in assisting government procedures, enhance people, and supply government services. The provision of the web for public application increases the use of e-government (Durickovic & Kovacevic, 2011). Certainly, the Internet is the most persistent technological

development that can be leveraged by every establishment. Iraq‘s government and its people are the same (Othman & Ramasamy, 2013). With the many beneficial effects of ICT in business, it is difficult to assume a modern stage business working without the use of ICT. ICT spreads throughout every factor of the 21st century companies. In the matter of fact, the citizens are the most important factors for the government, to increase social welfare, to improve the situation of the individual within the government, to modernize public services and to meet the requirements of the citizen (İdikat & Tuğba, 2004).

2.4 Technology for E-government

E-government technologies could be called on this context, including phone, fax, short message service, multimedia messaging service (MMS), third generation technology (3G), general packet radio service (GPRS), Wi-Fi, (WiMAX), and Bluetooth (Ansah, Blankson, & Kontoh, 2012). In addition, there are several other techniques such as CCTV and tracking systems and radio frequency identification systems and traffic management on public roads and smart cards and emails, online chats and other applications (Khan, Miankhel, & Nawaz, 2012).

The help of wireless infrastructure, and services all around the world, the opportunity for governments to exploit and enhance e-government is very potential. With e-government, the access will be exponential (Lallana, 2004). The services will be very ubiquitous, in which the term ubiquitous government (u-government) could be referred to (Song, 2006).

2.5 The Current State of E-government

The current state of e-Government was analyzed based upon the existing infrastructure, e-government state, front office and back office (Abdulwahida, Mutaliba, Yusofa, & Alib, 2014). In e-government front office, computer systems are used to make services and share information within and through, and e-government front office remains to enhance the comfort of homes and personal locations (Szeróvay, 2011). Among the benefits of e-government includes e-payment; also it could be seen in e-payment, which saves time and reduces queuing at the front offices (Ansah et al., 2012). The concept is presented illustratively in Figure 2.2.

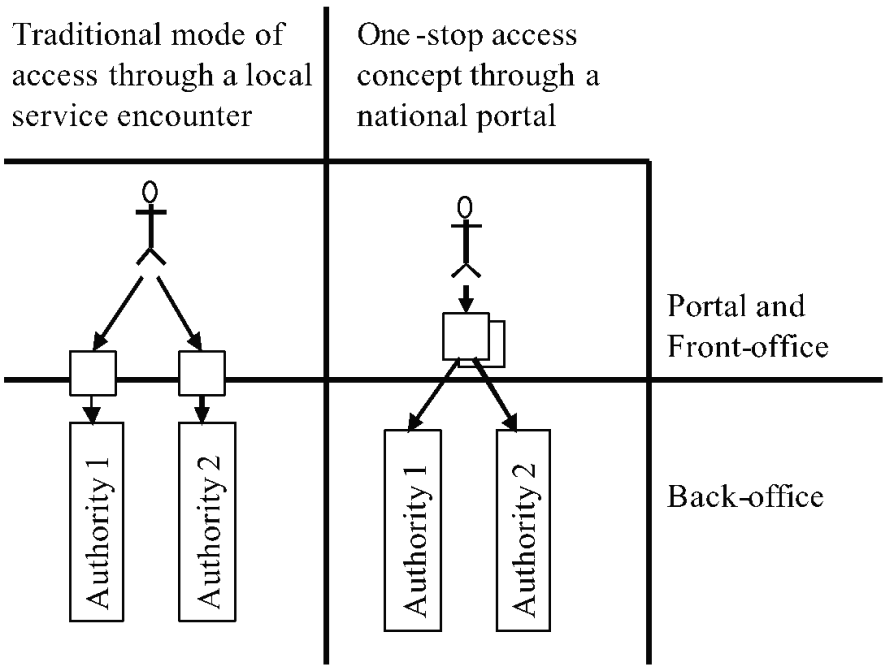


Figure 2.2: One-Stop Center E-government to Access All Kinds of Public Services (Ansah et al., 2012).

2.6 Front Office System

As an online service center, the e-government is expected to provide very clear information, through interactive communication channel, with provision of real-time transactions, and enabling data sharing among the users (Al-Hammadany &

Heshmati, 2011). This encourages the citizens to utilize the e-government services. Additionally, as a citizen engagement tool, the system should spread throughout every factor of the 21st century companies. In regards to that, Ansah, Blankson, and Kontoh, (2012) address that in an e-government environment, computer systems should be used to provide services and share information within and through the front office.

On the other hand, Wimmer (2003) believes that the success of any e-government is partly subjected to the ability of the system and the level of confidence among the citizens in the use of the available services and the citizen's confidence in the integrity of personal data in an open and responsible government.

In the United Kingdom (UK), Shareef, Jahankhani, and Dastbaz (2012) discovered that a front office of e-government portal evolved from the ability to provide information (basic site) to electronic publishing (e-publishing). Later, the interactivity became more tensed, with various utilities provided in the portal, which eventually transactions were made available in the portal including also finance flow. Finally, the portal became holistic, including being able to support user needs at any time anywhere. The evolution is depicted in Figure 2.3.

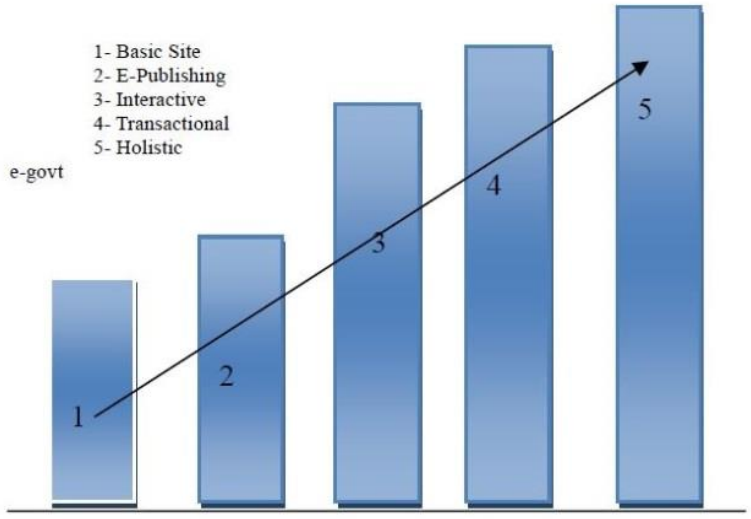


Figure 2.3: The UK E-government Evolution Model **(**Shareef, Jahankhani, & Dastbaz, 2012)

The model in the UK shown in Figure 2.2 has been very commonly seen in other countries as well. Generally, they are the evolution of Web technology, from informational to transactional, and eventually into a portal that locates all utilities in. Besides the model in the UK, Moon (2002) earlier described a 5-stage e-government model at various levels of interaction by its users and the degree of technical sophistication. The model emphasizes that there are various stages of e-government, which reflect the degree of technical sophistication and interaction with users:

i. Simple information dissemination (one-way communication).
ii. Two-way communication (request and response).
iii. Service and financial transactions.
iv. Integration (horizontal and vertical integration).
v. Political participation".

Each stage is described further in the following list:

Stage 1: The first stage is the government's basic electronic and static data are used in order to view the articles in the website online

Stage 2: At this stage is the interaction between the two represents the mode of interaction between citizens and government at this stage is for the government special applications can interact with the citizens of these applications, then process and responds to service requests.

Stage 3: At this stage, the government allows for financial transactions through the financial services provided by the government, such as paying taxes and fines and pay the bills of water and electricity in addition to financial aid.

Stage 4: At this stage the government to integrate services and the participation of all the data in order to enhance efficiency and ease of use and effectiveness of e-government services and this stage is difficult for the government because it will take a long time and many resources to merge services.

Stage5: At this stage is to promote and develop political participation through the Internet, such as electronic voting and opinion polls, where broader and direct interaction with the citizens. At this stage, highlights the political activities online by citizens.

On the other hand, West (2007) recommends twelve general actions to make e-government portal more accessible and usable. The recommendations are:

i. Standardise themes with constant navigation: in order to avoid misunderstandings should differentiate between the various agencies such as the show logo clearly and put significant differences between colors sites.

ii. Create ease of access assists to reduce misunderstandings: add some of the properties on the page so easily be used by different users (such as color and

text size, line spacing).

iii. Inform end users with the date of recent update: government must provide information on the latest update.

iv. Have personalized sections: it is very useful while portals have persona lised sections (such as for people, business, and student).

v. Provide an online services menu: characteristics of the portal to provide explanation and

vi. Audio Video Interleave (AVI) users the ability to get e-mail services from the same site

vii. Supply a list on most popular items: government portal need to supply containers with frequently required services to help users utilize the website quickly.

viii. Allow it to be attractive or exciting: as far as possible without unnecessary information and graphics, portal should be interesting and engaging.

ix. Avoid industrial advertising and marketing: the goal of e-government portal in to not help to make income. For reliability and attractiveness of portal should avoid advertisements.

x. Repair faulty hyperlinks: government portal must be sure all its hyperlinks are not damaged, and allow simple clicking and linking to avoid disappointment.

xi. enhance language ease of access: it must provide multiple languages within the portal in

xii. Order to help everyone communicate with e-services available.

xiii. Do not sell domain names: the new users and also the old end users who have no idea about the new domain site might fall for useless or trick website.

2.7 Front Office Architecture

Figure 2.4 shows a schematic view of how the front office architecture can be implemented (Chen, 2010). Based on the Figure 2.3, a page request starts with a request for content data. Based on either a request parameter or on the type of content requested, the extraction process queries the content map to retrieve the appropriate data and create the page template. This gives a skeleton page, with many of the navigation links now resolved to content in the content map. The result then goes to the content aggregation process, which is driven by the data retrieved from the content map and populates parts of the page with data from the content management system. Finally, a rendition process converts the content to the presentation form required. Page layout in the front office architecture depends primarily on an interaction between the extraction and the rendition components. The extraction component will determine what page elements are present by the data that it extracts from the content map. Meanwhile, the rendition component will then organize those page elements on the final rendered page.

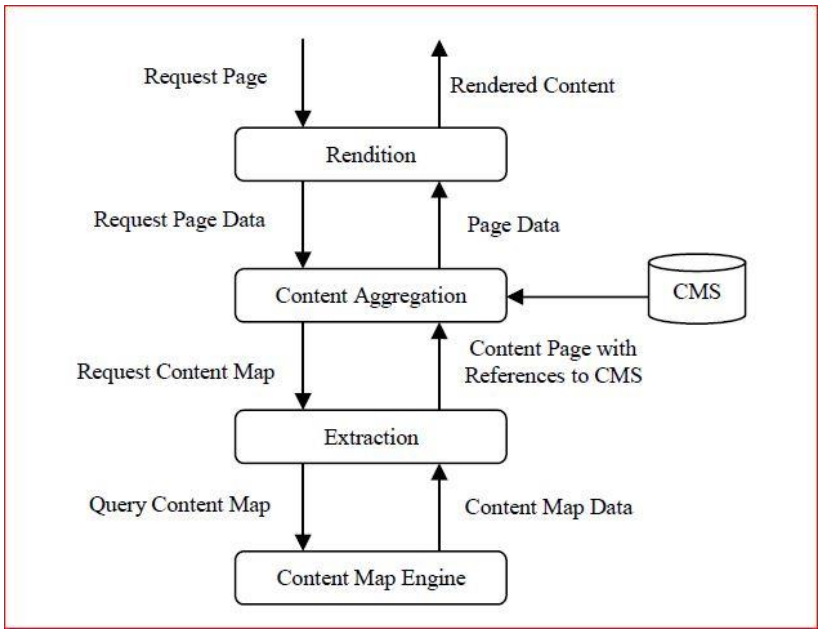


Figure 2.4: The Architecture of the Front Office (Chen, 2010)

2.8 E-government Portal

The e-government portal provides several services which can be classified using the service areas that have the highest effect and are of the greatest benefit to the customers. These services vary in accordance with end users' requirements and ICT capability, which variety has provided increase to the development of various applications of e-government. Generally, these services could be organized into three classes, as illustrated in Figure 2.5 (Lect & Hasan, 2010).

i. Government-to-Citizen (G2C) - identifies the interactions between governments and their particular people in an electronic form.

ii. Government-to-Business (G2B) - identifies government and business in which a government sells or supply to businesses several services, or businesses that sell products and/or services to government.

iii. Government-to- Government (G2G) - This identifies a large database for useful and efficient on the Internet assistance and interaction between units of the government. G2G consists of the connection between the government and public staff and Government-to-Staff (G2E) organizes the connection between the government and its staff the e- Government system, so that you can improve the employee's power in working with their work and in dealing with citizens.

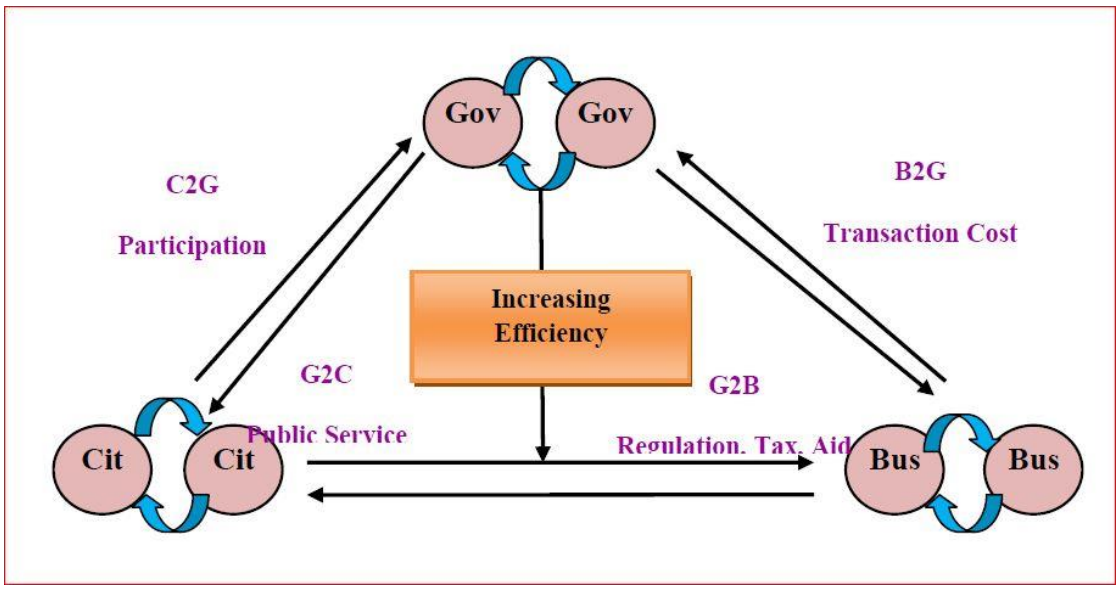


Figure 2.5: Relationship among Citizen, Business and Government (Lect & Hasan, 2010)

The citizens believe that the biggest benefits of e-government portal include increased government accountability to citizens and more access to information for citizens and the most effective in terms of cost and efficiency of the government (Alfawwaz, 2011). In addition to that, some other benefits include the following:

i. Avoid personal interaction: the provision of public services without any interaction with the staff of government.
ii. Control: e-government exercises more control over the delivery of the service than through another method.
iii. Convenience: access to public services at any time, any place and in any way it wants citizen.
iv. Cost: e-government portal provides opportunities to overcome the barriers of time and distance in the delivery of public services and citizens can choose the time and place to deal with the services provided by the government in order to save money as well.

v. Personalization: Allocation of services to citizens through the use of modern technology (ICT).

vi. To increase government efficiency and cost-effectiveness and ease of access to public information.

2.9 Existing Portals

Six models appear in the previous studies (Malaysia EG Portal, Punjab portal, Dubai portal, Korea portal, Haryana portal, and Jordan portal) are analyzed in this study. These portals were selected among those available and being used in Asia. On top of that, the reasons outlined in Table 2.1 are the foundations for selecting.

Table 2.1

Justifications for Selecting the Portals

Country	Justification
Malaysia	The portal is very popular and reliable, and it is ranked the 52nd in the world. The portal use https protocol.
Punjab portal	This portal is visited by 4,195 visitors daily.
Dubai portal	This portal provides 2,300 services to the users, and it is the first e-government portal among the Arab countries.
Korea portal	The portal for e-government in Korea stands the first in the ranking (among the e-government in the world).
Haryana (India)	This portal has received 2nd runner-up for the best e-Governance project award, awarded by computer society of India.
Jordan portal	Jordan is an Arab country, and it is the first country to implement e-government portal. Jordan is more advanced than the others Arab countries in terms of overall e-government service delivery capabilities

2.9.1 Malaysia EG Portal

The Malaysia e-government Portal guideline has been provided by Malaysian Administrative Modernization and Management Planning Unit (MAMPU) (Malaysia portal, 2014). The design of the portal for the Malaysian government focuses on the outline of the design and interface portal, and provides basic interface design through the layout and the use of colours and dealing with error messages (Mahmud et al., 2010). Based on this observation, the usability problems in that portal include:

i. Assist and software documentation: the portal does not supply appropriate assistance and software documentation for the end users.
ii. Visibility of system status: users cannot identify whether the link has been visited or not. The link should modify its colour when a user has visited it.
iii. Error avoidance: means an easy task to identify, and clear navigation.
iv. Use chunking: The content in the portal is scattered and contains a lot of irrelevant information: This portal supplies advertisement for companies that relate to tourism such as travel agency and hotels. Advertisement will interrupt users during the navigation.
v. Match between system and the real world: this portal should use metaphor such as icon map for map link and icon compass for travel guide. Design with metaphor will be more natural.

Figure 2.6 shows the functions in e-government portal of Malaysia by stages: enter, exploration (explore), and transaction (transact). The functionality of each design features must be emphasized to ensure the users need and requirements are addressed (Mahmud et al., 2010).

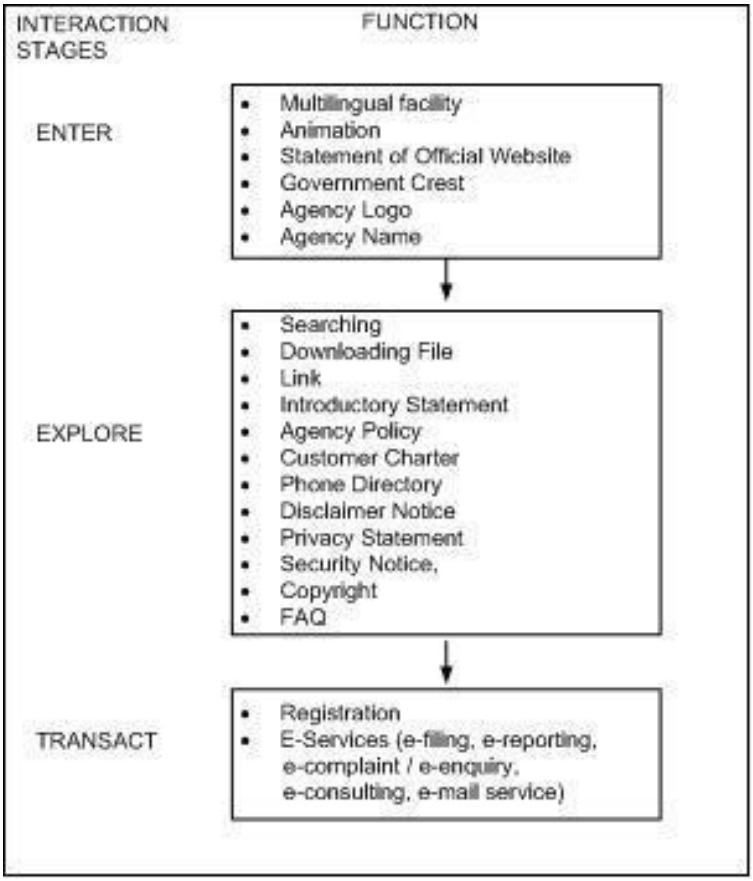


Figure 2.6: Functions In E-government Portal of Malaysia (Mahmud et al., 2010)

The implementation of e-government in Malaysia has led to the following suggestions (Haidar & Bakar, 2012) to make e-government portal more efficient and effective, so that it could attract the citizens to access the portal:

i. Provide ways for citizens to express their reactions, inquiries, and complaints.
ii. Find out the opinions of citizens, including the latest technologies.
iii. Meet the security requirements until they are sure that the citizens' deal with e-government services are secured and kept confidential.
iv. Transparency is essential to win the trust of citizens.

2.9.2 Punjab and Portal of E-government (SUWIDHA)

Single user friendly window disposal and helpline for applicants (SUWIDHA) from Punjab (Chander, 2012). Many services are provided by SUWIDHA center in Punjab and some of the services provided by SUWIDHA portal includes:

i. Issuance of a certificate of death.
ii. The issuance of a certificate of nationality.
iii. Issuance of a certificate to the victims of terrorism.
iv. Issuance of a certificate of fighters.
v. Issuance and renewal of cards fighters.
vi. Children and the disabled protesters.

Retirement for the elderly and widows In SUWIDHA portal in Punjab have been analysed in detail on the basis of the relevance of the services. Various metrics were chosen for the purpose as shown in Table 2.2.

Table 2.2

The Main Element To Evaluate The Web Portal (Chander, 2012)

Home page	Availability of Pull down menu and other options	Running news or text on the portal	Pictures and services sufficiency	Font size and accessibility
Contact us	Accuracy information	Clarity and efficiency	User convenience	Timeliness and relevance

2.9.3 The E-government Dubai Portal

The Dubai e-government portal (www.dubai.ae) has been launched in Dubai in 2001. It is the entrance to the electronic services provided by the government of Dubai. It

provides more than 2,300 services where it is organized into four sections – citizens, residents, guests, and businesses (Sethi & Sethi, 2008). Links to numerous government departments, latest happenings, how-to section, and most used products and services, and general information services are available on the home page. As a first step in the direction of usage of e-Services, the "How-To" section provides a step-by-step guideline for government procedures and dealings that are conducted manually or electronically. By February 2008, the adoption rate had reached at 91% of the more than 2,300 services available through the portal (Dubai e-government Website, 2008).

Additionally, four contact channels – AskDubai, mobile channels, SMS – for public interaction with government departments are shown on the portal homepage. An opinion poll section that tackled key questions about e-Services offered on the portal was also added (Al-Zuabi & Mahmud, 2011; Sethi & Sethi, 2008). The portal obtained record hits during 2005 with the user traffic growing by 167%.

Based on the survey, which was conducted by the government of Dubai, interface of its e-government portal has been re-designed in 2005, in which many features have been added to it to make it more user-friendly. The bilingual portal was separated into six groups – citizens, residents, guests, local businesses, international organizations and investing in Dubai – and appropriate e-Services were listed under each group. According to Evans and Yen (2006), Dubai is important in the region to release an e-government portal. This has the support of the government and the United Arab Emirates Defence Minister, Sheikh Mohammed al Maktoum, who pushed those in his nation to develop an e-life-style. The new portal consists of four main sections: online services, living in Dubai, going to Dubai and doing work in Dubai. This project

is expected to be met with great success as Intel projects in that there are eight million Internet users in the Arab world.

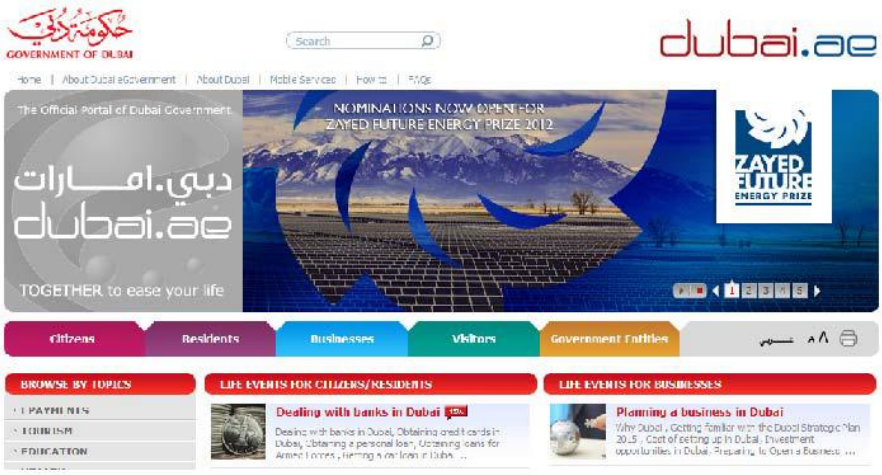


Figure 2.7: E-government Portal of Dubai (Al-Zuabi & Mahmud, 2011)

2.9.4 Korea Portal

Korea has improved a long history in local public services through the use of information technology. It includes home systems, databases, and national public services on the Internet. It is very significant because The Republic of Korea has a population around 48,453,931. Having accelerated their initiatives, it currently tops the rank among the e-government in the world (UN, 2014). The Korean e-government portal implementation is based on a concept called Two-pronged approach. In the approach, they have two gates. The first gate focuses on the provision of government information. Meanwhile, the second gate contains the latest information on government services and any online business between the government and the citizens as well as businesses (Lee & Cho, 2007).

The government's gate doors and door services and their information are also linked and integrated into the door of a single government. In July 2001, the Government Information Portal (www.eGov.go.kr), the integration of three existing e-government portals (www.korea.go.kr, open.korea.go.kr, and minwon.korea.go) have been developed. It was enhanced with extended functionalities, search engine, and directory services. It has been fully operating 2002 (Lee & Cho, 2007). Besides, the portal contains the following features:

i. Registration and logging-in to the portal. Reporting a lost social security card (Ministry of Government Administration and Home Affairs). Registration and logging-in to the e-Government.
ii. Reporting a lost social security card (Ministry of government Administration and Home Affairs).
iii. Application for a copy of one's family registration (Ministry of government Administration and Home Affairs).
iv. Registration and upload of one's resume to a Work-net (Ministry of labor)
v. Inquiry of building registration information to buy a house (Ministry of Construction and Transportation).
vi. Inquiry of land registration information to build a plant (Ministry of Construction and Transportation).
vii. Inquiry of tax arrears (National Tax Service).
viii. Registration of one's mobile phone number for cash receipt (National Tax Service).
ix. Inquiry of 4 major welfare-related insurance services (Ministry of Health and Welfare).
x. Inquiry of job training in job training info net (Ministry of labor).

xi. Request for an open public information (Ministry of government Administration and Home Affairs).

xii. Report to the Cyber Police of a crime (National Police Agency).

xiii. Weather report.

xiv. Plug-in installation for e-government program.

2.9.5 Haryana Portal (in India)

The URL for Haryana portal is http://haryana.gov.in/. Haryana is one of the small states of Indian Union with only 1.37% of the land area (44212 Km) and 2.09% of the population (around 253 lacs) of India. Haryana is advanced with information technology in India. The citizen in this state is provided with services either by traditional mail or electronic delivery (Chander, 2012). Through the electronic delivery, the Haryana portal is at the second place for the best electronic project by the community computer in India. The advantages of this portal is to eliminate corruption and middlemen in the traditional processes (Chander, 2012). The citizen can use this service anywhere and anytime without the need to visit many offices, and the aim of this portal is to improve the relationship between the citizens through electronic transactions. Many services are provided by the centres at district level and some of the services provided by e-DISHA centres in Haryana include the following:

i. Bills (Water, Telephone, Mobile Phone, Electricity Bills),

ii. Results & provisional certificates

iii. Kinds & methods

iv. Acceptation of applications for all transactional services

v. Human action writing through standard human action templates

vi. E-mail interaction &Internet browsing

vii. Costs of farming & important goods

viii. Information on government work, tenders

ix. Government recommendations

x. Panchayats development works

xi. Discharge of money

xii. Agriculture inputs accessibility

xiii. Ration cards and PDS information

xiv. Public grievances

xv. Blood bank information

2.9.6 The Proposed Architecture for Jordan E-government Portal

The URL of Jordan e-government portal is http://www.jordan.gov.jo/. The Jordanian government has a long-term vision for the e-government through the creation of a society dealing with electronic services effectively (Omari, 2006). It is achieved through the provision of electronic services and strengthening the infrastructure and skill development and modernization of the laws. In order to make the e-government more effective, it was made easy to use, where there the structure has been designed as follows:

i. Communication services

ii. Economic services

iii. Education and training services

iv. Health services

v. Transportation services

vi. Industry services

vii. Labor services

viii. Natural resources and environment

ix. project land, book a land for population/services projects

The actual process in the Jordanian portal is simple. It classifies the services into three levels. The first level: linking a specific system with the centers for databases and the second level is the middle class (business logic), while third level is responsible for the electronic payment. These levels work well through the support of appropriate infrastructure for e-government portal, including contributing to the provision of economic services great to Jordan.

Figure 2.8: E-Government Portal of Jordan (Al-Zuabi & Mahmud, 2011)

2.9.7 Iraqi Portal

The Iraqi e-government portal (Figure 2.9) could be accessed at http://www.egov.gov.iq. The portal has many services, which are divided into four sections and each section has deferent services.

Figure 2.9: E-Government Portal of Iraq

The sections with their services in the portal are listed below:

- **Cabinets Resolutions:** This section provides the cabinet resolutions taken by the Council of Ministries, and it also provides the important correspondence and main interaction with the government.

- **Legislation and Regulations**: This section provides access to information related to legislation and regulations. The base of the Iraqi legislation and regulations has information about explaining and interpreting legal materials associated.

- **Personnel Documents**: This section is for Iraqi citizens residing in Iraq. It provides the data, which they need to get certain documents of staff by connecting government departments concerned with citizens.

- **Traffic and Fines**: This section is responsible for The General Traffic Directorate of the Iraq Interior Ministry, and it has many tasks such as the provision of vehicle

registration in Iraq, the issuance of driver's license, the issuance of deferent permits and the collection of traffic fines, etc.

2.10 Strength and Weakness of the Portals

This section reviews a number of models of e-government portal. They implicate the work in this study either directly or indirectly. The earlier models of the portal are to determine the basic elements in assessing the design of e-government portals. Particularly, they suggest strong and weak elements in the design e-government portals. Additionally, they are analysed to determine the electronic services that must be added to the portal in order for it to be easily accessed and uncomplicated. Having analysed the portals, the strong and weak points are summarized in Table 2.3.

Table 2.3

The Strong and Weak Points in Many Web Portals

Model	Strength	Weaknesses
Malaysia EG portal (Mahmud et al., 2010)	All services provided by the government exist within a page portal in addition to a secure portal page.	More focused activities to ensure users return to the websites should be the way to deliver the future services. Confidentiality of users, user-friendliness, transparencies and efficiency and continuous promotion of these government websites.
Punjab and portal (Chander, 2012)	In this web portal availability of pull down menu and other options and accuracy and relevancy of information and user convenience	In this web provide only 22 services and this web portal not secure
Dubai portal (Sethi &	The web provide 2,300 services available the through the portal	This web portal not secure because not use protocol https.

Sethi, 2008; Dubai portal, 2104)	additional, four contact channels – AskDubai, mobile channels, SMS– for public interaction with government departments .	
Korea Portal (Lee & Cho, 2007a)	Korean e-Government web portal was ranked the highest in the world in the 2006 Brown university's Global E-Government 2006 evaluation which includes the government web directory service of 430 government bodies, integrated public notices and gazettes as well as downloadable e-forms.	A strong digital divide could be observed in the actual use of e-Government in that the users with different vocations and ages
Jordan e-government portal (Omari, 2006),	The web portal provide all e-services of e-government in Jordan	Web portal analyzer tool implies that using 12 to 20 objects per page, the latency due to object overhead makes up from 75% to 80% of the delay of the average web page. The web combining, replacing, and optimizing the graphics within web pages.
Haryana Portal (Chander, 2012).	The design of this web portal pictures & services sufficiency as well as many services in this page.	Haryana portal may not be able to get any important information except certain forms and it is very inconvenient for the users to get login and password for getting details regarding various ,this page is complex and is convenient for users
Iraqi Portal (Iraqi portal, 2014)	The services divided to the (citizen services , government services , business services)	At least 7 steps until the user can access to e-services

Those studies (in Table 2.3) recommend the key factors to apply and avoid in designing the new Iraqi e-government portal to ensure that users are happy with the portal. This is important to satisfy the users. Besides, a statistics regarding the online services will be generated to understand the necessity.

2.11 Factors that Affect to Use the Portal

The e-government portals need to be usable, user-centered, in other words: easy to use by every citizen, including people with disabilities (Szeróvay, 2011). The fundamental factors influencing the citizen's continuance intention to use e-government portal computer are perceived usefulness and perceived ease-of-use of e-government portal and citizen's computer self-efficacy directly enhances citizen's continuance intention to use e-government portal. In addition, perceived ease-of-use of e-government portal indirectly enhances citizen's continuance intention through perceived usefulness. This relationship is visualized in Figure 2.10 (Wangpipatwong, Chutimaskul, & Papasratorn, 2008; Szeróvay, 2011):

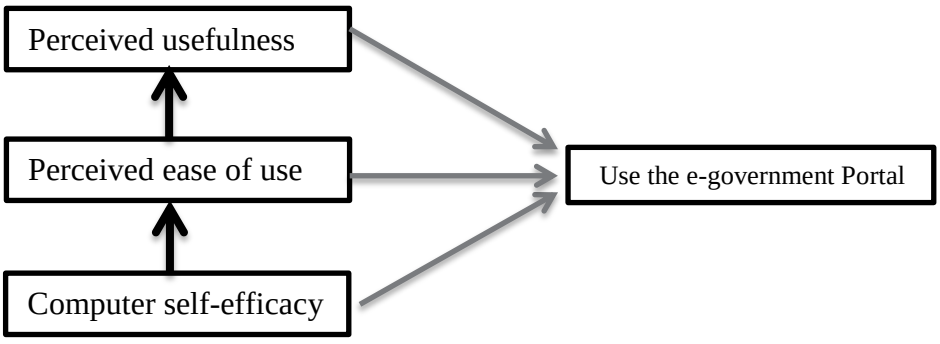


Figure 2.10: The Factors Affecting the Use of Portal (Wangpipatwong et al., 2008)

The concept of computer self-efficacy is fit into a model that reflects the continuance of intention to use e-government portal. When applied in the context of ongoing use, continuing is capable to overcome obstacles is necessary for continuance intention. In short, computer self-efficacy is an important factor to use computers to accomplish a task.

In addition, perceived ease-of-use of e-government portals indirectly enhances a citizen's continuance intention through perceived usefulness. The influence of perceived ease-of-use on perceived usefulness was strong. This supports Technology Acceptance Model, which asserts the easier a system is to use, the more useful it can be. Hence, developing e-government portal that is easy to use will enhance the usefulness of the portal and indirectly increase the continuance intention to use the portal.

Through the related work, this study also determines the features for the portal to ensure the new Iraqi e-government portal is easy to use and usefulness. This study expects to increase the confidence and awareness as well as knowledge levels of Iraqi citizens in utilizing the provided e-services. Simple design will apply to increase the usage of the online services in the e-government portal, in which easy to use and usefulness of the information are in the provision of services via the Internet.

2.11 Common Features for a Portal

Among the elements being considered in the portals include ease of navigation, content relevancy and usefulness, appealing and consistent style, security protection, ease of access, searching mechanism, reliability, user-friendly and innovative interface, and quickness of responses to customer (Szeróvay, 2011). Besides,

customer support, accessibility, usability, security, and accurate information, are also the main features to develop front office e-government portal (Maheshwari et al., 2007), as illustrated in Figure 2.11. The following details the features:

Figure 2.11: Common Feature for Evaluation Portal (Maheshwari et al., 2007).

i. Customer Support

Customer focus is a key to attract more citizens/customers of e-government portal and improve the quality of service duty. E-government portals that are equipped with customer support feature are able to respond to citizen/customer better with respect to help and support requests. Customer support can be provided online through integrated chat or email programs or over the phone through call centers (Lee & Cho, 2007). For every operator action, there should be some system feedback. For frequent and minor actions, the response can be modest, while for infrequent and major actions, the response should be more substantial (Petrie & Bevan, 2009). In addition, the portal should provide a 'quick vote' feature, which will help in giving fast

feedback. This information will help updating the information in the portal, which will eventually be very useful for the users (UN, 2014). There is a wide range of social networking tools that are widely used by a large number of citizens, where they take advantage of these networks in the adoption of a new way to interact with people and get their opinions and suggestions of electronic services and how to develop them (Khasawneh & Abu-shanab, 2013).

ii. Security

Portals security can be conceived as transactional security, authentication, and protection against functional risks. Better security in e-government portals leads to increased trustworthiness i.e. if citizens/customers are assured that the personal or financial information that they are entering in a portal is secured and cannot be tampered or misused, their trust in the portal's reliability and integrity is increased (Jaeger & Bertot, 2010). The security of any portal involves encoding the website and used the protocol Https to ensure the security of e-government portal front office.

iii. Usability

The e-government portal should be easy to use and useful (Davis, 1989). Ease of navigation refers to the characteristic that ensures users are clear and understand about the portal structure. It allows the users to move easily from a section or point to another (Basa, 2011). It covers the colors of the background and foreground. Also unvisited and visited links should have different colors. Selected from a pleasing palette, the colors should be consistent across the pages (Petrie & Bevan, 2009). When necessary, the portal should provide video, animation, and audio meaningfully. Graphics should be related to the theme/purpose of the site, are thoughtfully cropped, are of high quality, and enhance reader's interest or understanding. They have to

make the portal easy to use and increase its' usability (Dominic, Jati, Sellappan, & Nee, 2011).

iv. Accuracy of information

The information provided in the portal must be relevant, accurate, and reliable. Relevancy of the information means the information must be relevant and meaningful to the citizen. They should help the users getting right information (Chander, 2012). The information can be provided in a news column, which is unavailable in those portals, in which latest events can be shown in this column. The basic hardware and software requirement for getting information from these portals can be displayed in such column, so that users may be well-prepared before using the services in the portal (Chander, 2012). Also, the main page should provide general information about the country with support of appropriate images and also diversified into hyper that future projects for e-government services.

v. Accessibility

The services must be accessible to all citizens/customers. Therefore e-government portal should be utilized (Maheshwari et al., 2007). Easy-to-use search feature in e-government portal has the ability to provide relevant and accurate search results (information) to users in a low response time, efficiently (Maheshwari et al., 2007). Also, a good and helpful portal should provide access in multi languages (UN, 2014). This enables more users get access to information. Pull down menu is not available in any of those portals. This feature helps in providing a lot of information in less space comparatively. The feature suggests if one rolls the mouse over a particular option, s/he may get a list of all options available under that heading so that s/he may open the desired link (Chander, 2012). Being a citizen-centric service portal, a special care

must be taken regarding accessibility and font size. Changing the font size is important in e-government portal, especially for users who are visually-impaired. This feature helps the users to access to the content at their desired font size (Chander, 2012).

2.12 Summary

This chapter analyzes various models regarding e-government portal. The situation in Iraq, in terms of technology utilization as well as the existing portal is also outlined. The reviews indicate that the study being carried out is feasible, and well-supported with sufficient available knowledge.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

In the previous chapter, the general information and the usefulness of some existing e-government portal are outlined. It could be understood that the use of portal for various transactions is not new; in fact most of government matters are performed online by the citizens. Besides, the steps in designing the portal have also been studied, as well as the evaluation in general. Further, this chapter details the steps to be taken in achieving the objectives stated in Chapter 1. Generally, this study adapts the general design science methodology (Vaishnavi & Kuechler Jr, 2007). This method targets at the building and evaluation of IT artifacts to satisfy the needs of humanity, particularly it considers the process of artifact construction and the end product design (Von, March, Park & Ram, 2004).

3.2 Research Procedure

The design is initiated with the problem awareness. Suggestions for its solution are obtained from the existing knowledge, and then an attempt is made to implement the artifact based on the suggested solution. This phase is addressed as the development stage in this methodology. Partial or full successful implementations are evaluated based on the functional features implicit or explicit in the suggestion. The development, evaluation and suggestions are often iteratively carried out in the research effort process. The circumscription arrow depicts the basis of the iteration flowing from partial completion of the cycle to the awareness of the problem. Finally, the conclusion presents the end of the specific design research. Further, based on the

general design science methodology, the detailed research design of this study is depicted in Figure 3.1.

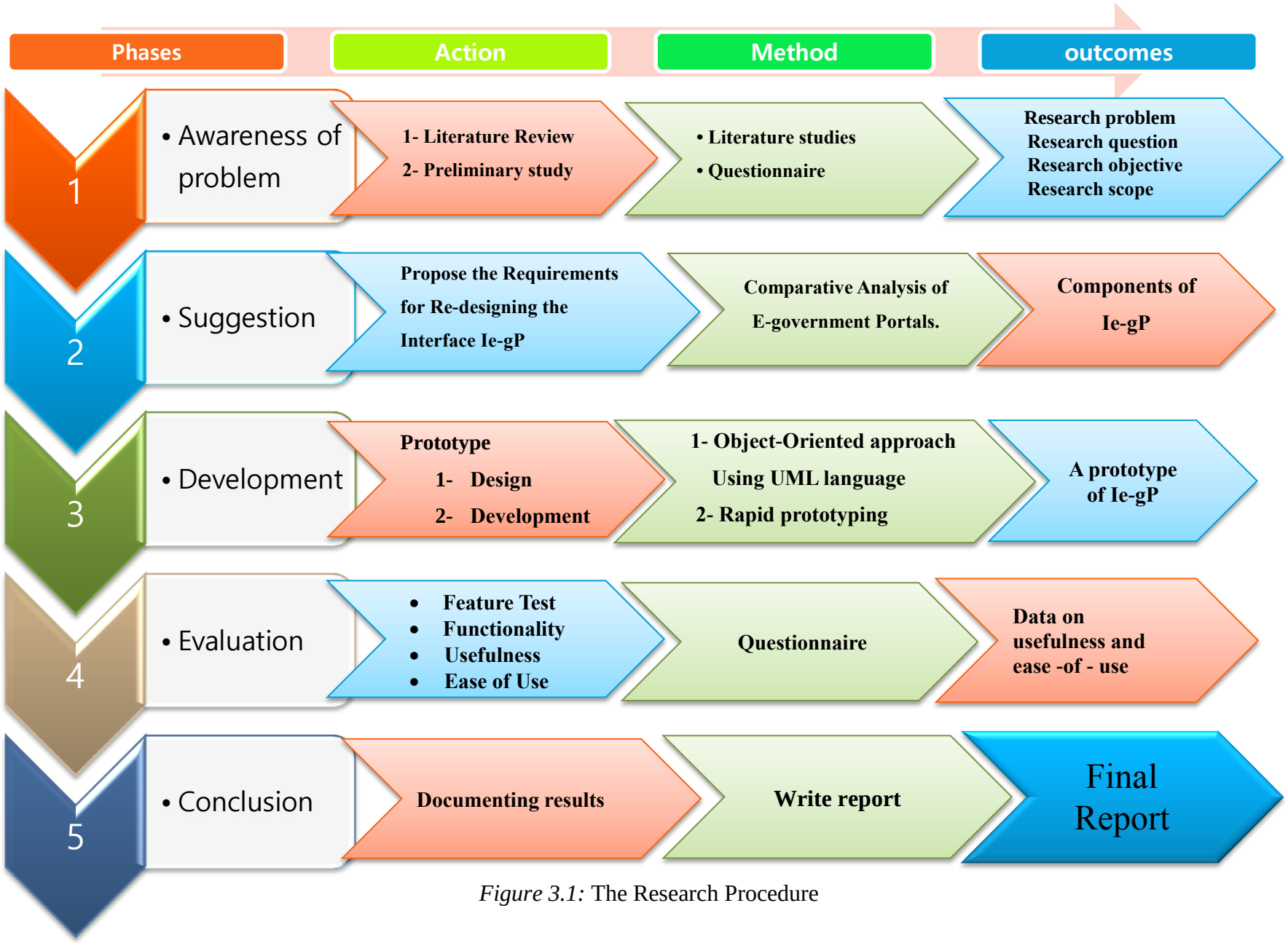


Figure 3.1: The Research Procedure

3.2.1 Awareness of problem

The first stage of this study is to comprehend the research scope and objectives. Data were collected to obtain more information regarding the main research issue; users do not utilize the Iraqi e-government portal. It was carried out involving literatures study and preliminary study. The preliminary study involves a survey, containing questions pertaining to the e-government portal. It was distributed to 30 Iraqi people in Malaysia (Hair, Black, Babin, Anderson & Tattam, 2006), who online for matters regarding their passport, election, and other tasks.

In the end, the contents of e-government portal in general, the requirements, and the models of front office were gathered, as well as the weak points and strong points in the portals. Eventually, the problem space was cleared-up, coupled with the gap as well as the objectives. On top of that, more roles of portal and the phenomena of the ICT advancement in Iraq as well as the e-government in Iraq have been better understood.

3.2.2 Suggestions

The activities were carried out in forming appropriate suggestions. Besides, reviewing related works in the literatures were carried out to understand in detail about successful portals. A comparative analysis has been carried out to determine appropriate interface elements of the e-government portal for the government of Iraq. Through this method, the study achieves Objective 1. Particularly, the models discussed in Chapter 2 stand as the base for further studying the components, which are detailed out in Chapter 4.

3.2.3 Development

In the development stage, the prototype was developed and implemented. First, the design took place. This involved designing task to ensure the functions are all in order. Artifacts such as class diagram, use case, interaction diagram, and database design were outlined for refinement purposes, and the study uses the UML language for designing the model.

Besides that, the design principles that make the Ie-gP easy to use are always considered. Recommendations by Sharp et al. (2007) and Mayhew (1999), and others were studied in detail and incorporated into the portal to support user tasks. Particularly, aspects such as content, navigation, structure, and layout are believed to enhance user motivation in using the portal.

Wickens et al. (1998) address that prototypes are initial versions of the real systems, which usually contain the 'look and feel' of the real system. To support interface design, usability testing, and other human factors activities, prototypes are developed at the early of designing processes (Nielsen, 1994; Liddle, 1996). The use of prototypes during the design processes has a number of advantages. Wickens et al. (1998) list the advantages as follow:

1. Support of the design team in making ideas concrete.
2. Support of the design team by providing a communication medium.
3. Support for heuristic evaluation
4. Support for usability testing by giving the subjects something to react to and use.

Based on the artifacts, the development took place. The prototype runs on desktop display, laptop, and smart phone. The prototype in this study requires an environment as outlined in Table 3.1, to work efficiently and to be interactive with user.

Table 3.1

Prototype Development Environment

Prototype Development Environment	
Program language	PHP, Hypertext Pre-processor
Server	WampServer
Database	MySQL version 5.6.17
Operating System	Windows 7 Home Premium

Having finished developing the prototype, it was implemented before the real data collection commenced. In this stage the study achieves Objective 2 through designing a new portal for the Iraqi e-government portal, specifically the Ie-gP.

3.2.4 Evaluation

Feature test is important to determine which features make the Ie-gP easy to use and effective in order to increase the number of access (Maheshwari et al., 2007). A functionality and usability test is one of the most fundamental methods in evaluation, because it requires users to use the product. The moderator of the test gives predetermined tasks one at a time to the test (Nielson, 1994 ; Daradkeh, 2010).

In Interaction Design and related fields, the focus of attention over a technology is the user (Preece et al., 2007; Dix, 2009). When a technology is developed for users, then users' feedbacks on their perception is sufficient for identifying whether the

technology is serving their needs and leading to their satisfaction at appropriate levels. Usefulness is defined in terms of user needs in the context of users' goals (Preece et al., 2007). In this study, the user satisfaction was evaluated through the execution of the prototype. Meanwhile, determining the performance of the portal was done through the requirements that involved two sections: features and usability.

A number of 30 Iraqi people who stay in Malaysia involved in the feature and usability test (Alorfi, 2012). This provides rich data regarding the portal. In the end, all gathered data were analyzed quantitatively to conclude on the feature and usability test and increase the number of access to Ie-gP. At this stage, the study achieves Objective 3.

3.3 Procedure

As stated above, this study applied the questionnaire technique. According to Harfoushi, AlFawwaz, Obiedat, Faris and Al-Sayyed (2012), questionnaire is an easy, inexpensive, effective, and efficient ways to collect data in scientific investigations. Meanwhile, studying the literatures and related models have led to the construction of questionnaire, which has been piloted then refined into the final questionnaire. During the questionnaire development, questions were focused on the main issues with emphasis on using short, simple unbiased language. The questionnaire took on average 20 minutes to complete. Upon completion of all the questions, their responses were coded to be analyzed using SPSS software.

3.4 Instrumentation

Questionnaire is a well-written set of questions to which respondents record their answers, usually within rather closely defined alternatives (Muhsen, 2011). For the

purposes of this study, the data was gathered by a questionnaire adapts the descriptive index by Moonier (2012). In short, the evaluation in this study includes:

i. Evaluating the effects of features: To measure the effect of the features extracted from the existing models in making the Ie-gP easy to use and useful (Petrie & Bevan, 2009; Maheshwari et al., 2007). Table 3.2 explains the features test in detail.

Table 3.2

Items of Features

Features	**Items**
Security	1
Usability	3,4,11,12,13,14
Accessibility	2,6,7
Customer Support	5,8,10
Accurate information	9

ii. Evaluating the functionality: There are eighteen items adopted into the questionnaire (Daradkeh, 2010) to test all functions in Ie-gP. The functionality test was carried out to ensure that the prototype functions as desired. Each of the function in the prototype was tested (detailed in Appendix C).

iii. Evaluating the usability: The questionnaire (detailed in Appendix D) is divided into two sections. The first section asks about demographic information including gender, age, citizenship, and years of experience in using Internet. Meanwhile, the second section contains sixteen items adopted from Alghamedi (2011), Alzughoul (2010), Davis (1989), and Järveläinen (2007) to

gather their perception on the usefulness and ease–of–use of the Ie-gP. For every question, a scale between 1 and 5 (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree and 5 = Strongly Agree) are used (Mahmud et al., 2010).

3.5 Sampling

This study involves a sample of 30 Iraqi people as the participations. They have been using the e-services such as for renewing passport and driving licenses. It is sufficient enough for this study, because the characteristics of Ie-gP users are homogenous. Particularly, the study respond regarding an object they are experientially, which leads to no bias.

3.6 Data Collection and Analysis

Feature and usability testing refers to collecting data about users when they perform tasks. Data collection was executed after the participants experienced the portal (Teoh, Ong, Lim, Liong & Yap, 2009). Several methods have been suggested in order to measure feature, functionality, and usability of the Ie-gP. The measurements here need to find out the usability of the portal from the user's point of view. The second method is called user testing method which is based mainly on the use of questionnaires (Thompson, McClure & Jaeger, 2003). Data analysis is the process of systematically detailing and arranging the gathered data. In this study, SPSS was utilized for the purpose of analyzing.

3.7 Validity

The validity of the instrument was within the concern of this study. Since the instruments involved in this study were adapted from those established instruments,

the validity is not a big issue. However, the instruments were distributed to three experts for face validity. Their responses were recorded. They only suggested a few minor modifications, which are on terminologies and editorial works. Hence, all recommendations were followed.

3.8 Reliability

Besides validity, reliability is another concern in this study. It was ensured through the Cronbach alpha. For that purpose, having gathered the data, the reliability was tested. Based on the gathered data, the instrument is able to gather intended data because the Cronbach alpha was 0.80. With reference to Hair, Tatham, Anderson, and Black (2006) and Coakes and Steed (2009), it is highly reliable (alpha is greater than 0.7).

3.9 Summary

This chapter outlines the methodology that this study has gone through. There are five stages, in which each stage involves activities and output. It reflects the objectives stated in Chapter 1. Having explained about the methodology, the following chapter describes about the comparative analysis involving the models explained in Chapter 2 to determine appropriate elements for Ie-gP.

CHAPTER FOUR
ANALYSIS AND COMPARISON

4.1 Introduction

This chapter compares e-government portals of various countries. The comparison is made through a document study. While Chapter 2 introduces about those models, this chapter extends the discussion by identifying the basic requirements in redesigning the components and elements of the Ie-gP.

4.2 Analysis of the Portals

Malaysia EG Portal, Punjab portal, Dubai portal, Korean portal, Haryana portal, and Jordan portal are analyzed in detail (discussed in the following sub-sections) to identify their functions and further determine the common elements among them. In this study, the scaling technique is used in identifying the elements, in which the scales between 1 and 3 as described in Table 4.1 is used. With reference to the scaling, if a particular element is necessary for the citizens and is available, then scale 3 is appropriate. Otherwise, if the element is not necessary from the citizen's point of view or it is unavailable in the portal or if overall particular feature is not available then it is assigned the weight 1 (Chander & Kush, 2012).

Table 4.1

The Scaling

	Rate	Description
Weak	1	Model applies very simple part or does not apply the function.
Moderate	2	Model has applied part of the basic functions of this feature.
Strong	3	Model has applied all the functions of this feature.

4.2.1 The Korea Portal

Korea is one of the advanced countries in the field of e-government service. Its' portal[1] is ranked the first in Asia, and also the first in the world (UN, 2014). The services on the home page are divided into four parts, in which each part has a set of services. Users can go directly to the links with a single click. Text is very minimal, which is less than 30%. This makes the home page design consistent. In addition, the colors and the images help users to easily identify the services provided on the home page at the first look (Korea portal, 2014). Also, the portal provides download facilities for e-applications. The portal performance is 92/100 (measured using an online tool at http://tools.pingdom.com, 2014). Based on those criteria, the portal is rated 3 for that element.

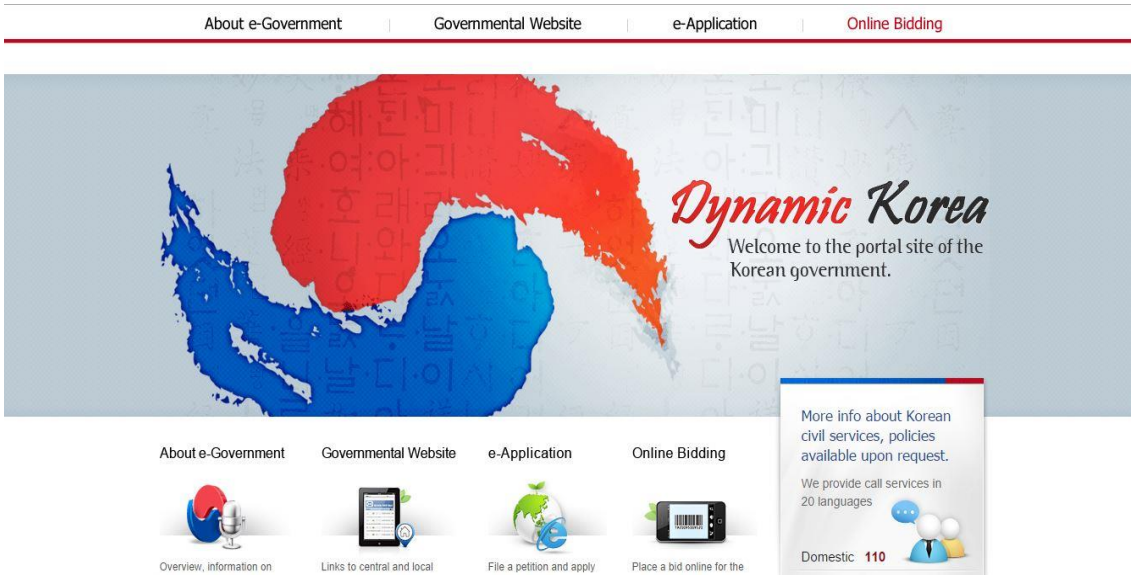


Figure 4.1: The Home Page for Korea Portal

[1] http://korea.go.kr/eng/

The services in this portal are divided according to agencies. The contents can be browsed in English and Korean languages. The amount of text on the home page is less than 30%, which makes the portal friendly to use. However, the portal has low loading and processing speeds (speed of loading 1.21 second). Hence this element is rated with score 3.

In terms of font size and accessibility, this portal can be used in Korean and English languages. It has search feature and easy supports the needs of people who have low computer experience because the portal provide 6 language to support the people around the world. The portal offers quick links any user can access the services quickly and by one click up the user to the desired goal, this element is rated with score 3.

Informative statistics are made available in this portal. The statistics notify users about the services rendered for the users. This feature is important because not only it informs users; it also provides an important database on developers and those responsible for the provided services. This further identifies the strengths and weaknesses of those services and how to address them. Hence it is rated with score 3.

This portal does not use the HTTPS feature, which exposes users to vulnerability in terms of attacks and surveillance. This means the protection for security is low. However the portal site uses the Ministry of Security and Public Administration to increase the security besides, the encoding type of this web page is utf-8. Accordingly, the score for this element is 2.

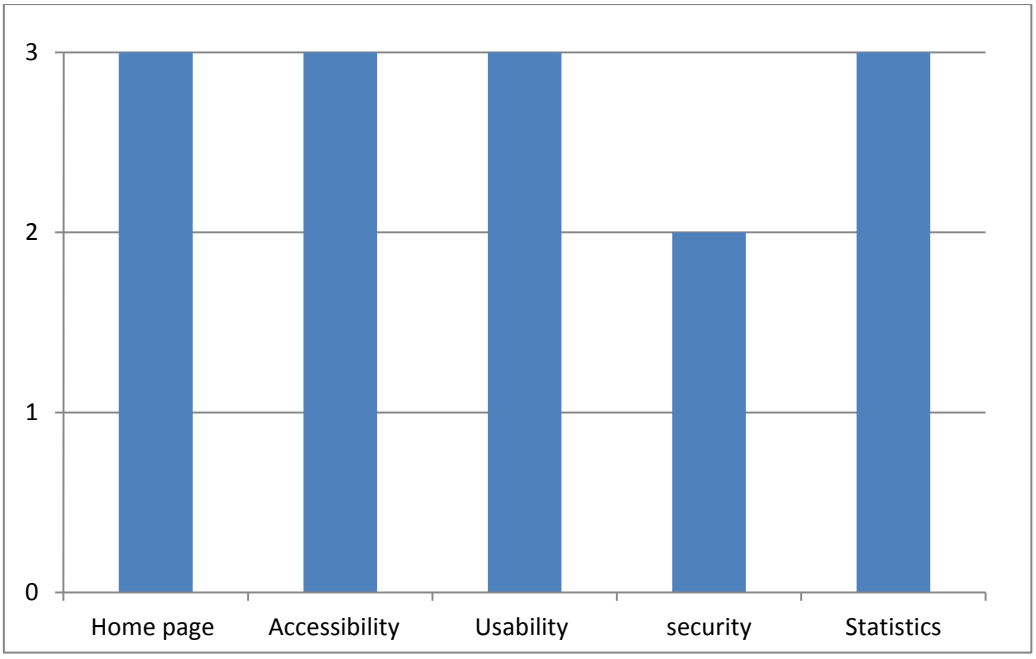


Figure 4.2: The Strengths and Weaknesses of the Portal

4.2.2 The Malaysia E-government Portal

Malaysia is one of the advanced countries in the field of e-government service. Its' portal[2] (shown in Figure 4.3) is among the six best in Asia, and 40 best in the world (UN, 2012). The home page has four options, which can be operated without any login information. Besides, the services on the home page are divided into three-parts, in which each part has a set of services. Users can go directly to the links with a single click. Text is very minimal, which is less than 40%. This makes the home page design consistent. In addition, the colors and the image help users to easily identify the services provided on the home page at the first look (Malaysia portal, 2014). Based on those criteria, the portal is rated 3 for that element.

[2] https://www.malaysia.gov.my

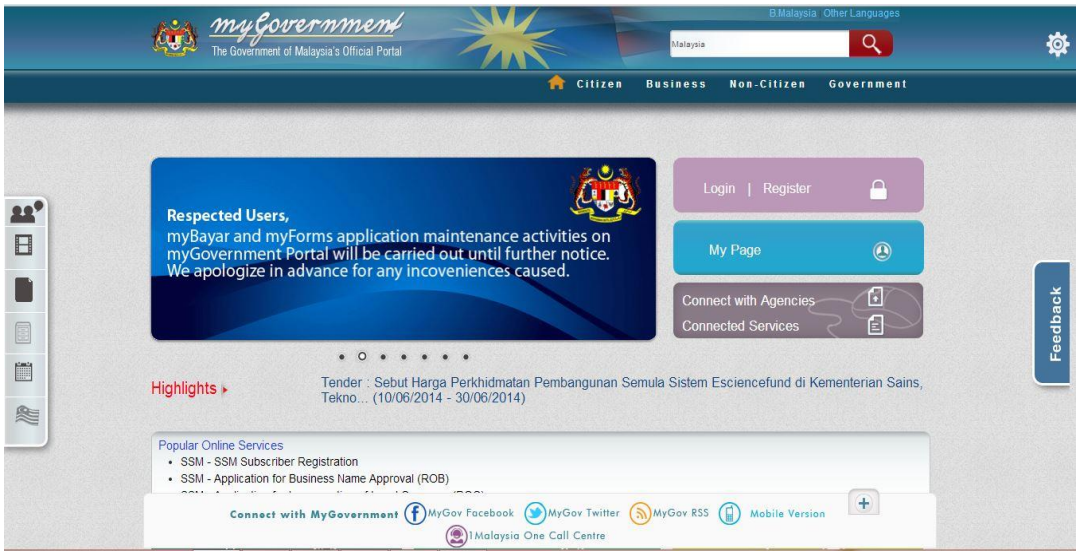


Figure 4.3: The Malaysian Portal

In terms of font size and accessibility, the portal also takes people with special care into consideration. Hence, it allows users to flexibly increase or reduce the font size as they intend to have. Besides, users could also change the portal color to please their interest and preferences. On top of that, the contents in the portal could be viewed in either Bahasa Melayu or English as well as 5 other languages (Malaysia portal, 2014). The page size is small enough (1.7 MB), which takes only 4.81 seconds to load. With its' 79 links, around 2,634 visitors visit the portal every day. Consequently, score 3 is given to this element.

Usability refers to the degree of ease of use and the feasibility with which citizens/customers are able to use the portal. The government seeks to improve information flows with the most convenient and efficient way of obtaining their services without regard to time constrains, physical locations, or organizational boundaries. For the Malaysian portal, the home page displays the services clearly. The links are clear, and easy to navigate. The mobile version is also similarly easy to use.

Users do not have to click many times to achieve their goals, making their tasks finish very quickly (Malaysia portal, 2014). Accordingly, rate 3 is given to this element.

In terms of security, the portal makes use of HTTPS technology. It implies that the connection to www.malaysia.gov.my is encrypted with an encryption bit. Besides, visitors who want to use facilities such as feedback and updates in the portal are required to register for security measures in order to avoid undesirable incidence. Visitors are fully responsible for information posted into the portal. They must ensure that files attached (if any) are free of viruses. Also, websites of government and private agencies that require links to the portal must get an approval from the Government of Malaysia (Malaysia portal, 2014). In addition, the encoding type in the portal is UTF-8, which is highly reliable. Hence rate 3 is given for this element.

The portal provides a feedback channel, in which a user can address his opinion upon the portal. Examples of opinions include what improvements needed by the portal and the things that help users to use the portal more efficiently. This element is very important so that the flaws and problems faced by the user could be overcome (Malaysia portal, 2014). With the available function, this element is rated with scale 3.

Contact us is another very important feature in reliable portals. Users will use it when they are stuck. In Malaysian portal, users could choose to contact either through the social media (twitter and Facebook) and phone call (numbers are provided). This makes the connection between users and the portal very flexible (Malaysia portal, 2014). Thus, rate 3 is the most suitable for this element.

The news and portal update is also very important. The Malaysian portal provides the Highlights feature. In addition, the RSS is also provided. The portal also provides daily news and urgent task, which are updated daily. With this, users can find out latest news, about available services and the submission date, as well as the deadline for submission and other things that are related to the daily lives of citizens easily (Malaysia portal, 2014). With those rich features, this element is rated 3.

In overall, the Malaysian portal is easy to use in terms of design and access to services in addition to being sufficiently protected for transfers and confidential information. In terms of user-friendliness, transparency, efficiency, and continuous promotion aspects, the portal has done at its best (Mahmud, Hussin, Othman & Dahlan, 2010). On the other hand, the portal needs to make links to sub-services more conveniently in terms of access to services, be more focused on activities to ensure users return to the websites. After analyzing the portal, rate 3 is the most appropriate.

Having analyzed the elements, it is found that all elements are strong in the Malaysian portal, in which they are rated with scale 3 (as seen in Figure 4.4). This indicates that the Malaysian portal could be a good reference.

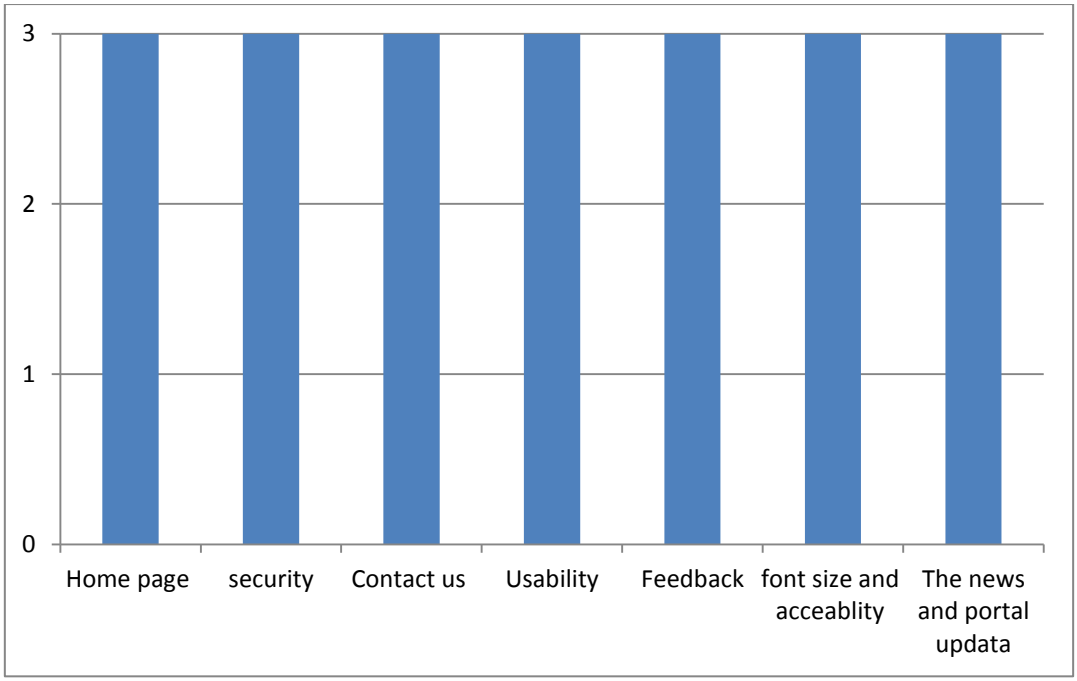


Figure 4.4: The Rating for Malaysian Portal

4.2.3 The Punjab portal

It is part of the e-Government initiatives in Pakistan. It[3] is ranked the 156 in the world (UN, 2012). Its home page locates services options, in which it offers the services to the users. Information about various districts and respective heads of districts with contact numbers are also made available (Punjab portal, 2014). The amount of text is minimal, and the page is very clean, making the services easier to be accessed without feeling discomfort while browsing. In addition, the page size is just 2.9 MB, which needs only 1.90 seconds to load. With its 79 links, around 5000 people visit the portal every day. Hence, it is rated with scale 3.

Availability of Pull down menus & other options: The pull down menu is not available in this portal. This feature helps in providing rich information in less space comparatively. The feature suggests that if one rolls the mouse over a particular

[3] http://www.punjab.gov.pk/

option, he may get a list of all options available under that heading so that one may open the desired link. It increases information readability. With this feature, users will be able to easily access the services available in the portal. However, the Punjab portal provides another good option in case of any problem in gaining access to the service, such as contact us. In the contact us feature, complete details of the Director, Department of Information Technology (DIT) with mobile numbers and email address are provided. It also provides email address so that users can email to the concerned authorities in case of any difficulty (Chander & Kush, 2012), which is very flexible. These enable this element to gain rate 3.

Running news or text on the portal: A citizen-centric portal must take care of the seasonal requirements and non-seasonal requirements of its citizens. Such information can be provided in a news column, which is unavailable in the Punjab portal. News or latest events can be shown in this column. The basic hardware and software requirement for getting information from these portals can be displayed in such columns so that users may be well-prepared before using the service in the portal (Chander & Kush, 2012). Hence this element has been awarded with scale 3.

The Punjab portal has no option for increasing or decreasing the font size. It uses the default font size. The contents are all in English only (Punjab portal, 2014). However, it has the search feature, it can search for contents in the portal. Hence this element is rated 1.

On the other hand, in terms of security, this portal does not use HTTPS, without having some of its contents loaded over the HTTP, or the user will be vulnerable to

some attacks and surveillance (Punjab portal, 2014). With the limitation, this element is rated 2.

The quickness of a query being answered is related with the efficiency of the portal. Also, information available on the portal must not be vague. In the Punjab portal, all desired information is strong (Chander & Kush, 2012). Hence the element is rated 3.

Having analyzed the elements, Figure 4.5 shows the rating for the Punjab portal (as seen in Figure 4.6). Most of the elements are strong, which could inspire this study.

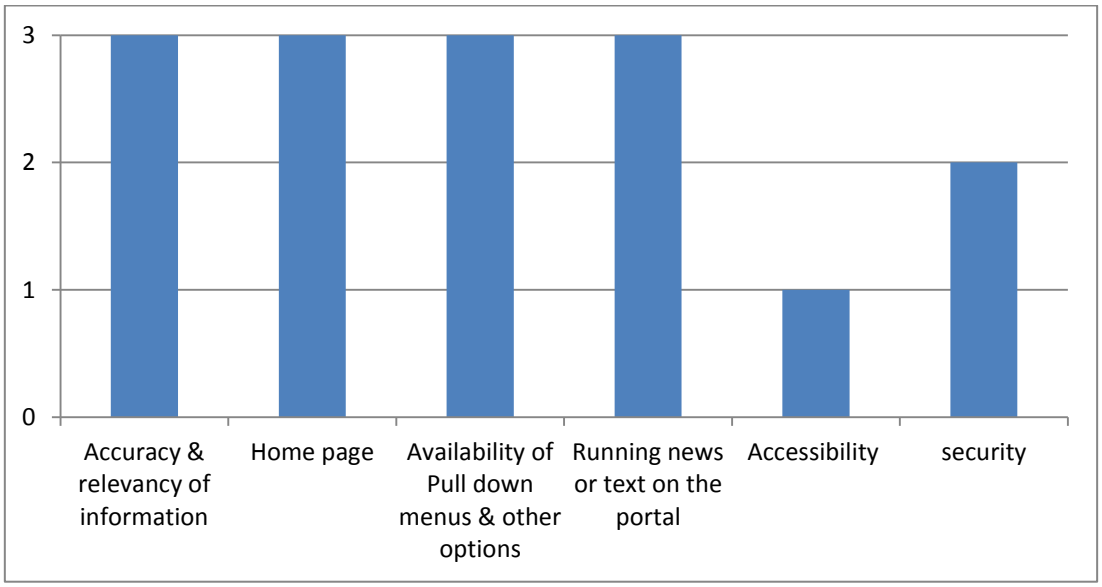


Figure 4.5: The Rating for the Punjab Portal

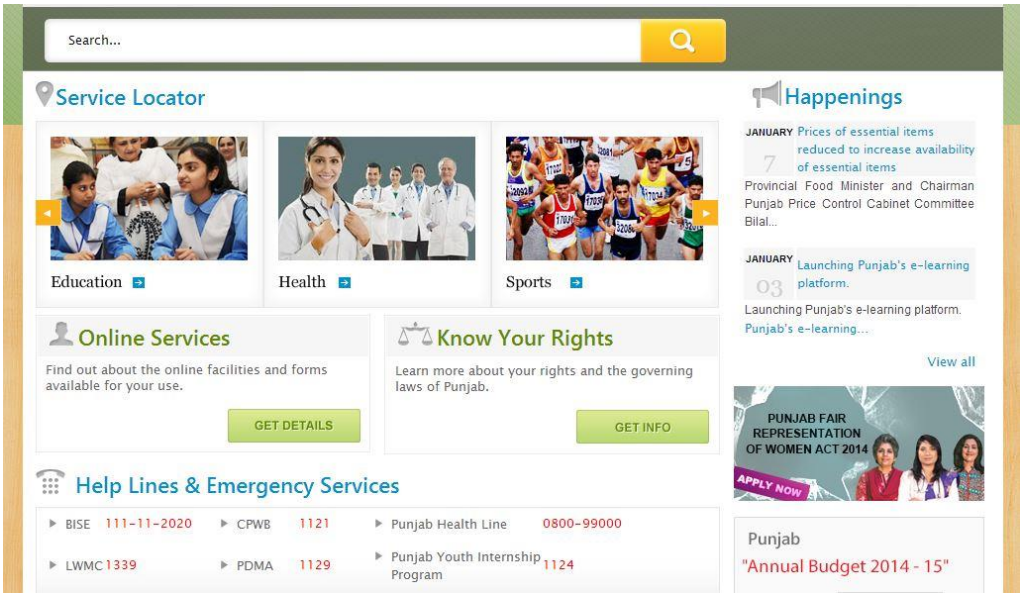


Figure 4.6: The Punjab Portal

4.2.4 The Dubai Portal

The Dubai portal[4] is part of the e-Government of the United Arab Emirates. It ranks the 28th in the world (UN, 2012). When accessed, the home page shown in Figure 4.7 is displayed.

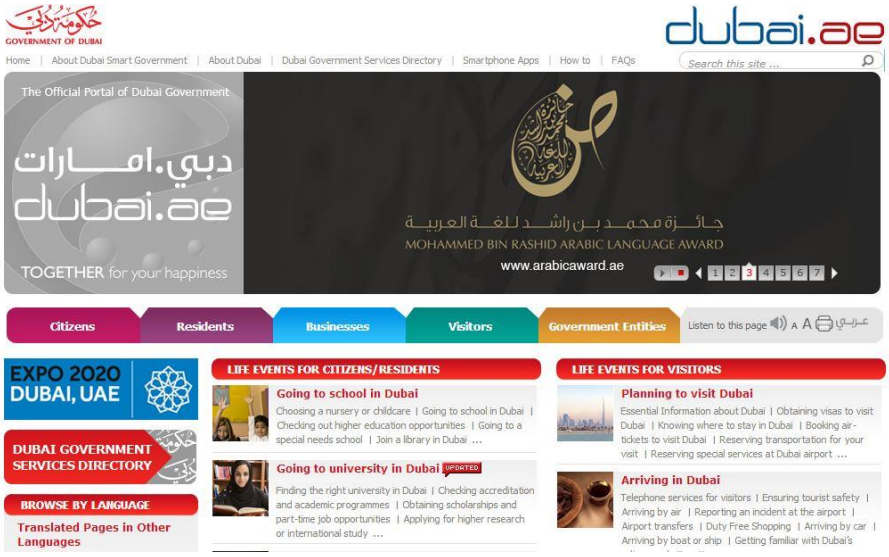


Figure 4.7: Home Page for Dubai Portal

[4] http://dubai.ae/en/pages/default.aspx

With reference to Figure 4.7, it can be seen that the home page has a range of services divided by topics. The services are arranged based on their importance and the frequency of used. The site can be used in both Arabic and English and can translate Home to six other languages. A calendar that contains events of every month is also provided, which could be downloaded. The home page is also equipped with a weather forecast for Dubai city and flight information besides many other functions (Dubai portal, 2014). Aadditionally, the official magazine of the Government of Dubai can be downloaded in PDF form. The page size is just 2.2, which takes only 4.34 seconds to load. While the portal contains 250 links, it is visited by (average) 3700 people every day. Based on those factors, this element is rated with score 3.

For the accessibility, the Dubai portal provides options for increasing, decreasing and default font size. On top of normal interaction, audio-based interaction is enabled, which both Arabic and English cold be used besides translation into six other languages (Dubai portal, 2014). Those advantages enable for the element to be rated with score 3.

The Dubai portal is highly usable to the users. It clearly lists the entities in the Dubai Government, provides a wide range of information and services to fulfil their customers' needs in an effective and efficient manner. Therefore, it is imperative to ensure that the Dubai Government entities' websites are aligned with their customer needs and expectations while portraying a coherent and uniform image. The portal provides 2,300 services, with clear information for four contact channels – AskDubai, mobile channels, SMS – so that the public could interact with the government departments conveniently. However users who have less experience using computer

will find some difficulties in using the portal (Sethi & Sethi, 2008). Accordingly, rate 3 is given to this element.

In terms of security, the Dubai portal has implemented generally accepted standards of technology and operational security in order to protect personally identifiable information from loss, misuse, alteration, or destruction. All Dubai Municipality employees follow a firm wide security policy. Additionally, only authorized Dubai Municipality personnel are provided access to personally identifiable information and these employees have agreed to ensure confidentiality of this information. Dubai Municipality policy is to use secure socket layer technology for the protection of information submitted through web forms. However the portal does not use the https technology to protect the portal from external threat (Dubai portal, 2014). Consequently, the element is rated with score 2.

The contact information is clear, in which it is linked with Ask Dubai (Dubai portal, 2014). This unified contact center eliminates the need for the users to remember many contact numbers, and ensures that one contact center can serve all their needs. The service in the portal is useful in helping users make the most of their visit to the portal. In addition, respective email addresses and phone numbers are made available. Besides, contacting through Facebook, Twitter, Instagram, and Youtube are also possible. This allows the element to get score 3.

In overall, the portal is very good in terms of design and services provided. In fact, the amount of text on the home page is less than 80%, which makes the portal complex for use. Figure 4.8 shows that only security element fails to achieve score 3, which indicates that the portal has strong influence over the design for portal.

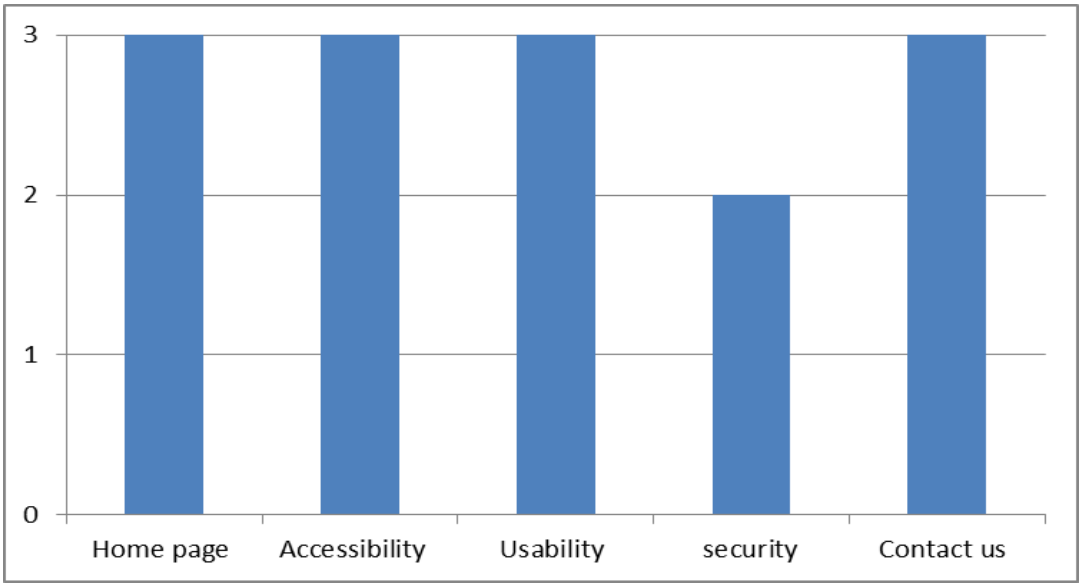


Figure 4.8: The Scores for the Dubai Portal

4.2.5 The Haryana Portal

The Haryana portal[5] is part of the e-Government of the India, which ranks the 125th in the world (UN, 2012). The page is shown in Figure 4.9. It has four options, without any login information required. One can download certain forms which are limited in number, such as forms for Haryana resident, rural area, income certificate, and caste certificate. For a user, there is limited scope for using this portal. The page operates only in English. There is less than 90% text on the page, which makes this portal hard for use. However it consists of only one page, making it easy to be downloaded. On top of that, while the page size is 428.5KB, the loading time is just 1.44 seconds. However, it contains only 59 links. Accordingly, this element is rated with score 2.

[5] http://haryana.gov.in/

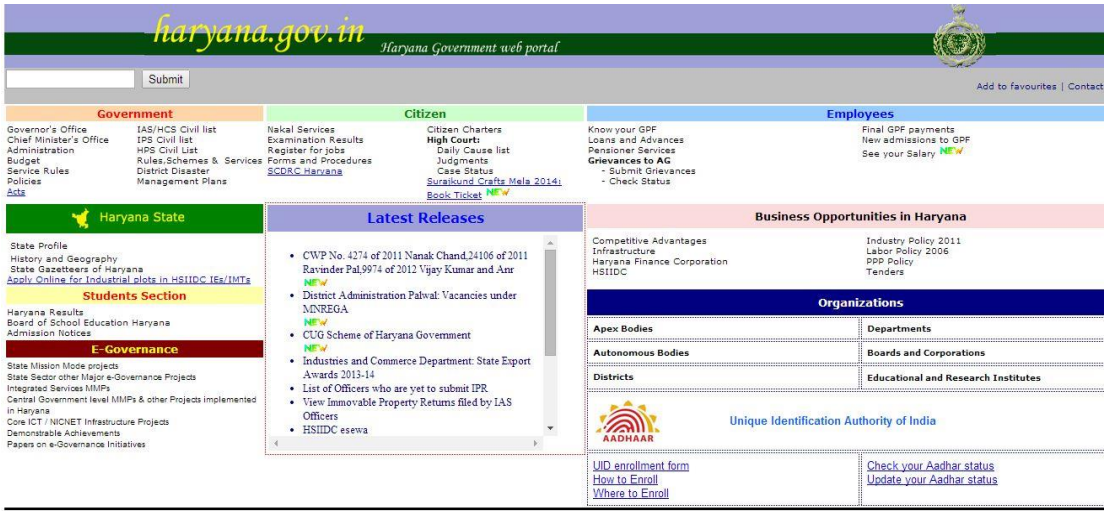


Figure 4.9: The Haryana home page

In terms of services sufficiency, the portal provides 36 services to the users. It is highly relevant as per basic services required by each and every Indian. Interestingly, it has a link regarding recharging of mobile options in these days which was not relevant 10 years back. Also, services which are gaining popularity are available and are utilized up to maximum level. While launching so many services, the bandwidth has also been considered, to ensure the portal does not betray users. Pictures are made available, to support users' tasks, so that the tasks are smooth and never slow (Chander & Kush, 2012). With those context, the element scores 3.

On the other hand, in regards to timeliness and reliability, the information on this portal is available on time. This ensures that the price and values are timely. Only relevant and reliable information are given a place on this portal for which it has been designed (Chander & Kush, 2012). With that, the element achieves score 3.

In regards to usability, Haryana Portal provide important information and easy to navigation the e-services with certain forms. It is convenient for the users to get login and password for getting details regarding various matters. Nevertheless, this page

convenient for users. On top of that, the portal has searching utility to help users search for information or materials in the portal (Haryana Portal, 2014). Accordingly, score 3 is given to this element.

The security aspect in Haryana Portal is designed and hosted by National Informatics Centre. It does not use the HTTPS technology. Similar with the Dubai portal, without the https feature, the users are exposed to vulnerabilities particularly to attacks and surveillance (Haryana Portal, 2014). Additionally, the encoding type of this portal is windows-1252. Consequently, score 2 is given to this element.

In case users face any difficulties in utilizing the portal, contact information is available. However, only traditional methods are available. It provides also email address for electronic communication (Haryana Portal, 2014). With those limitations, this element is rated 2.

Having analyzed the elements, this study found that the portal need to some re-designing works. It is timely for the portal to support users with more reliable information, besides more advanced technology-based communication channels. The graph in Figure 4.10 visualizes the scores for the portal.

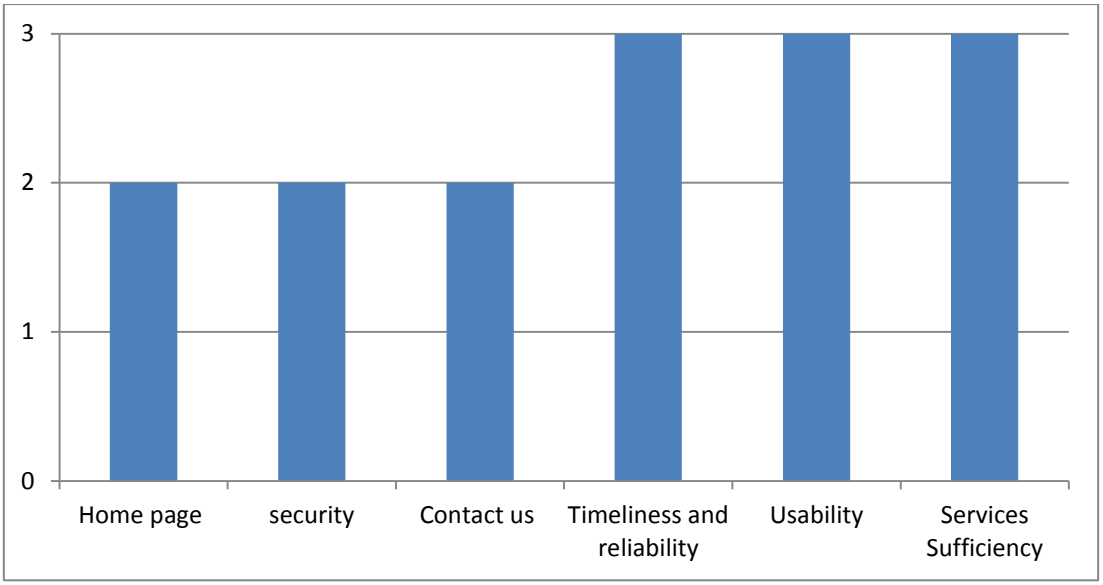


Figure 4.10: Scores for Haryana Portal

4.2.6 The Jordan Portal

The Jordan portal[6] is developed for Jordan, a country which its' e-government implementation is among the most advanced. It is ranked the 98th in the world (UN, 2012). The home page (Figure 4.11) provides a range of services to visitors. They are classified into most popular services, top rated services, electronic services, and latest services. Every part contains only five links to get to these services directly. Also, the portal provides unwanted sites application to increase the security (Jordan Portal, 2014). The page takes only 4.06 seconds to load, to load its' 121 links. The encoding type of this web page is UTF-8. However the portal does not use the HTTPs protocol for security purposes. Hence the portal is rated with score 3.

[6] http://www.jordan.gov.jo/

Figure 4.11: The Jordan Portal

In terms of font size and accessibility, the portal is provide opportunity for users to tailor the display elements based on their preferences. It limits users in some situations, such as in case users are visually impaired. However, it provides weather forecast information for the users. Also, the portal could be browsed in English and Arabic (Jordan Portal, 2014). With those advantages, the portal is rated 3.

In making the portal usable, it ensures that only 12 to 20 objects appear on each page. With that, the latency due to object overhead is between 75% and 80% of the delay. In most cases, the graphics in the portal are provided using combining, replacing, and optimizing techniques. Also, it provides mobile view function, making access through mobile devices very efficient (Al-Omari, 2006). Accordingly, this element is sufficient to receive score 2.

The portal provides online feedback form for the users. It makes feeding back regarding the portal and services very efficient (Jordan Portal, 2014). This enables the

element to get score 3. It is similar with the contact information, in which several ways are provided including mobile phone number, through e-mail, and direct number. Also, social networking sites such as Facebook, Twitter, and Youtube are provided (Jordan Portal, 2014). This enables the element to win score 3.

Based on the analysis in the previous paragraphs, the portal needs to some re-designing works because some of the elements are still weak (as seen in the illustration in Figure 4.12). It is recommended that the amount of text is reduced, while some features additional features should be provided for the users such as the ways to give and get feedback and the techniques to facilitate the process. Also, the security aspect should be improved to ensure users' transactions and data are safe.

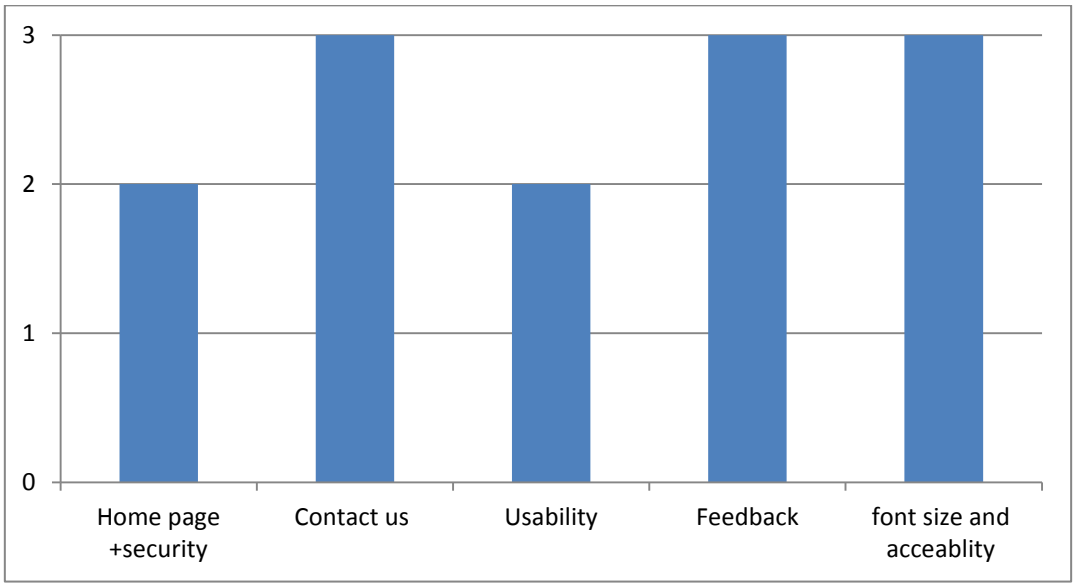


Figure 4.12: Scores for Jordan Portal

4.3 Basis on the Analysis

The basic elements of the analysis and evaluation for the Ie-gP are usability, accessibility, connect us, security, home page design, accurate information, and update news. They make the portal effective yet attractive (Maheshwari, Kumar;

Petrie & Bevan, 2009; Basa, 2011; Jiang, 2011). Therefore, these requirements have been adopted in analyzing each model. Table 4.2 a comparison between the previous models based on requirements extracted from analysis those portals with the rate for every portal based on those in Table 4.1.

Table 4.2

Comparison between the Previous Models

Features	Malaysia	Punjab	Dubai	Korea	Jordan	Haryana
Home page design	3	3	3	3	3	2
Security	3	2	2	2	2	2
Usability	3	3	3	3	2	3
Contact us	3	3	3	3	3	2
Accessibility	3	1	3	3	3	1
Accuracy and update	3	3	3	3	3	3

4.4 Website Evaluation Tool

As a norm, portal designers or administrators evaluate a portal design during the development works, to ensure the portal is successful. In general, portal evaluation can be done through preliminary review, conformance evaluation, or ongoing monitoring. The preliminary review identifies general problems of a portal. Meanwhile, the conformance evaluation discovers major violations of guidelines during the portal design stage. It generally examines which level of content accessibility guidelines the portal satisfies (Dominic et al., 2011).

In regards to this study, national e-government portals of selected countries in Asia have been evaluated: Malaysia, Punjab, Dubai, Korea, Jordan, and Haryana. Data of the portal were collected from more than 30 trials between 25/7/2014 and 17/9/2014 on various occasions on different period of time.

4.5 Using Website Diagnostic Tools

The study uses two widely used and available online web diagnostic tools to evaluate the portals, including websiteoptimization.com and webpagetest.org. They test on the performance (retrieved using this URL: http://www.websiteoptimization.com) and speed (retrieved using this URL: http://www.webpagetest.org/). A list of performance measured and reported by these tools include total size, number of objects (HTML, images), and downloading time on 512 kbps connection.

Another online webpage tool used in this study, which is for testing the quality is site-seo-analysis.com for checking broken links, number of visitors, and content (retrievable at http://www.site-seo-analysis.com/checklink). Having examined, the results are detailed in Table 4.3.

Table 4.3

Details about the Portals

Portals	**Page speed (loading time)**	**Server Response Code Rate**	**Link**	**Average Visitor (daily)**	**Page size**
Malaysia	2.81Second	151	79	2,634	1.7MB
Punjab	1.90 Second	130	79	4,212	2.9 MB
Dubai	4.34 Second	218	250	3,700	2.2MB
Korea	1.2 Second	202	173	1,152	554.4kB
Jordan	4.06 Second	175	121	784	2.7MB
Haryana	1.44 Second	138	106	1,152	428.5KB
Iraq	5.07 Second	83	5	18	1.1MB

The table above explains the Iraqi portal got the lowest result compare with different model. the result explain the Iraq portal need 5.07 second for loading time , while the size of page 1.1 MB . The portal has only 5 external links. In addition the daily visitor

is very low around 18 visitor every day, although the Iraqi people, talk two main language (Arabic, Kurdish), the portal support only (Arabic and English) languages.

4.6 Comparative Analysis of the Features in the Previous Models

Having analyzed the selected portals, with the justifications for selection as outlined in Table 2.1, in which each portal is analyzed in the previous section, this section further investigates the common elements among the portals. Among the elements being considered in the portals include ease of navigation, content relevancy and usefulness, appealing and consistent style, security protection, ease of access, searching mechanism, reliability, user-friendly interface and innovative, and quickness of responses to customer. For determining the common features, a scale of between 1 and 3 is used. The following describes the rates imply. Further, it is followed with Table 4.4 that lists all the portals with the elements and the rate.

3 - compulsory feature: when 5 to 6 portals apply.

2 - important feature: when 3 to 4 portals apply.

1- cosmetic feature: when 0 to 2 portals apply.

Table 4.4

Lists All the Portals with the Elements and the Rate

Features	**Malaysia**	**Punjab**	**Dubai**	**Korea**	**Jordan**	**Haryana**	**Rate**
Security	√	√	√	√	√	√	3
Changing the colour for home page	√		√		√		2
Changing the font size	√		√		√		2
Vote	√		√	√	√		2
About the country	√	√	√	√	√	√	3
Email	√	√	√	√	√	√	3
Phone	√	√	√	√	√	√	3
Social network	√	√	√	√	√		3
Gallery	√			√			1
Event calendar	√		√		√		2
Search	√	√	√	√	√	√	3
Feedback	√	√	√	√			2
Multi language	√		√	√	√		2
Log of portal	√	√	√	√	√	√	3
The accuracy of the information presented	√	√	√	√	√	√	3
Read texts			√				1
Classification of services	√	√	√	√	√	√	3
Statistics		√		√			1
Download app	√		√	√	√		2
Consistent colors	√	√	√	√	√		3

Table 4.4 explains that gallery, read text are just cosmetic. In contrast, security, information about the country, contact information, search tool, use of multi languages, accuracy of information, and classification of e-services, download application and consistent colors are compulsory. Additionally the rest are also highly

recommended (change color, change font size and vote) got 2 but these features are important to increase the usability and associability of design Ie-gP.

4.7 Summary

This chapter analyzes the existing portals as to determine the common features or elements to appear in the portal being studied. It is important in re-designing the Ie-gP, as outlined in the objectives of this study (stated in Chapter 1). Comparative analysis was used in determining the common features, in which document study was carried out. Altogether, six portals involved in the comparative analysis, in which they were selected based on justifications outlined in Table 4.1. Having analyzed the portals, the common features and elements are outlined in Table 4.4. Further, the elements or features (security, changing the colour for home page, changing the font size, vote, about the country, email, phone, social network, search, feedback, multi-language, log of portal, the accuracy of the information presented, classification of services, download app and consistent colors) are used in designing and developing a prototype of the Iraqi portal. They are explained in the next chapter.

CHAPTER FIVE
ANALYSIS AND DESIGN

5.1 Introduction

This chapter explains the development and design of the prototype, based on the details in Chapter 4. First, the portal development steps outlined in Chapter 3 are described in this chapter. It starts with the requirements, follows with the modelling phase that provides UML diagrams to convey the design of the Ie-gP. Finally, the prototype is presented, incorporated with the elements identified in Chapter 4.

5.2 Requirement for the Ie-gP

Determining precise requirements is very important prior to designing the portal proposed in this study, which translates into the main components. Committee and Board (1998) define requirements as a condition that a user needs to solve the problem and achieving the target. The user requirements for the Ie-gP are organized according to the portal functionality, which is divided into two types, which are:

i. Non-functional requirement.
ii. Functional requirement.

5.2.1 Non-Functional Requirement

Non-functional requirement refers to the requirements that determine the main criteria in the design of the Ie-gP. It is used to measure the operation of the portal, rather than on specific behaviours. In Software Engineering, the non-functional requirement describes a pragmatic and methodical approach to software development and quality portals and the measurement of quality attributes, such as security, accuracy, modifiability, and performance (Chung & do Prado Leite, 2009). In this study, the

non-functional requirements for the Ie-gP are exhibited in Table 5.1. In the table, the requirement id is labelled with 'Ie-gP', the acronym for 'Iraqi e-government portal'. The requirements are identified in terms of the importance using the list below:

• M – mandatory requirements (something the portal must do)

• D – desirable requirements (something the portal preferably should do)

• O – optional requirements (something the portal may do)

Table 5.1

Non-functional Requirement for the Ie-gP

Requirement ID	Requirement Description	Priority
Ie-gP_1	**Reliability issues**	
	This requirement is used to measure the operation of the portal, and must be able to address a number of specific precautions within certain period of time and without errors. Additionally, the portal should be available and operational at all time (real time).	Mandatory
Ie-gP_2	**Response Time / Speed**	
	The portal must work at a top speed to support user interaction and avoid low response time.	Mandatory
Ie-gP_3	**Security issues**	
	The portal should be able to update the customer information at any time. The user information will never be sold to other parties and will be kept secured at all times. Users will be authenticated to ensure that none unauthorized users gain access to private information.	Mandatory
Ie-gP_4	**Maintainability issues**	
	The source code will be kept private in an orderly and documented representation, so that it is easy to make improvement in the future.	Mandatory
Ie-gP_5	**Check in Database**	
	The portal will check the user profile in the database to ensure non-duplication occurs.	Mandatory
Ie-gP_6	**Usability issues**	
	The staff can change and update the information easily and quickly .	Mandatory
	The user can move between links easily. And easy to navigation the e-services.	Mandatory
Ie-gP_7	**Uunderstand ability**	
	The users should be able to understand the portal easily.	Mandatory

Ie-gP_8	**Performance**	
	The portal should be able to support up to 100 users concurrently.	Mandatory
	The portal must be able to complete 80% of all transactions within 2 minutes.	Mandatory
	The portal page loading in a short time does not exceed 5 second	Mandatory
Ie-gP_9	**Functionality**	
	The portal should be able to perform the same works for a number of users at the same time.	Mandatory
Ie-gP_10	**Design Constraints**	
	The portal supports all browsers and works on all operating portals as well as the consistency the page colors and images.	Mandatory

5.2.2 Functional Requirement

According to Wiegers (2003), the functional requirement is defined as the functions or techniques used, which aims at identifying the components of the portal and the attribute. The components have to be carefully identified to achieve the desired output. Bennett (2002) adds that functional requirements are portal components and features required to achieve the intended results. The objective of establishing the requirements are:

- To determine user requirements
- To identify the requirements of other well-known and in accordance with the requirements of non-functional.

All the portal components must be identified at the requirement gathering stage (Dennis, Wixom & Tegarden, 2005). For transaction portals including the portal (in this study), the functional requirements are presented in the form of use cases. With use cases, the how-to matters in developing the portal are described clearly. For the portal in this study, three actors are involved. The first actor is the user who interacts

with the portal by viewing the available information and move between links until reaching the desired service. Their tasks should be made easy. They can also give feedback about the portal. The second actor is an administrator to manage the site design and to add any required improvements when necessary. The third actor is a staff, who manages and updates the information in the portal. Having discussed about the concept of functional requirements, Table 5.2 details the functional requirement for the Ie-gP.

Table 5.2

Functional Requirements for the Ie-gP

Requirement ID	Requirement Description	User	Staff
Ie-gP_11	**Register** The new user can register in the portal by filling-in the information.	√	
Ie-gP_12	**Login** The portal allows users to login into the portal with correct user name and password. The portal verifies the users by comparing with the username and password in the database.	√	√
Ie-gP_13	**Display information** The portal allows users to view the information available on the page.	√	√
Ie-gP_14	**Display links** The portal allows users to view the available links and move between the links without any conditions.	√	√
Ie-gP_15	**Post comment** The portal allows users to add feedback about the portal in order improve the services.	√	
Ie-gP_16	**Polling** The portal allows users to vote about the way the portal works and the available services.	√	
Ie-gP_17	**Manage information** The portal allows users to update the information in the portal every day at any time.	√	
Ie-gP_18	**Manage Ie-gP design and information** The portal allows the administrator to manage the portal design and the added and updated information every day at any time.		√

Ie-gP_19	**Customer support** The portal provide the phones and the email and online chat to support the user if appear any problem through use the portal.	√	
Ie-gP_20	**Search** The portal provides the search features that help the user to find the e-services provide in the portal.	√	√
Ie-gP_21	**Change the language , font size and color** The portal provides the language, font size and color options in order increase the accessibility of Ie-gP.	√	√
Ie-gP_22	**Social media** The portal provides social media as Facebook, Twitter, Google++, and YouTube to share the latest information and services provide by the portal	√	√
Ie-gP_23	**Download document** The portal allows users to download documents.	√	
Ie-gP_24	**Logout** The portal should allow users to logout after completing their task.	√	√

5.3 Modeling and Portal Design

This section explains on the design of the portal. According to Salih (2012), the design of an interactive portal (the case of this study) could be presented in the form of UML diagrams. The benefits of UML diagrams include that they allow users and developers to view the portal from different perspectives. UML diagrams are commonly created in visual modelling tools. It includes class diagram, use case diagram, and sequence diagram. This study uses use case diagram to represent the functional modules. The class diagram is used to depict all the objects in the portal, while sequence diagram is used to demonstrate the interaction between objects in the portal.

5.3.1 Use Case Diagram

The use case diagram is considered as a modeling method in UML that formalizes the functional requirements incorporated in the Ie-gP. The goal is to understand the processes in which the Portal undergoes and its functionalities. UML suggests the use case mode to provide a description of the portal's functionalities. Not only use cases model the functionality of the portal, but they also model the functionalities of the entities at varying levels of abstraction including the entities, sub-modules, components, or classes (Salih, 2012). Other than that, Krishnan and Samuel (2010) describe that UML is invaluable in understanding issues, facilitating communication with experts, and preparing documentation. The cases are a formal method to collect and express the interaction between users and the Portal. A use case presents what the portal should do as opposed to how it should do it (Conallen, 2002). For the Ie-gP (the use case is illustrated in Figure 5.1), the complete interaction between the portal and the users are explained in the next section.

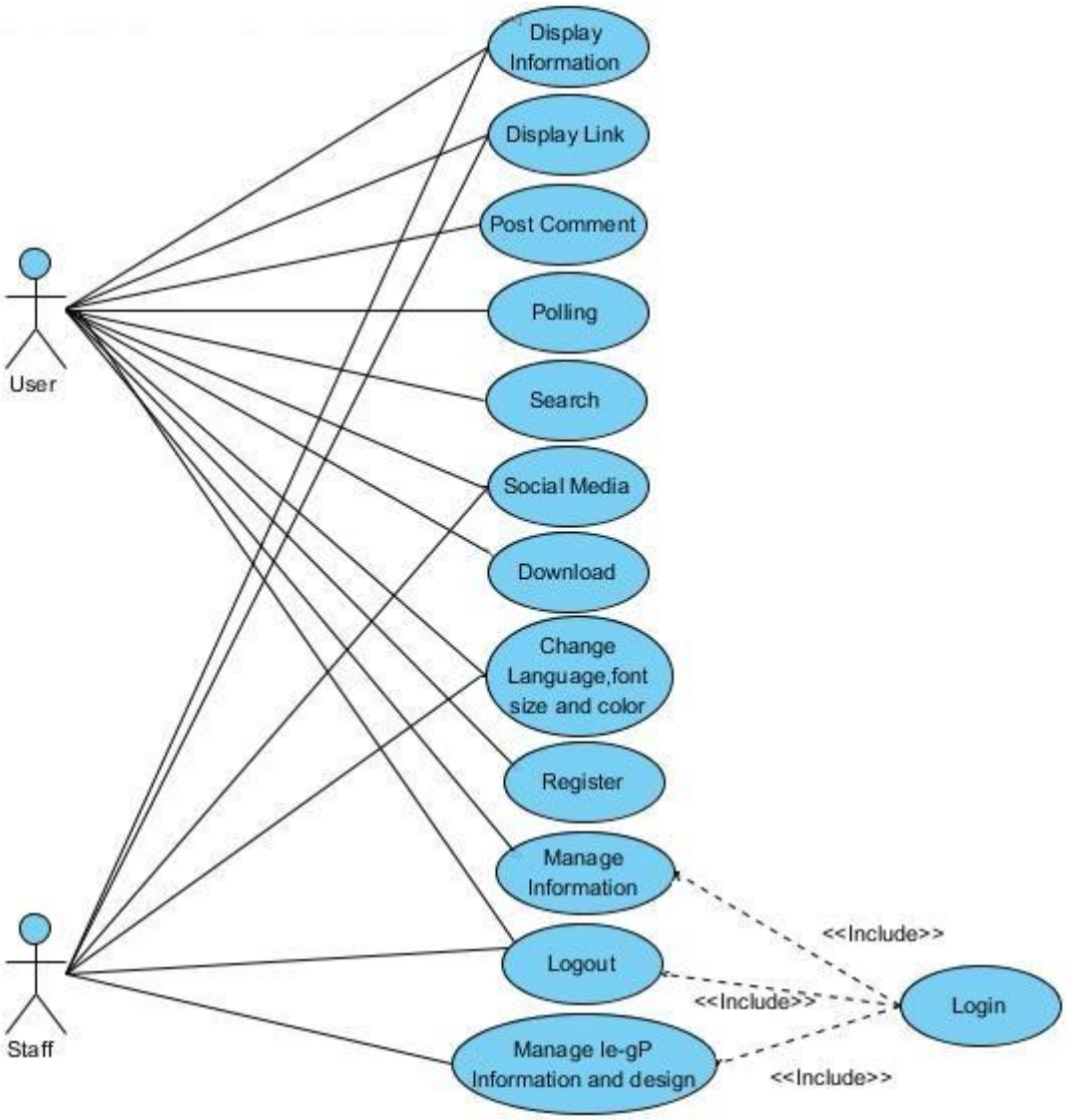


Figure 5.1: Use Case Diagram for Ie-gP

1- Use Case 1 (Registration)

A. Brief Description

The use case 1 explain the user registration process.

B. Preconditions

Does not apply.

C. Characteristic of Activation

After the user completes the registration by filling-in all required information (single time), the portal allows him/her to enter into the Portal and determines its validity.

D. Flow of Events

I. Basic Flow of Registration

1. This use case starts when the user clicks on the, “Register” button.
2. The Portal displays the registration form.
3. The user completes the registration form.
4. The user submits the registration form by clicking on the “submit” button.

II. Alternative Flow

Does not apply.

III. Exceptional Flow

Does not apply.

E. Post-Condition

Does not apply.

F. Rule

To register into the Portal, the user must have an Internet connection.

G. Constraints

Does not apply.

2- Use Case 2 (Login)

A. Brief Description

The use case 2 displays the login process. Only registered users will have access into the portal. Hence, authenticity filter is necessary.

B. Pre-Conditions

The user and staff administrator must have already registered and have user name and password to log in.

C. Characteristic of Activation

The login use case is done by the user and staff.

D. Flow of Events

I. Basic Flow of Registration

1. This use case starts when the user clicks on the “login” button.
2. The portal displays the login form.
3. The user inputs the username and password.
4. The user submits the form by clicking on the “submit” button.

II. Alternative Flow

The portal may return to the home page.

III. Exceptional Flow

The user prints the wrong user name and password.

E. Post-Conditions

Successful login will display the user’s name at the top of the page.

F. Rule

Staff, administrator, and user who have registered into the portal can log in.

Administrator: only authorized people can log in.

Staff: added by the administrator.

G. Constraints

Does not apply.

3- Use Case 3 (Manage Ie-gP Information and Design)

A. Brief Description

The use case 3 displays the managing information process. The use case explains the insert, delete, and update tasks. The staff can manage and update the information and design to the portal.

B. Pre-Conditions

The staff must login and get the authorization to manage the information.

C. Characteristic of Activation

Information update, deletion, and insertion are done by the staff.

D. Flow of Events

I. Basic flow of managing information

1. This use case begins when the staff want to change their information and design by clicking the “update” button.
2. The portal responds to the instruction and opens the update page.
3. The staff updates the desired information.
4. The staff clicks the “submit” button.

II. Alternative Flow

The user may click the main link to cancel the update, which will return to the Home

page.

III. Exceptional Flow

If the user clicks the “submit” button before finishing or by leaving some fields empty, the portal will go back to Home page.

E. Post-Conditions

Does not apply.

F. Rule

The user must have get the authorization to manage the information (update, insert, delete)

G. Constraint

Does not apply.

The Use case details as explain in (Appendix E).

5.3.2 Sequence Diagram

The sequence diagram presents the interaction among the objects participating in the use case and the message that is transmitted between them in a passage of time in a single use case. It is a model with dynamic character presented in a time sequence. It is basically utilized to show the interaction among the objects of classes in detail as opposed to the classes themselves. The Rational Rose Software generates a sequence diagram which is a UML standard representation of objects that are interacting with each other. It is utilized to present the behavior of a method as well as to present in-depth descriptions on the interaction of objects (Kern & Garrett, 2003).

For this study, the sequence diagrams in Figure 5.2 and 5.3, outlines the processes for registering new users, login, and managing the portal. In Figure 5.4 explain how can the staff mange (insert, delete and update) the information in the portal.

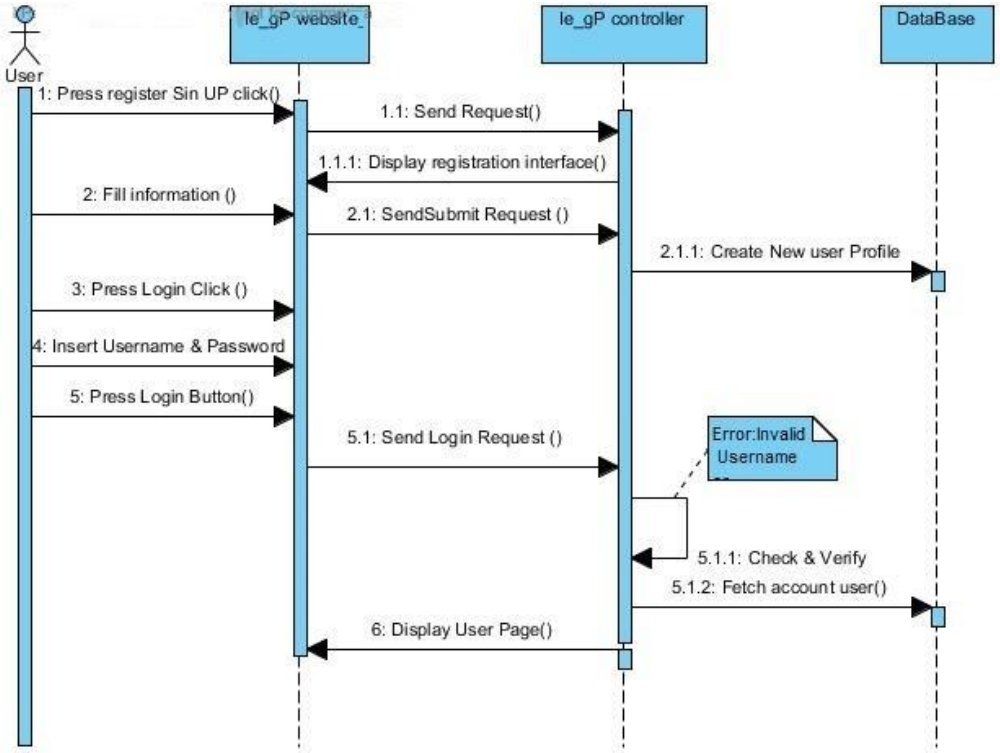


Figure 5.2: Sequence Diagram for Register and Login

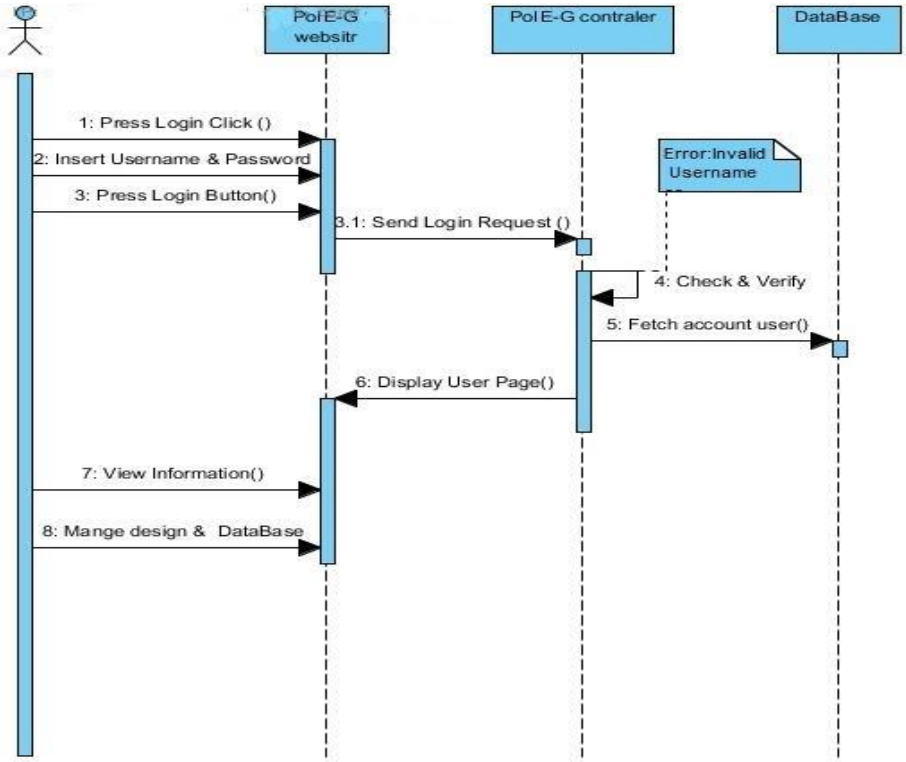


Figure 5.3: Sequence Diagram for Managing the Portal

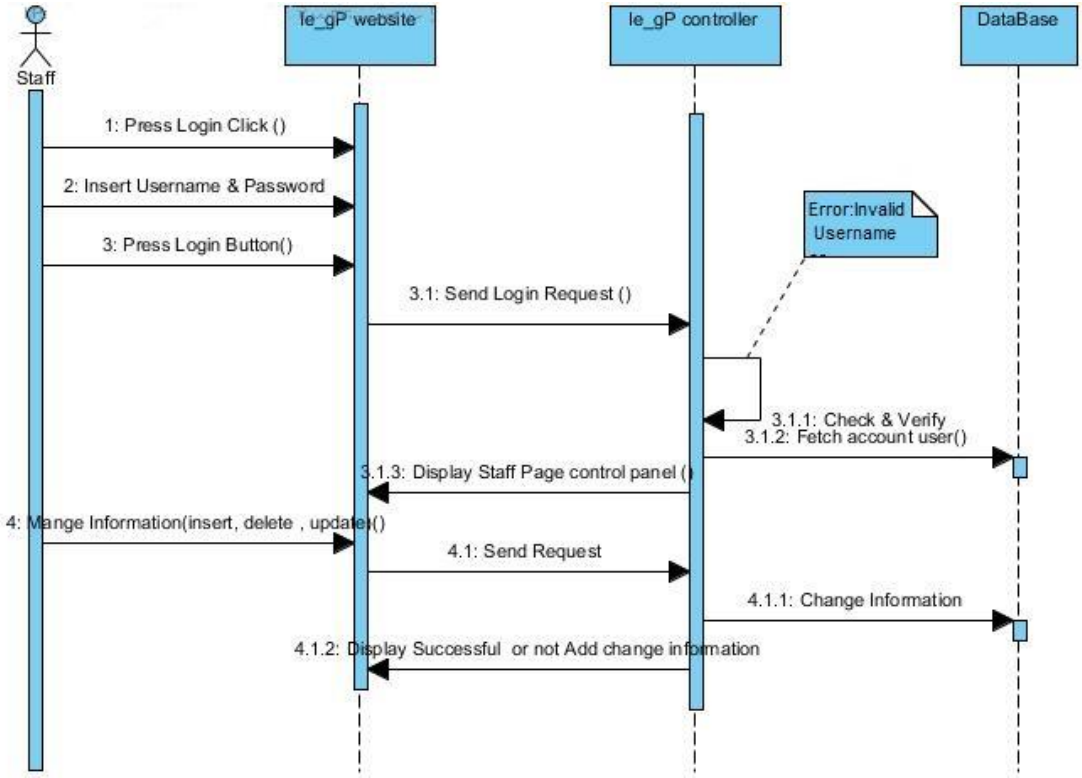


Figure 5.4: Sequence Diagram For the Staff Mange the Information

5.4 Prototype Development

Having determined the requirements (as described in the previous section), a prototype has been successfully developed. The prototype incorporates all functional and non-functional requirements. PHP was used to develop the prototype, with MySQL for the database. Some multimedia elements are incorporated to make it more aesthetic.

5.4.1 The Main Page

Figure 5.5 and Figure 5.6 show the Home page of the Ie-gP. It is seen that the portal is available in Arabic and English.

Figure 5.5: The Ie-gP in Arabic

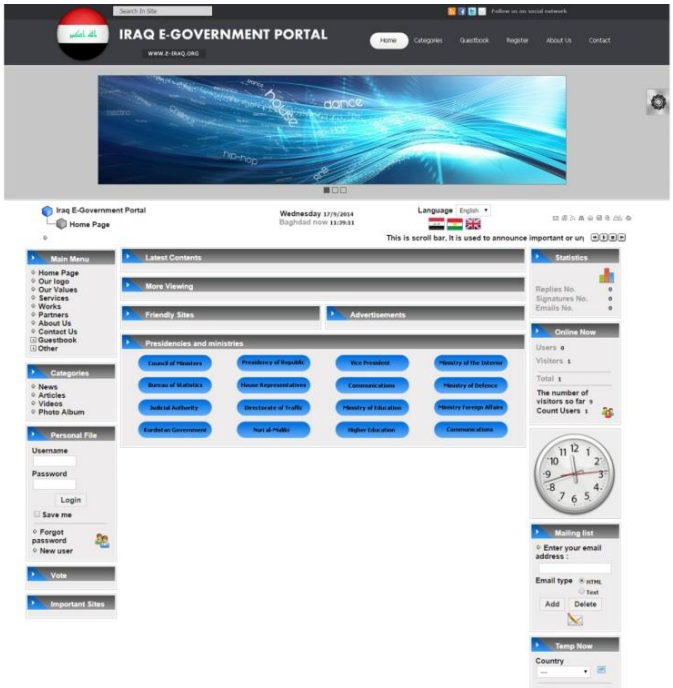


Figure 5.6: The Ie-gP in English

5.4.2 Registration Page

The page in Figure 5.7 can be accessed from the main screen via “New User” button on the Home page. This screen shows the user login page and required fields. For registration, the user is required to enter the desired information in the fields. The benefit for registration in Ie-gP is that it auto-completes all fields of e-government forms automatically.

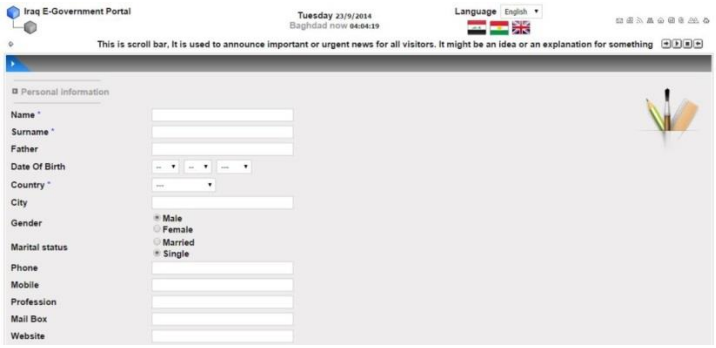


Figure 5.7 Registration page

5.4.3 Feedback Page

Figure 5.8 shows the feedback page of the portal. It is seen that the portal is available in to manage feedbacks about any problem faced by the users or anything the users perceive important to develop the portal in future.

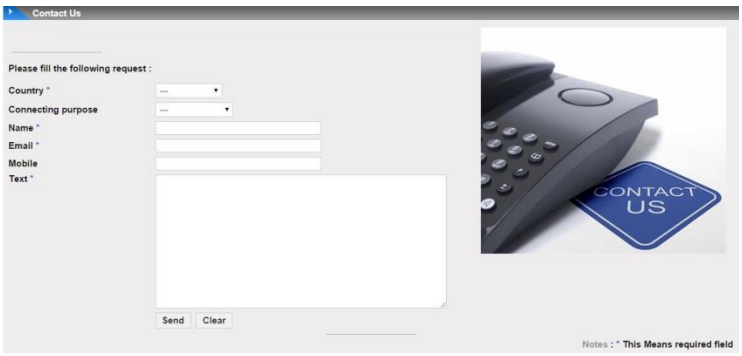


Figure 5.8 Feedback Page

5.4.4 Control Panel Page

Figure 5.9 shows the control panel page of the portal. It is seen that the portal is available to internal staff and users to manage the information (update, insert, delete) in the database.

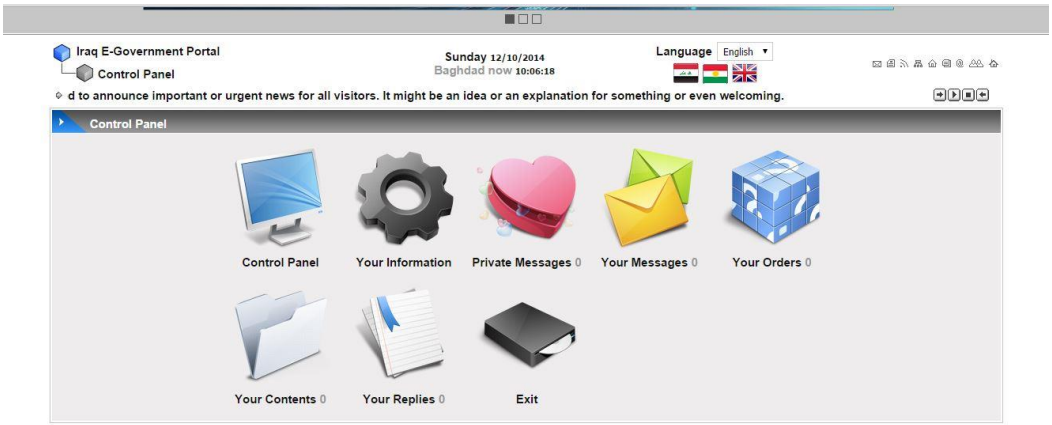


Figure 5.9: Control Panel Page

5.4.5 View Information and Links

Figure 5.10 shows the part of view the e-services and links. It also exhibits the classification of services by ministries.

Figure 5.10: View Information Page

5.4.6 Login Section

Figure 5.11 shows the login section. Through this part, the user can access to the portal, according to the authority granted by the admin.

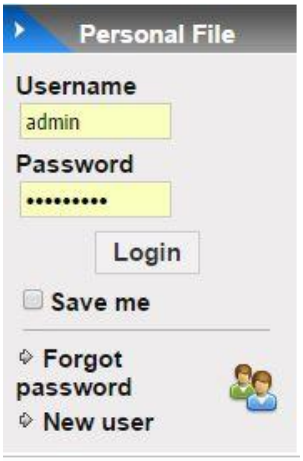


Figure 5.11: Login

5.5 Data Base Design

In this study, the database was designed using MySQL. Figure 5.12 shows the database design. The figure visualizes that there are three languages: English, Arabic, and Kurdish. For every language, seven tables are provided with, in which each table is described in the following list.

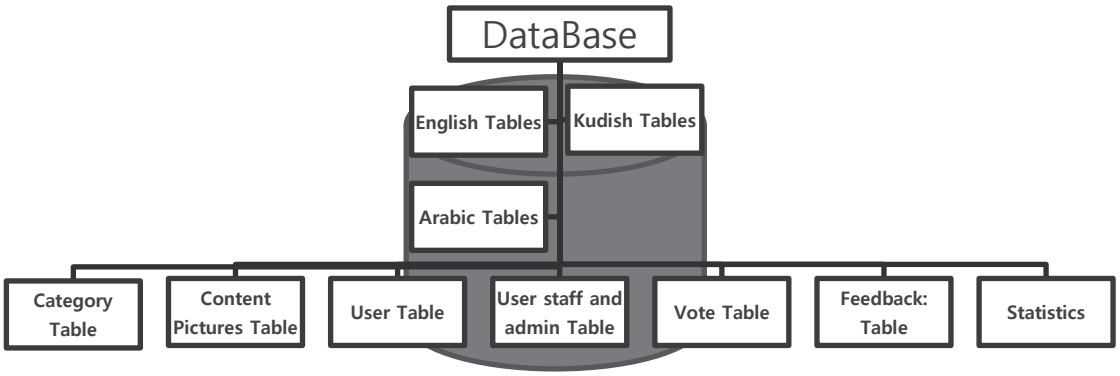


Figure 5.12: The Database of Ie-gP

1. Category: this table content the Sections and Categories
2. Content Pictures: this table content all pictures in Ie-gP
3. User: this table content for every user want to register in Ie-gP
4. User staff and admin: this table content all user add by admin and staff
5. Vote: this table content the number of user when vote
6. Feedback: this table content the feedback the user by email
7. Excite user: this table content how many user visit Ie-gP
8. Statistics: this table content the statistic about e-services
9. Links: this table content all links in Ie-gP
10. Content: this table content all news and texts in Ie-gP

5.6 Summary

This chapter starts with underlining the requirements for the Ie-gP. Both functional and non-functional requirements are outlined. They are then translated into the UML diagrams, including class diagram, use case diagrams, and sequence diagrams. Having designed the portal, a prototype has been developed. Hence, the prototype has been explained with helps of snapshots. The differences between the newly prototyped portal and the existing portal are addressed in a table.

CHAPTER SIX
EVALUATION

6.1 Introduction

The main objective of this chapter is to discuss the evaluation of the Ie-gP. Feature (perception on the increase of access), functionality, and usability testing were carried out (as outlined in Chapter 3) to determine the usability of the Ie-gP (Nielson, 1994; Sarwer, Crawford and Durlak, 1997). The feature test is important in order to know the impact of these features on the usage of Ie-gP page whether will increase the use of e-services through Ie-gP. The functionality is also necessary, to ensure that the portal works as intended before testing the usability, so that when users experience the portal. The functionally test use the test case method that measure all functions in Ie-gP, the procedures of testing were explained. Then, the results were discussed.

6.2 Evaluation Procedure

The procedures are different for the tests, in which the following paragraphs explain them in detail.

6.2.1 Feature Test

The feature test was carried out to ensure that the features have certain impact on the access to the Ie-gP (Petrie & Bevan, 2009; Maheshwari et al., 2007). Each feature in the prototype was tested by 30 participants. In the study, a survey that contains questions in Table 6.1 (Appendix B) was used to gather data. It is seen that the questions ask about the features of Ie-gP. The questionnaires were distributed to Iraqi people in Malaysia.

6.2.2 Functionality Test

The test case method is used to acquire feedback about the functionality of the Ie-gP. The functionality test was carried out to ensure that the prototype functions as desired. For the purpose of testing, the test has been carried out by the developer of the Ie-gP. Each of the function in the prototype was tested (explained in Appendix C). It is seen that the questions ask about the functionality of the Ie-gP.

6.2.3 User Usability Test

The usability test was carried out to ensure that users feel the Ie-gP (through the requirements as extracted and explained in Chapter 4) is useful and that they feel it is easy to use. Hence, their perceptions on the usefulness and ease of use of the Ie-gP were gathered. The study involved a sample of 30 Iraqi people. They are using the e-services such as renew passport and driving licenses, involved in the usability test.

6.3 Validation

In order to address its validity, the proposed model has been reviewed and assessed by three groups. The first group consisted of the specialists in the e-government portal. This represents the views of professionals in charge of managing the Ie-gP. The second group consisted of technical professionals (computer engineers, people with computer backgrounds, web administrators, designers, technical managers). The third group consisted of general Iraqi people who have different computer skills. In the end, 30 participants in total were recruited to participate in the assessment.

6.4 Results

This section describes the results gathered from the functionality test, features test and user usability test. Since they were carried out separately, the results are also discussed separately. First, the results of feature test are described, followed with the results of functionality test then the result of user usability test.

6.4.1 Results of Feature Test

The feature test was carried out to ensure that the perception on the increase of access is obtained as desired. As seen in Table 6.1, participants responded to 15 items (Appendix B) related to features test of the Ie-gP to address their perception on the increase of access.

Table 6.1

Results of Features Test

	Items	Yes It increases the access	Neutral	No It does not affect
1	The Ie-gP is secure and trustworthy.	93.3	6.7	0
2	The search feature in Ie-gP is able to search and provide relevant results. It makes the Ie-gP helpful	93.3	3.3	3.3
3	The classification of e-services by ministries makes Ie-gP easy to access.	96.7	3.3	0
4	The menu, site map, consistent color and list for easy scanning are useful.	96.7	3.3	0
5	Email, phone and feedback encourage quickly response	96.7	0	3.3
6	The language options widens the information accessibility	93.3	3.3	3.3
7	Options for font size and color support personal preferences.	90	6.7	3.3
8	Social media features will share the information and e-services widely	93.3	6.7	0
9	Accurate news and information stimulates interest.	86.7	10	3.3
10	The voting feature allows users to express their felling.	83.3	10	6.7
11	The URL address in the logo is helpful	90	6.7	3.3
12	Gallery enhance motivation	83.3	13.3	3.3
13	Ie-gP is impressive at the first sight.	96.7	3.3	0
14	Links to related content are meaningful	93.3	6.7	0
15	Overall features attract users	96.7	3.3	0

In Table 6.1, an overview of the responses related to the Ie-gP is addressed. There is a mixed agreement found among the respondents where in 96.7% of the sample consented with the features helped them in being more effective. On the other hand, 83.3% of the sample agreed that Ie-gP helped them in enhancing motivation, whereas 93.3% of the sample showed strong agreement with the Ie-gP. Besides, 93.3 % and 90% of the sample expressed that the features rendered them increased control in Ie-gP through the options of language, font size, and color. Also, 96.7 % of the sample disclosed that the classification the e-services by ministries enables them to carry out their work in an easier manner whereas 93.3% of the sample affirmed that links related content are meaningful.

The other findings can be summarized as such: 93.3% agreed that the search feature is able to provide relevant and accurate information. In fact, 96.7% and 83.3% agree that the contact feature will encourage the response and invokes positive feeling. Interestingly, 96.7% of the participants agree that the Ie-gP is impressive at the first time and site map with list for easy scanning.

Finally, the results reveal the average rate of features in items (3, 4, 11, 12, 13, and 14) will increase the usability of the Ie-gP (93.3). Meanwhile the rate of increase the accessibility in items 2, 6, and 7 is very high (91.5%). It has also been found that the rate of security features will increase the user trust when using the Ie-gP (93%). The customer support feature as explained in items 5, 8, and 10 is also very high (90%). Overall, users are attracted to use the e-services through Ie-gP (96 %) and will increase the number of user those use the Ie-gP.

6.4.2 Results of Functionality Test

The functions in the Ie-gP were tested one by one to ensure that the users are not distracted by any technical error that will influence their experience. It was also aimed at conveying the features in the Ie-gP to the users. The main test case is obtain information whether th Ie-gP succeed or failed as explain in Table 6.2 the result of test login option. In appendix C explain the result of test all Ie-gP functionality.

Table 6.2

Test Case1: Login Functionality

<table>
<tr><td colspan="2"><u>Test Case1</u>: the login process to the Ie-gP</td><td><u>Priority(H,L):</u> High</td></tr>
<tr><td colspan="3"><u>Test Objective :</u> the login process help to fill all e-services form automatically</td></tr>
<tr><td colspan="3"><u>Test Description:</u> The test case 1 explains the login process. Only registered users will have access into the portal. Hence, authenticity filter is necessary</td></tr>
<tr><td colspan="3"><u>Requirements verified:</u> Yes</td></tr>
<tr><td colspan="3"><u>Test environment:</u> Windows 8 , Google chrome browser</td></tr>
<tr><td colspan="3"><u>Test step/Pre Condition:</u>
1. This use case starts when the user clicks on the “login” button.
2. The portal displays the login form.
3. The user inputs the username and password.
4. The user submits the form by clicking on the “submit” button.
The user and staff must have already registered and have user name and password to log in</td></tr>
<tr><td colspan="2"><u>Actions:</u>
The user enter the correct user name and password</td><td><u>Expected Results:</u>
After verify the user login in Ie-gP</td></tr>
<tr><td colspan="2"><u>Pass:</u> Yes</td><td><u>Fail:</u> No</td></tr>
<tr><td colspan="3"><u>Problem:</u> Nil</td></tr>
<tr><td colspan="3"><u>Notes:</u> Successfully Executed</td></tr>
</table>

After finished developing the Ie-gP, the study tested the Ie-gP and filled the test case information, which shows the functionality of the Ie-gP to evaluate each function of Ie-gP. The results of evaluation (as shown in Appendix C) show that the Ie-gP is functionality implemented correctly and distinctive with high quality, good performance.

It is found that the address of the Ie-gP is found easily and almost all users could register into the Ie-gP and login. Meanwhile the study found that all links work perfectly. The result find out that user able to change the font size and the language . In managing the design of the Ie-gP, tat found performed well, they could update and manage the information in the Ie-gP and add new users successfully.

The findings in the previous paragraph show that almost all users were able to perform the tasks. This further explains that all functions in the Ie-gP work well as desired, in supporting users' tasks provided in the Ie-gP. While the Ie-gP was accessed by the users at different time from different locations, they have not complained about any deficiency relating to access.

The Ie-gP is suitable to be implemented in real life in order evaluate the usability of Ie-gP. It achieves objectives effectively.

6.4.3 Results of User Usability Test

The user usability test begins with some demographic particulars. Then, the results on perceived usefulness follow, which is followed next with the results on ease of use.

A. Demographic profile

The first section in the questionnaire focuses on general information about gender. Table 6.3 and Figure 6.1 detail the findings. It is seen that 26 (87%) participating users were male, while only 4 (13%) were female. It represents the actual norm, in which in Iraqi culture, males use online applications more than the female. In detail, it has been a culture in Iraqi culture that male assists the female on such tasks.

Table 6.3

Gender

Gender	Frequency	Percentage
Female	4	13. 3%
Male	26	86. 7%

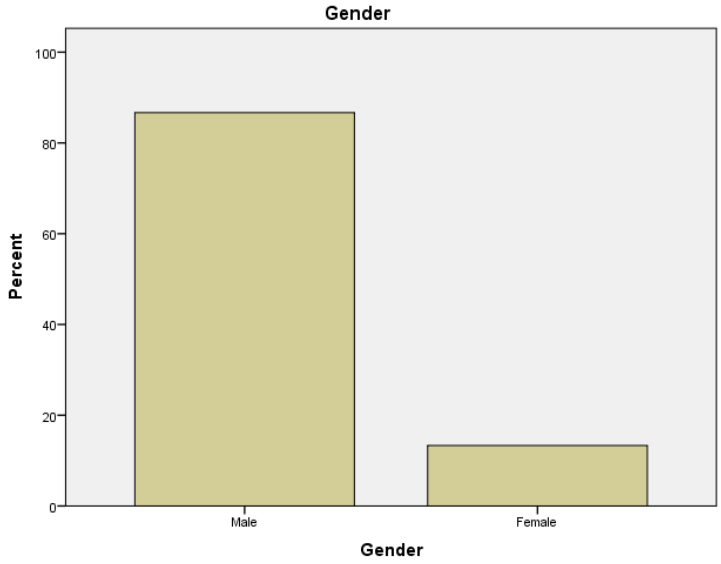


Figure 6.1: Gender Distribution

Most of the participating users aged between 29 and 36 years old (43.3%) and between 37 and 45 years old (36.7%). In the remaining, 16.7% of them were below 28 years old, and 3% above 45 years old. These details are illustrated in Table 6.4 and Figure 6.2.

Table 6.4

Age

Age	No	Percentage
22-28	5	16.7%
29-36	13	43.3%
37-45	11	36.7%
Above 45	1	3%

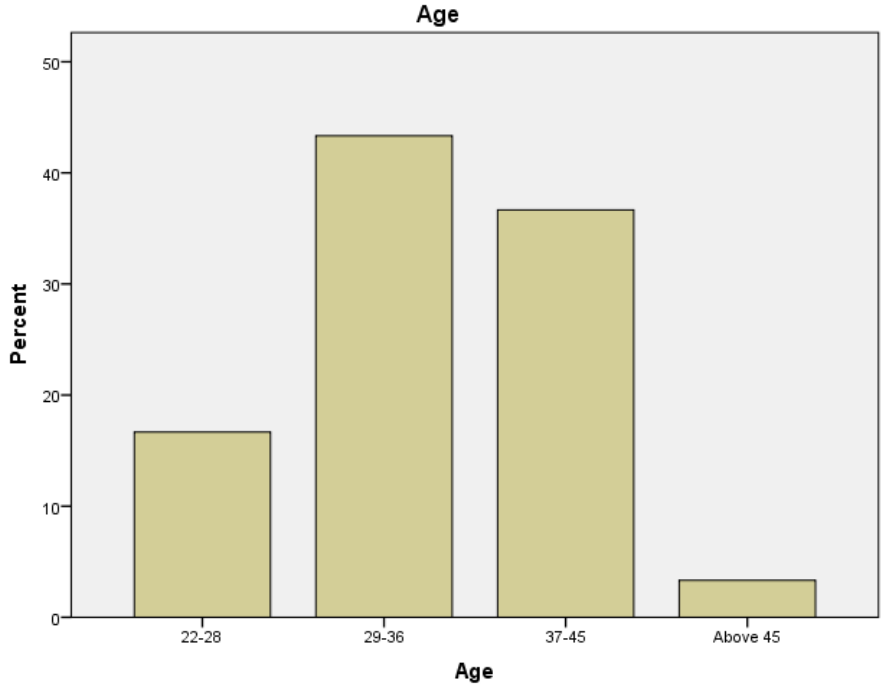


Figure 6.2: Graph for Age Distribution

In terms of educational level, most of the subjects have master degree (73.3%). It is not surprising, because in Iraq, only educated people use the e-government services. Hence, this fact conveys the norm. Besides, 20% of the subjects have degree, while 6.7% have PhD. These can be seen illustratively in Table 6.5 and Figure 6.3.

Table 6.5

Level of Education

Qualification	Frequency	Percentage (%)
Degree	6	20%
Master	22	73. 3%
PhD	2	6.7%

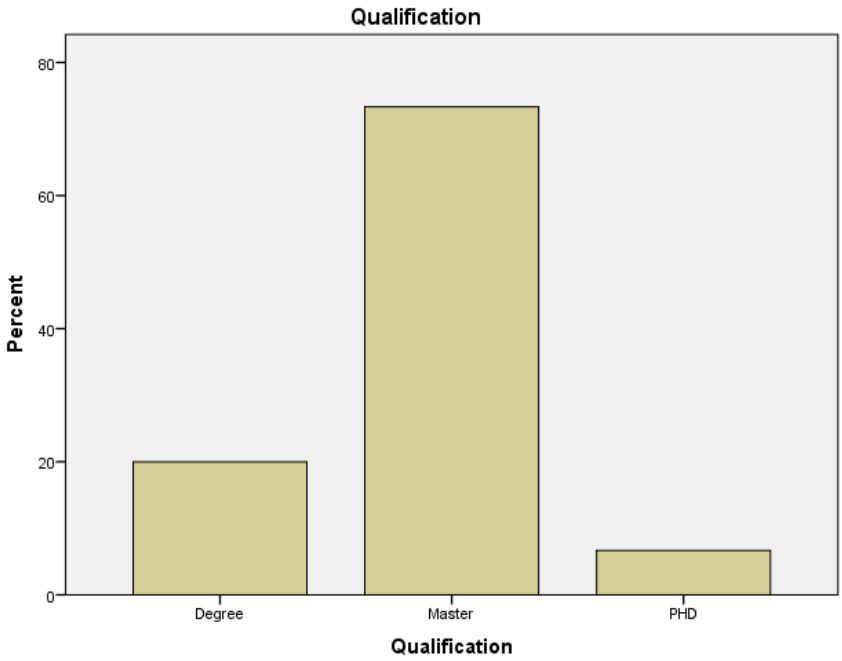


Figure 6.3: Respondents Education Level

The previous paragraphs elaborate the demographic profiles of subjects involved in the user usability test. It could be said that the respondents gathered in the data collection is a representative for the culture in Iraq. This allows this study analyse the gathered data convincingly.

B. Useful and Ease-of-Use

The second section of the questionnaire asks on how much subjects perceive that the Ie-gP is useful and easy to use (see Appendix D). For these perceptions, Likert scale

is used. Each question provides options between 1 (strongly disagree) and 5 (strongly agree).

Perceived Useful

The results of subjects' perceived usefulness of the Ie-gP are discussed in this section. They are detailed by noting each question individually.

Table 6.6

Perceived Usefulness – Question 1

Q1:- Using Ie-gP would enable me to access e-services quickly.			
	Scale	**Frequency**	**Percentage**
Usefulness	Strongly Disagree	0	0%
	Disagree	0	0%
	Neutral	5	16.7%
	Agree	17	56.7%
	Strongly Agree	8	26. 7%
	Total	30	100%

Question 1 asks whether the Ie-gP enables users to access e-services quickly. With the references in the results in Table 6.6, 56.7% of the subjects agree that it is. On top of that 26.7% strongly agree that it enables them to perform quickly. The remaining (16.7%) are not sure.

Next, Question 2 asks whether the Ie-gP saves users time and efforts. It can be noticed through the results in Table 6.7 that 50% of the subjects agree and 30% strongly agree that the Ie-gP saves their time and efforts. Meanwhile, another 20% are not sure.

Table 6.7

Question 2

Q2:- Using this Ie-gP could save my time and efforts.			
	Scale	**Frequency**	**Percentage**
Usefulness	Strongly Disagree	0	0%
	Disagree	0	0%
	Neutral	6	20.0%
	Agree	15	50.0%
	Strongly Agree	9	30.0%
	Total	30	100%

In Question 3, subjects are asked on whether the features in the Ie-gP satisfy their needs. The results in Table 6.8 explain that the features really satisfy them in their needs. Particularly, more than 70% (53.3 % agree and 20% strongly agree) of the subjects have been satisfied with the features. Meanwhile, the remaining (26.7%) were not sure.

Table 6.8

Question 3

Q3:- Using this Ie-gP has the ability to give the Ie-gP features that satisfy my requirement.			
	Scale	**Frequency**	**Percentage**
Usefulness	Strongly Disagree	0	0%
	Disagree	0	0%
	Neutral	8	26. 7%
	Agree	16	53. 3%
	Strongly Agree	6	20.0%
	Total	30	100%

Table 6.9

Question 4

Q4:- Using this Ie-gP gives me brief and simple information about what I need.			
	Scale	**Frequency**	**Percentage**
Usefulness	Strongly Disagree	0	0%
	Disagree	0	0%
	Neutral	6	20.0%
	Agree	18	60.0%
	Strongly Agree	6	20.0%
	Total	30	100%

Table 6.9 details the results for Question 4, which asks whether the Ie-gP provide clear information as desired by users. It is seen that the results are similar with Question 3, in which it explains that the Ie-gP does provide desired information precisely and clearly.

Perceived Ease-of-Use

Then, Question 5 precisely asks whether the Ie-gP is easy to use. As the results are analysed (displayed in Table 6.10), it is seen that 80% of the subjects agree (63% agree and 17% strongly agree) that the Ie-gP is easy to use. Additionally, the rest were not sure.

Table 6.10

Question 5

Q5:- It is easy to use.			
	Scale	**Frequency**	**Percentage**
Easy to use	Strongly Disagree	0	0%
	Disagree	0	0%
	Neutral	6	20.0%
	Agree	19	63%
	Strongly Agree	5	17%
	Total	30	100%

Flexibility is a feature that makes a Ie-gP friendly. Hence, it is asked in Question 6. Based on the results in Table 6.11, 63.3% of the subjects found that the Ie-gP is flexible. Particularly, 13.3% strongly agree, meanwhile 36.7% have not decided whether the Ie-gP is flexible.

Table 6.11

Question 6

Q6:- It is flexible use			
	Scale	**Frequency**	**Percentage**
Easy to use	Strongly Disagree	0	0%
	Disagree	0	0%
	Neutral	11	36. 7%
	Agree	15	50%
	Strongly Agree	4	13. 3%
	Total	30	100%

Besides flexible, simplicity is another influencing feature. It engages users while interacting with the Ie-gP. Accordingly, it is asked in Question 7. The results in Table 6.12 show that most subjects agree (76.7%) and strongly agree (13.3%) that the Ie-gP is simple to use. Meanwhile the rest (10.3%) have not decided.

Table 6.12

Question 7

Q7:- It is simple to use.			
	Scale	**Frequency**	**Percentage**
Easy to use	Strongly Disagree	0	0%
	Disagree	0	0%
	Neutral	3	10. 3%
	Agree	23	76.7%
	Strongly Agree	4	13. 3%
	Total	30	100%

User-friendly is also a highly influencing feature that attracts users to use a Ie-gP. Thus, it is asked in Question 8. Having analysed the data, results are exhibited in

Table 6.13. It is seen that almost 89% of the subjects agree that the Ie-gP is user-friendly. In fact, out of that, 16.7% of the subjects strongly agree. Meanwhile, the remaining (10%) did not decide on the user-friendliness aspect.

Table 6.13

Question 8

Q8:- It is user-friendly.			
	Scale	**Frequency**	**Percentage**
Easy to use	Strongly Disagree	0	0%
	Disagree	0	0%
	Neutral	3	10%
	Agree	22	73.3%
	Strongly Agree	5	16.7%
	Total	30	100%

While users for a Ie-gP vary between those who have deep experience in using computers and those who are new in using computers, the interaction in terms of navigation should be kept minimal, and avoid complexity. For this purpose, Question 9 asks whether the Ie-gP requires users to minimize their steps in doing each task. The answers are tabled in Table 6.14. The results show that quite a big percentage (30%) of the subjects have not decided, while the rest are (70%) either agree or strongly agree. In fact, 23.3% of the subjects strongly agree that the Ie-gP minimizes their task.

Table 6.14

Question 9

Q9:- It requires the fewest steps possible to accomplish what I want to do with it.			
	Scale	**Frequency**	**Percentage**
Easy to use	Strongly Disagree	0	0%
	Disagree	0	0%
	Neutral	9	30.0%
	Agree	14	46.7%
	Strongly Agree	7	23.3%
	Total	30	100%

Besides reducing steps, the instruction should be very clear in ensuring users get right to the meaning without having to guess, or make mistake. However, if the flow of interaction with the Ie-gP is very clear, the instruction could be skipped by the users. This portrays the high usability of the Ie-gP. In regards to this, Question 10 asks whether the subjects could use the Ie-gP without referring to the instructions. With reference to the results displayed in Table 6.15, it is clearly seen that more than 76% of the subjects agree (60.0% agree and 16.7% strongly disagree) that they can skip the instruction because the flow of interaction is clear to them. This reduces the time they have to spend on the Ie-gP. Meanwhile, the rest have not decided.

Table 6.15

Question 10

Q10:- I can use it without written instructions.			
	Scale	**Frequency**	**Percentage**
Easy to use	Strongly Disagree	0	0%
	Disagree	0	0%
	Neutral	7	23.3%
	Agree	18	60.0%
	Strongly Agree	5	16.7%
	Total	30	100%

Also, a good and usable Ie-gP must enable users to learn using it quickly. Accordingly, Question 11 asks about the learnability aspect, investigating how easy the Ie-gP is to learn. When seeing at the results in Table 6.16, 30% of the subjects have not decided, while the rest agree that the Ie-gP is easy to learn. In detail, 56.7% agree and 13.3% strongly agree.

Table 6.16

Question 11

Q11:- I learned to use it quickly.			
	Scale	**Frequency**	**Percentage**
Easy to use	Strongly Disagree	0	0%
	Disagree	0	0%
	Neutral	9	30.0%
	Agree	17	56.7%
	Strongly Agree	4	13.3%
	Total	30	100%

Then, Question 12 asks whether the users could remember the steps in the Ie-gP easily. This intensifies the previous three questions. It is purposely asked to determine the authenticity of the answers in the previous questions. When the results are analysed, and displayed in Table 6.17, it is found that only 20% of the subjects have not decided. In the remaining, 30% of the subjects strongly agree, while 50% agree that they can remember the way to use the Ie-gP.

Table 6.17

Question 12

Q12:- I easily remember how to use it.			
	Scale	**Frequency**	**Percentage**
Easy to use	Strongly Disagree	0	0%
	Disagree	0	0%
	Neutral	6	20.0%
	Agree	15	50.0%
	Strongly Agree	9	30.0%
	Total	30	100%

When users use a Ie-gP, they should be successful every time the make attempts to use. This reflects whether they remember the way to use. Accordingly, Question 13 asks about it, in intensifying the previous question. When the results in Table 6.18 are referred to, it is seen that only 30% have not decided, while the rest are happy with the Ie-gP because they are always successful in their attempts. Particularly, 16.7%

strongly agree and 53.3% agree that they are always successful in performing their tasks in the Ie-gP every time they use it.

Table 6.18

Question 13

Q13:- I can use it successfully every time.			
	Scale	**Frequency**	**Percentage**
Easy to use	Strongly Disagree	0	0%
	Disagree	0	0%
	Neutral	9	30%
	Agree	16	53. 3%
	Strongly Agree	5	16.7%
	Total	30	100%

A good and usable Ie-gP must also be clear to users in terms of what they have to do after performing certain action, or what comes up after they perform certain actions. For this reason, Question 14 asks whether users know what to do next after their action. The results are tabled in Table 6.19. It is found that only 30% have not decided, while 20% strongly agree that they are clear about the next action they have to do. Besides, 50% of the subjects agree with the statement.

Table 6.19

Question 14

Q14:- I always felt I knew what to do next.			
	Scale	**Frequency**	**Percentage**
Easy to use	Strongly Disagree	0	0%
	Disagree	0	0%
	Neutral	9	30.0%
	Agree	15	50.0%
	Strongly Agree	6	20.0%
	Total	30	100%

Human always make errors, hence, the Ie-gP should anticipate for human error. Thus, the Ie-gP should assist them when they make any error. Regarding this, Question 6.19

asks whether the error messages are helpful. The results in Table 6.20 explain that the error messages in the Ie-gP are helpful because 23.3% of the subjects strongly agree with the statement. Also, 60% of the subjects agree. Meanwhile only 16.7% of the subjects have not decided.

Table 6.20

Question 15

Q15:- Ie gP feedback: It is helpful in the error message .			
	Scale	**Frequency**	**Percentage**
Easy to use	Strongly Disagree	0	0%
	Disagree	0	0%
	Neutral	5	16.7%
	Agree	18	60.0%
	Strongly Agree	7	23.3%
	Total	30	100%

When the error messages are helpful, the actions in recovering from the error must be made simple and easy. This aspect is asked in Question 16, in which the results are exhibited in Table 6.21. Generally subjects feel that the recovery from mistakes is easy because 60%of them agree with the statement (particularly 46.7% agree and 13.3% strongly agree). The remaining (40%) have not decided. The rate is low in result because during the examination the participant did not face any problem to know the the Ie-gP will solution the problems or not.

Table 6.21

Question 16

Q16:- My mistakes were easy to correct.			
	Scale	**Frequency**	**Percentage**
Easy to use	Strongly Disagree	0	0%
	Disagree	0	0%
	Neutral	12	40.0%
	Agree	14	46.7%
	Strongly Agree	4	13. 3%
	Total	30	100%

Further, the mean for each question was investigated. The results are tabled in Table 6.1, 6.2, and 6.22. It is seen that all questions have high mean score, which is close to 4 or greater than 4. Besides, the standard deviations are small, less than 1. This explains that all statements regarding the Ie-gP in the questionnaire are agreed by the subjects with very small bias or influence of other factors.

In Table 6.1, participants respond to 15 item (Appendix B) related to features test to measuring the perception on the increase of access. There was a mixed agreement found among the respondents wherein 96.7% of the sample consented with the features helped them make the Ie-gP more effective, easy to use and usefulness.

As illustrated in Table 6.2, participants responded to 15 items (Appendix C) related to functionality test. Most of participants found all functions in the Ie-gP work well as desired, in supporting users' tasks provided in the Ie-gP. While the Ie-gP was accessed by the users at different time from different locations.

Table 6.22 explain, participants responded to 16 items (Appendix D) the ease of use and usefulness of using Ie-gP. However, the highest percentage of the ease of use and usefulness scores among the research participants was (combination of 'not sure or

'agree'). Most of the participants using the Ie-gP, which reported that they "agree or strongly agree" with that statement with Mean score (M=4.10) and Standard Deviation (SD=.662). While some participants felt uncomfortable using the Ie-gP (M=3.73) and Standard Deviation (SD=.691).

Table 6.22

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Q1	30	3	5	4.10	.662
Q2	30	3	5	4.10	.712
Q3	30	3	5	3.93	.691
Q4	30	3	5	4.00	.643
Q5	30	3	5	3.97	.615
Q6	30	3	5	3.77	.679
Q7	30	3	5	4.03	.490
Q8	30	3	5	4.07	.521
Q9	30	3	5	3.93	.740
Q10	30	3	5	3.93	.640
Q11	30	3	5	3.83	.648
Q12	30	3	5	4.10	.712
Q13	30	3	5	3.87	.681
Q14	30	3	5	3.90	.712
Q15	30	3	5	4.07	.640
Q16	30	3	5	3.73	.691
Valid N (listwise)	30				

6.5 Reliability For Easy of Use and Usefulness

Table 6.23 presents the reliability aspects for ease of use and usefulness in using Ie-gP. The measurement was conducted 16 item and the obtained result was 0.78. Table 6.23 presents the total statistic of the ease of use and usefulness items.

Table 6.23

Reliability Result

Cronbach's Alpha	N of Items
.788	16

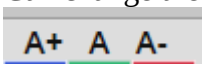
6.6 Comparison Between the Existing Portal and the Ie-gP

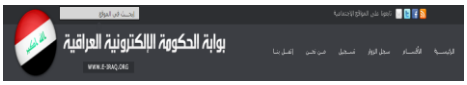
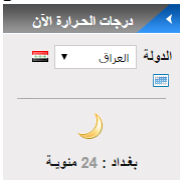
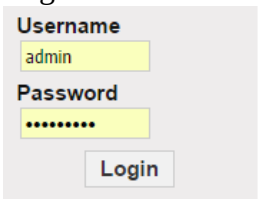
This section addresses the differences between the existing portal and the new portal.

The newly added elements are described in Table 6.24.

Table 6.24

Compare between existing portal and new portal

	Feature	**Ie-gP**		**Old Portal**
1	Main Page			
2	Address	Https://www.e-iraq.org		Http://www.e-gov.gov.iq
3	Customer support	E-mail	Support	Support
		Phone	Support	Support
		Social Media	Support	Not support
		Feed back	Support	Not support
4	Accessibility	Access to e-services by 1 step, this feature attracts users.		Access to e-services by at lease 5 steps.
5	Change font size	Can change the font size. 		Cannot change the font size.
6	Change the colours	Support changing the colour. 		Does not support this feature.

7	Multi Language	Support three languages. 	Support two languages (only Arabic and English).
8	Consistency : colours and logo		
10	Statistics	Support the statistics of e-service. 	Does not support this featuers
11	Mailing list	Provides a feature for sending news.	Does not support this featuers
12	Locate users	This feature locates the users, identifying users' location, and whether users are on mobile phone or computer. 	Does not support this featuers
13	Extra Link	Provides 56 links.	Provides 5 links.
14	Page size	983 KB	1.1 MB
15	Load page	0.54 seconds	5.07 secound
16	Temperature	Notifies the temperature in various place in the world. 	Does not support this featuers
17	Registration	Registers users in the portal. 	Does not support this featuers
18	News bar	This feature helps notifying the beark news in the portal and new e-service provided in the portal.	Does not support this featuers

19	Classification services	Services classified by ministries 	Services not classified by ministries

6.7 Summary

This chapter analyses the gathered data. Both aspects, functionality and user usability tests have been discussed in detail in terms of their procedure and results. While the procedures are clear, the results are reliable. Hence, this study in convinced that the results are highly representing feedbacks for the models obtained and discussed in Chapter 4 and translated into a prototype visualized in Chapter 5.

Based on the results in this chapter, the model is able to make the Ie-gP perceived useful and easy to use by the subjects. Bot modules, for users and administrators respectively, have obtained high credits by the subjects.

CHAPTER SEVEN
CONCLUSION

7.1 Introduction

This chapter discusses the study and its achievement. A prototype of an e-government Ie-gP for Iraq has been developed called Ie-gP and described in Chapter 5, based on a model proposed in Chapter 4 after determining the most common features in successful portals. They were necessary to achieve the objectives stated in Chapter 1. Particularly, the selection of the common features to make Ie-gP usable from users' perception has been based on portals elaborated in Chapter 2. In overall, the whole process in this study from identifying the problem until the analysis of the results is detailed structurally in Chapter 3. In the end, the results are discussed in Chapter 6.

7.2 Objectives Achievement

Having carried out the activities as outlined in Chapter 3 and explained in Chapters 4 and 5, this study has achieved all the stated objectives in Chapter 1. In conjunction, they are discussed in the following.

Objective 1 – to determine the interface elements for the front office Ie-gP.

The interface elements for the Iraqi e-government portal (ie-gP) have been gathered successfully by deriving from successful portals in different countries, with different justifications explained in Chapter 2. A systematic technique called comparative analysis has been carried out (explained in detail in Chapter 4) in ensuring the gathered elements are reliable.

Objective 2 – to design and develop the front office of Ie-gP.

Based on the derived common elements gathered in Chapter 4, the design of the Iraqi e-government portal (Ie-gP) has been outlined. As an interactive system, it has been designed showing the classes and interaction through use cases, class diagrams, and interaction diagrams. The database design is also visualized, showing the relationships among the tables. It is necessary, and important to ensure the interaction is minimized in the portal.

Having finalized the design, it was translated into a working prototype explained in detail in Chapter 5, so that users could get through the constructed model derived in Chapter 4. It is important because without a working prototype, users will not be able to understand the model. In the prototype, all the features gathered through the comparative analysis (explained in Chapters 2 and 4) are incorporated, in which all the features have also been proven perceived able to increase the access to the Ie-gP (Chapter 6).

Objective 3 – to evaluate the users' perceptions on the usefulness and ease-of-use of the front office of Ie-gP.

Then, the prototype was made live, and tested in terms of perceived usefulness and ease-of-use involving subjects from different countries covering tasks as users and administrators. Chapter 6 details about the evaluation, in which the obtained results show that the portal receive high perceptions from the subjects in terms of both usefulness and ease-of-use. The results are not influenced by any technical effects because prior to testing the perceptions, the functions in the prototype were first tested, to ensure that they work well as intended.

7.3 Limitations and Recommendations for Future Studies

The results obtained in this study are convincing. However, a few factors may have influenced the generalizability. Perhaps, the following are some of the factors, which may be possibly improved in future.

- The prototype has been tested by using a set of test data. It is more convincing if a set of real data are used for testing. In this regard, test data refers to data collected for the purpose of this study. Meanwhile real data refers to continuous data gathered in the real implementation. It has to be continuous because the portal affects performance.

- This study managed to gather 30 subjects in the evaluation, both for functionality and user usability tests. It was able to provide sufficient data. However, a bigger set of data may explain the findings in more detail. Hence, it is highly recommended that future studies consider users of various other countries, covering various services besides the immigration.
- For the purpose of this study, the prototype has been tested using http. For the real implementation, the portal needs to be tested using https for Secure Socket Layer (SSL Certificates). For that purpose, more time and budget is required because more considerations including technical infrastructure should be planned and put in place.
- The data were collected quantitatively only. This study recommends that qualitative data would make the discussions more convincing. Hence, future studies should consider observing users when they interact with the portal, and interview them. It is significant because they can provide deep elaboration on the findings.

- In this study is the number of participants in the test design of the Ie-gP of employees who are responsible for the management and implementation of e-government in Iraq is not very large, to hire these employees is not a easy task, since, it is a limited number.

7.4 The Context

The portal has been developed based on the model derived in Chapter 4. It has been proven useful and easy to use from users perceptions after hey interacted with it. It could be used by Iraqi government to support its citizen. At the same time, the local context (the Iraqi context) may influence the portal.

1- Iraq has lack of qualified IT staff, as many IT skilled people have migrated to other countries for better living chances. For example, 20% of the Iraqi ministries lack the necessary skilled IT staff and therefore, they still proceed with their daily works in the traditional way.
2- The citizens in Iraq have different levels of education as well as different levels of computer skill. Hence, they should be supported with public computer center, both for learning computer and for accessing the e-government portal.
3- In terms of security difficulties that Iraq has been facing since 2003, the people are not very open in their live. They are scared in sharing information; hence, they tend to be very cynical in sharing information online.
4- The Internet was first available in Iraqi in 2004. It is considered new, and is still slowly developing. Hence, most users in Iraq are not experienced with computers.

7.5 Summary

Having discussed the achievement of the objectives, this study is confident that the contributions are significant. It gathers inputs from various sources in constructing the proposed model, which stands as a significant contribution to the body of knowledge. Other researchers may use the proposed model to further enhance in the future. Besides, it contributes to the society through the developed prototype.

While this study has achieved the stated objectives, some future considerations as addressed in the previous section should be taken into account in enhancing this initiative. This ensures that the citizens get the real benefits.

If the efforts are really paid attention, coupled with sufficient investment, the living of the people will be improved because Iraq has been striving for better living.

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