



**An Enhanced Model for e-Government Applications
in Iraq**

Student Name: Zaid Ahmed Nadhim

Student ID: 401110021

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Supervisor: Prof. Reyadh Naoum

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Department of Computer Information Systems

Faculty of Information Technology

Middle East University

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AUTHORIZATION STATEMENT

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NAME: ZAID AHMED NADHIM

DATE: 26 / 4 / 2014

SIGNATURE: 

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Examination Committee		
Prof. Reyadh Naoum Department of Computer Science Faculty of Information Technology Middle East University	Supervisor & Chairman	<i>R Naoum</i>
Prof. Alaa Hussein Al-Hamami Dean of Computer Sciences and Informatics College Amman Arab University	Member	<i>Alahamami</i>
Associate Prof. Oleg Viktorov Department of Computer Information Systems College of Information Technology Middle East University	Member	<i>Oleg Viktorov</i>

DEDICATION

To my beloved parents and my lovely wife and to my wonderful family

For their love, support, encouragement and mostly their patience

You are my life support

May God bless you now and forever.

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Abbreviations Table

ICT	Internet and communication Technology
EGOV	E-Government
G2C	Government to Citizen
MSC	Multimedia Super Corridor
GUI	Graphical User Interface
CMS	Content Management System
HCI	Human Computer Interaction
EG	e-Government
EC	e-commerce
SQL	Structured Query Language
PHP	Personal Home Page
.JSP	Java Server Pages
ASP	Active Server Page
AI	Artificial Intelligence
PC	Personal Computer
GSM	Global System of Mobile
DB	Database
PMI	Point wise Mutual Information
HTTP	Hypertext transfer protocol
XML	Extensible Markup Language
WCM	Web Content Management
1NF	First Normal Form
2NF	Second Normal Form
3NF	Third Normal Form
BCNF	Boyce-Codd Normal Form
SMS	Short Service Message
PIN	Primary Identifier Number
UK	United Kingdom
US	United States
UN	United Nations
SD	Service Database
MH	Manager Handler

CH	Citizen Handler
E	Entity
R	Relationship
BB	Broadband
EG	E-Government
EC	E-Commerce

Abstract

The application of the e-Government systems differs from one country to another, based on the government strategies and limitations as well as based on the system analysis, features, and complexity. This research has studied all possible technical factors that affect the citizens' behavior and decisions towards relying on the e-Governments system. Also it has studied improving Iraq e-Government system based on comparison between Iraq and Jordan e-Government system and benefiting from Jordanian experiment which is considered the oldest in application. To collect data and develop the model, the researcher used two methods: Primary Research which aimed to distribute questionnaire on Iraqi and Jordanian citizens, and Secondary Research that aimed to study the previous e-Government models in order to outline the weaknesses aspects in them. Primary Research depends on questionnaire distributed on sample of 500 Iraqi citizens, where 450 questionnaires were collected. Besides that, the same questionnaire was distributed to a similar sample in Jordan for comparison objectives to determine the gap. The results of questionnaires showed that most of Iraqi citizens are not satisfied with Iraq e-Government system in several aspects, such as: user interface, service, security, and overall performance of the system. Also, the results showed that most Jordanians are satisfied with Jordan e-Government system. Based on previous indications, Iraqi e-Government system framework was developed to meet the Iraqi requirements. The new framework was introduced, database management system was also indicated besides to represent strategies of system in dealing with official documents instead of traditional methods. In Secondary Research, many previous e-Government models were introduced and analyzed to indicate their weaknesses and benefiting from them in designing the new model of Iraq e-Government. The new Iraq e-Government framework will be suitable for application because it is based on avoiding technical problems that face Iraqi citizens.

ملخص

إن تطبيق نظام الحكومة الإلكترونية يختلف من بلد إلى آخر، استناداً إلى استراتيجيات وقوانين الحكومة المتبعة. من جهة أخرى، فإن نظام الحكومة الإلكترونية نفسه يختلف من بلد إلى آخر، استناداً إلى تحليل النظام، وميزاته، ودرجة التعقيد في النظام. هدف هذا البحث هو دراسة جميع العوامل التقنية الممكنة التي تؤثر على رضا المواطنين وقراراتهم بالاعتماد على إطار نظام الحكومات الإلكترونية لإنجاز معاملاتهم الرسمية. هذا البحث يهدف إلى تحسين نظام الحكومة الإلكترونية في العراق على أساس المقارنة بين نظام الحكومة الإلكترونية في العراق ونظام الحكومة الإلكترونية في الأردن والاستفادة من التجربة الأردنية التي تعتبر أقدم من حيث التطبيق. وقد اعتمد الباحث على طريقتين لجمع المعلومات وهما: المصادر الأولية المتمثلة بتوزيع الاستبيان والمصادر الثانوية التي تعتمد على دراسة نماذج الحكومة الإلكترونية في الدراسات السابقة وبيان مجالات الضعف فيها. وعليه فقد تم اعداد الاستبيان وتوزيعه على عينة مقدارها 500 من المواطنين وقد تم استرداد عينة مقدارها 450 استبيان من المواطنين العراقيين للتعرف على درجة رضا المواطنين العراقيين نحو نظام الحكومة الإلكترونية في العراق. وتم توزيع الاستبيان نفسه ايضا على عينة من المواطنين الاردنيين لغايات المقارنة فقط من اجل تحديد الفجوة. وأظهرت نتائج الاستبيان أن معظم المواطنين العراقيين غير راضين عن نظام الحكومة الإلكترونية في العراق من عدة جوانب، مثل: واجهة المستخدم وامن البيانات والأداء الكلي للنظام. وفي المقابل اظهرت نتائج الاستبيان ارتياح المواطنين الاردنيين اتجاه نظام الحكومة الإلكترونية. بناء على المؤشرات السابقة، قد تم وضع إطار نظري لنظام الحكومة الإلكترونية العراقية الجديد، وتم تمثيل إدارة قاعدة البيانات الخاصة بالنظام وتوضيح استراتيجيات النظام في التعامل مع المعاملات الحكومية الكترونياً بدلاً من الطريقة التقليدية. بالإضافة الى ذلك، تم توضيح انسب نموذج للحكومة العراقية والذي يلبي متطلبات المواطنين العراقيين ويحقق الارتياح عند التعامل معه من قبل المواطن العراقي. علاوة على ذلك، تم في هذا البحث إدخال العديد من أطر الحكومة الإلكترونية التي وردت في دراسات السابقة وتحليلها وبيان أماكن الضعف فيها والاستفادة منها في تصميم إطار الحكومة الإلكترونية العراقية الجديد والذي يعتبر مناسب للتطبيق لأنه مبني على تجاوز خبرات المواطنين للمشاكل التقنية التي يواجهونها.

Chapter 1: Introduction

It is by now the era of rapid technological, political, cultural and social influx. Electronic technologies and businesses that were unknown a few years ago are now widespread. Recently, the explosive growth of telecommunication technologies and software solutions especially the “Information Infrastructure platforms” or the “Information Superhighway” including Internet and intranet has enabled people to communicate and exchange information on an unprecedented scale. The telecommunication infrastructure has also widened the horizon of communications without increasing costs in locating users, knowing their needs and requirements, and supplying them with products or services. Governments now recognized that the information systems are an appropriate platform to deal and communicate wider with citizens. Instead of concentrating governments in localities, with the help of the e-Government system can expand and render services to those citizens virtually where it would have been difficult in the past considering the distances, time, costs, and more efficiencies and effectiveness (Imran and Gregor, 2007).

According to VrabieandÖktem, (2012) the computers and the Internet have changed significantly the way in which the citizens can have access to public services. The informational society is more and more present in all the activities of the public sector, including through complex applications of electronic governance.

This research will study all possible factors that have effect on the citizens' behavior and decisions towards relying on the e-Governments system for implementing their public and official services, which also will investigates and measures the impacts of the current implemented e-Government systems on the citizen's behavior, such as the interfaces, ease of use, functions, telecommunication tools, help menu, etc. Moreover, the application of the e-Government systems differ from country to another, based on the government strategies and limitations. Also, the e-Government system itself differs from country to another, based on the system analysis, features, and complexity. Furthermore, the research will be arguing the application of the e-Government systems, taking into considerations the main aspects, rules, and limitations as a comparative technique in order to find out all differences that influence on

applying e-Government systems in two different countries, which have a key role of analyzing the citizen's behavior as well.

1.1 BACKGROUND OF THE STUDY

The basic purpose of e-Government is to facilitate the public services-based connection between government and the end users such as citizens, business and other government agencies. Measuring the end-users perception on e-Government applications is one of the most important elements in assessing e-Government success (Noor et al., 2011). According to Fang (2002) one of the most important aspects of e-Government is how it brings citizens and businesses closer to their governments over the e-Government system.

According to Odat, (2012) the Jordan government is moving towards becoming more efficient operationally by collaborating across traditional departments. The government also has to become more responsive towards the Jordanian citizen's needs. Furthermore, the key objective for e-Government initiatives is to improve citizen access to service delivery and not to further expand the role of government. Thus, the government faces an increased pressure to form an effective e-Government. The e-Government is not only meant to bring public services online, but is also focused mainly in reducing overall operational costs by transforming the e-Government into an organization that generates both social and economic value for citizens effectively. Thus, effectiveness and efficiency factors have to be investigated and prioritized (Mohsin and Raha, 2007).

The Iraq e-Government site offers many services and conducting continuous development processes to facilitate the services for its citizens. The national portal features links to hundreds of electronic services ranging from communication and technology eservices to paying for different public services online. The electronic portal easily connects its citizens to the online services of various government agencies for such purposes as obtaining personal documents, filing complaints, utilizing business services and paying utilities as it was mentioned by (Alshomrani, 2012).

1.2 PROBLEM STATEMENT

Many papers such as: “Government Information Quarterly” Mohsin and Raha, (2007) and “e-Government: Evolving relationship of citizens and government, domestic, and international development” are concerned with design and evaluation methods of the current applied e-Government system frequently (Odat, 2012). However, those methods often use inappropriate measures because they do not pay the adequate and real attentions to the users’ behavior and interactions, and often apply a mere “report card mentality”, thus often do not yield meaningful results. Moreover, the special aspects that are induced by the e-Government context and the special requirements that arise in the context of a developing country are often neglected. Also, no one said how those methods could be adapted to the context of e-Government projects in developing countries. This research will address how to involve the real end users, and will enhance the way data and information is collected so that they can significantly affect the user interface of the e-Government application in Iraq based on the Jordanian experience. In fact, to know the rate of Iraqi citizens who are satisfied with the current e-Government system, the researcher have already requested to get the statistics (from Iraqi government) of the Iraqi citizen’s satisfaction about using e-Government system. From these collected data, the problems will be concluded and take these statistics in our considerations that prevent Iraqi citizens from using e-Government system. Thus, this research will address how to involve the real end users’ feedbacks-based behaviors and interactions in the enhancement process for the purpose of benefiting from the data and information that are collected from them and employing these data in a appropriate approach, so that they can significantly affect the user interface of the e-Government system in Iraq based on the Jordanian experience.

1.3 THE RESEARCH QUESTIONS

This research will answer the questions:

- Are the Iraqi citizens feel satisfied toward the current e-Government applications which are represented by system interface, provided services, Privacy and Security, overall performance?
- Is there a difference between the e-Government systems in Jordan as a benchmark for the e-Government system in Iraq?

- Is there a difference in the level of satisfaction between Jordanian and Iraqi citizens regarding the four features (Interface, security, service, and performance)?
- What are the technical developments and new model that will fulfill the technical users' requirements based on benefiting from the Jordanian experience?

1.4 THE RESEARCH HYPOTHESIS:

In this research the following hypotheses are considered:

H1: There is no difference in the awareness level about e-Government system between Jordanian and Iraqi citizens

H2: There is no difference in the level of using e-Government system between Jordanian and Iraqi citizens

H3: There is no difference in the level of satisfaction between Jordanian and Iraqi Citizen regarding the e-Government system's interface.

H4: There is no difference in the level of satisfaction between Jordanian and Iraqi Citizen regarding the e-Government System's Security.

H5: There is no difference in the level of satisfaction between Jordanian and Iraqi Citizen regarding the e-Government System's Services provided.

H6: There is no difference in the level of satisfaction between Jordanian and Iraqi Citizen regarding the e-Government System's Overall Performance.

1.5 OBJECTIVES OF THE RESEARCH

The main objective of the study is to develop Iraqi e-Government system through the enhancement of the current e-Government system-based model, which will take into considerations the Jordanian experience, Iraqi statistics about the e-Government's usage, data gathering based survey from the Iraqi citizens, preventive and obstacles purposes, and all previous e-Governments system's evaluation measurements and approaches that based on users behavior and interactions. Thus, this research will compare e-Government of Jordan and e-Government of Iraq. This comparative will be based on the results of both Iraqi and Jordanian statistics-based survey. The following objectives will be achieved by this research.

Exploring the current e-Government system in Iraq from the standpoint of the end users, and based on the e-Government system of Jordan, which is considered as a developed country that already implemented the e-Government system and has valuable experience in this field. The researcher will use the result of this evaluation to measure the satisfaction degree and the behavior of the Iraqi citizens toward using the e-Government applications and highlight the main factors that impede the citizen from using these applications or affect their behavior negatively, and the researcher will conduct a gap analysis between the e-Government system in Jordan as a benchmark for the e-Government system in Iraq.

Based on this comparison between Jordanian and Iraqi case (Gap Research-Based Comparison), the researcher will develop a new model that fulfills the technical users' requirements benefiting from the Jordanian experience.

Developing model of e-Government system for Iraq based on the results of questionnaire. This model will achieve user satisfaction based on user behavior.

1.6 SIGNIFICANCE OF THE RESEARCH

As discussed, e-Government has become an important tool for the public sector not only to provide electronic services to citizens but also to interact with businesses, other organizations and governments. According to Mohsin and Raha, (2007) the Internet made its first appearance in Iraq in 1998, but only became available for public usage six years later. Besides that, Iraq is one of the main countries in Middle East and is in process for a transition to e-Government for all services, where Internet and Communication Technology (ICT) is playing an important role in Iraq since 2008. Thus, this study will have a valuable contribution as follows:

This research address a very important issue at this time for the Iraq governments because of its approach to adopt the strategies of organizational development and modernization in the systems of the public sector based on the citizens' behavior perspective.

This research is particularly important for its compatibility with the directives of the Iraq government to implement the systems and concepts of e-Government.

This research attempts to identify the importance for the application of e-Government, especially as it relates to the human side, which is the core foundation for processes of development and modernization in general.

This research will provide recommendations to Iraq government to overcome the weaknesses in e-Government system as well as improves the performances of the systems based on the citizens' behavior perspectives.

This research will help Iraq government to improve the electronic system efficiency and effectiveness to critically attract citizens and make them rely on the e-Government system and increase their trusts and awareness.

1.7 SCOPE OF THE RESEARCH

This research reviews the citizen's behavior towards e-Government applications in Jordan with the aim to assess current implemented e-Government applications for Iraq according to the e-Government applications in Jordan and based on the citizens satisfaction. This will be done by applying comprehensive questionnaire evaluates the current system based on different factors which effect on the citizen's satisfaction and influence his/her behavior toward the e-Government applications such as functions, ease of use, interfaces, flexibility, and others in both countries. The researcher will use the questionnaire results in Iraq to understand the requirements of the citizens and translate it to specification that help in the development of the current system, in addition to the result that can be provided from the questionnaire in Jordan which will be considered as a reference and guide for tackling the different problems and reach the required results. The questionnaire will target all the citizen's categories (different educational background, experiences, sectors, ages geographical region and from both gender) to have comprehensive view into the real citizen's behavior.

Chapter Two: Literature Survey and Related Works

This chapter presents a review of all related previous studies that related to this research study.

2.1 Overview of e-Government System

Electronic government (e-Gov) systems can be fundamental instruments of citizens' access to knowledge (Hornung et al., 2007). According to the surveyed literature there are so many definitions of e-Government. One popular and comprehensive definition by David McClure states it as “the government use of technology, particularly web-based Internet applications to enhance the access to and delivery of government information and services to citizens, business partners, employees, other agencies and entities”. Another definition by Texas’s Electronic Government Strategic Plan, (Department of Information Resources, State of Texas, and January 2001) states it as Government activities that take place over electronic communications among all levels of government, citizens, and the business community, including: acquiring and providing products and services; placing and receiving orders; providing and obtaining information; and completing financial transactions. Texas. Moreover, (Fang, 2002) introduces the terms “Continuous optimization”, “participation”, “internal and external relationships” in his definition. His definition indicates implicitly some aspects as reliability and quality of service delivery by optimization. Participation and, internal and external relationships terms indicate the mutual relationship internally between the departments of the government and externally between the government and citizens.

The various e-Government definitions show that new interaction between citizens and governments can be introduced in the delivery of services making governments smarter and smaller (Al-Mushayt, 2009). Based on the previous definitions e-Government system can define as web based platform that represents official services instead of traditional way in representing these services. And it is considered as a new interaction between citizens and official employees.

The life and wellbeing of citizens is directly affected by the way public administrations perform their various tasks services and actions (Hornung et. al, 2007). This means the faster and the easier these public administrations such as governments provide their services, the higher the satisfaction, wellbeing and welfare of citizens will be. Governments started to use information

systems in their organizations as early as computer sciences' early beginnings, yet the term "E-Government" spread in the late 1990's as the use of internet emerged (Hornung et. al, 2007). The focus of electronic data processing initially was on isolated and targeted modernization effort. On the contrary, today the focus is on the workplaces networking, administrations, and political institutions as well as on Information and Communications. This new trend of focus demands for new means to integrate modernization goals and investment planning of various institutions through the analysis of service portfolios and the public services demands (Kaur, 2006).

Moreover, e-Government has to focus on the demands of the citizens, promoting the access to and the consolidation of citizenship, in particular: the right to the access to public services, the right to information, the right to save time and distance; the right to be listened; the right to a social control of the public agent actions, and finally, the right to political participation (Hornung et. al, 2007).

2.2 Features of e-Government

Areas where e-Government can make a significant difference are wide. (Hornung et. al, 2007) listed some examples such as: certificates applications, tax payment, governmental portals, tele-consulting and tele-consultation, e-procurement, e-forms, online opinion polls, online job vacancies, online statistical data, traffic information, e-forums etc. there are different ways to categorize these services. Authors categorize services according to the content they provide. These categories are mentioned in (Kaur, 2006) as:

- Information acquisition: provides access to information about government directives and decisions;
- Service access: allows online transactions of government products and services;
- Participation: enables citizens to participate in the decision making process.

Other authors use different criteria to define different service categories (e.g. Lee et al., (2005; Hornung et al., 2007).

An effective e-Government system is more responsive to citizens' needs as information are accessed easily and quickly, consequently lowers the reliance on paperwork or reduces its time span and decreases the administrative costs.. It also provides transparency and reduces the

scope of corruption and the subjective decisions in providing services. (Lee et al., 2005). Transparency could increase investors' confidence.

The service value is increased as well as the awareness of the country responsibilities and services. Citizen self-sufficiency, respect and appreciation of ethnic and cultural diversity are increased. Objectives and goals are clearer. Citizen involvement in government initiatives is enhanced. All of these could be considered as indicators of an effective e-Government (Kaur, 2006).

e-Government could reflect some benefits if effectively achieved its goals. These benefits could create a better business environment, get customers online, not in line, improve the productivity and efficiency of government agencies and improve the quality of life for disadvantaged communities (Kaur, 2006). It also allows for decentralization of governance, allows greater scope for integration and allows learning from the past; moreover it leads to improved interactions with businesses and industry (Al-Mushayt, 2009).

Value chains are the best way to view services. The main stakeholders that the e-Government interacts and provides services to, such as citizens, businesses, and agencies that form a government could be grouped as a value chain with wide range of customer needs.

Interrelations between the e-Government and its stakeholders can be of three different types namely: government-to-government, government-to-business, and government-to-citizen, all with their reverse. (Lee et al., 2005; Müller 2004; Hornung et al, 2007; Fang, 2002) outlines another potential type or interrelation that is Nonprofit-to-Government and its inverse. The government-to-government and its inverse interrelation shares the information and data between the several government departments and agencies, the government –to-business and its inverse interrelation deals with the mutual e-transactions such as procurements and electronic market places for government purchases. Government procurement tenders could be handled through electronic means of information exchange, while the government-to-citizen and its inverse interrelation deal with the online public services to the citizens.

Some of the obstacles facing the e-Government system are security and privacy. Security means protecting the information assets and the access to the information has to be controlled, while privacy means that the individuals' information are to be treated with an appropriate level

of protection. If citizens trusted that their information is secured and protected they will begin to use the e-Government services (Bellare et al., 2000; Kaur, 2006).

E-Government requirements are challenging. Citizens expect to have a proper service everywhere and every time they use the e-Government services. This means that there are so many stockholders involved in this process in different places with different purposes. Moreover, the E-Gov services depend mainly on the existence of an internet connection so this is also another issue that has to be considered on a wide scale along with increasing the efficiency (Lee, Tan, and Trimi 2005). According to Bellare et al, (2000) other society challenges could be the unfamiliarity of citizens with the technological advances, or the lack of access, training and skills to use the e-services.

2.3 e- Government in Iraq

The political unrest in 2011 in the Middle East is a testament to how far citizens may go to demand accountability from their governments. An example of a developing country is Iraq, where the majority of citizen services are provided by government offices with the same office hours as educational institutions and private companies. If for any citizens to finish their paper work, they have to be excused from their work and sometimes they have to spend a very long time in queues waiting to finish their work. E-Government promises to eliminate diminished productivity, frustration, and wasted effort, time, and money. With several clicks, citizens can perform their tasks whenever and wherever they want at their convenience 24 hours a day, 365 days a year. Therefore, in this unique Iraqi culture, e-Government is a necessity, not a luxury (Bellare et al., 2000). Furthermore, given that most of the Iraqi population has little experience with the Internet, it is more important to design citizen-centered web sites that promote higher acceptance and create more positive attitudes toward e-Government.

As it was mentioned by Al-Dabbagh, (2011) there are still many problems and challenges related to the e-Government success such as: Iraqi citizen's fear from personal data loses and weak confidence of citizens with e-Government, so Iraq e-Government has not achieved its objectives. To outline, People aspect has issues of political and civil instability and lack of skilled personnel. In Process aspect, the lack of a political process that suits the e-Government project goals such as centralization of ministries and other government offices. Political decision has effect the e-Government process such as, there are many of manual G2C services have not

been converted to e-Government because it need political decision. On the other hand, the infrastructure of Iraq still needs to stabilize with electricity service and internet technology as major components. Besides that, Iraq suffers from poor in resources management and corruption which slows the project progress and the dissatisfaction of the project staff.

There are huge advantages in using e-Government services in Iraq. These benefits could be reflected in Government agencies as huge amount of communication and associated costs between the government's agencies are saved, also a general improve in services provided to individuals, including citizens, businesses and other government organizations. On the individual side, the time factor is very important as people are more concerned with "how long" rather than "how good", so the savings in time are a major advantage. Another benefit is the existence of electronic search engines to ease the find information. Moreover it could play a major role for Iraq in proceeding to be an International Trade organization as e-services are a vital issue in it. It also contributes to increasing the government transparency.

2.4 e-Government in Jordan

Jordanian Government launched the Electronic Government initiative in 2003, generally known as e-Government, to reinvent it to lead the country into the Information Age. E-Government seeks to improve the expediency, openness, and quality of interactions with the public and businesses at large. Concurrently, it will enhance information flow and processes within the government, enhance the speed and quality of policy development, and enhance coordination and enforcement. This would allow the government to be more responsive to the needs of its citizens. There are many models have described and suggested about four to six stages of e-Government evolution such as the UN model, such as, (Lee, 2008) model, and Two-Dimensional model of e-Government. All of them show the development of e-Government as an evolutionary process. According to Alkhaleefah et al, (2010) e-Government implementation in Jordanian based on international best practices, from the western countries such as the UK and US that have been implementing e-Government project successfully. Jordan developed a model called the e-Government Maturity Model which is based on the UK e-Government Maturity Model. The e-Government Maturity Model shows the development of e-Government in Jordan as an evolutionary process.

In this research the Jordanian initiative for the Information Age is introduced. The main applications are:

- a) Electronic Government
- b) Multipurpose Card
- c) Smart School
- d) Tele health and Telemedicine
- e) Research and Development Clusters
- f) Electronic Business
- g) Technopreneur Development

According to Alkhaleefah et al., (2010) Jordan has become the first country in the Middle East to have a multipurpose smart card such as, magnetic card that facilitates transactions with government agencies and private organizations. Many features are contained in this new card such as the owner's identity code, electronic signature in a plastic card with an embedded microprocessor chip. The national identification document and driving license are combined into one card that serves as a key to managing access to many other services. To simplify the exit and re-entry of border check points, instant passport information are also imbedded on the card.

Thus, e-Government initiatives have led to a new mode of governance replacing the traditional conventional paperwork at offices and counters by new methods. Provisions for online services have been particularly convenient, as the citizens are not required to make transactions over the service counter of the agency; it is easy now to make such transactions online, multimedia kiosks and other channels. The integration of services offered many multiple agencies means that the customers are no longer required to visit each and every agency to access services; one single agency can provide all these services in a more convenient and hassle-free manner. Therefore, the members of the public are now getting better services that are often streamlined and integrated with other services offered by government and private agencies. As elaborated earlier, under the e-Services system, the clients of several public and private agencies are able to access multiple services at one point. Moreover, the availability of services 24 hours a day and 7 days a week means that services are available without any loss of time. In some case, long queue at service counters have now become a matter of the past. Even those

members of the public not electronically connected at home may conduct the business with government agencies by using community based centers/kiosks. While the customers and businesses enjoy the convenience and ease of accessing multiple services at one point, such networking of services has relieved the departments and agencies of excessive workload. They can now focus on control and data integrity while leaving the onerous job of direct delivery of services to a network of providers.

To achieve and construct the e-Government project governments must make serious efforts in this argument, the Jordan government overcomes all challenges and at the same time enhancing the strengths points, Odat and Khazaaleh, (2012) indicated that more than half of Jordanian approximately doesn't know what e-Government system is, and the most of them fear from dealing with e-Government system. Also, this study indicates that there are 22.3% of Jordanians claim the lack of security of their information at e-Government system. Besides to 20.6% of them claim the fear of paying for services and 19% of them claim the lack of confidentiality.

However, e-Government projects are long-term endeavors, needing large capital casting in software, hardware, infrastructure and training. For the sake of project sustainability, financing plan should not only pay for the immediate needs to jumpstart e-Government, but also must consider long-term financing options (Kaur, 2006).

2.5 Technical Issues of e-Government Platforms

2.5.1. User Interface

According to (Baxley, 2003) the term of GUI covers all aspects of interaction between the user and the system. Each system must have good interface that enables user to interact with the system particularly learning system such as e-Government web based systems. The system developer has to draw a plan of interaction the system via User Interface. So, the developer must be careful when he distribute buttons, textboxes, labels, etc. Also, the developers are responsible for coordinating the colors of forms and backgrounds.

Some developers may focus on programming or security more than focusing on interfacing aspect. So, bad interface may cause problems in interaction with the system. When the user is not comfort with system interface, the user will behave wrongly with the system that

will prevent user from arriving to the desired goal of accessing the system and will give bad impression to the user. Bad content management in the website may cause several difficulties to the user. To build good and strong websites in all aspects either in designing or security the programmers use “Three Tier Technique”: User Interface, Security Tier and Intermediate Tier. However, User Interface is considered as one of most important part of website designing procedure.

2.5.2. Integrity

The term of integrity in information technology refers to maintaining and assuring the accuracy and consistency of data over its entire life-cycle. Also, integrity is necessary property for databases and data storages. According to Boag, (2010) Integrity of data means that the data in database is reliable and accurate. On other hand, data warehousing and business intelligence control the accuracy of data in the databases and in warehouses. In our system, data warehousing and intelligence control data validity and accuracy in the system database. Data that has integrity is identically maintained during any operation, such as transfer, storage or retrieval.

However, all data features such as: business rules, rules for how pieces of data related, dates, definitions and lineage must be correct for its data integrity to be complete. When executing functions on the data, the functions must ensure integrity. For examples: transferring the data, storing history and storing metadata.

2.5.3 Content Management System

E-Government website is big and multifunctional website which contains many contents because e-Government system must contain all functions of official procedures in the governmental departments. According to (Browning & Lowndes, 2001) each group of functions is located under main title which expresses the role of the group. The groups of contents are managed in a way that expresses about the functions of the group. Many websites and systems use content management system but they employ it in inappropriate way which will cause problems for the users when they use these systems. Most of e-Government contents are functional contents which execute services and functions. Not all citizens are experts with websites particularly electronic payment using the website. For this reason it has to take into account the how the citizen will behave when using the e-Government system.

Content Management System may need to graphical designers in order to build good interface with suitable colors and styles. In this stage it is necessary to share designers with this system to design the website template particularly designing the contents of the pages (content management system) (Chin, 2008).

2.6 Previous Studies

(Lee et al., (2005) noticed that the majority of publications on e-Government system is based on surveys and case studies. Also, Hornung et al., (2007) concluded from his research that the papers can be categorized in 4 different categories. The first one is design methods where papers in this category treat aspects and problems that arise during different stages of the process of interaction design. The second one is evaluation methods as papers in this category propose new or show the application of existing user interface evaluation methods. The third category is about Human Computer Interaction (HCI) practice where the papers in this category present case studies that demonstrate the use of HCI methods and techniques in e-Government. Finally the last category is about Meta level where papers in this category treat problems that arise on higher levels of the aforementioned e-Government application layers, e.g. HCI related success factors of e-Government projects and initiatives. In total, Hornung et al., (2007) reviewed 29 documents where, 9 of which fall into the class “design methods”, 8 into “evaluation methods”, 5 into “HCI practice”, and 7 into “meta level”. Almost all papers in the category “HCI practice” and some papers in the category “meta” also deal with design and evaluation methods, but do have no focus on them. Almost all articles in the category “design methods” deal with participatory or at least user centered design.

In the design methods category, Dawes et al., (2004) identified the design dimensions of electronic access programs, such dimensions are related to users, uses, suppliers and content (e.g. predictability and homogeneity of users, sensitivity of content, status of metadata), dimensions related to organizational structure and context of the access program (e.g. relationship with information users and suppliers, suitability of existing technology) and analyzed the interdependencies between different dimensions. (Dawes et al., 2004) worked on personas as user models in e-Government services. Collection of statistical data by means of analyzing questionnaires, data mining and clustering, creation of personas based on clustering. Also, authors worked on the political online participation of citizens in local governance. They worked

on what methods of participatory design can be used in large scale network e-Government systems. They focused on multinational projects with high distribution (network and organization). No focus on large scale user participation. Petriceket al., (2006) focused on the inversion from user-centered design to user-designer collaboration.

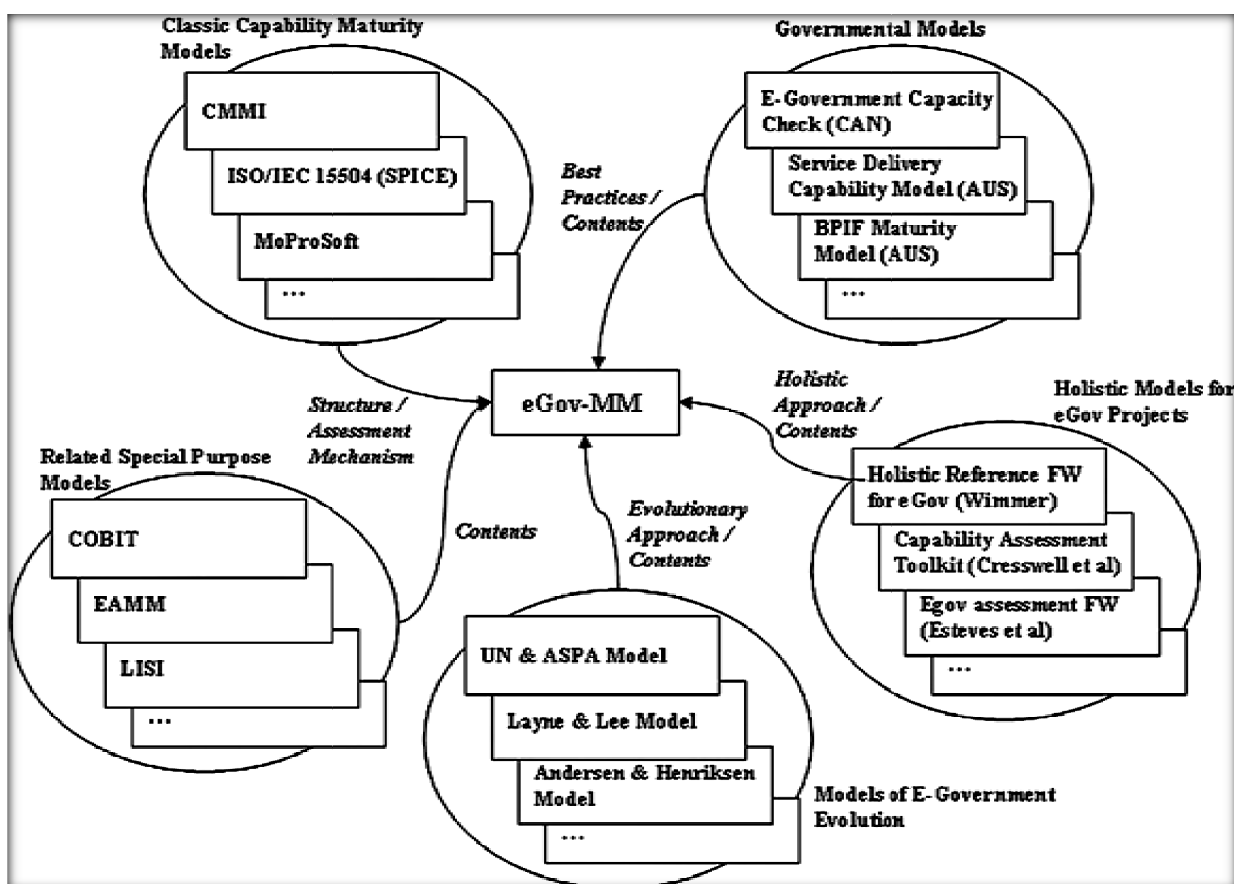
In the evaluation methods category, Prabhankaran, (2006) worked on web accessibility assessment; older adults; e-Government web sites. Siddique et al., (2005) assessed 127 Brazilian e-Government web sites and identified the special e-Government usability requirements. They also addressed how to measure accessibility more accurately. Authors conducted a comparative study of using study based vs. electronically viewing information and methods to prepare and execute a voting decision. Morshidiand Hamid F., (2010) worked on the e-Government and HCI in developing countries and the cultural identity.

As for the third category “HCI Practice”, Prabhankaranet al., (2006) worked on how to build a HCI community across organizational borders, but there was no focus on users or interaction design. Siddique et al., (2005) described the current state of HCI in South Africa, the challenges of developing countries but no direct focus on e-Government services. Morshidiand Hamid F., (2010) reported the typical HCI related problems in large systems (in this case: Austrian health insurance). Moreover, authors discussed how HCI principles can be applied in e-Government projects. They described how HCI principles and practices are applied by the U.S. Bureau of Labor Statistics.

Many researchers are concerned with design and evaluation of methods. However, as mentioned by (Morshidiand Hamid F., 2010), those evaluations often use inappropriate measures and often apply a mere “report card mentality” and thus often don't yield meaningful results. Furthermore, researches on design methods demonstrated the practical use of such methods, but always minimized the direct collaboration of real users. Although there are papers that present different methods and techniques of interaction design, the special aspects that are induced by the e-Government context and the special requirements that arise in the context of a developing country are often neglected. Only one paper (Dearden et al., 2006) particularly discusses participatory and inclusive design methods in the context of e-Government services, however, not in the context of a developing country. Some researches (Prabhankaranet al., 2006) pointed out that the simple one-to-one adoption of algorithms and best practices established in developed

countries is one of the reasons why projects fail in developing countries. Nothing was encountered in the literature about how those algorithms could be adapted to the context of e-Government projects in developing countries.

2.7 Previous Theoretical Framework-based Users' Behavior



Framework 1:

Figure 2.1: e-Government Framework (Source: Valdés et al, 2011)

The framework in figure (2.1) indicates the using of e-Government applications as it was already built, but does not tell about building process based users' experiences that supports the system.

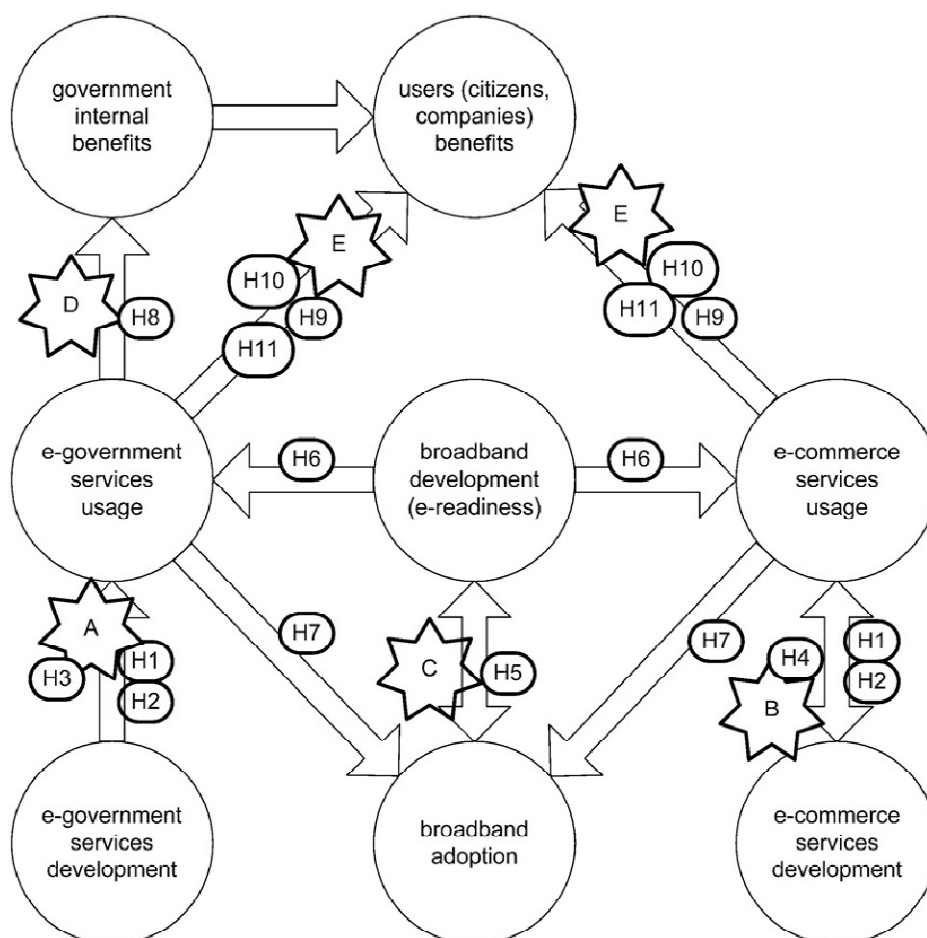
Framework 2:

Figure 2.2: e-Government System Models (Source: Trkman& Turk, 2009)

The framework in Figure (2.2) discusses the interconnection of the adoption and diffusion of broadband, e-Government ('EG') and e-commerce ('EC') services, it provides a structured literature review and proposed a conceptual framework for studying the interconnection of the development and adoption of BB, EG and EC. The interconnections of various concepts are shown along with several hypotheses that are thoroughly theoretically grounded.

Chapter Three: Proposed Model and Methodology

This chapter conations the steps of designing of e-Government system and indicates the procedure of performing the system. Also, in this chapter previous models of e-Government system are shown and weakness points of these models were indicated.

3.1 Steps of e-Government System Building

Flowcharts are built to indicate the procedure of the proposed system and indicate the steps of the system stages. Figure (3.1) shows the flowchart of the overall system performance and how the general procedure of the system sequences. As shown in figure (3.1), the policy of building the system begins from user accesses the system interface and then measure the impression of user based on user satisfaction with the system website. The steps begin with determining the problem of the research and finding out the tools and techniques of e-Government system procedure.

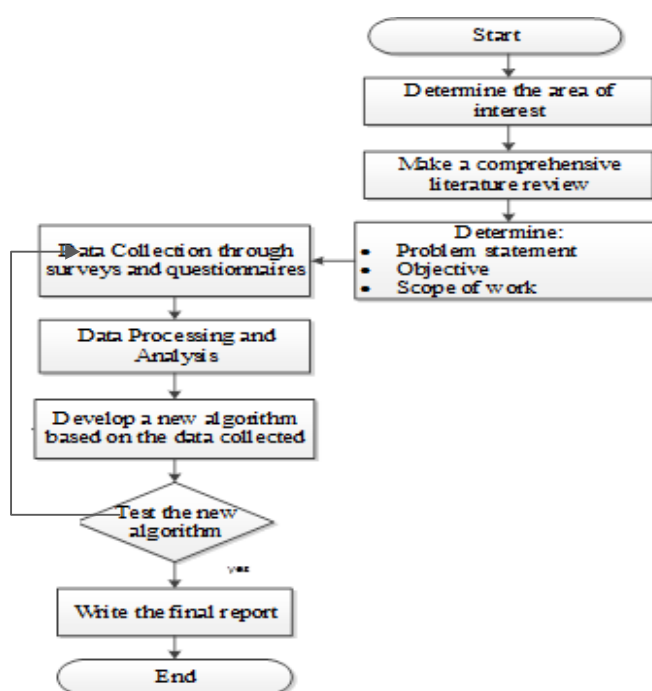


Figure 3.1: The Proposed Study Methodology

3.1.1 Research Approach

In this descriptive research, quantitative approach was used and this method included collecting data through questionnaires; this approach is chosen for its appropriate to the study.

The questionnaire is considered a relevant and easy way of collecting data especially as the sample will be Jordanian and Iraqi Citizens in general which means that it is difficult to reach such population in other ways of collecting data, which force the researcher to measure the Citizen Satisfaction through designing a questionnaire to collect the data.

The researcher used the quantitative approaches for gathering data for different reasons, as the objective of the research is to test the research questions (Kumar, 2005). Moreover, this approach used when the objective of the research is to describe a phenomena and the researcher seeks to know the satisfaction of Iraqi and Jordanian citizens regarding the e-Government system. Also, the quantitative approach quantifies the relations between any study variables, so it helps the researcher to reach the fact by gathering numbers then used the statistical process to determine the results between these variables, then follow the data gathering with analysis through SPSS Software. The final stage is to represent the result through relevant tables. Furthermore, quantitative approach supports the researcher to generate a conclusion and statistical analysis through flexibility in repeating data collection to verify and validate the model build by researcher (Amaratunda et al., 2002).

3.1.2 Data Collection Method

After determining the scope of work and the objective of the study, the first step is collecting the data that can give a clear indication about the level of satisfaction of Iraqi e-Government system. Also, collecting data about the current state of the Jordanian e-Government applications and analyzing the main quantitative data from the stand point of the citizens.

The researcher relied on Quantitative approach of collecting data through preparing a comprehensive questionnaire with reliable measures that were validated for this application; it has taken into consideration Computer Technical issues that could have an effect in the citizens' usage, and satisfaction of the system. This questionnaire was prepared after examining the existing system and studying the detailed services that provide and the place that implemented at. It concerned the technical data that helped the researcher in the development stage. In this research two source of collecting data were used: Questionnaire as primary source and Previous Studies, Articles, and disk research as secondary source, where in disk research the researcher compares between Jordanian e-Government system website and Iraqi e-Government system website features to support research results and data collection.

3.1.3 Targeted Segment

The study targeted the citizens of Jordan and Iraq countries. Where, the study concluded the citizens from all the categories (different educational background, ages geographical region and from both gender) to have comprehensive vision into the real citizen's behavior. A multi-stage random sampling technique was adopted to conduct the study. At first stage, the total number of citizens will be classified according to the sector they belong (public and private sectors). Then they were classified in terms of the category they belong (male, female, educated, uneducated, urban population, and rural population). Next the sample put into three strata— large, medium, and small. The criteria for selecting the stratum were the applications of granted access from the government and users behavior towards implementing their public and official services. Therefore, a proportionate random sampling procedure ultimately utilized to locate the respondents for enumerations, representative random sample was chosen for both Jordanian and Iraq citizen 500 from Iraq citizens and 500 from Jordanian citizens; assure response of 450 for both samples, According to (Krejcie, and Morgan, 1970) role which indicated the minimum size of sample for large population to (384).

3.1.4 Data Processing and Analysis

After collecting the data, the researcher used special programs to deal with it and to classify it according to the different factors. In this aspect (IBM SPSS Statistics 20) program was used for the analysis objectives. These data was analyzed to come up with clear indicators for the citizens' behavior, and which factors the researcher has to concern in. On the other hand, the researcher learned from the Jordanian experience and had a good knowledge in their built methodology for achieving this level of performance for the Iraqi case. The used Tests were Cronbach alpha ($\alpha=0.05$), Descriptive Statistics (Mean and Standard deviation), Frequency, and Correlation Matrix.

3.1.5 Research Validity

Validity is the degree or the extent to which a testing instrument can assess what the researcher is really trying to assess (Sekaran, 2003). In other words, it is necessary to demonstrate the validity of the instruments used for collecting data, which are represented by questionnaires. The first English version of the questionnaire and was sent to my university academic instructors, who proof-read it. The comments received from my instructors and

supervisors led to a number of changes in the questionnaire, as well as expanding the imagination regarding overall enhancements for it. As a result, some items were eliminated or added to construct the final copies of the instruments.

3.1.6 Research Reliability

According to Sekarane, (2003), reliability refers to the degree to which the dimension is free of accidental errors and offers consistent data. This study will use Cronbach's alpha to test the consistency of the results produced by the scale. According to Sekaran (2003), the values of Cronbach's Alpha for each variable of the questionnaire and the entire questionnaire should exceed 0.60 in order to consider the result acceptable. The higher the value of Cronbach's Alpha, the greater the consistency of the instrument and the more trustworthy it is data. The reliability of the data collected through the questionnaire was calculated using SPSS program, and the value of Cronbach's Alpha was 0.82, for Iraqi Case and 0.85 for Jordanian Case which considered being a very good result. This reflects the trustworthiness of the research instrument's data and its high consistency level, where both values are over the acceptable level 0.70 according to (Hair et al, 1998), or 0.60 According to Sekarane (2003).Table (3.1) shows Cronbach alpha values for all the variables.

Table 3.1:Cronbach alpha measure for Iraqi sample

Variables	Cronbach Alpha ($\alpha=0.05$)
User Interface	.75
Security and privacy	.80
Provided Service	.69
Overall performance	.83
Entire Questionnaire Reliability	.82

From Table 3.1 and Table 3.2,conclude that the consistency of the used tool for both samples Iraqi and Jordan was above acceptable level. Therefore, the overall reliability was very good, it's worth to mention that as much the reliability increase as much the tool considered consistence.

Table 3.2: Cronbach alpha measure for Jordanian sample

Variables	Cronbach Alpha
User Interface	.85
Security and privacy	.79
Provided Service	.81
Overall performance	.86
Entire Questionnaire Reliability	.85

3.2 The Proposed Enhancement Process of Previous Models

The following models are proposed by researcher for e-Government systems. Moreover, these models have some weaknesses in different areas as well as they do not support specific services of the system which does not for example reduce the wasted time in execution. Furthermore, these models are most familiar in many previous academic researches.

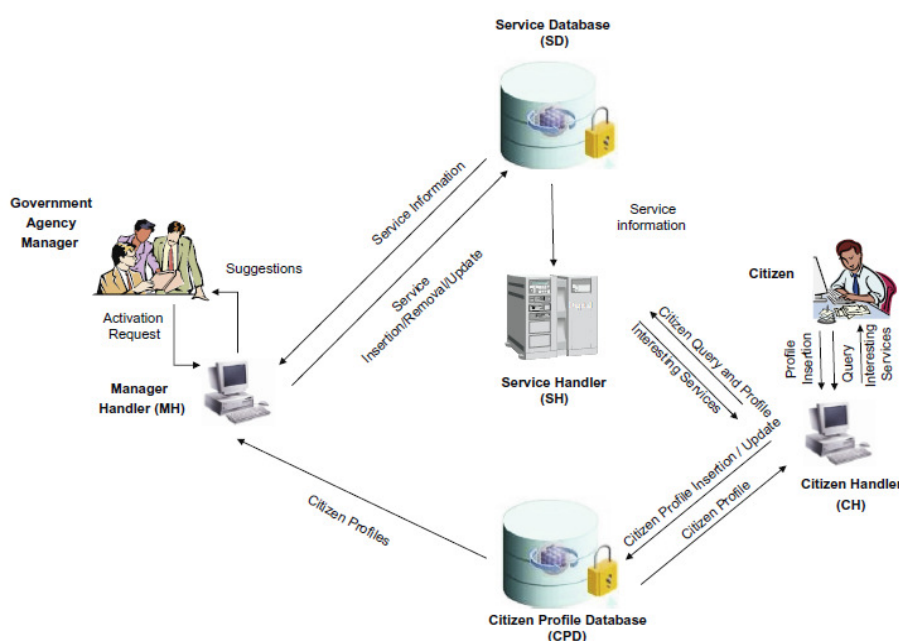
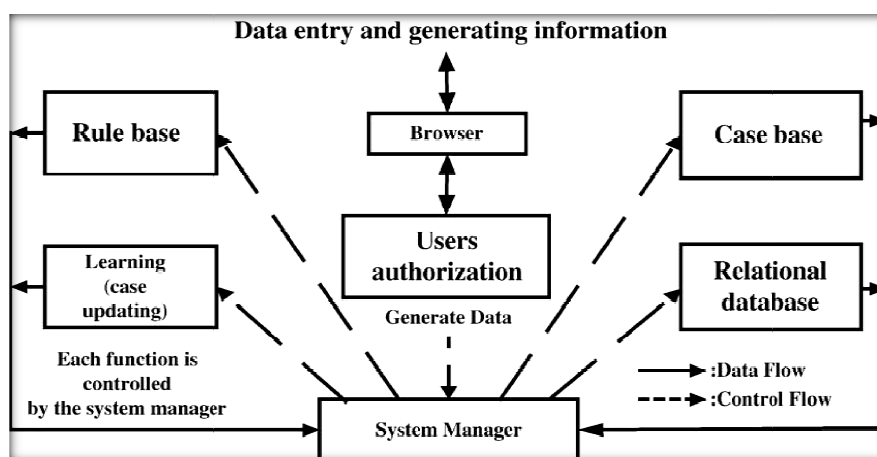


Figure 3.2: The Proposed e-Government Model (Source: Meo et al, 2008)

The model in figure (3.2) supports the governmental services but it did not explain the nature of these services and how citizens can apply their requests. Moreover, this model did not indicate the payment operation using special services that connect the system with the banks in

the country. However, the researcher can enhance this model by supporting payment system and associate this service with the database system. Also, it is possible to make credit card for each registered citizen to save the personal data and also support the financial operations via the e-Governmental system, as well as the enhancement process could go further to other operations than the financial, which will be revealed during the coming researches.



Figure

3.3: The

First Proposed e-Government model (Governo et al, 2004)

Generally, the model in figure (3.3) did not indicate the types of services that represented to the users or the citizens. However, this model also did not indicate the payment operations that should be cleared in the e-Government system. So, the researcher has to enhance this model by customizing specific features associated with governmental services. These services must be distributed according to the citizens' requirements (Governo et al, 2004). Also, the enhancement will be operated on system manager by increasing system manager roles to support governmental services.

In this model-based flowchart in figure (3.4), there is an obvious weakness in the way of executing sequence, and in handling with database of the system. On the other hand, this flowchart does not support security system of the user accounts, i.e. it does not indicate how the system will deal with accounts of users. This model is brief and it is not strong to describe usable e-Government system.

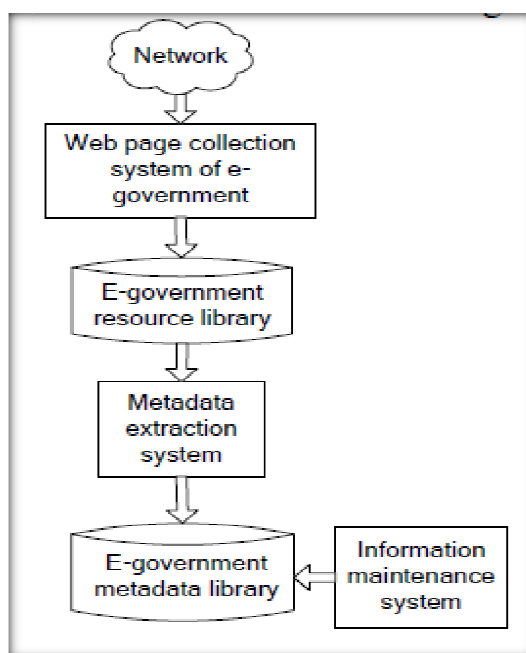


Figure 3.4: Flowchart of

e-Government Source:

(Liu & Hu, 2012)

So, it is possible to enhance this model by building strong database that contains all data about citizens, operations, services and financial operations. Enhancement must be in “collection of web pages” by adding new details about web services of e-Government system and supply it with electronic financial system in order to enable citizen to make payment operation in secret way. On the other hand, the researcher did not find previous models regarding the analysis and design stages which have taken into considerations their behaviors and so on, therefore, the researcher will also add more valuable enhancement regarding this issue as well.

3.2.1 Previous Conceptual Models

There are different, previous, models that described the e-Government system and life-cycle; our research is based on most two well-known models, as shown in the following figures:

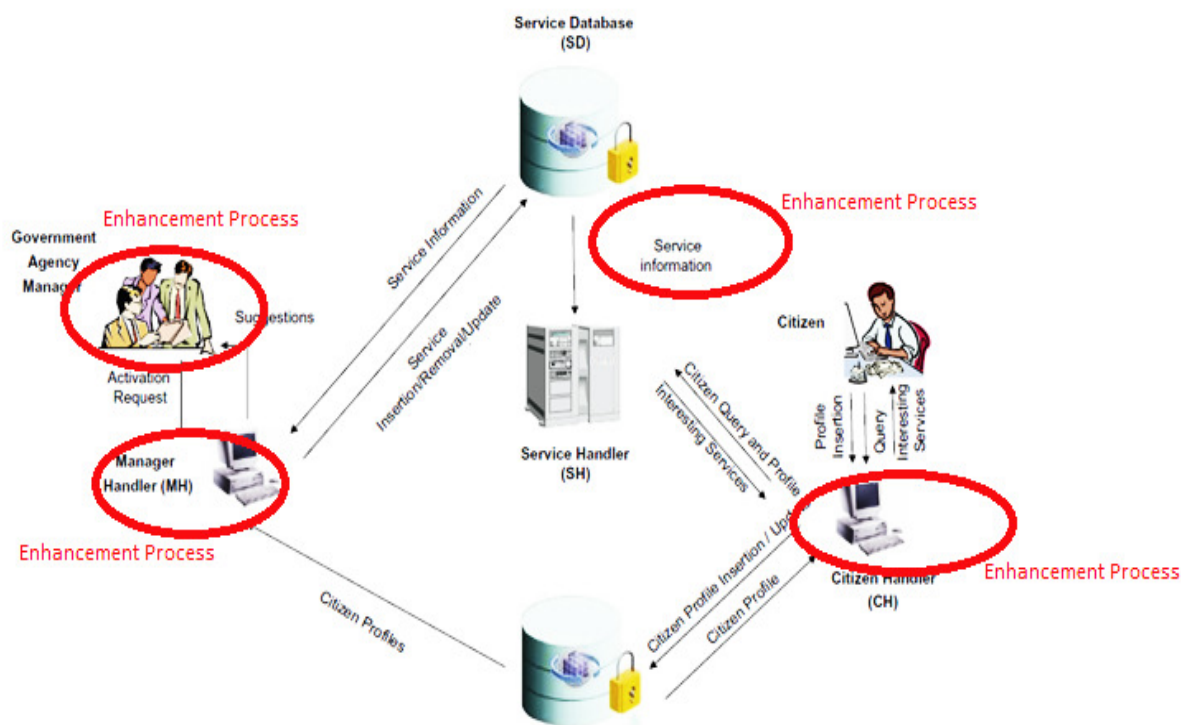
Model 1:

Figure 3.5: Architecture of the e-Government System (Source: Meo et al, 2008)

In this model, the system is not fast enough (it is slow system) because the procedure is not effective enough where distribution of elements is not suitable according to their roles. Firstly, it is not suitable to put this “government agency manager” actor in the system model because the discussion is about electronic system while this actor is not really in this electronic life-cycle. However, “Citizen Handler” may slow down the system because the system must be smart enough to check the reliability of the citizen profile data and if these data are real or not through special queries based on artificial intelligence (AI) which makes the system fast in a good level of performance.

On the other hand, the system model must include registration procedure and governed by authentication processes. Moreover, to get fast and accurate response from the system, registration procedures must be connected directly with system database because processing on the database consumes more time than other services. Moreover, other part of services (such as:

e-payment, official documents, requesting official services, etc) must be isolated from others while these services appear in the main page through hyperlinks, where each link opens in a distributed page. However, citizen cannot use the services unless he/she have registered in the system database. Additionally, this model does not indicate the financial services when citizen have to make payment operation online.

Model 2:

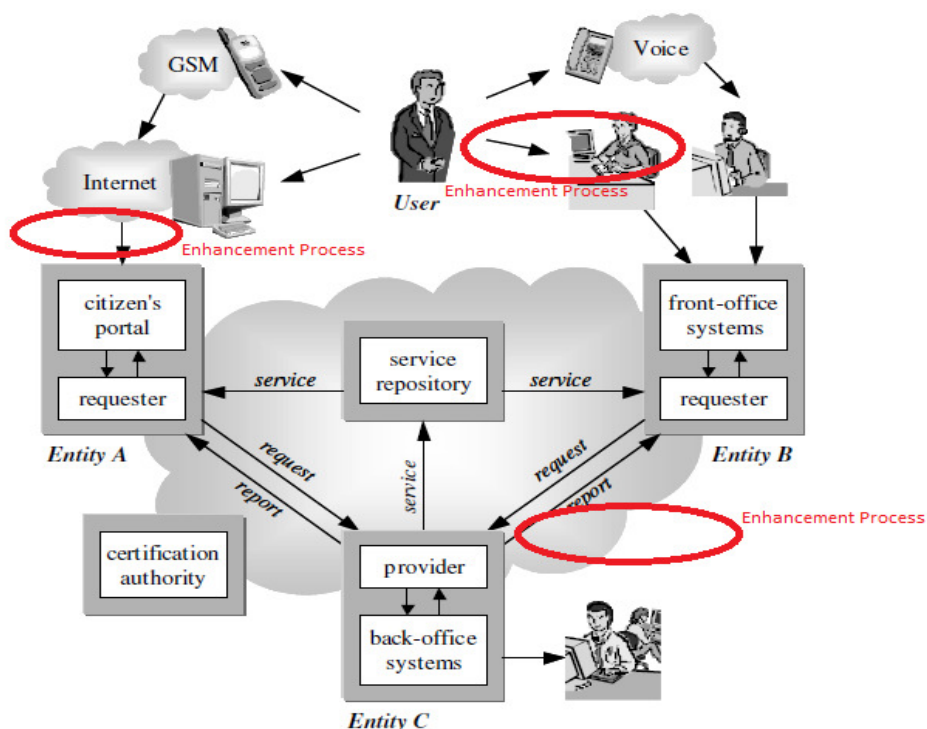


Figure 3.6: e-Government System (Source: Dias & Rafael, 2007)

The model in figure (3.6), is more comprehensive system than the first model, where citizen may use GSM (Global System of Mobile) module (mobile system), PC (Personal Computer) and may use voice call. But it is not suitable to consider office visiting in e-Government system; as shown in the model “user” can visit employee in the office which is called routine procedure. So, it is weak point in the model and it must be avoided. On the other hand, the model does not indicate the registration procedure where the user can enter the profile data and this entity must be connected directly with system database.

Moreover, this model does not provide the database entity which is considered as important element in the e-Government system. Also, the model does not indicate system administrator that have all permissions on the system. As well as the administrator element may be more than one person, it may be also a group of developers who are responsible for developing the system along the time. There is another risk point, the model does not explain that there is response from the system to the user or feedback process that assure user about the requested services and the system approved the processes.

3.2.2 My Research Method Based-Conceptual Model

The following model was built in the way to avoid the weaknesses in the previous models. The e-Government model includes all the system elements and actors that control the overall system procedure. In addition, administrator has all permissions in the system where he/she controls on the available services of the system and also control with accounts of the citizens. Additionally, most of processes in the system must be connected directly with the system DB.

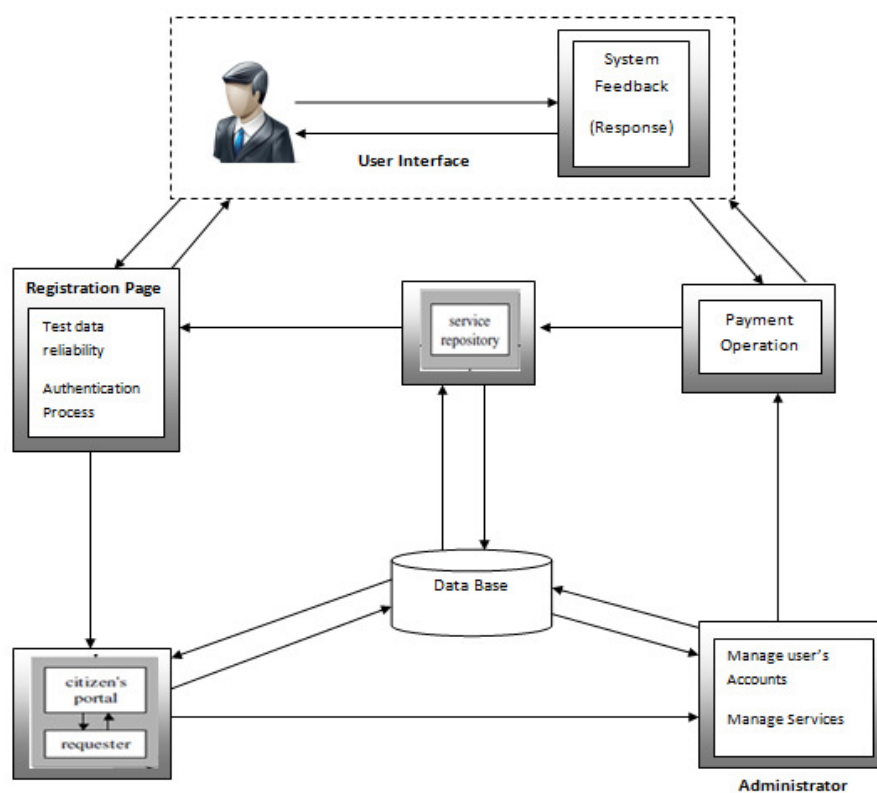


Figure 3.7: The New Proposed Conceptual Model of e-Government System

However, our proposed conceptual model will support “system feedback process” which is not existed in the previous models and all weakness that have not taken into considerations in the previous researches. These processes are automatic service that indicates to the user where the requested processes have been executed or not. There are many ways that the system can send this feedback either by internet connection (user PC receives the feedback) or by mobile messages as well.

3.2.3 Develop and Test the New Model

As mentioned before, the questionnaire will concentrate on the technical features that really play a major role in the customer satisfaction. This will give the opportunity to the citizens to be involved on the improvement process. So the new model will be based mainly on the citizens’ satisfaction, and help in remove any obstacle that forms a real problem or that prevent and impede the citizens from using the e-Government services. In the other hand this new model will take into consideration the Jordanian experience as a benchmark in the improvement process. The new system has to be inspected and tested in different ways to assure that it really reflects and directly aligned with the objectives. Testing new system enables users to request official services and other services secretly and easily. Also, the new system is expected to be usable and secure in order to comfort the users.

Citizens are comfortable when they access the e-Government system. This case will be achieved by building the system in smart way. However, the system developers are responsible for building Framework with all necessary contents, and they have to divide the pages according to the services i.e. each division must contain similar services under specific titles refer to the objective of the Framework of e-Government system. On other hand, security is considered as critical factor which is important for users because they are interested with security on their personal data. So, e-Government system must provide big and secured database to serve customers in safe way.

E-Government system usually faces huge attention from many customers, and it may seem the virtual system of government which can serve very huge of people at the same time. To achieve good performance, the e-Government should support services that are important for people and their corresponding must be fast and accurate in order to get customer loyalty. The

following flowchart indicates the stages when user accesses the e-Government system, and it depends on user behavior and user impression about the system services.

After citizen enters to e-Government system, citizen accesses the Interface of system which is called Graphical User Interface GUI. Citizen already will interact with the interface, if the citizen comforts with the interface (which includes background colors, font size, contents management and menus distribution), citizen will determine the services of system.

As shown in the flowchart in figure (3.8), e-Government should support services that fulfill the citizen requirements and needs. The system must distribute citizen services according to their title, i.e. the systems developers must organize page services in a smart and friendly way by arranging groups of services under a title indicates the content. On the other hand, when a citizen decides to create account in the system, it is necessary the database to be robust and secret in order to assure security environment when a citizen uses the e-Government system.

To achieve success of the model, citizens answer the questionnaire about their impression about the design and services of the e-Government system. The questionnaire focuses on asking the citizens about the system services and interface. Transmission from each stage of model to next one depends on the result of the questionnaire that indicates citizen satisfaction about using each content and service of the e-Government system.

Questionnaire results should give percent about citizen impression about each fact of e-Government system. So, successful of the model depends on the percent of the questionnaire results. Citizen behavior on the system affected by the usability of the system facts, which depend on organization of the system pages. This will result that the e-Government system model depends on the citizen behavior towards the system. However, the developers have to consider the results of questionnaire in order to conclude how to design and build the system. Besides that, the developers must establish online questionnaire on e-Government system pages. This process will improve the performance of the system by sharing the citizens in development process.

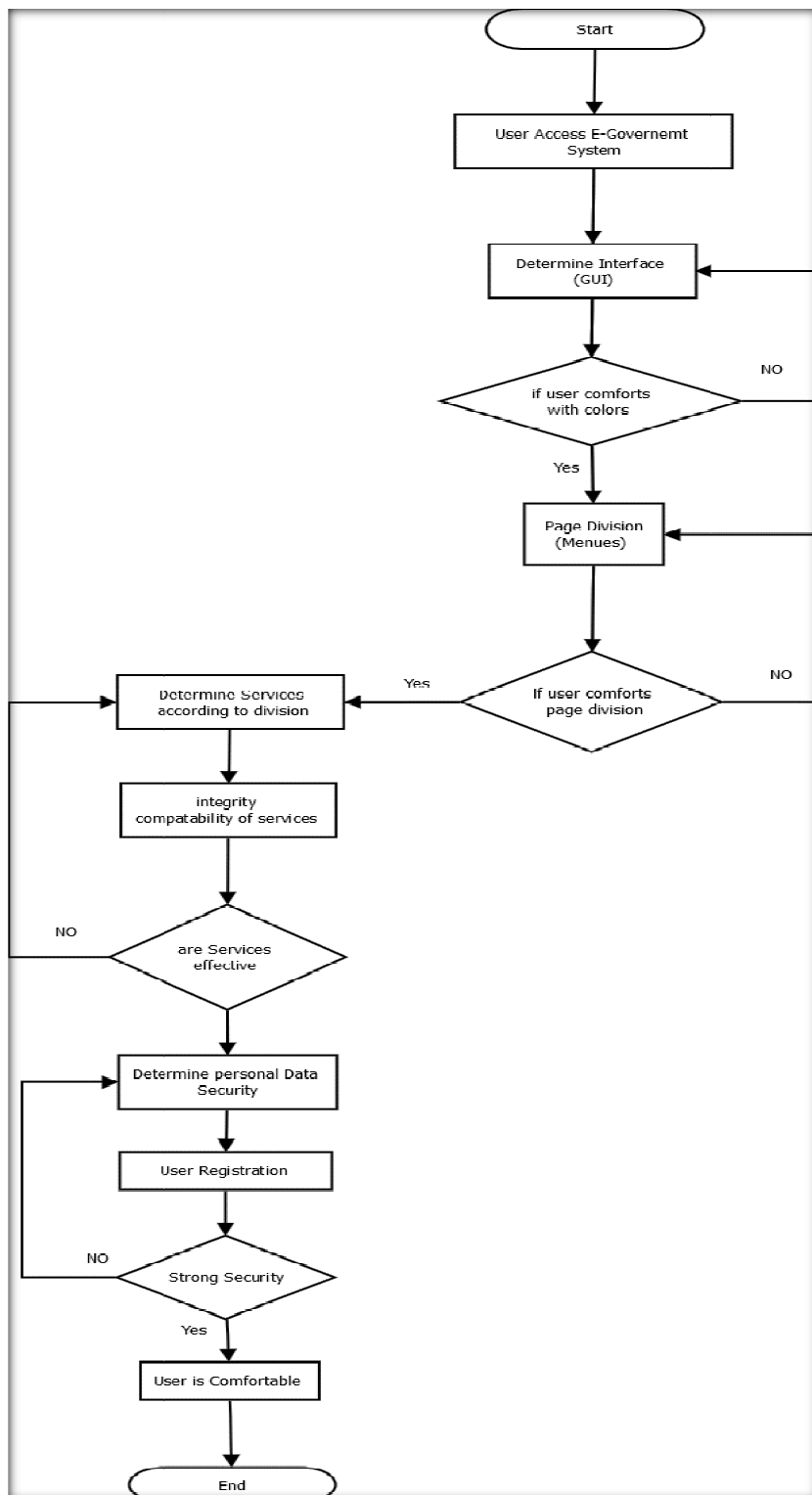


Figure 3.8: Citizen Behavior towards using e-Government System

Citizen is main element in e-Government system, and it is important to satisfy citizen about data security in the system. So, system database must be strong and secret to store the personal data of users such as, profile data and their arguments details. It is suitable if developers build the system database on special server with strong properties to make queries fast and accurate via the system. Registration process is related to the database directly, and it is necessary to simple the registration steps such as focusing on the main required data.

Furthermore, developers are responsible for building the e-Government system according to Three-Tire method which can isolate each part of the system from others. This way can increase the security over the system because this way enables developer and programmer to build each part alone and then connect the three parts together in secret way which makes the system strong and it is difficult to be hacked from anyone. Besides that, any risk happens on the system will not affect all the system contents, but it may affect one part only because three-tire method isolate the system parts in individual parts.

Algorithm-based Model (Pseudo code)

Input → User Access e-Government system

Output → evaluation of e-Government system

Iterate:

If the pages of current system divided in unsuitable way

 Update division of pages

Check services on the system

If services do not achieve users requirements

 Update services

Check integrity and compatibility

If services are not effective

 Update performance of services

Check dealing with personal data

If there is no privacy on personal data

 Update functions

Check usability of system

If there are difficulties in using system

 Establish system manual

End

The Time Complexity of Algorithm-based Model

The previous model-based algorithm has three loops and five statements; hence, the time complexity will be as following:

$$\begin{aligned} T(n) &= n + n + n(n + 1) + n(n + 1) + n(n + 1) \\ &= 2n + n^2 + n + n^2 + n + n^2 + n \\ &= 5n + 3n^2 \end{aligned}$$

The complexity is $O(n^2)$

3.3 System Requirements

The system requirements consist of software and some configurations with certain methods and strategies that help us to perform the desired goals of the system.

3.3.1 SQL Server 2008

SQL server is a version of Microsoft SQL server which is considered as primary function to store and retrieve data by the software application (McGehee, 2009). However, e-Government database is stored in SQL server. Many frameworks support SQL server within them like Visual Studio. To retrieve and send data from/to SQL server researcher have to use SQL statements that connect the applications with system database. SQL server 2008 is usable by many developers in modern systems and e-Government system is considered as one of big systems so it is suitable to use SQL server 2008 in our proposed system.

SQL server has been used, which is depended in 2008, in our system in order to store all elements data of the system. These data includes Citizens, Civil servants, Bank accounts and official documents. This version of SQL server is suitable for our system because of its features and properties which are mentioned in the following (Coles, 2009):

1. Ability to audit SQL at server, database and table levels.
2. Ability to deal with spatial data types which are non-relational data types for mapping GPS style applications.
3. Able to track changes without timestamp columns and triggers.
4. Including better reliability and performance with automatic data page repair.

5. The ability to encrypt an entire database without having to change any code in the application adding an additional layer to the data security.

There are more features for SQL Server 2008 is mentioned by (Coles, 2009). On the other hand, SQL server 2008 makes the data security more strong and there will be no data loss or hacking on the system. Using SQL commands aims to retrieve data from/to SQL server so it is important using SQL appropriate statement in the programming code.

3.3.2 Web Server

The web server either software or hardware aims to host websites. Web server like other servers is considered as a high capacity to store data but web server stores data and websites mainly. As it was mentioned by According to Cavanaugh, (2006) using web server reflects many benefits that reflected to the using of e-Government website either by developers, end users or employees. Besides that, the e-Government website will behave more like the live one and the developers can configure directory security. Also, the developers can use server side languages such as PHP language. Using web server enables the developers to standardize the coding on the data.

3.3.3 Programming Language

E-Government system is web based system that runs at server side. Iraqi e-Government website is designed using Java Server Pages (.JSP) which is considered as similar to PHP language. However, this website programmed using JavaScript language which depends on Java commands. To select specific programming language it is necessary to understand its advantages over other languages. So, a comparison between PHP and ASP will take place.net languages. Asp.net is Microsoft technology while PHP is open source technology and PHP also is considered as cheaper than ASP.net. Besides that most developers prefer ASP.net language since it support security methods in programming code and it is better running at server side. However, code behind is better to be Visual Basic.net language. Already programming by asp.net allow programmer to use multi language: asp.net commands and visual basic.net code in code behind pages. On the other hand, PHP can be run via any other operating system like: LINUX so it is considered as open source language while ASP.net can be developed using only Microsoft windows. However, PHP language can be considered as programming language of e-Government system because of its advantages: faster in running than other language, can be

developed using many operating systems like Windows and Linux and also it support CMS (content management system) in easy ways (Lindridge, 2002).

3.3.4 Search Algorithms

There are many methods were used in the search algorithms, which are summarized as the following:

- **Lexical method**

Matching must be obtained between consumer requirement (query concepts) and our system service concepts. The similarity measurements used in the system matching are lexical similarity; and it is performed using synset, defined in WordNet (om1). Included Synonym (the same meaning), Polysemy (different meaning).

1. User entered keywords of requirement to query about specific service through specific user interface available in search page.
2. These keywords filtered by remove words such as 'a', 'the', 'of', 'in', etc. to convert requirement to concepts.
3. The remained concepts matched with its Synonym and Polysemy concepts by consult WordNet service, if two concepts have the same meaning or concept has multiple meanings, the related concepts are match and transform to our system.
4. The similarly concepts are match by consult our system inter-concept class, and calculate the various types amount of information collection in the system and get the similarity results.
5. The similarity concepts stores in a repository for future matching and present the result to user.

Lexical similarity depends on building lexical dictionary which includes all concepts of services in the system. Search begins with take each word in the text and then comparing the word with all words in the dictionary. The following pseudo code indicates the lexical similarity method.

Input: search text

Variable: W word

Output: list array of words

Read input text

$W \leftarrow$ gets word from text

Intarr[] as array

Foreach w to end of text

If read character is “**NULL**” “which is space” or special character”*/?> etc”

Then

Consider it is the end of the word

Else continue

End For

Note: the pseudo code is derived from previous algorithms that used lexical method.

- **Comparison between words**

After making split operation on the text each word is stored in specific location in special array, and each element in array will be processed individually. System takes each element in the array and compares it with system lexicon by compare words with dictionaries according to the type of word: verb, adverb, noun, etc. However, dictionaries are created manually and filled with entries of the famous word that are repeated by the users on Twitter site. Unfortunately, relatively little attention has been paid to how well these derived SO values perform in text classification tasks. One exception was according to Turney, (2002) who not only attempts to classify full texts, but eschews a unigram (single word) approach in favor of two-word bigrams, extracted according to their part of speech (i.e., adjective/noun pairs, adverb/verb pairs, etc.). The SO values of these bigrams are derived by calculating their Point wise Mutual Information (PMI), which is defined as follows (Church and Hanks, 1989):

$$PMI(word1, word2) = \log_2(p(word1 \& word2) / p(word1) p(word2))$$

That is, the PMI of two words is equal to the base-2 log of the probability of the two words appearing together, divided by the product of the independent probabilities of the words; as such, the PMI of two words that appear independently of one another would be close to zero (since $p(\text{word1} \ \& \ \text{word2}) = p(\text{word1}) \ p(\text{word2})$). In order to calculate the SO value of a phrase, Turney, (2002) uses the PMI of the phrase and two seed words of opposing polarity (“excellent”, and “poor”), with internet hit counts (using the AltaVista search engine and its NEAR operator, which searches for collections of words in close proximity) standing in for the probabilities in (1): (9) $SO(\text{phrase}) = PMI(\text{phrase}, \text{“excellent”}) - PMI(\text{phrase}, \text{“poor”})$. Essentially, if a word tends to appear more often with the word “excellent” than the word “poor”, it is probably positive and will, according to the above formula, have a positive SO. Once the SO for each of the extracted phrases in the text has been calculated using the results of internet queries, the average document SO can be calculated.

3.4 Building System Pages Using Three-Tire Technique

This technique is used by developers to strength the security over the database and over application. This method depends on dividing building the website into three parts: database tire, application tire and intermediate tire. Database tire is considered as main part in the system which contains all data of the system (Ageno et al, 2007). On other hand, application tire is the interface of client or normal user and this tire is important because it enables user to access the website. The connection between database and application tire is done via intermediate tire that allows transmitting data from/to database from/to application tire and vice versa. Using three-tire allows the programmer to program each part individually from the other parts. This strategy save the website from many risks in such damaging in any part will not affect the other parts. Using three-tire method in e-Government website is necessary to save very huge of data on this system from any hacking that may cause data loss. However, three-tire method is used in many websites particularly big websites like our system (e-Government system).

3.5 Research Methodology

Research method contained two main parts: Questionnaire and the proposed e-Government model.

3.5.1 Questionnaire for the proposed model

Through questionnaire results, a comparison between Jordan and Iraq case in terms of satisfaction on e-Government system's models features will take a place. A questionnaire has been designed in order to measure the adopted aspects of e-Government system evaluation, these aspects mainly revolves around for user interface, privacy and data protection, services side, and overall performance side, where data have been gathered and analyzed, and the outcomes will be described in comparative manner to investigate the efficiency of e-Government from various angles in both of Jordan and Iraq. Such issue could open the doors towards more upgrading and developments in the e-Government system in Iraq, because taking a comparative study approach facilitate the diagnosis of weakness areas, limitations, and imperfections processes, and make it easy to catch up modern and contemporary systems, thus, this step will be addressed afterward, to find out the extent of potentials improvements within e-Government system in Iraq, with regard to Jordanian e-Government system as ideal case for them, so that could be expanded to include more strengths and successful functioning.

3.5.2 Results of the Questionnaire:

In this section a review of research results and used tests will be listed in order to show the research strong statistical entrance, therefore this section will explore the following test and analysis of results:

1. Frequency analysis to presents participants demographic and characteristics percent's.
2. Descriptive analysis to presents the mean and standard deviation for all the Variables and its statements, where it's give indication about sample agreements regarding statements of the questionnaire, and agreement regarding general variables.
3. Frequency of all hypothesis and statements of the four variables used to measure satisfaction regarding the e-Government system.

4. Correlation matrix for revealing the correlation between mentioned four variables (interface, service, security, and performance).

The mean scale rating of the level of agreement was used to analyze the survey questions. In order to classify the degree of agreement on the variables, the mean scores were categorized into intervals as follows: (1-2.33 Low, 2.33 – 3.66 Medium, 3.67- 5.00 High).

3.5.3 Respondent Demographic

The study sample included 450 Participants for each Iraqi and Jordanian citizen, Table (3.3) shows the socio-demographic characteristics of the Iraqi Citizen which indicates and reflect the diversity on the sample age, education background and others demographic characteristics to add more accuracy to study results.

Table 3.3: Socio-demographic characteristics of the Iraqi Citizen N (Number of targeted participants)= 450 (for each country)

Variable	N (%) (Number of targeted participants)
Gender	
Male	247 (54.9)
Female	203 (45.1)
Age (years)	
< 25	100 (22.2)
26-40	199 (44.2)
41-56	151 (33.6)
>56	000 (00.0)
Education	
Secondary	25 (4.7)
Bachelor	62 (11.6)
Master	173 (32.6)
Others	271 (51.2)
Residence	
Urban	350(77.8)
Rural	100(22.2)

Table 3.4: Socio-demographic characteristics of the Jordanian Citizen (N= 450)

Variable	N (%) (Number of targeted participants)
Gender	
Male	303 (67.3)
Female	147 (32.7)
Age (years)	
< 25	100 (22.0)
26-40	254 (56.7)
41-56	96 (21.3)
>56	000 (00.0)
Education	
Secondary	25 (4.7)
Bachelor	62 (11.6)
Master	173 (32.6)
Others	271 (51.2)
Residence	
Urban	370(82.2)
Rural	80(17.77)

Both tables above showed the distribution of the sample between the age, education and gender groups which reflect diversification on the sample of the study for both Iraqi and Jordanian citizen.

3.5.4 Testing Hypothesis:

First hypothesis: H1: There is no difference in the Awareness level about e-Government system between Jordanian and Iraqi Citizen.

Table 3.5: Frequency percentage of awareness level in e-Government system for both citizens

Variable	N (%) (Number of targeted participants)
Awareness in system	
Jordanian	450 (100%)
Iraq	450 (100%)
Awareness in system benefits	
Jordanian	296 (65.8)
Iraq	175 (38.9)

Regarding the above table that represents number of targeted participants (N) and the awareness level of Jordanian and Iraqi citizen in e-Government system, it's clear that for the first statement all Jordanian and Iraqi sample ever heard and know about the existence of such system as they all try it, but the important difference was regarding the awareness of the system contents and benefits, where there is observable difference to Jordanian side, it's worth to mention that this low level of awareness regarding Iraqi citizen lead to low usage and that what will be confirmed through the coming hypothesis results. The results of applying e-Government system depend on Iraqi citizens' behavior when using the system website. The results are percent's of user satisfaction when requesting a service and executing some functions. Also, the results depend on the questionnaire that was distributed to Jordanian and Iraqi people. The study sample included (450) participants from each Iraq and Jordan Citizens who have been chosen randomly to answer the questionnaire statements.

Second hypothesis: H2: There is no difference in the level of using e-Government system between Jordanian and Iraqi Citizen.

Table 3.6: Frequency percentage usage of e-Government system for both citizens

Variable	N (%) (Number of Targeted Participant)
Ever Use	
Jordanian	450 (100%)
Iraq	450 (100%)
Frequency Usage	
Jordanian	296 (65.8)
Iraq	175 (38.9)

Regarding the above table that represents the usage active of Jordanian and Iraqi citizen for e-Government, it's clear that for the first statement all Jordanian and Iraqi sample ever used e-Government system, and this is a logic result as all the respondent who answer the questionnaires used e-Government system, but the important difference was regarding the frequent usage where there is observable difference between the percentage usage of Jordanian and Iraqi citizen.

Third Hypothesis: H3: There is no difference in the level of satisfaction between Jordanian and Iraqi Citizen regarding the e-Government system interface.

As it is shown below, the user interface design within e-Government system in Iraq suffer from low level, where most of results response regarding the statement that measure interface satisfaction is below the average mean 3, where the main hypothesis statement and average mean value are (2 and 1.68) respectively, this mean values reflect the sample negative attitude toward the interface statements, which indicate their disagreement with its contents , thus reflect their low level of satisfaction regarding interface. Regarding the standard deviation, its values were normal and support the disagreement regarding the interface, thus mean that sample answers were close and revolving around the Mean, in other word its determine the extent of convergence of readings from its mean.

Table 3.7: User Interface Data (Iraq Case)

Statement	Mean	Std. Deviation
H1: e-Government system has an appropriate user interface	2	1.159
S1: The general frame of the user interface is well designed.	2.1	.996
S2: The user interface provides flexibility in dealing with e-Government system's contents.	1.68	.947
S3: The access to the desired information within the system is clear and simple.	1.45	.835
S4: The used language of the system reflects its meanings in an understandable and clear manner.	1.66	.941
S5: The user interface has a modern and contemporary design for its pages.	1.22	.629
S6: The available information on the e-Government system is accurate and clear.	1.67	.944
Average Mean	1.68	.921

But on the other hand, in case of Jordan e-Government system, the user interface design outcomes obviously illustrates that the mean average over 3.66, and revolves around (3.78, 383) for the main hypothesis and average mean respectively, which is considered as an indicator to the extent of Jordanian citizen agreements regarding interface statements and more over their satisfaction, where standard deviation remains acceptable as well, its values were normal and support the agreement regarding the interface, thus mean that sample answers were close and

revolving around the Mean, in other word its determine the extent of convergence of readings from its mean.

Table 3.8: User Interface Data (Jordan Case)

Statement	Mean	Std. Deviation
H1: e-Government system has an appropriate user interface	3.78	.418
S1: The general frame of the user interface is well designed.	3.77	.418
S2: The user interface provides flexibility in dealing with e-Government system's contents.	3.89	.315
S3: The access to the desired information within the system is clear and simple.	3.89	.315
S4: The used language of the system reflects its meanings in an understandable and clear manner.	3.89	.315
S5: The user interface has a modern and contemporary design for its pages.	3.79	.409
S6: The available information on the e-Government system is accurate and clear.	3.85	.302
Average Mean	3.83	.356

Fourth hypothesis: H4: There is no difference in the level of satisfaction between Jordanian and Iraqi Citizen regarding the e-Government System Security.

the Security issue within e-Government system in Iraq suffer also from low level of protection, where most of results response regarding the statement that measure security satisfaction are below average mean 3, where the main hypothesis statement and average mean value are (1.44 and 1.50) respectively, this mean value reflect the sample negative attitude toward the security statements which indicate their disagreement with its contents , thus reflect their low level of satisfaction regarding security. Regarding the standard deviation, its values were normal and support the disagreement regarding the security, thus mean that sample answers

were close and revolving around the Mean, in other word its determine the extent of convergence of readings from its mean.

Table 3.9: Privacy and Data Protection (Iraqi Case)

Statement	Mean	Std. Deviation
H2: e-Government system provides high level of security and privacy for user information.	1.44	.823
S1: The system provides high level of protection regarding personal data for users.	1.45	.835
S2:The Reliability degree for all data on e-Government system is high.	1.43	.823
S3: The system provides protection and prevention against Hacking and viruses.	1.65	.939
S4:The system provides precautionary measures in terms of technical problems such as backup version for database.	1.44	.826
S5: I trust the authorized people to use personal information and database on e-Government system.	1.67	.945
S6:The system provides security precautionary measures in case of the occurrence of any emergency technical defect to keep users accounts in good manner.	1.45	.835
Average Mean	1.504	.860

In case of Jordan e-Government system, the sample response regarding security statements reflect their agreement on the security of e-Government system, but its notable that this issue still needs improvements, it worth to say that security issue all over the world still form a problem, but in general Jordanian citizen outcome shows medium satisfaction regarding this issue, the mean average and main hypothesis values are (2.17, 3.14) respectively, for the main hypothesis and average mean respectively. Regarding the standard deviation, its values were normal and support the agreement regarding the Security statements, which mean that sample answers were close and revolving around the Mean.

The privacy and data protection aspect, despite of that there is variation in the results in Jordan case, also that there is medium mean value which is relativity acceptable mean value reflect satisfaction but still need improvement, the Jordanian e-Government system still

considered much better from the Iraq system, where in case of Iraq the mean average show low level of satisfaction.

Table 3.10: Privacy and Data Protection (Jordan Case)

Statement	Mean	Std. Deviation
H2: e-Government system provides high level of security and privacy for user information.	2.77	.791
S1: The system provides high level of protection regarding personal data for users.	3.66	.473
S2: The Reliability degree for all data on e-Government system is high.	3.35	.655
S3: The system provides protection and prevention against hacking and viruses.	3.13	.731
S4: The system provides precautionary measures in terms of technical problems such as backup version for database.	3.00	.824
S5: I trust the authorized people to use personal information and database on e-Government system.	3.00	.823
S6: The system provides security precautionary measures in case of the occurrence of any emergency technical defect to keep users accounts in good manner.	3.09	.878
Average Mean	3.14	.739

Fifth Hypothesis: H5: There is no difference in the level of satisfaction between Jordanian and Iraqi Citizen regarding the e-Government System Service.

Regarding provided Service within e-Government system in Iraq results, its showed low level of services, as most of results responses regarding service statements satisfaction are below average mean, where the average mean value is (2.35), this mean value reflect the sample negative attitude toward the security statements which indicate their disagreement with its contents, thus reflect their low level of satisfaction regarding service. Regarding the standard deviation, its values were normal and support the disagreement regarding the service, thus mean that sample answers were close and revolving around the Mean, in other word its determine the extent of convergence of readings from its mean.

Table 3.11: Service Side Data (Iraq Case)

Statement	Mean	Std. Deviation
H3: e-Government system characterized by comprehensive performance that fulfills all needs.	3.12	.994
S1: The available information on the e-Government system fulfills the requirement of high percentage of user services.	3.56	.497
S2: Thee-Government system contributes in decreasing loads on the different governmental departments in the public sector.	2.12	.994
S3: The contents of e-Government system are appropriate all classes of people.	2.12	.994
S4: The system contributes in saving time and effort.	1.76	1.13
S5: Pages of e-Government system are dynamic pages.	2.12	.993
S6: Information show in the e-Government system achieves its desired goals.	2.12	.994
S7: e-Government system characterized by its high flexibility that helps on uploading and downloading information.	2.12	.994
S8: e-Government system provides information similar to that available on the other governmental departments	2.12	.994
Average Mean	2.35	.953

But on the other hand, in case of Jordan e-Government system, the service provided outcomes, revolves around (3.89, 3.85) for the main hypothesis and average mean respectively, which reflect high agreement and positive attitude of the Jordanian sample regarding this issue, and

more over reflect their level of satisfaction, where standard deviation remains acceptable as well, As values were normal and support the agreement regarding security statements, therefore mean that sample answers were close and revolving around the Mean, in other word its determine the extent of convergence of readings from its mean.

Table 3.12: Service Side Data (Jordan Case)

Statement	Mean	Std. Deviation
H3: The e-Government system provides comprehensive services for users.	3.89	.315
S1: The e-Government system provides search services in good manner.	3.85	.312
S2: e-Government system provides set of laws, regulations and instructions for users.	4.00	.00
S3: The e-Government system provides a detailed site map in good manner.	3.90	.30
S4: e-Government system provides quick response on inquiries and questions.	3.56	.496
S5: The system provides feature of complaints and suggestions in an organized manner.	3.56	.496
S6: The system provides query services in good manner.	3.89	.315
S7: e-Government system characterized by its quick and easy browsing.	4.00	.00
S8: e-Government enables the users to know all updates on the web pages of system.	4.00	.00
Average Mean	3.85	.248

Sixth Hypothesis: H6: There is no difference in the level of satisfaction between Jordanian and Iraqi Citizen regarding the e-Government System Overall Performance.

As it is shown below, the response of Iraqi case regarding the overall performance show negative attitude toward the performance, where most of results response regarding the statement that measure overall performance are below average mean 3, where the main hypothesis statement and average mean value are (2.56 and 2.41) respectively, this mean value reflect the sample negative attitude toward the performance statements, which indicate their disagreement with its contents. Moreover, reflect their low level of satisfaction regarding performance. Regarding the standard deviation, its values were normal and support the disagreement regarding the overall performance, thus mean that sample answers were close and revolving around the Mean, in other word its determine the extent of convergence of readings from its mean. Regarding the overall performance, the average mean for Iraq case was low, in other words most of customers observed that e-Government system has weak performance in light of services which should be provided. On the other side, Jordan average mean in terms of overall performance was more than 3 average mean, which considered very good percentage and better than Iraq case.

Table 3.13: The Overall Performance (Iraq Case)

Statmentent	Mean	Std. Deviation
H4: The available information on the e-gate caters the requirement of high percentage of customers services.	2.56	1.071
S1: The website contributes in decreasing loads on the different governmental bodies in the services sector.	3.11	.882
S2: The website commensurate in services providing and information with various society levels and categories logically.	2.66	.949
S3: The website helps in saving both of time and efforts for the public.	1.45	.838
S4:Updating level in the website is high.	3.55	3.55
S5: Showing website information achieved the desired aims.	2.11	.995
S6: The e-gate provides rapid website downloading on the browser in high manner.	2.32	.947

S7: The website provides data and services helps on wide range various bodies that specialized in integrated manner.	1.68	.947
S8: e-Government system provides information similar to that available on the other governmental departments.	2.33	.945
Average Mean	2.41	1.236

The overall performance of Jordanian case show positive attitude toward to all statements of performance, which reflect their agreements and satisfaction, the average mean and main hypothesis mean values were (3.89, 3.89) respectively. Regarding standard deviation values it was acceptable as well, As values were normal and support the agreement regarding performance statements, therefore mean that sample answers were close and revolving around the Mean, in other word its determine the extent of convergence of readings from its mean.

Table 3.14: The Overall Performance (Jordan Case)

Statmentent	Mean	Std. Deviation
4: The available information on the e-gate caters the requirement of high percentage of customers services.	3.89	.315
S1: The website contributes in decreasing loads on the different governmental bodies in the services sector	3.70	.301
S2: The website commensurate in services providing and information with various society levels and categories logically	3.88	.250
S3: The website helps in saving both of time and efforts for the public	3.77	.390
S4 :Updating level in the website is high	3.5	.32
S5: Showing website information achieved the desired aims	3.79	.409
S6: The e-gate provides rapid website downloading on the browser in high manner	3.89	.315
S7: The website provides data and services helps on wide range various bodies that specialized in integrated manner	3.56	.496
S8: e-Government system provides information similar to that available on the other governmental departments.	3.56	.496
Average Mean	3.72	.365

Table 3.15 shows the difference in behavior between Iraqi and Jordanian citizens towards to e-Government system.

Table 3.15: Comparison between Jordan e-Government system and Iraqi e-Government system

e-Government Feature	Iraqi			Jordan		
	Average Mean	Average Std	Cronbach Alpha	Average Mean	Average Std	Cronbach Alpha
User Interface	1.86	0.921	0.75	3.83	0.356	0.85
Security and Privacy	1.504	0.860	0.80	3.14	0.739	0.79
Provided Services	2.35	0.953	0.69	3.85	0.248	0.81
Overall Performance	2.41	1.236	0.83	3.72	0.365	0.86

3.5.5 Correlation Matrix:

Correlation matrix describes correlation among Independents variables; this test is run on order to determine the Pearson correlation between study four variables, to avoid multi co linearity which mean that the variables are not orthogonal, all the variables Pearson correlation are under 1 which indicate normal value.

Table 3.16:Jordan Sample Correlation Matrix

		Interface	Security	Service	Performance
Interface	Pearson Correlation	1	0.286	0.139	0.49
Security	Pearson Correlation	0.286	1	0.297	0.196
Service	Pearson Correlation	0.139	0.297	1	0.139
Performance	Pearson Correlation	0.49	0.196	0.139	1

Table 3.17:Iraqi Sample Correlation Matrix

		Interface	Security	Service	Performance
interface	Pearson Correlation	1	.337	.134	.094
Security	Pearson Correlation	.337	1	.505	.300
Service	Pearson Correlation	.134	.505	1	.579
Performance	Pearson Correlation	.094	.300	.579	1

3.5.6 Desk Research Result

Jordan and Iraqi e-Government systems are compared based on their website features. The researcher compares between the two systems according to interface, security, services and overall performance. Researcher noted that Jordan e-Government system website is more advanced than Iraqi e-Government according to the comparison sides. Also, it is noted that Jordan e-Government has dynamic contents. On the other side, Iraqi e-Government system has static contents and need more updates on pages and functions.

As mentioned before that, e-Government system serves all people types in order to represent good services for the citizens. This research will address how to involve the real end users and will enhance the way data and information is collected so that they can significantly affect the user interface of the e-Government application in Iraq based on the Jordanian experience. Designing and building e-Government that makes users satisfied when they interact with it was discussed. Our methodology depends on the results of questionnaire which determines the procedure of methodology. Besides that, methodology aims to enhance the e-Government system which satisfies the user when using the system particularly that our system is website. E-Government website is used by many users at the same time that may cause traffic on the system performance and our methodology takes in account the traffic on the system.

Therefore, methodology focuses on enhancement of e-Government system by concentrating on the gap between Iraqi and Jordan system and benefit from Jordanian system as ideal for Iraqi system, then develop Models, Database, Interface strategy and Services. All these elements affect user behavior towards e-Government system of Iraq. So, it is necessary to highlight these elements and how it can be improved.

3.5.7 Our Research Based-Conceptual Model

The following model was built in the way to avoid the weaknesses in the previous models. The e-Government model includes all the system elements and actors that control the overall system procedure. In addition, administrator has all permissions in the system where he/she controls on the available services of the system and also control with accounts of the citizens. Additionally, most of processes in the system must be connected directly with the system DB.

However, our research conceptual model will support “system feedback process” which is not existed in the previous models and all weakness that have not taken into considerations in the previous researches. These processes are automatic service that indicates to the user where the requested processes have been executed or not. There are many ways that the system can send this feedback either by internet connection (user PC receives the feedback) or by mobile messages as well.

3.5.8 System Model

Figure (3.7) shows the proposed system model of e-Government website. As shown in the model, the system consists of normal user, the website and administrator. In the beginning of the procedure citizen must register in the system database via registration page. After that citizen become end user of the system which means that he/she can request the services from the website. Services on the website include all operations that the citizen needs and like to execute. System administrator is responsible for managing user’s accounts and supporting the services. Administrator has all permissions on the system and also enhancement the system continuously in order to represent all good services. Official document on the website is represented as requesting the services. Official documents are classified on the website according to the type of service. The website supports web pages to be filled by the user instead of hard copy document in the normal procedure.

After user finishes filling the document, the user must pay the fees of the document. However, payment can operation can be done on the website via payment page as shown in figure (3.7). When the payment operation finished system will execute feedback process to tell user the result of operation according the user balance in the bank. The result of payment determines the result of the official document of user. On other hand, “service repository” supports all the services to the users and it is connected with system database in order to prepare the services.

The system database is represented as a major element in the model because it supports all needed data for services and other operations. However, database stores all the results of operation that happens on the website pages. Only the administrator who has authority on the system database and database must be secreted enough from hacking.

3.5.8.1 System Network Interaction

Citizen's requester and service providers use HTTP protocol (hypertext transfer protocol) in order to exchange the services over SSL protocol (secure socket layer protocol). These protocols are used for transferring objects over the system website using Internet. On the other hand, POST command to upload services on the website which is used by the system administrator. Besides that, users use GET command to find out and download services and reports. Objects to be transferred over the network are coded into XML (extensible markup language) format because XML is used to carry data over the network which is not programming language (Lang, 2013).

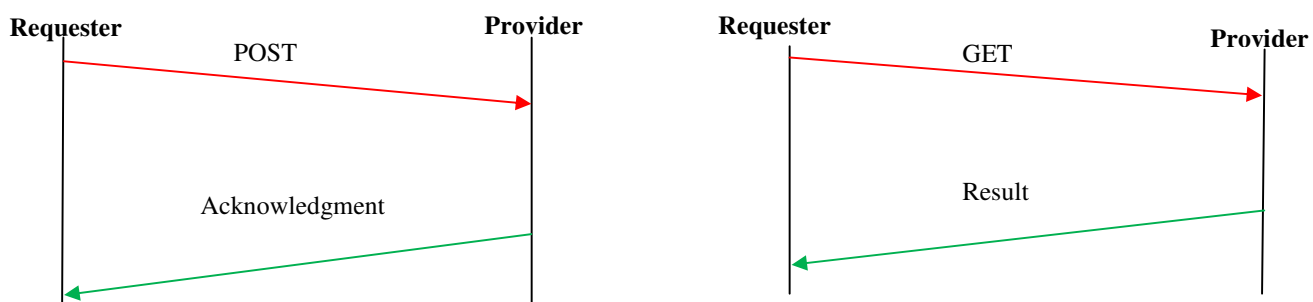


Figure 3.9: Interaction Scenario between the Requester and the Provider (Dias & Rafeal, 2007)

As shown in figure (3.9) the providers upload services using POST protocol. However, they publish services by sending POST command with service object. The object is carried within an XML container. Uploading services on the website is directed to service repository which sends acknowledgment about accepting the new service. User requests a service from service provider or user wants to download any other file either from user profile or from any other page, user sends GET protocol to request the service. After that, provider sends the result of the request order which is read by requester via interface. Interaction between the two situations is done using two main protocols (POST and GET) seriously. Maybe many requesters send GET command at the same time which may cause traffic on the service repository, but these requests are managed according to the priority standardized by the network. Requesting of services is executed by Query statements and executing SQL statements to retrieve data necessary for some services from system database.

3.5.9 Graphical User Interface

User can access computer systems via user interface. According to (Baxley, 2003) the term of GUI covers all aspects of interaction between the user and the system. Each system must have good interface that enables user to interact with the system. The system developer has to draw a plan of interaction the system via User Interface. So, the developer must be careful when distributing buttons, textboxes, labels,...etc. Also, the developers are responsible for coordinating the colors of forms and backgrounds. Our proposed system is Web based system so it is essential to coordinate good and suitable colors for windows and forms that are suitable to the objective of the system. However, the interface of our web pages must be more suitable that convinces the users with the system. Normal users are interests with good interface which fulfills their requirements and changes their thoughts about the system particularly web based system like our proposed system.

Some developers may focus on programming or security more than focusing on interfacing aspect. Therefore, bad interface may cause problems in interaction with the system. When the user is not comfort with system interface, the user will behave wrongly with the system that will prevent user from arriving to the desired goal of accessing the system and will give bad impression to the user. Bad content management in the website may cause several difficulties to the user. On other hand, users often describe the difficulties that they faced in any system as “computer problems”. Normal users have no big experience in websites systems and computer systems, so they cannot diagnosis where is exactly the problem available. Additionally, the bad User Interface will cause difficult interaction with the system that may cause wrong behavior from user which will cause difficulties in system responding or “program responding”. To build good and strong websites in all aspects either in designing or security the programmers use “Three Tier Technique”: User Interface, Security Tier and Intermediate Tier. However, User Interface is considered as one of most important part of website designing procedure (Baxley, 2003).

As mentioned before, good interface leads to satisfaction for user and avoiding many problems that caused by wrong using. To get good interface for any website, the designer must know how to distribute contents of the website exactly as the programmer planed. Most websites templates that based on CMS “Content Management System” distributes the contents in smart

way and gives beautiful interface particularly colors coordinating. Moreover, developer must design website interface according to the type of users. If the users are limited like the case of company, developer must design pages interface according to their interests. Also, developers can collect the opinions of the users about the interface design in order to comfort them with the system. But when the users of the system are not limited which means that the users are all people, the developer can ask sample of people and then generalizing the results on the system interface. Besides that, developers can prepare questionnaire to collect users' opinions about the preferred interface design. Importance of good interface in any websites will get customers loyalty such as online shopping companies. As it is known, online shopping companies are interests in representing good interface to the customers to promote items. However, suitable interface in websites aims mainly to get user loyalty (Baxley, 2003).

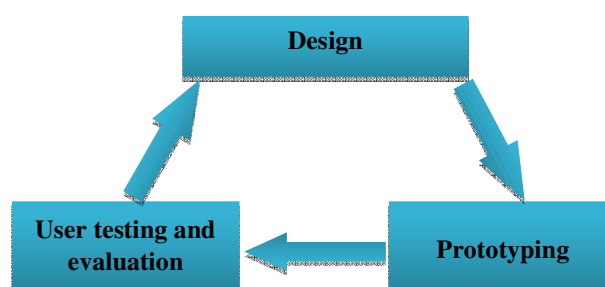


Figure 3.10: stages of website development (Greenberg, 1996.)

As shown in figure (3.10), the procedure of good interface: Design, Prototyping and user testing. This procedure interests with user opinion and satisfaction by making testing from user themselves. After designing user interface, developers release prototype interface which will be tested by sample of users. Then, the system interface will be updated according the users' opinions and so on.

3.5.9.1 System User Interface

The researcher build an e-Government website which will be accessed by people either employees or end users. The questionnaire must be prepared based on users' opinion according to their satisfaction and suitable to the user's requirements. E-Government website is accessed from all people so the user interface must be suitable for all people as the developer can do. All types of users have to be considered because there are normal users, professional users and employees who are responsible for controlling the system and data entering. Contents of the

website are distributed in smart way wherein each group of contents is located under title which indicates the nature of the contents role and objective. User behavior on the website is affected by the pages colors and the way of contents' distribution.

However, control pages of administration are completely different from web pages of the users. The usability term is importance in our system that comforts the users when they interact with our website system. Besides that, usability must be managed before releasing the website in order to guarantee user satisfaction. The website must be usable for all users' types which mean that the website contents are distributed in smart and easy way. Furthermore, the website must contain "Site Map" that guides users how to interact and access the website.

3.5.9.2 Graphical User Interface Prototype

The following algorithm indicates the steps of checking user interface of current e-Government and this algorithm is divided into two main stages. The checking is conducted for determining the ability of the proposed user interface to comfort user when using the proposed e-government system. The time complexity is necessary to find the efficiency of algorithm when it is executed.

Input → current GUI features

Output → new GUI prototype

Procedure:

Stage 1:

Iterate:

If the website does not have consistent and practical design in general

 Change design of pages

If the current colors are not suitable

 Change colors according to the contents

If the current footer style contain required components

 Change footer style and contents

If the body part of the page is not good

 Change body contents and style

End iterate

Stage 2:

Set header high 170Px and width 700Px

Set footer high 80px and width 700px

End

Time Complexity

In this algorithm there are seven steps executed, so function of complexity will be as following:

$$\begin{aligned} T(n) &= n(1 + n + n + n) + n + n \\ &= n(1 + 3n) + 2n \\ &= 3n + 3n^2 \end{aligned}$$

Hence,

Where n = time stage. The time complexity of algorithm is: $O(n^2)$

The user interface design within e-Government system in Jordan enjoyed with high quality level, where most of results over than 3 averages mean. In the case of Iraq e-Government system, the user interface design outcomes obviously illustrates that the mean average less than 3, which is considered as an indicator to that the extent of satisfying for customers who deal with e-Government system in Iraq.

Lifecycle of the Website Contents

Contents of the website either static contents or dynamic contents are important to get robust e-Government system. The system elements and functions for each one. The main page has limited capacity of contents and any other contents on the page will be replaced with the oldest content. But the replaced content will be stored in backup container (Vidgen et al, 2001). It is necessary to talk about website archiving, content life cycle and organizational integration. In Website Archiving: Contents and sessions on the website need for archiving in order to store the previous sessions whenever the user wants to retrieve these previous pages. On the other hand, in Content Lifecycle: Vidgen et al., (2001) mentioned that the contents' lifecycle includes creation to destruction of content components. As it is known that, new content comes from new document such as "MS word, MS Excel, jpeg, etc" and paper documents such as: press releases, new product descriptions. The original data may need storage prior to publication and this may need to be continued after publication if it is published in a different form. However, context with the publication must include one of the following:

Authentication: this process depends on identifying user information by checking the validity of the username and password.

Personalization: this term refers to enable personality on each user data. In other word, each user has different view and different information that depends on preferences, access profiles, role, and previous accesses.

Transformation: which is concerned with constructing (e.g., combining subcomponents into new documents) and transforming content at the time of delivery.

It may be necessary to archive data and sessions of the system website. Archiving on the system website may be done automatically according to the deadline date which is determined by the developers. On the other hand, the archives of data may be stored online or offline. The archives may be stored online or offline. Finally, at some stage, there will be a need to remove (destroy) the content permanently. This may affect either online or archived data. The repository is a collection of data stores that cater for components with more or less structure, including relational and object-oriented databases, document stores, file systems, etc. The WCM (Web Content Management) must give seamless access to the content components regardless of where and how they are stored. Figure (3.11) showed the lifecycle of the website contents. The lifecycle begins from creation of the website, review, storing, publish, archive and destroy. The last stage of the lifecycle (destroy) is needed when the contents are not necessary and it is important to disposal them particularly when the time deadline finished.

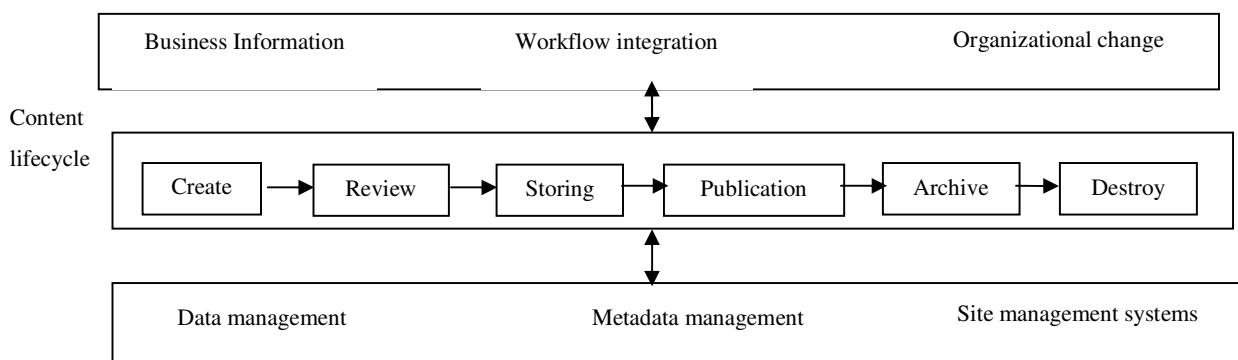


Figure 3.11: lifecycle of website contents (Vidgen et al, 2001)

Organizational Integration

The website contents are generated by business processes and also are supported by business support. If advantages of the web are taken effectively, the workflows will need to be redesigned possibly to incorporate computer mediated communication and collaboration. The

process of archiving depends on collecting the contents of the websites and web pages in order to store this data in specific resource for future use. The archivist contents employ “web crawler” for the storing purpose. The most popular archiving organization is “Internet Archiving” that aims to maintain and archive the entire web contents (Vidgen et al., 2001). Commercial web archiving software and services are also available to organizations that need to archive their own web content for corporate heritage, regulatory, or legal purposes. Archiving in the e-Government website includes archiving all documents, web pages and information that viewed on the website.

On the other hand, database archiving is different from the archiving of the web page contents. Database archiving refers to extraction of the website database.

Guide of the Website (Website Manual)

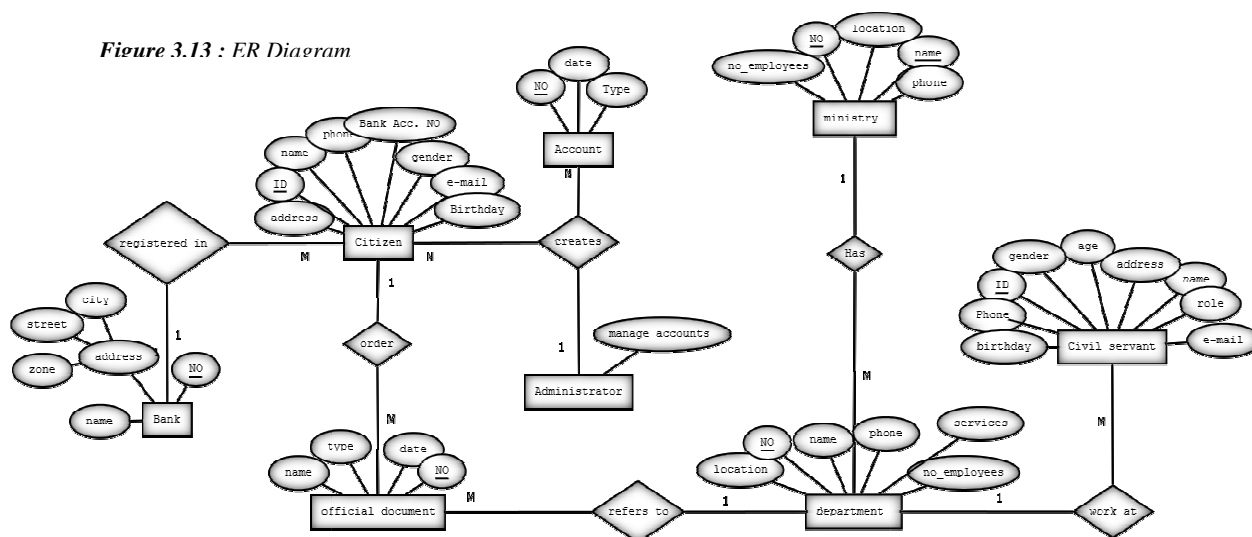
The successful websites are those that represent guide to the users in order to train them how they can use the website. This policy like the site map but it represents the steps of official document procedure and what is estimated time to complete the operation. Also, this service gives outline about the website to the registered users and the non-registered users to promote about website services. Guide service is represented using multimedia object like video clip or images. Administrator of the system controls this service and updates it according to the new services on the website or any changes in website policies (Greenberg, 1996.). According to the questionnaire results most of Iraqi citizens are not experts with smart websites such as e-Government system. So, it is necessary to support the website with guide in order to help those people how they can use our system services particularly how representing official documents. The system administration can promote about the system and how accessing the system services using different advertisement tools. On the other hand, Iraqi citizens in general prefer fast official document operation via e-Government system but they afraid from payment online using their accounts in banks. Also, Iraqi citizens consider their bank accounts as special information so they worry from electronic steal by hackers. The questionnaire indicated that there is high percent of Iraqi people who need fast official document operation and replacing the current system with other smart system to reduce wasted time. However, the system must contain guide service to convince the people with the system security and convince them with system safety.

The System Database

System database consist many entities that are interacting together in the e-Government processes. E-Government database is different from any other database because of its size wherein it contains very huge number of entities and attributes. However, these entities express the elements of system either these elements are people or departments. On other hand, interaction between entities is called “relationships” which indicates the nature of relation between any two entities. Besides that, the relationship between entities determines the process that accessed between those entities. The relationship also determines the role of the related entities in the database and in the overall performance of the system.

Figure 3.12 : ER Diagram

The system database shown in figure (3.12) (ER diagram) consists all elements of official procedure that happens in governmental departments daily. However, the system database consists of: Citizens, Departments, Accounts, Employees and Administrator. These entities are interacting in order to achieve the desired objective of the system. Also, the relationships between entities express the processes that happen between these entities. The role of each entity in the system is compatible with the related entity via the relationship between them. As shown in figure (3.79) that shows ER diagram of the system database, the database entities are interacting at SQL server. The system allows end user to register in the website and create accounts that are stored in the database. End users in this system may be citizens or employees of the government. Administration part of the system is responsible for managing users’ accounts and also managing the database in general. Each entity in the database is converted into individual table. In our proposed system the entities are converted into tables in the SQL server



as shown in the following tables. These tables are connected together via the relationships that were indicated in ER diagram in figure (3.79). Each table has unique key called “primary key” which allows the tables to connect together. The primary key enables performing SQL statements from many tables according to the statement.

- **Database Normalization**

Normalization is important process on the database in order to avoid redundancy in the data of database. However, normalization is necessary particularly in big database.

e-Government system has very huge data because it must cover all people in the country. So, redundancies in data which may cause errors in retrieving data from database have to be reduced. Many authors like lowczuk, (2010) claimed that normalization is the process of organizing the fields and tables of a relational database to minimize the redundancy. Normalization usually involves dividing large tables into smaller (and less redundant) tables and defining relationships between them. The objective is to isolate data so that additions, deletions, and modifications of a field can be made in just one table and then propagated through the rest of the database via the defined relationships.

Redundant data wastes disk space and creates maintenance problems. If data that exists in more than one place must be changed, the data must be changed in exactly the same way in all locations. A customer address change is much easier to implement if that data is stored only in the Customers table and nowhere else in the database. So, this forces researcher to make normalization on the system database because it is very huge database and to avoid data redundancy.

Each entity in the database is represented with tables and the attributes are represented with fields of the table. To achieve good normalization, normalization steps that are familiar to the software developers must be followed. 1st Normal Form, 2nd Normal Form, 3rd Normal Form and The Boyce-Codd Normal Form will be used.

- **Relational Map**

It is necessary to make relational mapping before make database normalization. For each entity in the database, a relation R that includes all simple attributes of the entity E has to be created. If the chosen key of E is composite, the set of simple attributes that form it will together form the primary key of R. as shown the following relational map, relations Doctor, Patient, Department, Record, Card and Bank were created.

Citizen

<u>ID</u>	Name	Gender	Birthday	Address	Phone	e-mail	<u>Account NO</u>
-----------	------	--------	----------	---------	-------	--------	-------------------

Civil Servant

<u>ID</u>	Name	Gender	Role	Address	e-mail	<u>Department NO</u>	salary	birthday
-----------	------	--------	------	---------	--------	----------------------	--------	----------

Department

<u>NO</u>	Name	NO_Employees	Location	Address	Services
-----------	------	--------------	----------	---------	----------

Official Document

<u>NO</u>	Name	Type	Date	<u>Citizen ID</u>	<u>Department NO</u>
-----------	------	------	------	-------------------	----------------------

Account

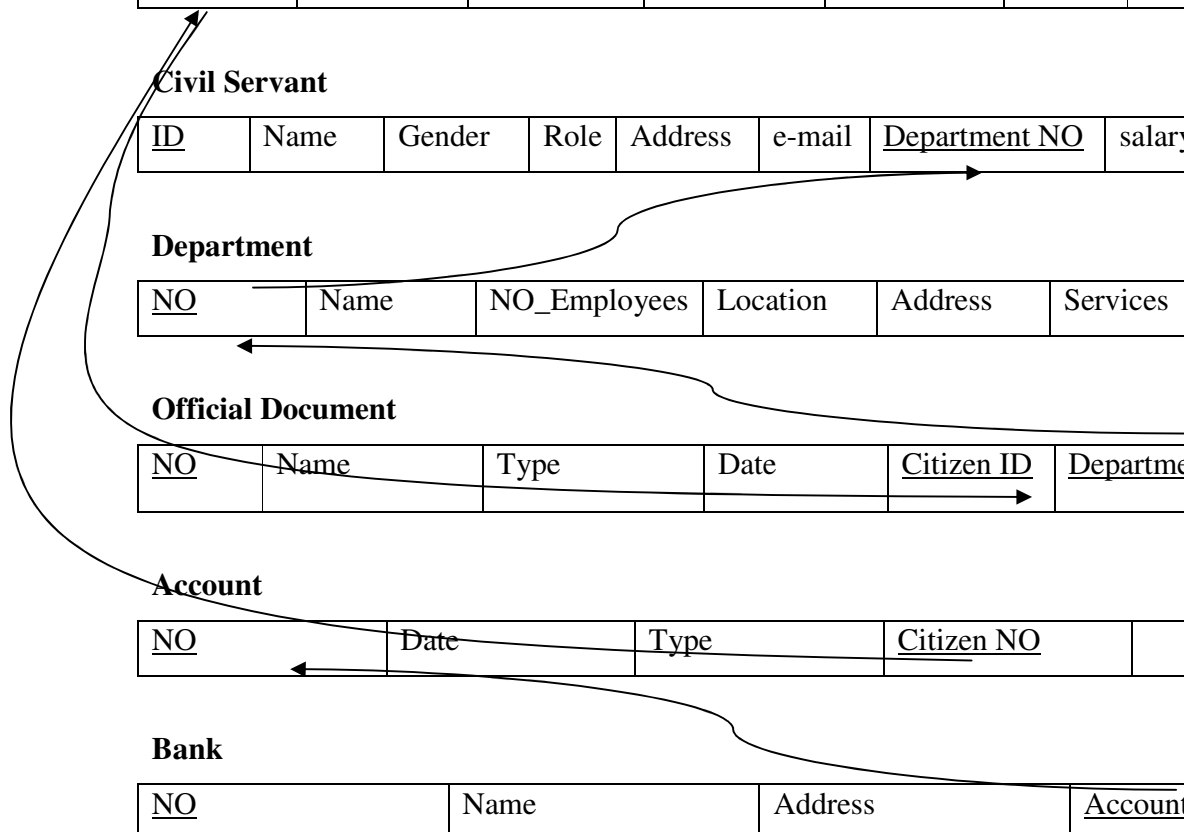
<u>NO</u>	Date	Type	<u>Citizen NO</u>
-----------	------	------	-------------------

Bank

<u>NO</u>	Name	Address	<u>Account NO</u>
-----------	------	---------	-------------------

Administrator

<u>ID</u>	Name	Gender	Role	Address	e-mail	experience	salary	birthday
-----------	------	--------	------	---------	--------	------------	--------	----------



✚ 1st Normal Form(1NF)

The normalization process involves getting data to conform to progressive normal forms, and a higher level of database normalization cannot be achieved unless the previous levels have been satisfied. First normal form is the basic level of database normalization. For 1NF, it states that the domain of an attribute must include only atomic values and that the value of any disallows having a set of values; which means they are unique, containing no sets of values. The rules of 1NF are summarized below:

- i. There are no columns with repeated value or similar values.
- ii. Each data item cannot be broken down any further.
- iii. Each row is unique; i.e. it has a primary key.
- iv. Each field has a unique name.

The results of applying 1NF:

All tables are 1NF, because they achieves all rules of 1NF.

✚ 2nd Normal Form (2NF)

Second normal form (2NF) cuts down the tautological/superfluous data in a table by selecting it, putting it in new tables and by establishing relations amongst them. In database normalization, 2NF is about the relations between the composite key columns and non-key columns. That means the non-key columns have to depend on the whole composite key.

The result of applying 2NF is to convert Civil Servant table into two tables:

Civil Servant

<u>ID</u>	Name	Gender	Birthday	Phone	Address	Special	Salary	<u>Dpt.NO</u>
-----------	------	--------	----------	-------	---------	---------	--------	---------------

Special

Doctor name	<u>ID</u>	Special	<u>Dpt.NO</u>
-------------	-----------	---------	---------------

✚ 3rd Normal Form(3NF)

This requires that all columns depend directly on the primary key. Tables violate the 3NF when one column depends on another column which in turn depends on the primary key, (A transitive dependency).

The result of applying 3NF:

Official Document

<u>NO</u>	Name	Type	Date	<u>Citizen_ID</u>	<u>Department</u>
					<u>NO</u>

It will be divided into:

Official Document

<u>NO</u>	Name	Date
-----------	------	------

Document Department

<u>NO</u>	Department NO	Type
-----------	---------------	------

The Boyce-Codd Normal Form(BCNF)

When a relation has more than one candidate key, anomalies may result even though the relation is in 3NF. Besides to, 3NF does not deal satisfactorily with the case of a relation with overlapping candidate keys, in the other word, composite candidate keys with at least one attribute in common. On the other hand, BCNF is based on the concept of a *determinant*. A determinant is any attribute (simple or composite) on which some other attribute is fully functionally dependent. A relation is in BCNF is, and only if, every determinant is a candidate key.

- **Database Security**

Database is considered as one of the most important parts of any system. For this reason it is important to guarantee that data is saved from hacking or changing the data. On the other hand, some data in the system database are used in the system procedure. Any hacking on the

database may cause failure in system running. Database of e-Government system is big database because it contains all people types and their profile data that may have very huge information. There are many methods that used by system developers in order to keep database from hacking. These methods include the policy of data saving and the way of programming such as strength SQL statements.

- **SQL injection**

This method is used by developers to strength the security on the system database. However, SQL injection aims to increase application confidence with running the SQL code that was not intended (Spett, 2003). SQL Injection is one of the many web attack mechanisms used by hackers to steal data from organizations. It is perhaps one of the most common application layer attack techniques used today. On the other hand, SQL injection is the type of attack that takes advantage of improper coding of the web applications that allows hacker to inject SQL commands into say a login form to allow them to gain access to the data held within the database. In essence, SQL Injection arises because the fields available for user input allow SQL statements to pass through and query the database directly.

The web pages enable user to retrieve and submit data to/from the system database via Internet using browsers. SQL Injection is the hacking technique which attempts to pass SQL commands (statements) through a web application for execution by the backend database. If the SQL injection was not strong enough If not sanitized properly, web applications may result in SQL Injection attacks that allow hackers to view information from the database and/or even wipe it out. Such features as login pages, support and product request forms, feedback forms, search pages, shopping carts and the general delivery of dynamic content, shape modern websites and provide businesses with the means necessary to communicate with prospects and customers. These website features are all examples of web applications which may be either purchased off-the-shelf or developed as bespoke programs. These website features are all susceptible to SQL Injection attacks which arise because the fields available for user input allow SQL statements to pass through and query the database directly.

Encryption

Encryption is the process of writing messages in a way that hackers cannot read them, but the administrator who encodes them can read the messages. Encryption algorithms are used by developers to encrypt messages. The result of encryption is cipher text that cannot be read (unreadable text). In an encryption scheme, the message or information (referred to as plaintext) is encrypted using an encryption algorithm, turning it into an unreadable cipher text (ibid.) (Richardson, 2008). This is usually done with the use of an encryption key, which specifies how the message is to be encoded. Any adversary that can see the cipher text should not be able to determine anything about the original message. An authorized party, however, is able to decode the cipher text using a decryption algorithm that usually requires a secret decryption key that adversaries do not have access to. For technical reasons, an encryption scheme usually needs a key-generation algorithm to randomly produce keys.

According to Richardson, (2008) there are two types of encryption are used by developers: symmetric-key and public-key encryption. In symmetric-key encryption developers use encryption key and decryption key are same. Thus communicating parties must agree on a secret key before they wish to communicate. In public-key schemes, the encryption key is published for anyone to use and encrypt messages. However, only the receiving party has access to the decryption key and is capable of reading the encrypted messages. Public-key encryption is a relatively recent invention: historically, all encryption schemes have been symmetric-key (also called private-key) schemes. It is recommended to use Asymmetric Forms that uses two keys: a "private" key and a "public key" for performing encryption and decryption.

Access control in my method

When a credential is presented to a reader, the reader sends the credential's information, usually a number, to a control panel, a highly reliable processor. The control panel compares the credential's number to an access control list, grants or denies the presented request, and sends a transaction log to a database. When access is denied based on the access control list, the door remains locked. If there is a match between the credential and the access control list, the control panel operates a relay that in turn unlocks the door. The control panel also ignores a door open signal to prevent an alarm. Often the reader provides feedback, such as a flashing red LED for an access denied and a flashing green LED for an access granted (Quatrini & Rondini, 2006).

The above description illustrates a single factor transaction. Credentials can be passed around, thus subverting the access control list. For example, Alice has access rights to the server room but Bob does not. Alice either gives Bob her credential or Bob takes it; he now has access to the server room. To prevent this, two-factor authentication was used. In a two factor transaction, the presented credential and a second factor are needed for access to be granted; another factor can be a PIN, a second credential, operator intervention, or a biometric input.

There are three types (factors) of authenticating information:

Backup

Backup in the system was used in order to archive the data in computer. Backup term aims to put other copy of the desired data in specific place or storage resource. This process used to restore the data to avoid loss Caused by hacking or any other risk. Backup aims mainly to: recover data after loss and to recover data from an earlier time, according to the user policy in handling with data. Also, user uses backup policy according to how long copies of the data are required. Although backup popularly represents suitable form of disaster recovery, backups should not alone be considered disaster recovery. Pedregal, (2010) claimed that not all backup systems or applications can restore computer system or other complex configurations such as: computer cluster, active directory servers or database server by restoring a computer cluster, active directory servers or database server. Since a backup system contains at least one copy of all data worth saving, the data storage requirements can be significant.

Before data is sent to its storage location, it is selected, extracted, and manipulated. Many different techniques have been developed to optimize the backup procedure (Wold, 2002). These include optimizations for dealing with open files and live data sources as well as compression, encryption, and de-duplication, among others. Every backup scheme should include dry runs that validate the reliability of the data being backed up. It is important to recognize the limitations and human factors involved in any backup scheme.

Feedback

The proposed system responds to the users by sending acknowledgment for them about any operation. This acknowledgment indicates the result of operation if the operation was successful or it failed. However, this process depends on the speed of the system responding

which depends on the type of programming language and also the way of managing system. Feedback process can be achieved by sending message to the user either by e-mail or by mobile network (SMS). Moreover, feedback process must be fast to avoid user to wait long time.

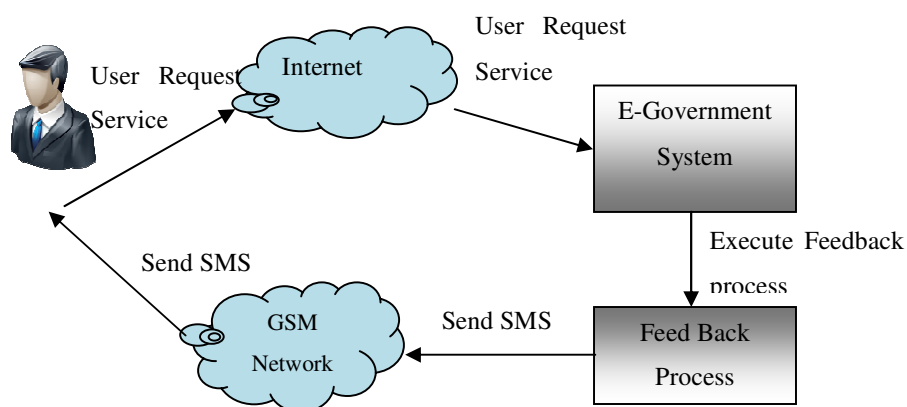


Figure 3.14: Feedback process using GSM

As shown in figure (3.13), the system can send feedback to the user using SMS via GSM network. When user creates account in the system, one of the entries is phone number. The website then sends acknowledgment via sending SMS according to the user phone number. This process is considered as secrete method because another type network in the system which is GSM is used. However, this process may be better than sending e-mail to the user because not all Iraqi people have an e-mail and not all can handle with e-mails. But most of Iraqi people have mobile phone which gives percent higher than who have e-mail accounts. The speed of the feedback process depends on the networks that used in the system. So, in this method using GSM network is considered correct choice wherein speed of data transmission over GSM reaches to (9.6 Kb/s) or 1800 MHz (when transmitting message long 160 characters) (AbdWahab et al., 2008).

If feedback process is done by sending e-mail from, the website to the user's e-mail account, then this method requires user to have an e-mail account. However, this process is

considered faster than previous method (feedback process) because the same network (Internet) is used. As shown in the following figure (3.14), after user finishes his governmental transaction, then the system sends acknowledgment to the user's e-mail account to assure that the operation was successful. The speed of this process depends on the speed of Internet. Nevertheless, this method still little secure than above method because it uses the same network in requesting and feedback processes.

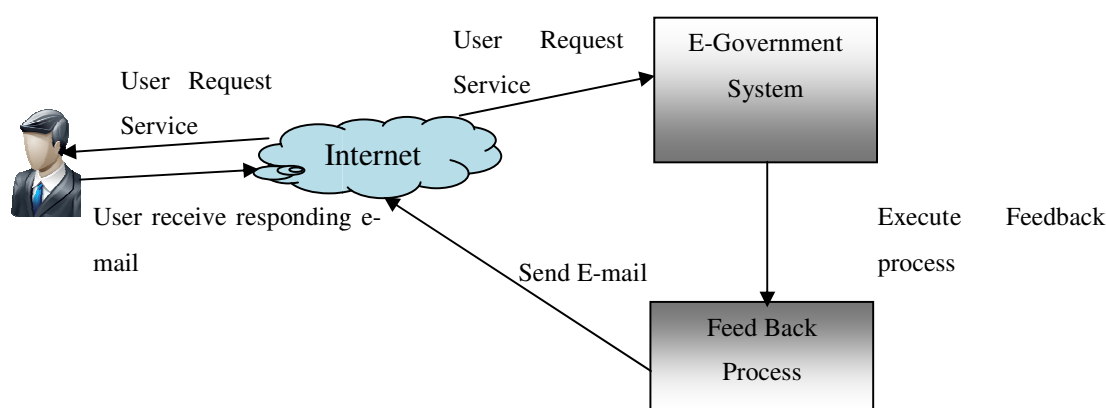


Figure 3.15: Feedback process using Internet

3.5.10 Contents of the website pages in our proposed system

Registration page:

The current Iraqi e-Government system does not support registration page. It depends on registration by official offices which support citizen with username and password. This feature will be enhanced by supporting the system with registration page which can be accessed by normal user to register in the system. Moreover, the suggested e-Government system supports registration page which requests data like: username, password, phone, age, gender, birthday, e-mail and password. However, it is better to request little information from user in order to make registration operation easier.

Main Page:

The main page in any website contains most of website contents and links. Also, it must be designed using good interface and suitable colors that expresses about the subjects of contents. Main page also contains all links of citizens' services and business services that are needed by users when they request official documents. All ministries are shown in the main page and the official document is related to specific ministry according to the nature official document subject. Advertisement and news are also shown in the main page and updated in every day.

Site Map

This page contains a map for the website and it can guide users how to access the website. However, it contains all links in the website and ordered as main page until to sub page. These links are ordered according to the priority of each one. User can open the site map to understand how to reach for the requested pages and links. However, Iraqi e-Government system provides site map but it does not introduced in robust way.

Contact Page:

This page added to the website to enable user to contact with the administration of the website. However, this page contains e-mails, phone numbers and fax numbers. E-mail is marked with website extension such as: aaaa@Iraqi-eGovernment.com which is existed in Iraqi e-Government but replication is delays or does not reach to the user. Besides that, the system users can send their recommendation and notes via this page. Administrator is responsible for monitoring this page and replying to the users' questions.

Search Page:

Search page enables user to search for any topic: page name, links, articles...etc. This page uses special algorithm in searching that depends on "semantic analysis search" which gives the most matched subjects first. Also, this page supports for users all needed links without

searching for them within the pages. Iraq e-Government contains Search page but it does not depend on robust match methods such as sentiment analysis besides to match algorithms.

Page of Complaints and Suggestions:

This page has a form that enables user to fill the form with the opinions of users about many different arguments such as: type of services, responding and other opinions. The form is connected with the system database and when user fills data, this data will be stored in the database directly to be read by administrator.

Statistical Page:

This page introduces statistics about the number of visitors who have visited the e-Government. Besides that, this page gives statistics in charts and updated every time.

Services Pages:

These pages contain dynamic contents because they receive data from users and reply with results. These pages official services and the users upload their document via them and they receive replications and results via these pages. However, Iraqi e-Government does not contain like these pages, but all the contents of Iraqi e-Government are static.

3.6 Flowcharts and Algorithms

Flowcharts and algorithms depend on the system sequences and system procedure. The system procedures were divided into sub-procedures in order to understanding how the system sequences the steps of servicing the Iraqi citizens.

Login procedure

As shown in figure (3.82), citizen opens the login page and then inserts username and password that are already stored in the system database. Then system will authenticate the validity of the entered data. If the entered username and password matches the stored data in the database the system will enable the user account and then all the services are enabled to the user. If the entered data are not matched the stored data in the database the login page will appeared continuously.

✚ Requesting service

After user fills the official document of any matter, user requests service that it is necessary for this document. As shown in the following flowchart in figure (3.15), user requests the service. After that, user enters that required data of the document which includes personal data and data about the required service. However, the system requests from user to confirm the order. Then, user must pay the fee of the document by executing the payment operation. The success of the payment operation depends on the assurance from the bank which checks the balance of the user. If the user balance covers the fee of document, bank sends approval to the e-Government system which be considered by the system to complete the procedure of the official document. Finally, the system requests from user to confirm the order in order to transmit order to the system database.

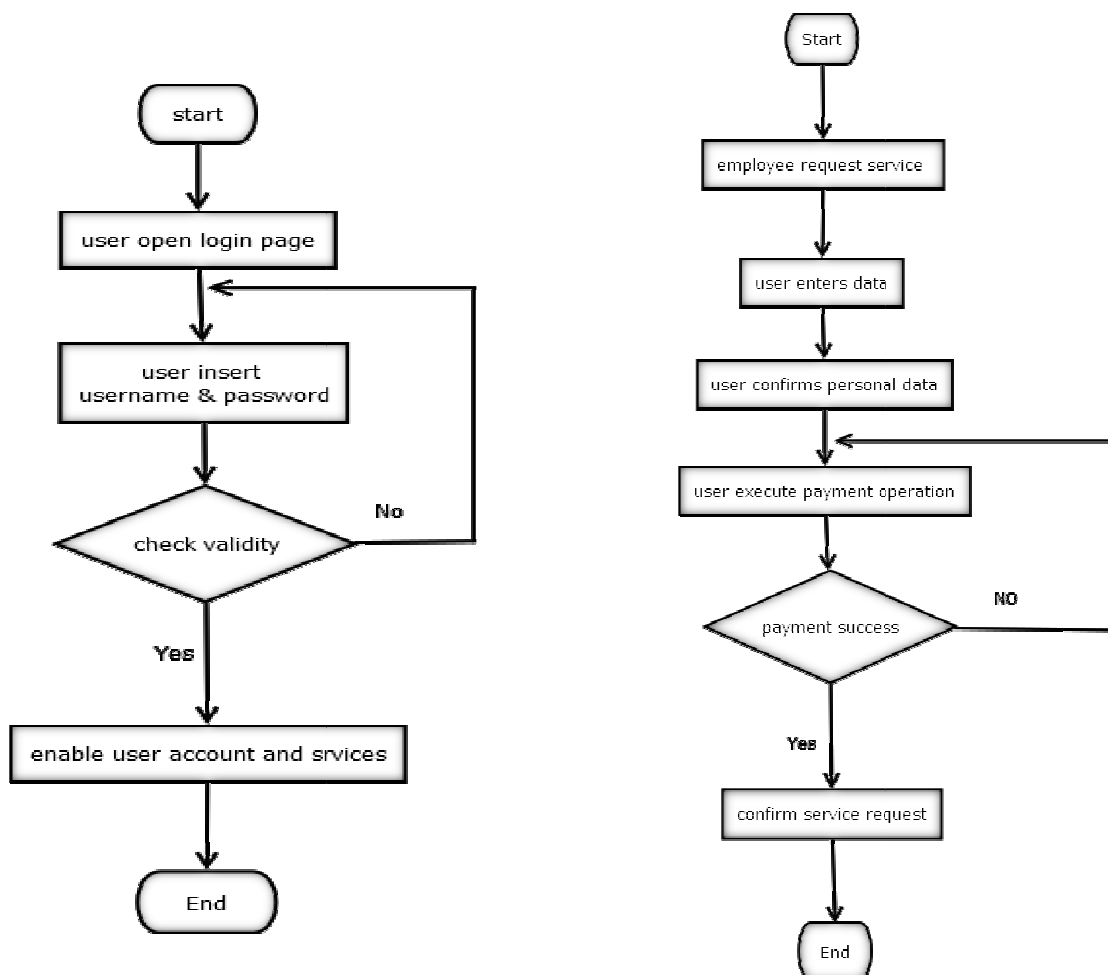


Figure 3.16: login flowchart

Figure 3.17: requesting service flowchart

Registration Scenario

In first stage citizen author opens registration page and fills the required personal data and then submits the data as shown in figure (3.17). After submitting, data will be stored in the database which will be saved in table “Citizen”. After completing the registration on the system, administrator checks the user account to check if the entered data was real or not. However, administrator then replies to the user if the account is accepted or not.

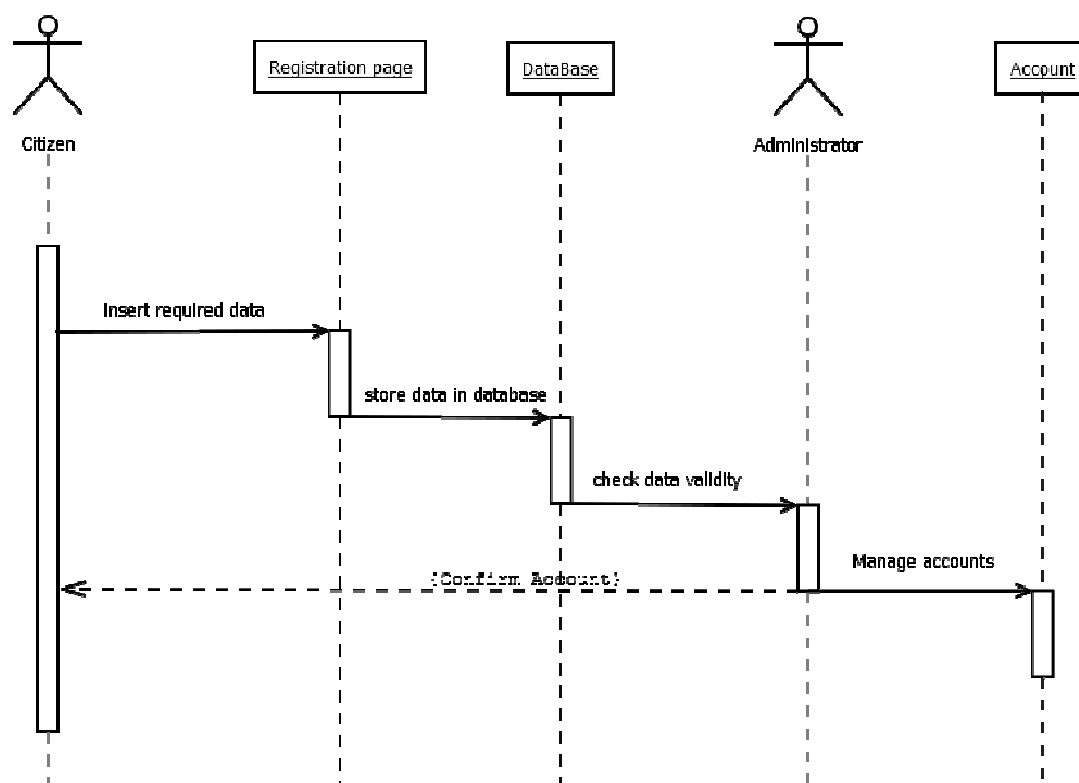


Figure 3.18: Scenario of Registration in the proposed system

Official Document Procedure

Figure (3.18) indicates how the citizen author submit official document to the system. However, the figure shows the registered citizen (user) opens the form of the official document and fills the form with the required data according to the nature of the document subject. After that, user actor requests the required service of the document and system replies with feedback process to indicate the result of the service. After submitting the document and executing the services the payment page will be appeared to executing the payment operation by the user. Then

the official document will be stored in the database which will be checked by civil servant and replying to the user about his official document.

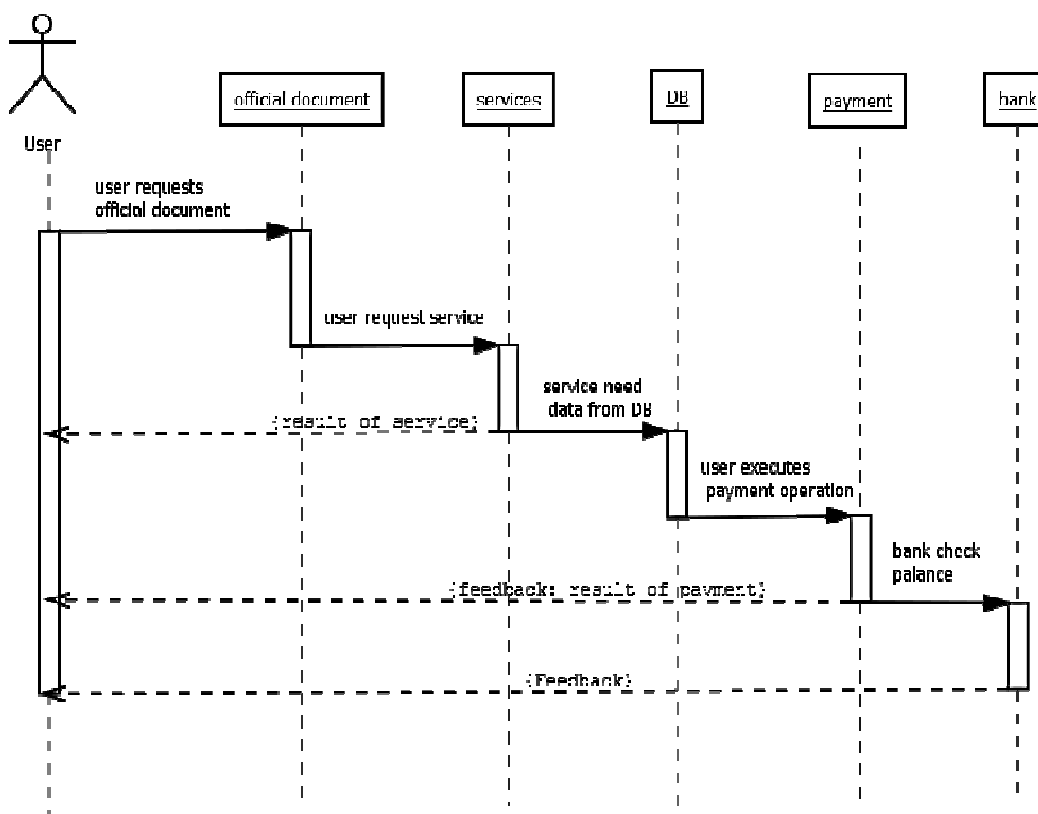


Figure 3.19: Scenario of Performing Official Document

✚ Use Case Diagram

In our proposed system four main actors are available: User, Civil Servant, Administrator and Bank which are not existed in both Iraq and Jordan e-government. Each actor has individual role and affects the system performance according to the processes that the actor accesses. More than one actor may share in the same function as shown in figure (3.19). User, Civil servant and Administrator share in “create account” function. On the other hand, user requests services and executes payment operation. Administrator confirms users’ accounts if they are real and administrator also manages the accounts and services on the website. Besides that, civil servant confirms the official document after checking the reliability of the document.

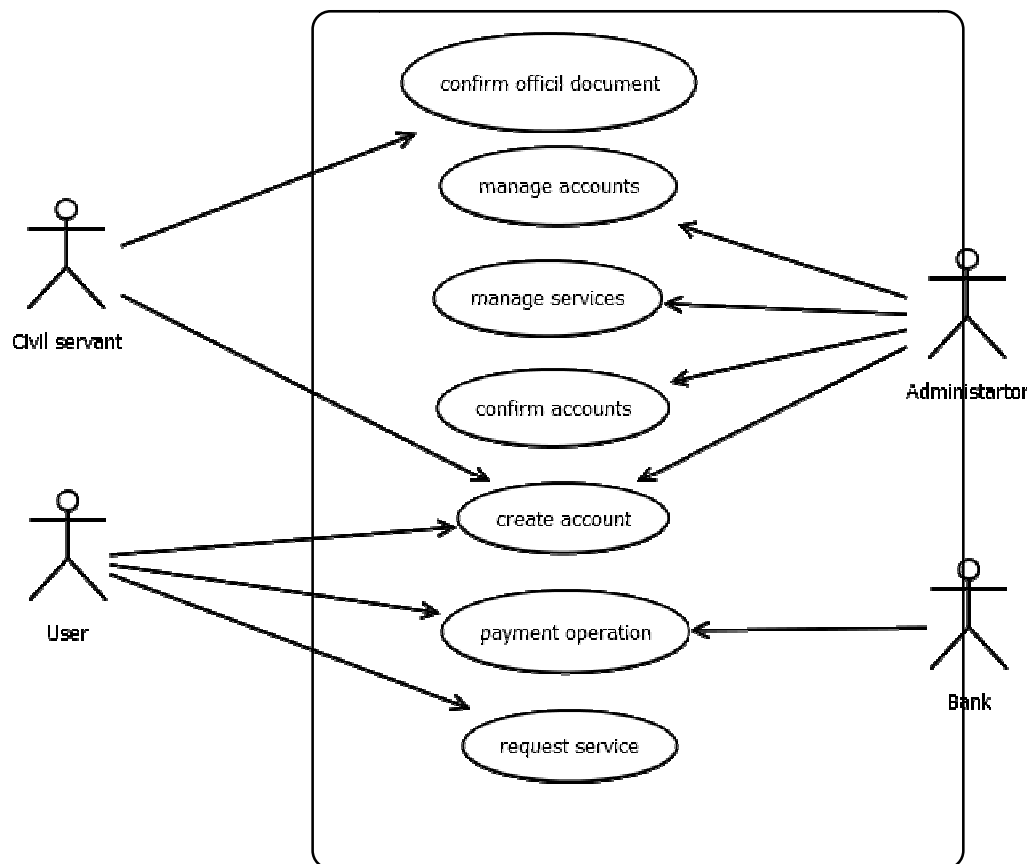


Figure 3.20: Use Case Diagram of the System

✚ Static Class Diagram

Figure (3.20) shows the classes of the system that are indicated in the database as entities. Classes are interconnected together via relationships that express the nature of each class role. In programming stage it is important to indicate the relations between the classes. Static class diagram is the main building block for object oriented. Citizen class is connected with bank class and official document class. Administrator class inherits Civil servant class properties because administrator is also an employee in the system and carries the same properties of civil servant but it has different role. Civil servant works in specific department so civil servant class is connected with department class and this relationship is called “has a” because department has many employees (civil servants). The relationship between citizen and official document is “has a” while the relationship between administrator and civil servant is “is a” which means that administrator class inherits properties of civil servant class.

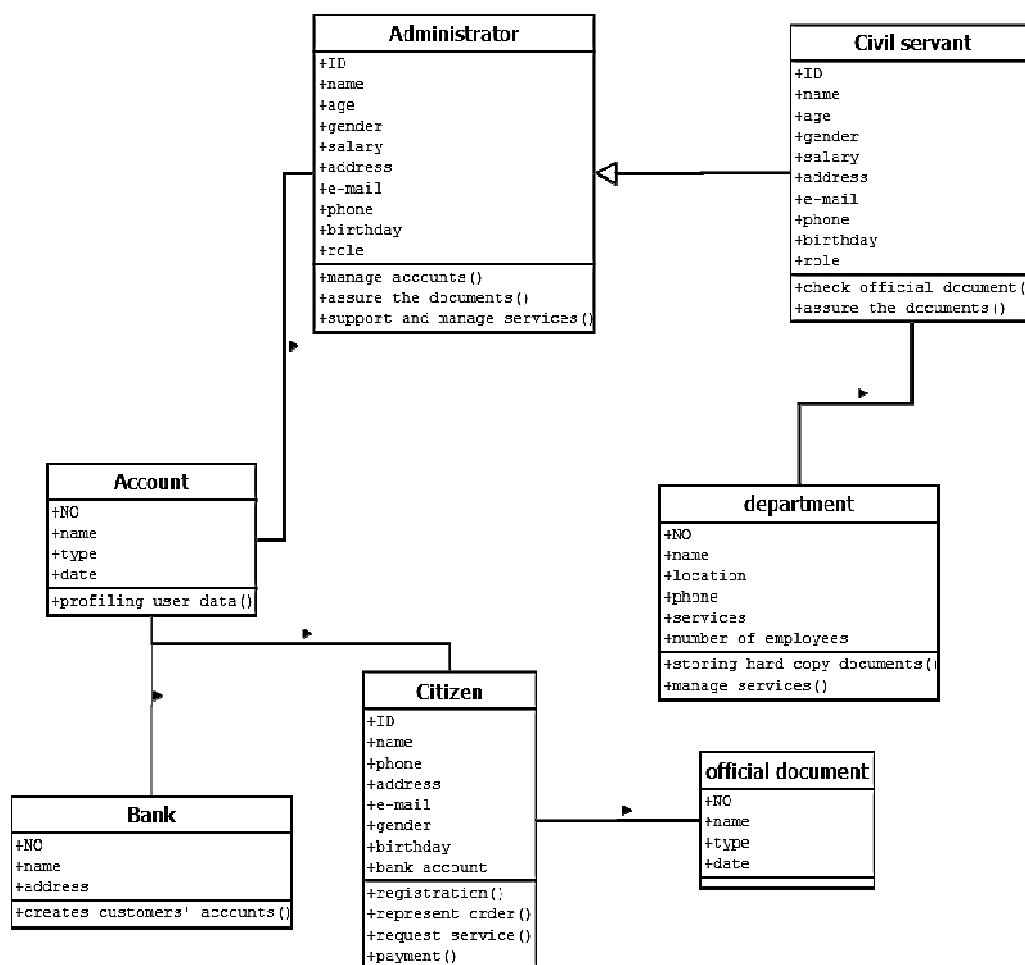


Figure 3.21: system static class diagram

Analysis

Analysis of the system consists analyzing each part and each stage in the system procedure. Stages of executing any official document by the system includes saving the data into system database. However, stages of the official document process include many processes and executing many algorithms that takes time from overall executing time. The overall executing time is calculated by sum each stage time and also noting the delay time that may be caused by problems or delay in executing wrong service in inappropriate stage. Also, large number of users at the same time may reduce the efficiency of the website particularly when there is huge number users access the system database. The following equation shows indicates the overall time spent:

$$\text{executing time} = \sum_{i=0}^{\text{number of stages}} (\text{stage time})_i + \sum_{i=0}^{\text{number of stages}} (\text{delay time})_i \quad (2)$$

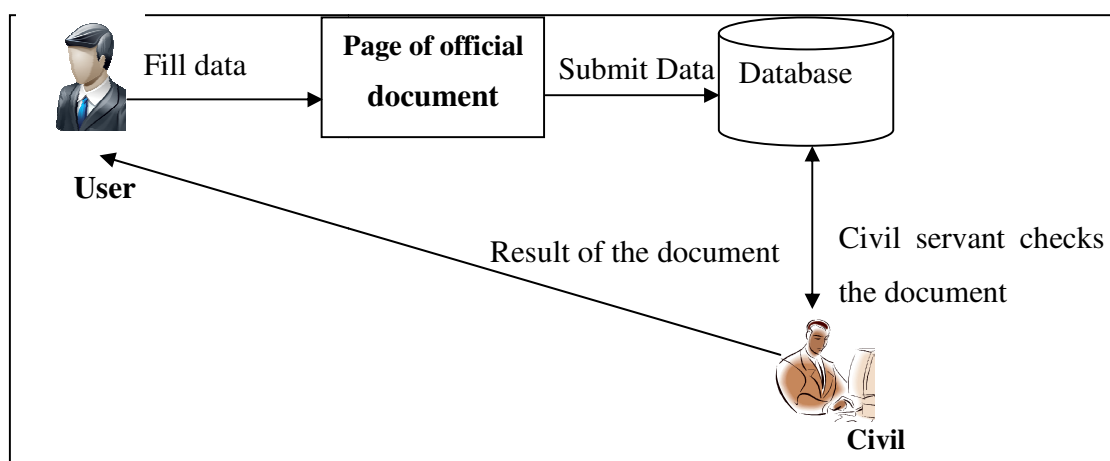


Figure 3.22: requesting service using official document

As shown in figure (3.21), the civil servant opens the official document and checks the reliability of the entered data in order to reply to the user about the result of the document. This process takes time according to the policy of dealing with these cases based on the government policy in official procedures. The time that token in this stage is internet access time and time of revision the document by the civil servant.

Releasing the e-Government Website

According to Tracy et al., (2007) designing the website using appropriate programming language and already PHP chosen as a programming language besides to HTML. In parallel with designing the website pages, developers design and build the system database and manage it in order to complement application with the database. After that, developers prepare hosting for the website to reserve space on the host. Additionally, hosting is last step in development of the website that can be done free hosting or by paying money as a cost of hosting on the server. However, releasing e-Government website to Internet will take time until the website will activate because of the stages of releasing on a server. It is better if the developers repair web server in order to upload the system website on this server. This technique increased the security on the website because it is uploaded on existed server. Web server enables the developer to maintain, check and control the website contents and pages in little time and in secreted way.

Chapter Four: Conclusion and Future Works

4.1 Conclusion

E-Government system is considered as electronic governmental system which allows the citizen to execute the official procedure for any official document using the web based platform only. In this research, it can be concluded that all official documents can be conducted and processed at web based e-Government system. However, new e-Governmental model that preserved all e-Government factors is represented and the suggested model supports good interface strategy for the website of system which makes user satisfied. On the other hand, the suggested system represents strong security plan on the database using different methods in order to keep data from hacking or lost. The security also covers all pages on the website and increases the citizen confidence with e-Government system because it supports feedback processes for each operation on the system website. The user interface design within e-Government system in Jordan enjoyed with high quality level, where most of results over than 3 averages mean. In the case of Iraq e-Government system, the user interface design outcomes obviously illustrates that the mean average less than 3, which is considered as an indicator to that the extent of satisfying customers who deal with e-Government system in Iraq.

Moreover, most of Iraqi citizens are not satisfied with the current e-Government system which strength our hypothesis about user satisfaction when they are using e-Government system. Confidence with e-Government system was the main factor in our policy in building the system because the interest with user loyalty for our system is existed. The new model that is represented in this research faces all factors of e-Government system and users' satisfaction factors particularly payment of fee using internet. The new developed Model was viewed in chapter methodology which is used as a guide to develop Iraqi e-Government system. Development contains many stages started from Interfacing until to designing system database which serves very huge data. Based on these results the researcher builds development models for e-Government system. The enhanced model of e-Government system is viewed in page 53. Also, the research views the strategy of User Graphical Interface (GUI) which affects the user behavior towards e-Government system as well as content management system (CMS).

Furthermore, the questionnaire indicated that most of Iraqi citizens worry about payment using websites such as: e-Government website. For this reason mainly the model has been investigated with new methods and techniques that make user trusted with e-payment operations. The questionnaire showed that most Iraqi people need guaranteed e-Government system because they worry about their personal data. Also, the questionnaire showed that the current Iraqi e-Government does not have the factors that make users trusted and satisfied with the system website. However, the system website reduces the risk about data storage and data validation according to the results of the questionnaire. The privacy and data protection aspect, despite of that there is variation in the results in Jordan case, also that there is medium mean value which is relatively acceptable mean value reflect satisfaction but still need improvement, the Jordanian e-Government system still considered much better from the Iraq system, where in case of Iraq the mean average show low level of satisfaction. In respect to service side, the average mean of Jordan case reflects the distinguished performance level regarding the service provided by e-Government system, where a lot of values and results more than 3, and this is a highly-positive indicator. On the other hand, Iraq case the average mean value was low and reflect low level of satisfaction which mean that such aspect has poor level and need to be developed more and more.

E-Government systems affect the official employees and Iraqi citizens parallel. E-Government system benefits citizens by allowing them to perform the official document in little time and without routine procedures. Also, the system affects the employees by reducing the official daily documents and reducing the wasted time in performing the official procedures. In general, e-Government systems reduce the wasted time in the official procedure time with low costs.

4.2 Future works

Regarding Future works, interfacing and data security still need more study and enhancement. There is motivation for studying management of system contents and support web based platform with functionalities. It is better to study improving e-Government system by adding official platforms at system web based platform. On the other hand, the future works must constraint on studying possibilities of connecting banks systems with e-Government system in order to facilitate payment operations and save the wasted time in conducting official

documents. Also it can concentrate on studying other technical issues related to e-Government system, such as learning systems and Massive open Online courses systems.

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Appendix 1

Questionnaire (Enhanced Model for e-Government Applications: A Comparative Study between Jordanian and Iraqi Citizens)

This questionnaire aims to recognize the opinions of citizens towards to the e-Government system in order to build e-Government system that fulfills their requirements and needs to achieve user loyalty. To be informed that the data you would support will help us to reach a greater understanding of this issue. Also, note that the answer will be based on the current situation and is not a situation in which you are looking to be.

We very much hope in scientific cooperation and the answer to paragraphs of the questionnaire carefully, accurately and objectively, given their deep impact in the enrichment of this study, and to ensure the safety analysis and sincerity conclusion. Note that all the data will be used for research purposes only, and will be treated confidentially. If you want a copy of the results we will be pleased sent to you via e-mail until the end of the search, and we thank you for your cooperation and patience.

Receive sincerely,,

First: Personal Information

1. Gender

Male

Female

2. Age

Less than 25 years old
years old

More than 25 and less than 40

More than 40 and less than 56 years old

More than 56 years old

3. Qualification

High School

Bachelor

Master

Other

4. Place of Residence

Urban

Rural

5. Job Title

Manager

Supervisor

Manager of department

Employee

Other

6. Do you have knowledge about e-Government system?

Yes

No

7. Are you aware of the benefits of e-Government system?

Yes

No

8. Did you deal with e-Government system?

Yes

No

9. Do you usually use e-Government system?

Yes

No

No	Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
User Interface Variable						
H1	e-Government system has appropriate user interface					
S1	The general frame of the user interface is well designed					
S2	The user interface provide flexibility in dealing with e-Government system content					
S3	The access to the desired information within the system is clear and simple					
S4	The language used in the system reflect its meanings in understandable and clear manner					
S5	The user interface uses pages with modern and contemporary design					
S6	The available information on the e-Government system is accurate and clear					
Privacy and data protection variable						
H2	e-Government system provides high level of security and privacy for user information					
S1	The system provides high level of protection regarding personal data for users					
S2	Reliability degree for data mentioned on e-					

	Government system with characterized high level					
S3	The system provides protection and prevention against hacking and viruses					
S4	The system provides precautionary measures in terms of technical problems such as backup version for database					
S5	I trust the authorized people to use personal information and database on e-Government system					
S6	The system provides security precautionary measures in case of the occurrence of any emergency technical defect to keep users accounts in good manner					
Service Side variable						
H3	The e-Government system provides comprehensive services for users					
S1	The e-Government system provides search services in good manner					
S2	e-Government system provides set of laws, regulations and instructions for users					
S3	The e-Government system provides system map service in good manner					
S4	e-Government system provides quick response					

	on inquiries and questions					
S5	The system provides feature of complaints and suggestions in smooth and organized manner					
S6	The system provides query services in good manner					
S7	e-Government system characterized by its quick and easy browsing					
S8	e-Government enable the users to know all updates on the web pages of system					
Overall Performance Variable						
H4	e-Government system characterized by comprehensive performance that fulfills all needs					
S1	The available information on the e-Government system fulfill the requirement of high percentage of user services					
S2	The e-Government system contributes in decreasing loads on the different governmental departments in the public sector					
S3	The contents of e-Government system are appropriate all classes of people					
S4	The system contributes in saving time and effort					

S5	Pages of e-Government system are dynamic pages					
S6	Information show in the e-Government system achieve its desired goals					
S7	e-Government system characterized by its high flexibility that helps on uploading and downloading information					
S8	e-Government system provides information similar to that available on the other governmental departments					

Appendix 2

بسم الله الرحمن الرحيم

استبانة بعنوان (تعزيز نموذج لتطبيقات الحكومة الإلكترونية: دراسة مقارنة بين المواطنين الأردنيين والعراقيين)

تهدف هذه الاستبانة إلى معرفة آراء ووجهات نظر المواطنين من أجل بناء نظام حكومة إلكترونية يعكس متطلباتهم ويلبي احتياجاتهم لبناء ثقة عالية وولاء لدى المستخدمين. أرجو العلم بأن المعلومات التي ستزودونها بها ستساعدنا للوصول لفهم أكبر لهذه المسألة، كما نرجو العلم بأن الإجابة ستكون اعتماداً على الوضع الحالي وليس الوضع الذي تتطلعون أن يكون عليه الحال. أملنا كبير في تعاونكم العلمي والإجابة على فقرات الاستبانة بعناية ودقة وموضوعية، لما لذلك من أثر بالغ في إثراء هذه الدراسة، وضمان سلامة التحليل وصدق الاستنتاج. علماً بأن كافة البيانات التي ستعطيها ستستخدم لأغراض البحث العلمي فقط، وستعامل بسرية تامة. إذا رغبت بنسخة من النتائج سنكون مسرورين بإرسالها لك عبر البريد الإلكتروني حين انتهاء البحث، ونشكر لكم تعاونكم وصبركم.

واقبلوا فائق الاحترام،،،

أولاً: المعلومات الشخصية

1. الجنس

ذكر أنثى

2. العمر

أقل من 25 سنة أكثر من 25 وأقل من 40

أكثر من 40 وأقل من 56 56 سنة وأكثر

3. المؤهل العلمي

الثانوية العامة بكالوريوس ماجستير أخرى

4. مكان السكن

مدينة قرية

ثانياً: معلومات الاستخدام

1. هل لديك معرفة بنظام الحكومة الالكترونية؟

نعم لا

2. هل لديك معرفة بالفوائد المتحققة من استخدام نظام الحكومة الالكترونية؟

نعم لا

3. هل سبق لك ان تعاملت مع نظام الحكومة الإلكترونية؟

نعم لا

4. هل تقوم باستخدام نظام الحكومة الالكترونية بشكل متكرر؟

نعم لا

ثالثاً: يتضمن هذا القسم عبارات تقيس مدى رضا المستخدمين عن نظام الحكومة الالكترونية من خلال اربعة ابعاد وهي: واجهة المستخدم، الامان وسرية المعلومات، الخدمات المقدمة والاداء العام. يرجى التكرم بوضع إشارة × أمام العبارة التي تعكس رأيك.

الرقم	العبارات	غير موافق بشدة	غير موافق	محايد	موافق	موافق بشدة
متغير واجهة المستخدم						
1H	يوفر نظام الحكومة الالكترونية واجهة مستخدم مناسبة					
S1	الشكل العام لواجهة المستخدم ذو تصميم متناسق وعملي					
S2	توفر واجهة المستخدم مرونة في التعاطي مع محتويات البوابة الإلكترونية					
S3	الوصول إلى المعلومات المطلوبة في النظام سهل وواضح					
S4	اللغة المستخدمة في النظام تعكس مدلولاتها بصورة واضحة ومفهومة					
S5	توفر واجهة المستخدم موقعاً ذا تصميم عصري وحديث					
S6	المعلومات المتوفرة على البوابة الإلكترونية دقيقة وواضحة					

متغير الامان وسرية المعلومات

متغير الامان وسرية المعلومات					
الرقم	العبارات	غير موافق بشدة	غير موافق	محايد	موافق بشدة
H2	يوفر نظام الحكومة الالكترونية درجة عالية من الامان والسرية لمعلومات المستخدمين				
S1	يحافظ النظام على خصوصية استخدام المعلومات الشخصية في سياقها القانوني				
S2	درجة الموثوقية للمعلومات الواردة على البوابة الإلكترونية عالية				
S3	يوفر النظام حماية ووقاية من الاختراقات والفايروسات				
S4	يوفر النظام إجراءات احترازية إزاء المشاكل الفنية كالنسخة الاحتياطية لقواعد البيانات				

					لدي ثقة بالأشخاص ذوي الصلاحية باستخدام المعلومات الشخصية وقواعد البيانات في نظام الحكومة الالكترونية	S5
					يوفر النظام إجراءات وقائية أمنية في حال حدوث أي خلل فني طارئ بهدف حفظ حسابات المستخدمين بصورة جيدة	S6
متغير الخدمات المقدمة						
					يوفر نظام الحكومة الالكترونية خدمات شاملة للمستخدمين	H3
					يوفر النظام خدمة البحث بصورة جيدة	S1
					يتوفر في النظام مجموعة القوانين والأنظمة والتعليمات الخاصة بالمستخدمين	S2
				غير موافق بشدة	العبارات	الرقم
موافق بشدة	موافق	محايد	غير موافق	موافق		
					توفر البوابة الإلكترونية خدمة خارطة النظام بصورة جيدة	S3
					سرعة التجاوب والرد على الاستفسارات والأسئلة عالية	S4

					يتوفر في النظام خاصية تقديم الشكاوى والاقتراحات بصورة سلسلة ومنظمة	S5
					يتوفر في النظام خدمة الاستعلام بصورة جيدة	S6
					يتميز نظام الحكومة الالكترونية بسرعة وسهولة التصفح بكفاءة عالية	S7
					يساعد نظام الحكومة الالكترونية المستخدمين في معرفة جميع التحديثات التي تطرأ على النظام	S8
متغير الاداء الشامل						
					يتميز نظام الحكومة الالكترونية بأداء شامل يلبي جميع متطلبات المستخدمين	H4
					المعلومات المتوفرة على البوابة الإلكترونية تلبي احتياجات نسبة كبيرة من الخدمات للمستخدمين	S1
					يساهم النظام في تخفيف الأعباء على الدوائر والجهات الحكومية المختلفة في القطاع العام	S2

الرقم	العبارات	غير موافق بشدة	غير موافق	محايد	موافق	موافق بشدة
S3	تناسب المحتويات المتوفرة على نظام الحكومة الالكترونية مختلف شرائح المجتمع وفئاته					
S4	يساهم نظام الحكومة الالكترونية في توفير الوقت والجهد على المستخدمين					
S5	يتميز نظام الحكومة الالكترونية بتكنولوجيا التحديث المستمر					
S6	عرض معلومات النظام يحقق الأهداف المرجوة منها					
S7	يتميز نظام الحكومة الالكترونية بمرونة عالية تساعد المستخدمين على تحميل وتنزيل البيانات					
S8	يوفر نظام الحكومة الالكترونية معلومات مطابقة لتلك المتاحة في الدوائر بصورة كاملة					