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Evaluation of E-government Project in Iraq:
The General Directorate of Traffic (Case Study)

M. Sc. Thesis

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Evaluation of E-government Project in Iraq:
The General Directorate of Traffic (Case Study)

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AHMED Anwer M. RAMADHAN

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ABSTRACT

Evaluation of E-government Project in Iraq: The General Directorate of Traffic (Case Study)

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The main objective of the e-government project is to provide online services to citizens by using the information technology and particularly the Internet. Thus, the use of information and communication technology (ICT) is the key element of any e-government project. Consequently, great efforts are presented by governments to develop their infrastructure, staffing skills, governmental websites and citizens' awareness to achieve this objective. In Iraq, the government took its first steps to develop the e-government at the end of 2003. These steps represented by putting the implementation strategy of e-government with the help of the United States. Most ministries and institutions had create their own e-government project through their websites. Although it provided few services for citizens, the initiatives were likely good as a young project. Unfortunately, there were many challenges that handicapped the development of the e-government in Iraq involving political reasons, poor infrastructure, digital divide and lack of funding lack. The last reason played an important role in the middle of 2014 and the stakeholder could not maintain the portal of the Iraqi e-government. However, some governmental institutions still create or develop their own e-government projects.

This thesis makes an evaluation of the e-government project of the General Directorate of Traffic (GDT) as case study by using a risk assessment technique called Design-Reality Gap (DRG) model to avoid failure in such project we made. This evaluation introduces the gap exist between the design stage and the reality situation in the GDT. Besides, it takes actions to reduce the gap to increase the success rate. In addition, a proposed assessment technique used to complete the evaluation process. This thesis also presents the e-government of Iraq in general as well as the e-government of two other countries. During the evaluation process, the thesis emphasizes on the technical aspects of the e-government project.

Keywords: Iraq, E-government, ICT, project, GDT, Evaluation, Risk Assessment, DRG.

ÖZET

Irak'taki E-Devlet Projesinin Değerlendirilmesi:

Trafik Genel Müdürlüğü (Vaka Çalışması)

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E-devlet projesinin amacı, bilgi teknolojisini ve özellikle İnternet'i kullanarak vatandaşlara hizmet sunmaktır. Böylece, bilgi ve iletişim teknolojisinin (BİT) kullanımı, herhangi bir e-devlet projesinin kilit unsurudur. Sonuç olarak, hükümetler tarafından altyapılarını, personel yeteneğini, hükümet web sitelerini ve vatandaşlar tarafından bu hedefe ulaşmak için farkındalık geliştirilmesi için büyük çabalar gösterildi. Irak'ta hükümet e-devleti 2003 yılı sonunda geliştirmeye yönelik ilk adımlarını atmıştı. Bu adımlar, Birleşik Devletlerin yardımıyla e-devletin uygulama stratejisini koyarak temsil edildi. Çoğu bakanlık ve kurum kendi web siteleri aracılığıyla kendi e-devlet projelerini yaratmıştı. Vatandaşlar için az sayıda hizmet sunmasına rağmen, girişimler genç bir proje olarak iyiydi.

Maalesef, Irak'taki e-devletin gelişiminde engel teşkil eden birçok zorluk vardı: siyasi sebepler, zayıf altyapı, dijital bölünme ve finansman eksikliği. Son neden 2014 ortalarında önemli bir rol oynamış ve paydaş Irak e-devletinin portalını koruyamamıştır.

Bununla birlikte, bazı hükümet kurumları hala kendi e-devlet projelerini yaratıyor veya geliştiriyor. Bu tez, Yaptığımız projede başarısızlığı önlemek için Design-Reality Gap (DRG) modeli adı verilen bir risk değerlendirme tekniği kullanarak Trafik Genel Müdürlüğünün e-devlet projesinin (GDT) bir vaka çalışması olarak değerlendirilmesini sağlar. Bu değerlendirme, GDT'deki tasarım aşaması ve gerçeklik durumu arasındaki boşluğu ortaya koymaktadır. Ayrıca, başarıyı artırmak için boşluğu azaltmak için eylemler gerekiyor. Buna ek olarak, değerlendirme sürecini tamamlamak için önerilen bir değerlendirme tekniği kullanılmıştır. Bu tez, Irak'ın e-devlet yanı sıra diğer iki ülkenin e-devletini de ortaya koyuyor. Değerlendirme süreci boyunca, tez, e-devlet projesinin teknik yönleri üzerine vurgu yapar.

Anahtar Kelimeler: Irak, E-devlet, BİT, proje, GDT, Değerlendirme, Risk Değerlendirmesi, DRG.

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LIST OF ABBREVIATIONS

ICT	Information and Communication Technology
USAID	United State Agency for International Development
DRG	Design-Reality Gap
G2C	Government to Citizen
G2B	Government to Business
G2G	Government to Government
G2E	Government to Employee
EGDI	E-government Development Index
TII	Telecommunication Infrastructure Index
OSI	Online Service Index
HCI	Human Capital Index
PSN	Public Secure Network
GSI	Government Secure Intranet
GCSx	Government Connect Secure Extranet
GDT	The General Directorate of Traffic in Iraq
VSAT	Very Small Aperture Terminal

1. INTRODUCTION

The e-government project in Iraq represents the first steps that the government had taken to develop the Information and Communications Technology (ICT) concept in the country after the United States invasion in 2003. Before that, the development of ICT was limited by many factors that involve political, economic and social factors. These factors isolated the country from its neighbors and handicapped the interaction with outside world. In opposite, a project like e-government requires an openness by the government to the technology world without any restrictions. Therefore, many efforts had been put by the people in charge make the e-government of Iraq one of the modern and effective e-government projects. When we talk about e-government, we mean many nested projects, each project belongs to a ministry or institution or even a governmental department.

1.1 OVERVIEW ON IRAQI E-GOVERNMENT:

The new government in Iraq established the Ministry of Science and Technology in the mid of 2003. This ministry included many research centers interested in aspects of Iraqi citizens' life. In June 2004 and with the help of the United Nations, the ministry signed a memorandum with the Italian Ministry of Innovation and Technology to create a national network in Iraq that connects the ministries with each other as a beginning of E-government. According to this memorandum, the Italian Ministry would provide the technical and financial support to build an intranet project in Iraq; this was the first step in creating the E-government in the country [42]. In 2007, United States Agency for International Development (USAID) and the Iraqi Ministry of Science and Technology put a strategy from (2007) to (2010) to develop the E-government

project in Iraq. This strategy would ensure success if it has enough support and sponsorship [43]. However, there were many obstacles against the success of this strategy such as the security situations especially in 2009. Thus, the e-government portal had become poor; it does not contain many services. Each ministry or institution has its own e-government and tries to develop it independently. The General Directorate of the Traffic (GDT) in Iraq began to design an e-government project in the middle of 2016.



Figure 1. E-government Strategy in Iraq from 2007 to 2010 [43]

1.2 PURPOSE AND RANGE:

This thesis debates the design of the e-government project of GDT in Iraq from the perspective of risk assessment. In other words, it evaluates the gap that exists between the design and the reality situation in the directorate. Besides, it evaluates the project from the perspective of the citizens. Thus, it indicates the extent of the risk that could make the project fail or success

according to the Design-Reality Gap Model (DRG) as well as the assessment of citizens. All these steps done before the implementation of the project to avoid the full failure and prevent the government to fund a project before it can be sure that the project will be success or partial failure in the worst case.

Additionally, this thesis diagnoses the aspects of failure if it exists and points out the solutions especially that are related with the ICT infrastructure.



2. A LITERATURE REVIEW OF E-GOVERNMENT

2.1 E-GOVERNMENT DEFINITION:

E-government generally is a term that refers to the services provided by the web from governments to their citizens [1]. Services and government proceedings are supported by information technology and especially the Internet. The interaction form between citizens and the government could be represents obtaining information, form filings or carrying out payments and other activities via the web. E-government projects are already implemented in many governments while some governments are considered as leaders of offering government services online. However, the long business processes of the government requires restructuring and converting to recognize the right potential of e-government. Gartner Group's defined the e-government as "the continuous optimization of service delivery, constituency participation, and governance by transforming internal and external relationships through technology, the Internet and new media." [2]. In any case, transforming primarily into production forms which general services are created and provided is one of the e-government goals, so the scope of links of governmental institutions with the businesses, citizens and other governments are converted to an electronical form [3].



Figure 2. E-government [56]

2.2 E-GOVERNMENT HISTORY:

While the historical backdrop of processing frameworks in government institutions could be characterized from the beginnings of PC history, the e-government term arose in the late of 1990s [4]. If we investigate the literature on “IT in government” we have to go back to the 1970s which regards IT use within government, whereas the modern e-government literature more often concerns the use of IT externally, for instance, providing online services to the citizens [5]. However, recent studies could not be pertinent to some earlier e-government versions, as many issues were decision-making, service procedures, and values. The whole definitions of e-government goes further and involve hierarchical change and the part of government. In this manner, as the establishment of e-government, the two strands of literature should be taken into account together [6].

2.3 E-GOVERNANCE DEFINITION:

The employment of information and communication technology (ICT) in the government to guarantee more involvement and profounder citizens’ participations, organizations, and the private area in the process of decision-making process of government can be a definition of the e-governance [7]. It is essentially the application that archives ‘Simple, Ethical, Responsible, Reactive and Transparent’ (SMART) governance [8]. The reasons behind the use of ICTs by governmental institutions are [9]:

- (a) Information interchange with citizens, businesses or other government agencies.
- (b) Services are delivered faster and more effective.

(c) Enhancing internal adequacy.

(d) Decreasing costs / rising revenues.

(e) Re-organizing of managerial procedures and enhancing service quality.

2.4 WHY E-GOVERNMENT?

The development of ICT around the world makes the globe smaller and collect the users in a huge network via the Internet. This development motivates (IT) professionals to find a way that makes the citizens close to their government and simplify the interactions between them as well as between the governments.

2.5 E-GOVERNMENT TYPES:

E-government provides different electronic services according to the citizens' requirements. This variety of needs leads to the evolution of different types of e-government.

- **Government to Citizen E-government (G2C):**

Government-to-citizens represents the application of providing customers (citizens) the information and enabling them to do government transactions, where the majority of government services similar to this application [11]. There is a continuous communication between government and citizens. Therefore, this type of application improves the services and supports responsibility. Utilization the citizens to facilitate the interaction with government is the major objective of G2C by using Internet websites, which make common information more attainable and decreases the time consumption for a transaction.



Figure 3. G2C E-government [57]

- **Government-to-Business E-government (G2B):**

Most studies put this application as the second major type of e-government classification. Governments and businesses could get considerable efficiencies by using G2B. Various services such as classification of policies, memos, rules, and regulations are exchanged between government and the business sections, all these services refer to the term of G2B [13]. Obtaining current business information, new regulations, downloading application forms, residence taxes, renewing licenses, registering businesses, obtaining permits, and many others represent offered business services. Besides, G2B transactions play an important role in the evolution of small and medium enterprises as well as in business development.



Figure 4. G2B E-government [57]

- **Government-to-government (G2G):**

The online connection between governmental institutions and departments over a super-government database is classified as G2G e-government. In addition, G2G could represent the relation that exist between the government and its employees [11]. G2G improves the performance of the services as it allows the sharing of database and resources as well as incorporates the skills of the employers. The simple and attainable style is the feature of G2G in forming information regarding restitution and benefit policies, training and learning ways, and civil rights regulations.



Figure 5. G2G E-government [57]

- **Government-to-employee (G2E):**

Few e-government projects use this application, as it is an internal part of G2G sector, while some researchers consider it as an independent e-government application [17]. G2E represents the relation that exist between government and its employees only [12]. Utilizing employees and providing several online services is the aim of G2E. Demanding an annual leave or checking the salary records are some of the services provided by G2E.



Figure 6. G2E E-government [57]

2.6 E-GOVERNMENT STAGES (FIVE STAGES OF DEVELOPMENT):

The evolutionary stages of e-government begins with information, interaction, transaction and vertical and horizontal phases [18][19]. In the building of an e-government project the designer not to have to cross these phases one by one. In other word, a stage includes an interaction before providing information could be done. UN (2005) presents a model of e-government that includes five stages, which is used for statistical analysis [20].

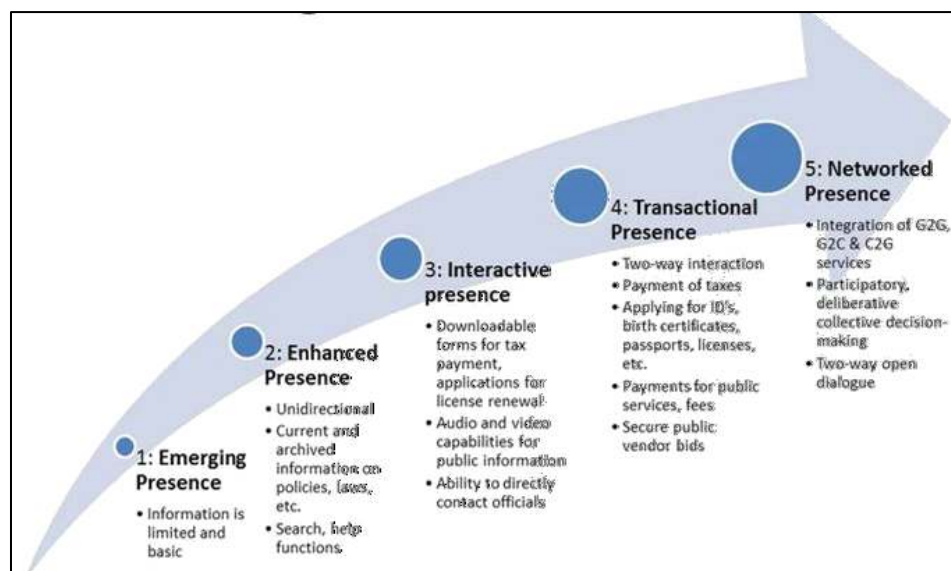


Figure 7. E-government Five Stages [20]

- **Emerging presence**

The information in this stage is bounded and basic [20]. The e-government in this step represents an official website, which has links to ministries such as education. It also could have a link to social insurance or domestic government. Besides, it could have some archived information such as the message of the manager or it could contain a simple document like the constitution. The options remain slight for citizens and most information stays static.

- **Enhanced presence:**

The government in this stage provides larger information and keeps it up to date. For instance, laws and regulations, reports, and newsletters. Citizens also could download databases from the websites and search for a document, as there is a site map [20]. E-government strategy, policy summaries on particular education or health issues could represent the public policy documents. The interaction remains unidirectional since the information flows from the government to the citizen.

- **Interactive presence:**

The application of license renewal and downloadable forms for tax payment represents the interactive online services of this stage. The services are improved to adapt the customer especially with the use of audio and video capabilities, which are pertinent public information [20]. Email, fax, telephone, and post are the facilities to reach the government officials in the website.

- **Transactional presence:**

The two-way interaction emerges in this stage where the interaction represents flowing the information between the citizen and the government. Many of G2C services like tax payment, issuing passports, issuing identity cards and issuing birth license are applied in a transactional form. The citizen could submit all these interactions in any time. In addition, this stage allows goods suppliers to offer their services online by using secure connections [20].

- **Networked presence:**

The most developed scale in the e-government projects is the networked presence stage where it represents the integration of G2G, G2C and their reverse interactions. The government provides an environment of a two-way open discourse and supports the contributory deliberative decision-making [20]. In this stage, the government asks the citizens to give their opinions about laws and policies as well as the interactive benefits such as the web feedbacks, and techniques of online consultation. The democratic right of the citizens allows them to understand the integration of the public institutions and the concept of cooperation for making a decision.

2.7 E-GOVERNMENT BENEFITS:

- **Improving the efficiency and reducing the cost:**

One of the upsides of e-government that it diminishes the requirement for the human energy of managing the main part of paper-based work. Thusly, e-government permits the procedure dealt with by less workers and in this manner, prompting reduced the cost of operations [22].

- **Saving the time:**

Both the government and citizens could save time through the services provided by the government via websites [23][24]. The competitiveness of business environment is enhanced by the e-government services and as a result, intelligent customers are created. E-government helps the businesses to save money, time and energy and invest them elsewhere [34]. Figure (7) shows the Estonia's e-government time saving from (2003 – 2014).

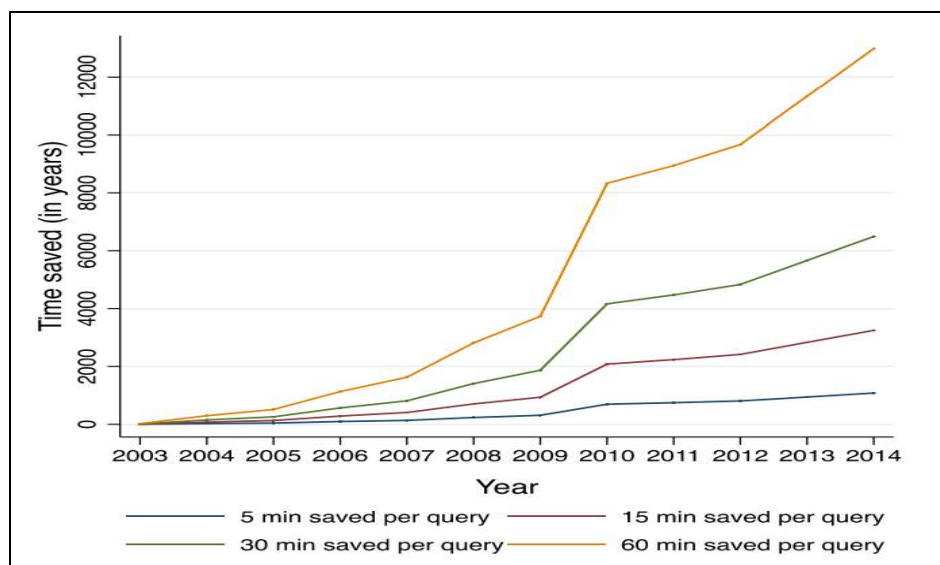


Figure 8. Estonia's e-government time saving [58]

- **Communication improvement among businesses, citizens and government:**

A better communications between three essential elements of e-government (business, citizens and government) represents another advantage of e-government. For instance, e-procurement makes the communication between G2G and B2B easily, which will allow business to compete the contracts offered by government. Therefore, the reason behind creating a wide market and a strong economy is the improvement in the interaction between government and business [25]. Figure (8) presents the communication between the domains of e-government.

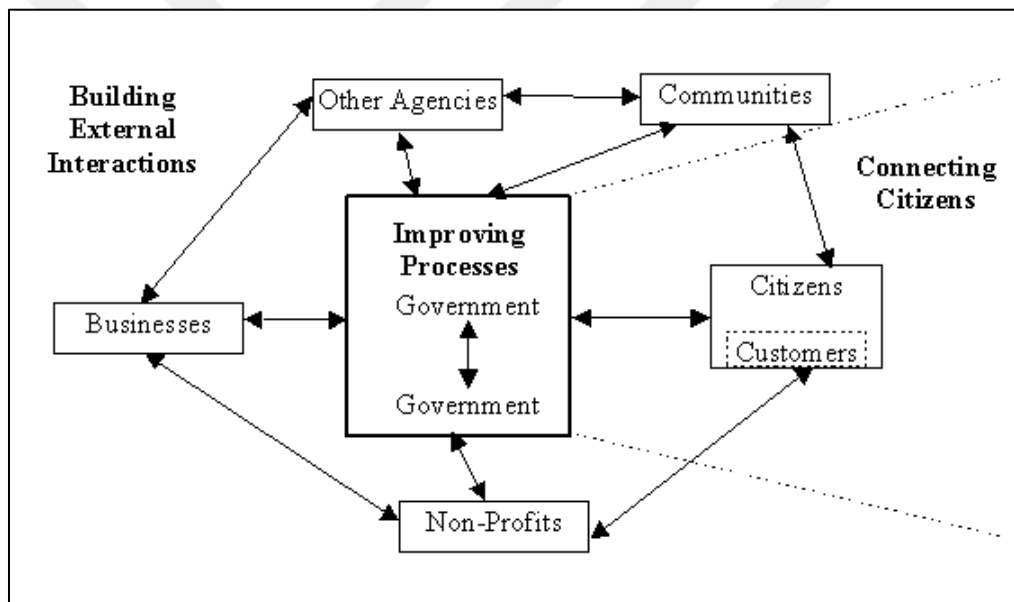


Figure 9. Focal Domains for E-government [49]

- **Accessing the services online:**

The main goal of any e-government initiative is simplifying procedures and making the access to government services simpler for public sector and citizens [26]. There is no a particular time for interacting with the government by citizens, also there is no a specific place to travel [23]. Figure (9) show the amount of using online services by the individuals in EU during (2009).

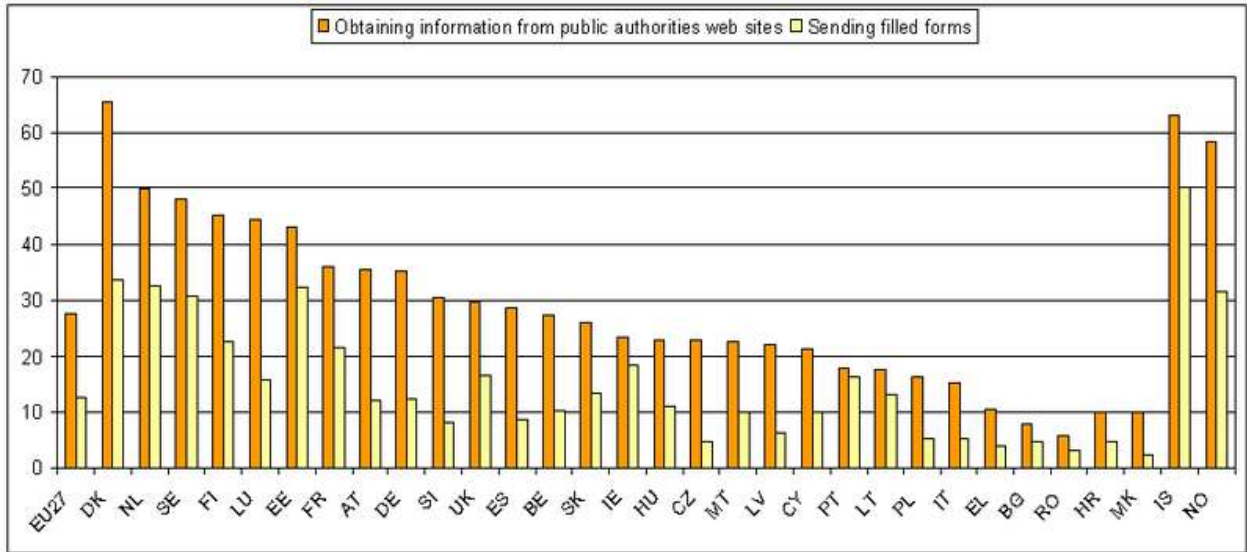


Figure 10. Online Interaction of individuals with public authorities by EU countries (2009) [59]

- **Increasing transparency and decreasing bureaucracy:**

The customer could easily assess and argue any official policies have been uploaded on any governmental website. A level of transparency and freedom of information is guaranteed, and corruption effectively is prevented. In e-government, bureaucracy is decreased, as digital data can transfer immediately from one office to another without crossing the traditional routine [27] [28].

Figure (10) displays the concept of transparency in e-government environment.

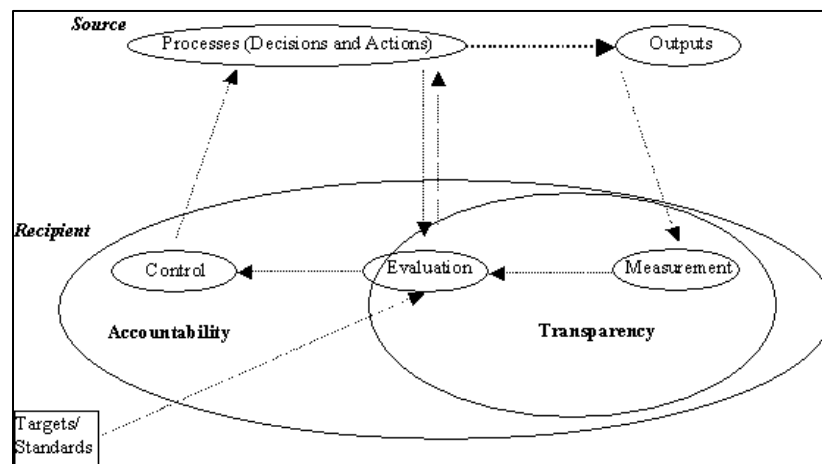


Figure 11. Transparency in E-government [49]

- **Electronic Participating:**

E-government helps to create an environment of transparency and democracy for decision making in a cooperative way and encourages the relationship between the citizens, government and business. It increases the efficiency and the responsibility between the two parties. For example, the participations of the citizens in the elections and using their votes through websites is a type of e-participation [30]. The concept of e-participation is shown in figure (11) below.

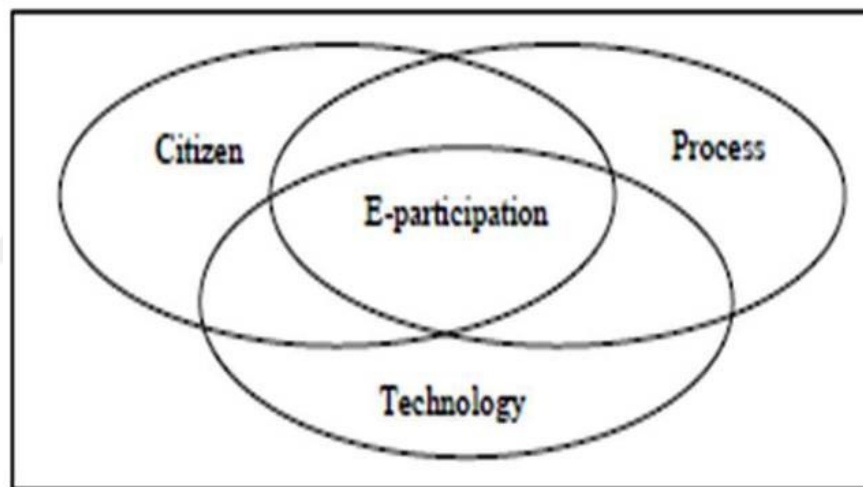


Figure 12. E-participation [60]

2.8 E-GOVERNMENT DRAWBACKS:

Although the e-government tries to develop the process of delivering services to citizens, the implementation of e-government has some disadvantages [21]. These drawbacks could be increase or decrease depending on the environment and the process of implementation.

- **Accessing inequality to the internet:**

Researches have proved that e-government usability could be decreased because the citizens are either not able to access the Internet or they cannot use computers effectively [31]. Therefore, literacy of the citizens prevent them to use provided online services. Besides, elderly people have lack of education and they could require help of other citizens who already use these services. This would to lead to the term of digital divide or (e-exclusion), which is the main drawbacks of e-government [27]. The Internet using rates in the world displayed in figure (12).

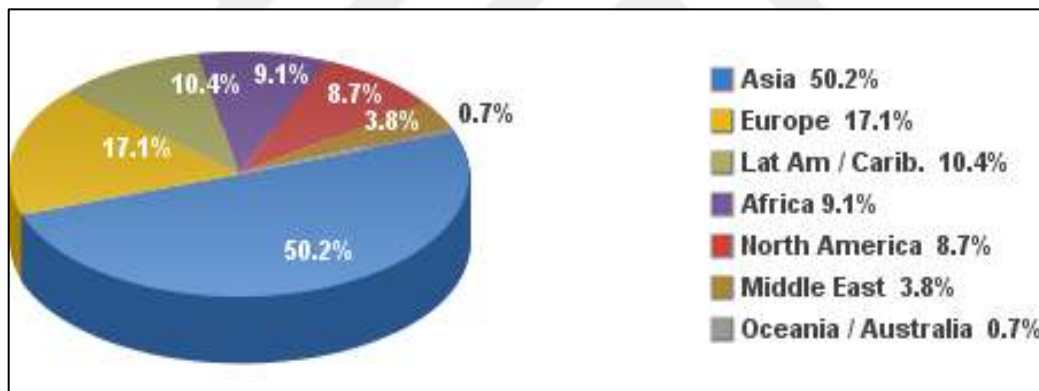


Figure 13. Internet users in the world by regions (DEC 2016) [61]

- **Trust insufficiency and cybercrime:**

The citizens who use e-government are still have a concern about security, a fear of spam when they provide their email addresses and saved interaction dates by the government although there is a great level of security provided by the e-government projects [29]. Cybercrime is the term that represents the attack of hackers to the government official websites and threatens them despite of government efforts to ensure a high level of safety for the private data of citizens [28]. Figure (13) presents the top 10 targets of cybercrime in (2016).

Thus, the usability of the e-government projects is decreased due to the low trust of customers in keeping the private information away from cybercrime [27].

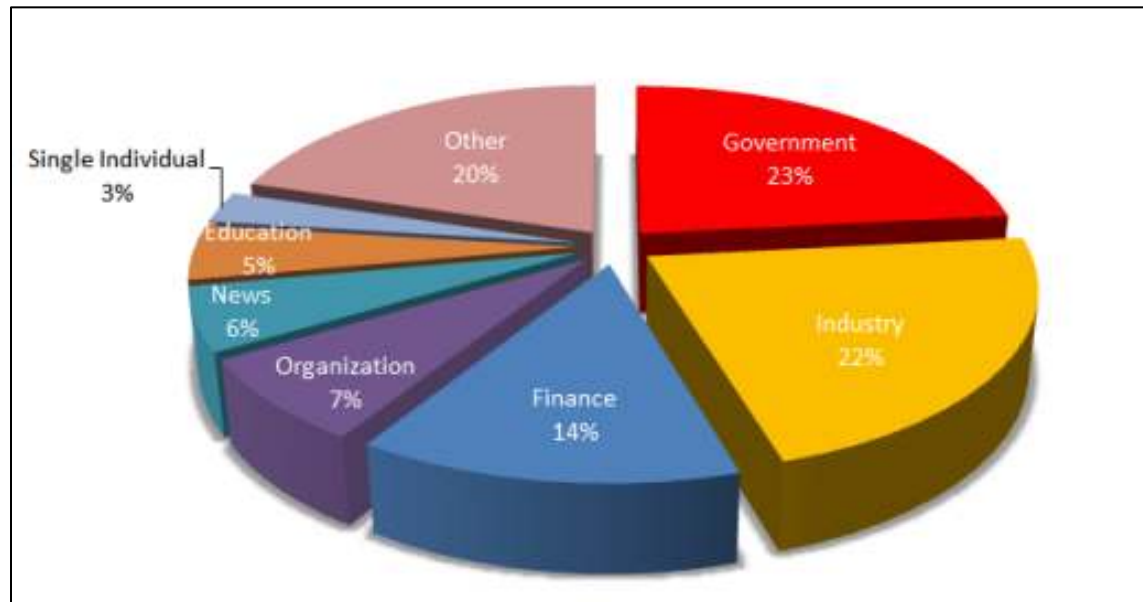


Figure 14. Top 10 targets of cybercrime in 2013 [62]

- **High oversight by Government:**

While the government tries to increase the use of e-government by providing more online services, it also increases the oversight on their citizens [32]. The development of an e-government could lead up to an increase of relationship between citizens and government in a two-way interaction form and the government will have more information about citizens [33]. Therefore, citizens and businesses suffers from the decrease of privacy and they have anxieties to deliver their private information to the government [34].

- **The Spurious sense of transparency and responsibility:**

Because the government itself supervised on its e-government project, some people argue that the presented transparency by the government is dubious. Especially, government could add or remove any information from the eye of the customers. Not all organizations have the ability to monitor these modifications on e-government projects [35]. Thus, hiding the government agenda from the citizens opinion could be represents another disadvantage of e-government [21].

- **Costly infrastructure:**

All the citizens that are using e-government required an access to the Internet. Besides, e-government initiatives needs a communication infrastructure, network devices, and web servers and security systems. For all of these, e-government project considered as costly investments which undeveloped countries have difficulties to implement modern e-government project [28]. Figure (14) show the costs of e-government from (75) state-level of USA in (2003).

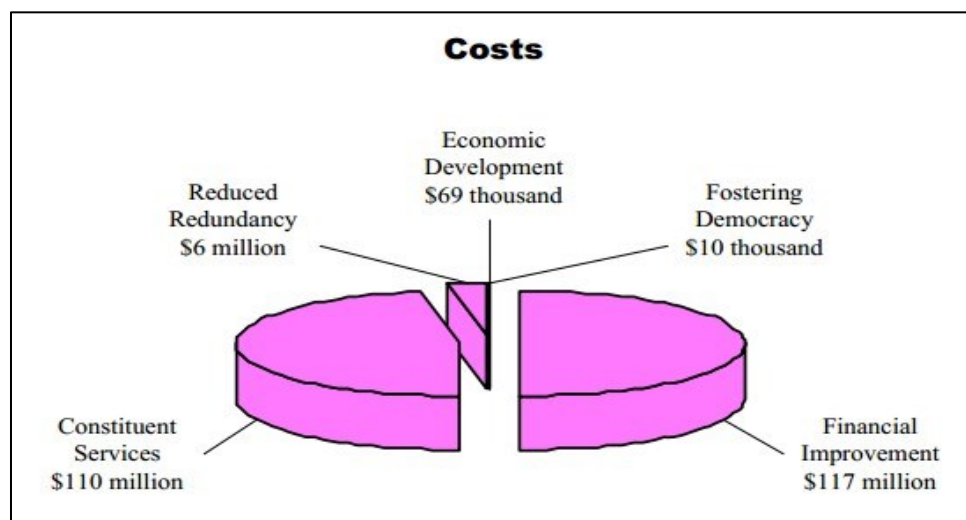


Figure 15. Cost categories from 75 state-level e-government initiatives (2003) [63]

2.9 E-GOVERNMENT PROJECT OF TURKEY (E-DEVLET):

2.9.1 History:

The developments in ICT since the 1980s have opened the way for adoption of new organizational structures, the transformation of social precedencies, and styles of human beings especially in education, agriculture, health, and industry. In Turkey Internet was emerged in 1993. Using Internet in the government was a fundamental element of Turkish government's effort to develop the concept of e-government and to set up a national ICT infrastructure as a resolution of the economic crisis and because of its bid to the European United membership. From 1993, Turkish government tried to increase the utility of the Internet especially in the municipalities; large municipalities had web sites and provided online and interactive services while websites of small municipalities represented online brochures. After that, many ministries also created websites and offered services online. The revolution of e-government began with the concept of e-supply, which represents an attractive method to deliver services and goods [36]. eEurope+Action Plan had the main impact to develop the e-government in Turkey, since this plan tried to strengthen the economy of countries by using modern technologies to provide services for citizens. Besides, the plan provided cheaper, faster and reliable internet access. In 2001, the plan reproduced to eEurope Initiative to involve e-business, e-health, e-learning and e-government. Therefore, the European initiative within the evolution of ICT around the world made every organization in each government has its ICT and websites and keeps its information in a virtual environment. All these steps led to the creation of Turkish e-government gateway, which is turkey.gov.tr. [37]

2.9.2 Ranking:

United Nations Survey 2016 shows the ranking of countries according to E-government Development Index (EGDI). Turkey is not within the top 10 of Asia countries as table (1) show below.

<i>Country</i>	<i>OSI</i>	<i>HCI</i>	<i>TII</i>	<i>EGDI</i>	<i>EGDI Level</i>	<i>World Rank</i>
Republic of Korea	0.9420	0.8795	0.8530	0.8915	Very High	3
Singapore	0.9710	0.8360	0.8414	0.8828	Very High	4
Japan	0.8768	0.8274	0.8277	0.8440	Very High	11
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<i>Turkey</i>	<i>0.6014</i>	<i>0.3775</i>	<i>0.7910</i>	<i>0.5900</i>	<i>High</i>	<i>68</i>

Table 1. Turkey's E-government ranking in Asia [52]

The Republic of Korea (first) and Singapore (second) are the third and fourth in the world ranking respectively with Very High Level of EGDI. While the ranking of Turkey is (17) and (68) in Asia and in the World respectively according to EGDI value of (0.5900) which is considered (HIGH). The value of EGDI determined by the value of Telecommunication Infrastructure Index (TII), Online Service Index (OSI) and the value of Human Capital Index (HCI) as the figure below shows: [52]

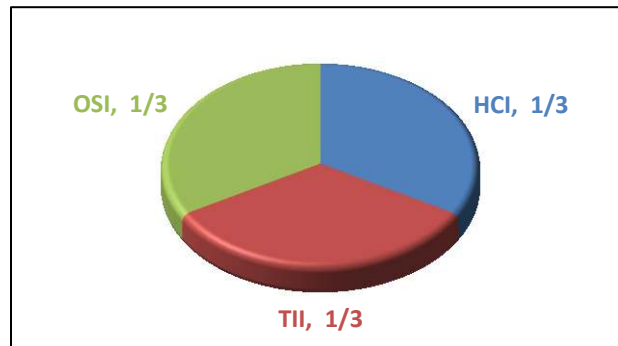


Figure 16. EGD distribution [52]

Where:

- OSI means scope and quality of online services.
- TII means development status of telecommunication infrastructure.
- HCI means inherent human capital.

2.9.3 Offered services:

The E-government gateway in Turkey provides (1822) services within (305) institutions including the following types of services: [38]

- a) Information services.
- b) E-Services.
- c) Payment transactions.
- d) Shortcuts to agencies and organizations.
- e) Information updates and announcements.
- f) Messages to citizens from agencies.

The website of e-government portal enables the citizens to log in in order to get benefit from the provided services. The number of registered citizens are (31740575) user within around (76.5) million, which is the population of Turkey. Thus, (41%) of the population are registered

and use the e-government portal. Besides, the non-citizens also can use some of the services in the portal related to accommodation forms and tax payment without registration. [38]

2.9.4 Network Infrastructure:

The infrastructure of network in Turkey is developing and expanding rapidly particularly in the mobile phones. The digital interchange also allows an increasing in subscribers, while the use of digital microwave radio relays and fiber-optic eases the communication between urban centers in the cities. Domestic satellite systems are used to reach remote areas. There are four submarine fiber-optic cables in Mediterranean and Marmara Sea as well as the Intelsat earth stations and mobile satellite terminals in Inmarsat and Eutelsat provide the international service of internet. [55]



Figure 17. Submarine fiber-optic cable in Turkey [70]

2.9.5 Network Types:

The two major types of network in Turkey are:

- **Public Secure Network (PSN):**

It is a common secure connection infrastructure provides the requirements of public institutions, which form the backbone of government's architecture. [55]

- **xDSL, Ethernet, Fiber, Cable Internet and Interactive Services:**

These services provided by Turksat, which has high-speed broadband internet access. Besides, all the interactive services provided via Turksat cable infrastructure and systems by using a single TV cable elongated to subscribers via Turksat's fiber optic cable infrastructure. [55]

2.9.6 Secure Network Applications:

The security level in the e-government portal is minimum because it is done by software and the installation of hardware, which enables the users use the online services securely. [55]

2.9.7 E-government of Traffic Services Department in Turkey:

a) Introduction:

Due to the high population in Turkey especially in its largest town Istanbul, the need of an e-government project that arranges the traffic services has risen. The website of the traffic department belongs to the main website of the general department of security.

b) Website Technical Features:

The website domain of traffic department reserved on 2002 and launched in 2005, table (2) below shows some technical features of the website:

Feature Name	Value
Sever type	Microsoft.IIS/7.5
Response code	200
SEO score	56%
Links	77

Table 2. Technical Features of Traffic Department Website [54]

We noted from the table that the server type is (Internet Information Server) with version (7.5) which is delivered by Microsoft Corp. It is not able to customize like open-source web servers and this is the only disadvantage of this type.

c) Available Services:

The website of department of traffic provides the following services: [38]

- Admission Registered Vehicle Query.
- Penalty Questionnaire Written on Vehicle Plate.
- Driving Document and Penalty Questioning to Individuals.

2.10 E-GOVERNMENT OF UNITED KINGDOM:

2.10.1 History:

By the accountability of the Cabinet Office, the Central Computer & Telecommunications Agency (CCTA) launched the website (open.gov.uk) in 1994 as a central government website and directed internet users to governmental sites. The departments that are new to the internet also hosted by (CCTA) servers. After two years the government issued a green paper named “Government Direct” to state the services which going to deliver online. The Prime Minister announced in 1997 that there an initiative to make 25% of all interactions with the governmental institutions should be in an electronical manner by 2002. Then, after three years in April 2000, the government published an Official E-government Strategy framework, which defied all public institutions to devise and perpetrate all governmental departments to improve e-business strategies and asked the government to provide required infrastructure. The portal (ukonline.gov.uk) was launched in Dec 2000; the portal provided a one-stop-shop for citizens to public services. Later on, the portal developed to include not only business services, but also education, employing, driving, jobs and pensions, tax payments and local services among other services via the new portal (gov.uk) which was launched in 2012. [41]

2.10.2 Ranking:

According to the United Nations Survey 2016, the ranking of the e-government of United Kingdom is the first in Europe and in the world, as we mentioned before the ranking depends on the (EGDI) value for each country. Table (4) below shows the top 10 of Europe e-government ranking with the values of OSI, HCI, TTI and EGDI [52]:

Country	OSI	HCI	TII	EGDI	EGDI Level	World Rank
United Kingdom	1.0000	0.9402	0.8177	0.9193	Very High	1
Finland	0.9420	0.9440	0.7590	0.8817	Very High	5
Sweden	0.8768	0.9210	0.8134	0.8704	Very High	6
Netherlands	0.9275	0.9183	0.7517	0.8658	Very High	7
Denmark	0.7754	0.9530	0.8247	0.8510	Very High	9
France	0.9420	0.8445	0.7502	0.8456	Very High	10
Estonia	0.8913	0.8761	0.7329	0.8334	Very High	13
Germany	0.8406	0.8882	0.7342	0.8210	Very High	15
Austria	0.9130	0.8396	0.7098	0.8208	Very High	16
Spain	0.9130	0.8782	0.6493	0.8135	Very High	17

Table 3. Top 10 E-government systems in Europe shows the ranking of UK's E-government [52]

2.10.3 Offered Services:

E-government of UK provides more than 2000 services within (25) ministerial and (376) other agencies and institutions. The services include all the sectors that conduct with citizens and businesses [41].

2.10.4 Network Infrastructure:

The network infrastructure of UK's e-government is consist of three types of networks:

- **Government Secure Intranet (GSI):**

GSI represents the primary network used for connecting the central government institutions and agencies. It is a secure and a reliable connection, which includes a secure access to the web, file transfer and search servers. It is also secure in mail exchange [41].

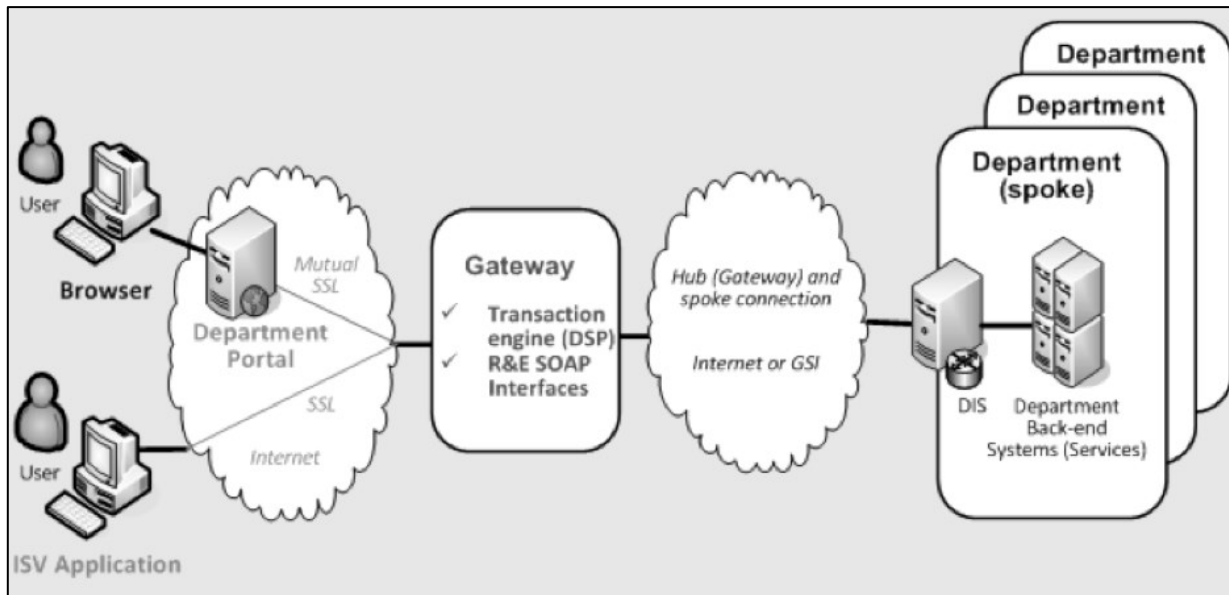


Figure 18. GSI structure in UK [41]

- **Public Services Network (PSN):**

PSN used to build network of networks for public section from the commercial networks and to improve the market that provides the opportunities for industry. The PSN provides an open environment for all UK public sector employees. [41]

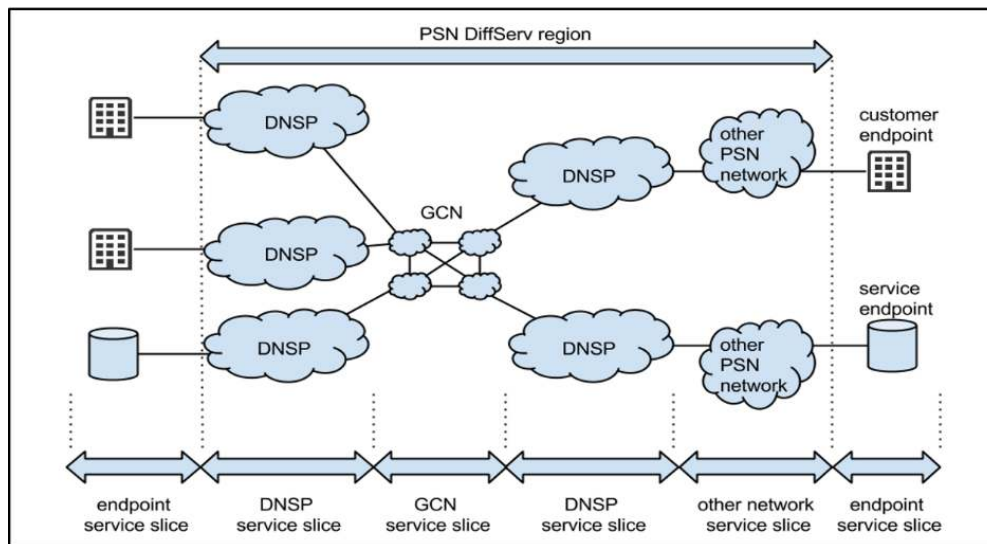


Figure 19. PSN structure in UK [41]

- **Government Connect Secure Extranet (GCSx)**

GCSx is a platform that furnish a secure private (WAN) for the secure interactions that happen between organizations and local authorities. The GCSx is funded by government and it connected to GSI, the Government Secure Extranet (GSX), the Police National Network (PNN), the Criminal Justice Extranet (CJX) and the National Health Service (NHS) without using the internet. [41]

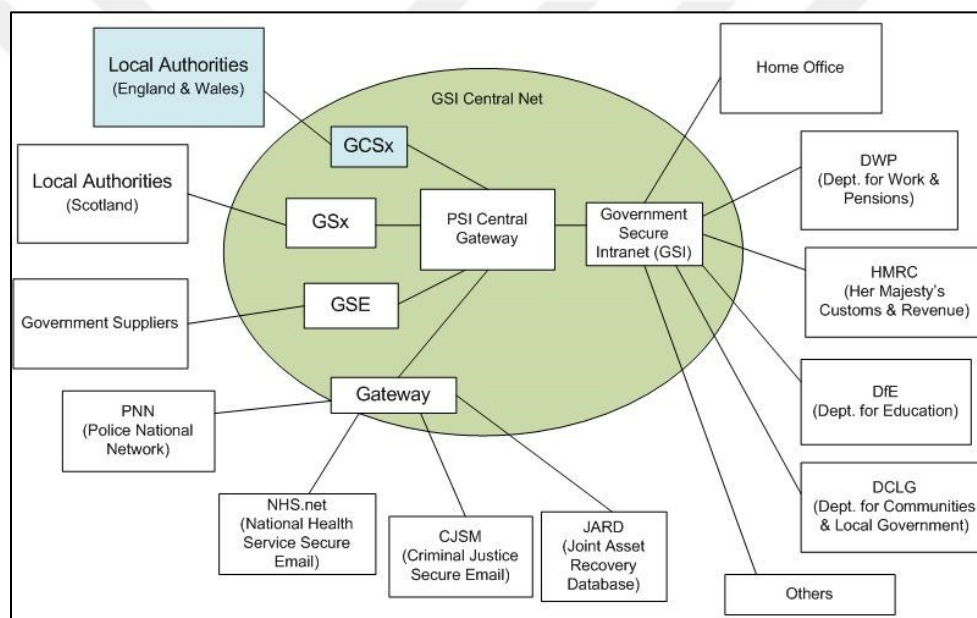


Figure 20. GCSx structure in UK [41]

2.10.5 Driving and Transport in UK's E-government:

The department of driving and transport provides the services related to driving and transport, the services are [40]:

- Driving licenses
- Vehicle tax, MOT and insurance

- Driving tests and learning to drive or ride
- Number plates, vehicle registration and log books
- Buy, sell or scrap a vehicle
- Driving with medical conditions, Blue badges and public transport
- The highway code, road safety and vehicle rules
- Vehicle and driver data and information
- Penalty points, fines and driving bans
- Driving in the UK and abroad
- Lorry, bus and coach drivers
- Transport and driving businesses
- Teaching people to drive
- Driving and enforcing the law
- Parking, public transport and the environment
- Manufacture or adapt a vehicle

3. E-GOVERNMENT OF IRAQ

3.1 BACKGROUND:

Iraq is one of the Middle East countries and lies in a strategic position. Besides, Iraq has an ancient civilization. Along the history, Iraq was a target from many invasive powers in the region especially in the twentieth century after the discovery of oil on its lands. The late governments in Iraq was able to extract and export oil to the world and gained large revenues. Therefore, these revenues contributed in the development of Iraq at the end of 1970s in various sectors in the country such as education, health, industry, among other sectors. In the end of 1980s, when the evolution of ICT around the world had risen, Iraq was involved in a war with its neighbor Iran. In August 1990, Iraq invaded Kuwait and involved in another war in the beginning of 1991 against an international coalition led by the United States of America after imposing economic sanctions by the United Nations. In the period (1991 – 2003), Iraq suffered from these sanctions, which affected every aspect of the society and isolated the country from the modern world. In Apr 2003, the United States of America invaded Iraq and removed the regime; the United Nations also canceled the sanctions. The new regime in Iraq tried from the first day to establish a modern country based to keep pace the development in the world [42]. ICT was the main aspects that Iraq wanted to develop. This would not be without the help of international community.



Figure 21. Iraq Map [64]



Figure 22. Iraq Position in the Middle East [65]

3.2 MOTIVATION:

As we mentioned in Ch1, ICT was the key element of the development in Iraq. To communicate to the world outside with modern concepts after years of isolation. The new regime in Iraq decided to create an interactive system include providing the citizen with information and services. Besides, the regime wanted to return the trust of citizens to their government by applying transparency and democracy in its operations. Because of all these reasons, the government had to enable e-government in its ministries and institutions. [42]

3.3 CHALLENGES OF THE E-GOVERNMENT IN IRAQ:

3.3.1 Poor Infrastructure:

Iraq suffered from hard circumstances within last 35 years, which made the infrastructure of the communication and telephone systems to remain old and even useless, providing internet made by depending on the neighbor countries (e.g. Jordan) or via VSAT [44]. Applying an e-government project in any country requires modern communication infrastructure to overcome the needs of the online services. Thus, the lack of the infrastructure in Iraq forms the main challenge to apply E-government. [45][46]

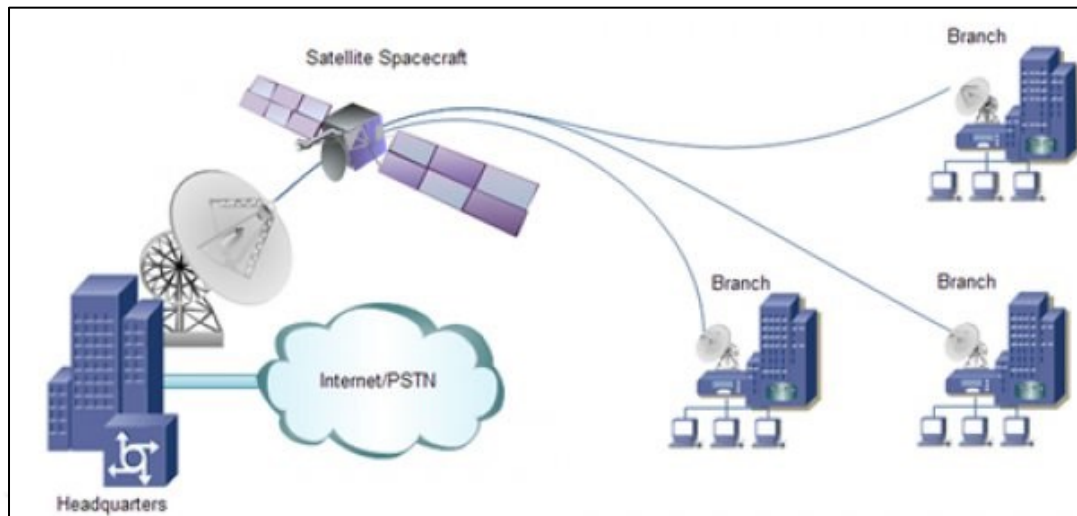


Figure 23.VSAT Network in Iraq [66]

3.3.2 Legislation and Overall Policy

Creating an effective E-government in Iraq requires legislations that protect this project and because Iraq includes an unstable political life after 2003, building an E-government faces great challenges especially in the term of stakeholders that have to support the project. [46]

3.3.3 Digital Divide

This term point to an economic and social inequality regarding the accessibility of the use of, or the effect of (ICT) [47]. In Iraq, the rate of internet users is around (17%) in 2015 [53], figure (24) shows the comparison of Internet users growth of the countries that discussed in this thesis. Therefore, there are large portions of people who cannot get the benefit of E-government online services. [44]

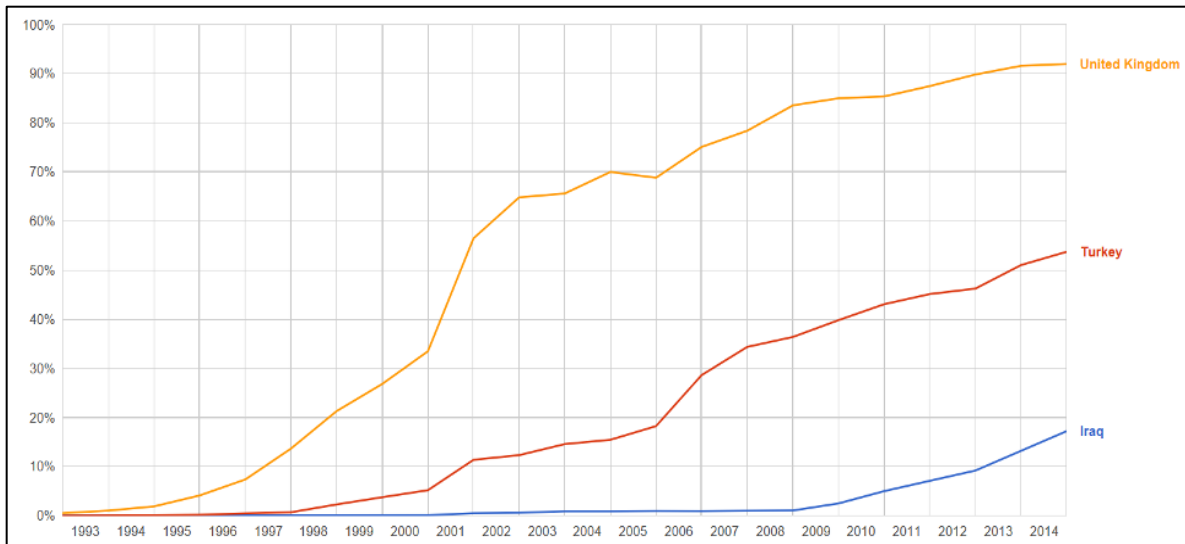


Figure 24. The growth Internet users in Iraq compared with countries in this thesis (1993 – 2015) [53]

3.3.4 Illiteracy

The wars that Iraq had been involved in and the economic sanctions that imposed the Iraqi people, led up to increase the percentage of illiteracy among the people [44].

Gender	Illiteracy Rate in Iraq %	Illiteracy Rate in Turkey %
Male	14.3	1.6
Female	26.3	8.2
All	20.3	5

Table 4. Illiteracy rate in Iraq and Turkey by UNESCO (2015) [67]

3.3.5 Corruption and Shortage of Transparency

Corruption is the main factor of government's failure in any country, especially when there is a lack of transparency that covers corruptions. E-government as an application operated by governmental institutions and departments requires more transparency in applying the rules that handle the corruption cases. Citizens have to be aware how the decisions ended [44]. This will be obvious when we know that Iraq ranking of corruption in 2016 was 166 among 175

countries according to the Corruption Perceptions Index provided by Transparency International [44]. Figure (25) shows the index of Iraq in the last 10 years.



Figure 25. Corruption Perception Index of Iraq (2016) [68]

3.3.6 Security and Lack of Privacy:

Any user wants to access an application of E-government has to be certain that his or her personal information will not be hacked. In other words, a trust has to exist between the user and the government department website, because the user may have a compliance on a particular ministry, or the user may provide his or her mail address to an online service [48]. Therefore, the security issue has to take the priority in any E-government application. In Iraq, there is some governmental website is still depending on free mail addresses to communicate with citizens which can easily hacked or destroyed. [44]

3.4 IRAQI E-GOVERNMENT RECENTLY:

Because of the challenges mentioned above and other political reasons, the government was not to develop the e-government project. Besides, the Ministry of Science and Technology could not maintain the portal of e-government (egov.gov.iq) because of the financial crisis in Iraq in the middle of 2014, which came as result of falling of oil prices in the world. However,

most of the ministries and institutions have created an e-government project for their services as G2C e-government type. Each ministry has its website and tries to develop providing services online independently. Some of them are providing their services; others are in the beginning of their project. The swell of corruption led the government to establish a new way for building the e-government project. The council of ministers launched a website of e-government and called it “Citizen E-government”. The website provides a single service of editing proposals, demands, complaints and plaints on (52) governmental institutions via the council of ministers. After sending his/her message, the citizen can track the demand. For security reasons, the website shows the IP of the user before sending process to avoid disturbance or spam messages.

The screenshot displays the 'Citizen Affairs - Citizen E-Government' website. The header includes the site's name in English and Arabic, along with the logo of the Council of Ministers. A yellow banner below the header reads 'تقديم الطلبات والشكاوى' (Submitting Requests and Complaints). The main content area contains a form with the following fields:

- معلومات شخصية (Personal Information):**
 - الاسم الكامل (Full Name):
 - رقم الهاتف (Phone Number):
 - البريد الإلكتروني (Email):
 - عنوان السكن (Residential Address):
- معلومات عامة (General Information):**
 - الجهة المرسل إليها (To Whom It Is Sent):
 - الموضوع (Subject):
 - الملخص (Summary):
 - اللقية (Receipt):
- تاريخ (Date):** 27/02/2017
- نوع المطالبة (Type of Request):** شكوى (Complaint)
- نوع المطالبة (Type of Request):** شكوى (Complaint)
- نوع المطالبة (Type of Request):** شكوى (Complaint)

At the bottom of the form, there is a 'تحميل المرفقات' (Upload Attachments) section with a file upload button and a 'رابط' (Link) field.

Figure 26. Citizen E-government of Iraq website [69]

3.5 RANKING:

The ranking of Iraq's e-government according to United Nations Survey for 2016 is (141) in the world [52]. Figure (27) below shows the comparison of the Iraqi e-government with the e-government systems discussed in Ch2:

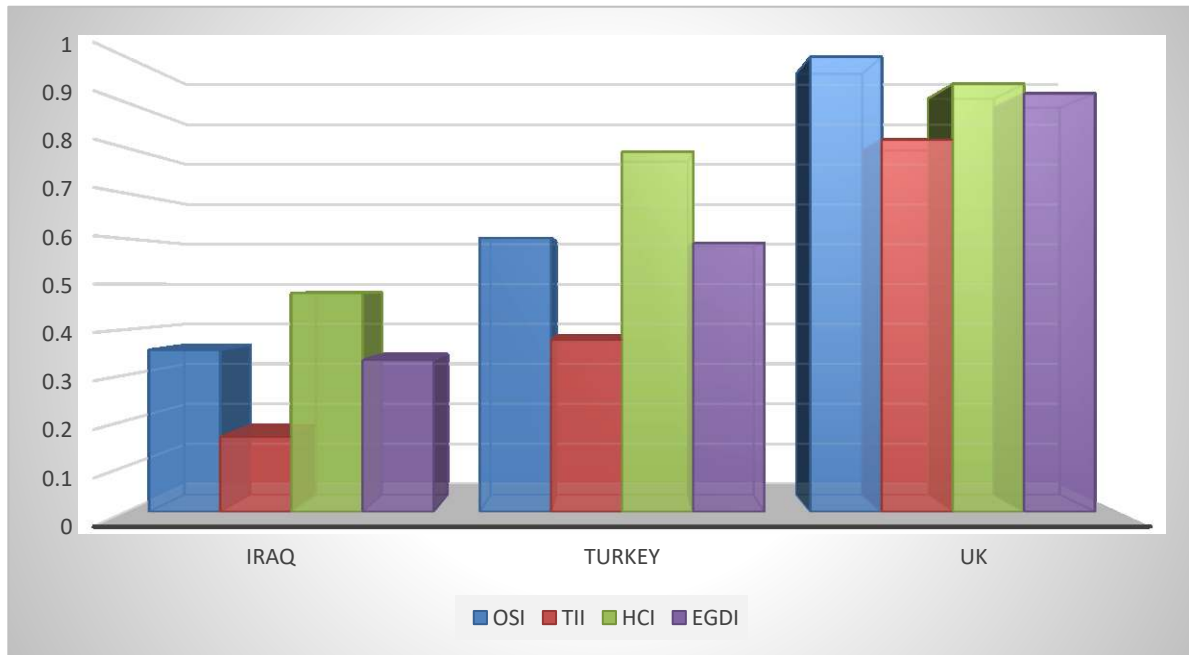


Figure 27. Comparison of three e-government projects according to United Nations Survey 2016 [52]

It is clear that Iraq's e-government has the lowest indexes (OSI, TII and HCI) resulting the lowest EGDI of course. Therefore, the e-government in Iraq requires great efforts in many aspects to improve the ranking and to enhance the online services.

3.6 RISK ASSESSMENT

The lowest ranking of Iraqi e-government according to UN survey 2016, and the challenges that face the development of the e-government in Iraq are the main reasons behind assessing risk of the e-government project before implementation. Thus, in this thesis we are evaluating the e-government project of Iraq in GDT as a case study using risk assessment technique, which is called Design-Reality Gap Model (DRG) in Ch5 to avoid failure, and complete the assessment process using a proposed technique in Ch6. The next chapter presents the process of assessing risk in e-government in detail.

4. ASSESSING RISK IN E-GOVERNMENT USING DESIGN-REALITY GAP MODEL

4.1 ASSESSING RISK CONCEPT:

Creating an e-government project requires huge efforts from many sectors of the government such as IT professionals, administrators, and employers responsible for management processes to provide the services and information in a way that satisfies the citizens. During the design or even the implementation of the E-government project, a critical analysis of risk assessment must perform to avoid the failure of the project. Design-Reality Gap model [50] is one of the risk assessment techniques proposed by Richard Heeks.

4.2 DESIGN-REALITY GAP MODEL (DRG):

4.2.1 Definition:

Design-Reality Gap model emphasizes on the gap between the design stage of the e-government project and the reality situation in the same governmental organization. In other words, this model answers the two important questions that asked, “What is our reality now?” which means the current reality situation and “Where the e-government project wants to get us?” the gap size that exist between the two domains specifies the success and the failure of the project. The gap is regarding seven dimensions (Information, Technology, Processes, Objectives & Values, Staffing & Skills, Management Systems and Structures, and other resources). Thus, these dimensions create the other name of this approach, which is ITPOSMO gap assessment. [50]

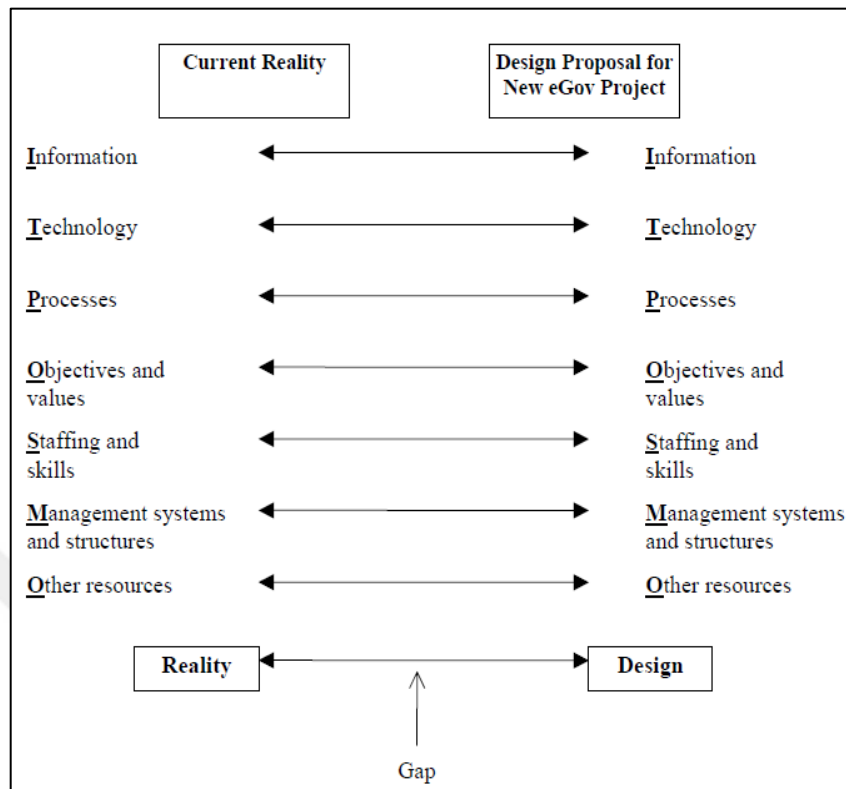


Figure 28. Design – Reality Gap Model [50]

4.2.2 History:

In 2003, Richard Heeks [50] expressed that individual assessment could be rely on upon conditions, for example, individuals, time, and condition. Hence, plainly evaluation is not a basic procedure, but rather it needs more extensive perspectives and learning of what is have been noted. Assessment or appraisal focuses to a procedure to direct and measure the capacity of the e-government to accomplish its predefined goals. Plus, Heeks additionally expressed that in developed nations the early usage of e-government are nearly fizzled, while (35%) being delegated add up to disappointments since it was not executed or was relinquished promptly after execution, and roughly (half) of them are considered as incomplete disappointments because of real objectives were not accomplished and additionally there were undesirable results. Accordingly, Heeks arranged the e-government activities to the followings:

- **Total Failure:** It implies that the activity was never actualized or was abandoned quickly after execution.
- **Partial Failure:** Principle goals not accomplished or there were undesirable outcomes.
- **Success:** The activity completely succeeded, the primary objectives accomplished, and there were not undesirable results.

Likewise, Heeks proposed a proper model (ITPOSMO) to dissect the e-government extend and presented a hole system, which accommodating for the examiner to decide a few measurements that influence the usage of the e-government extend [51].

4.2.3 Design-Reality Gap Dimensions:

Heeks defined the following dimensions of the (ITPOSMO) model:

- **Information:** Represents a correlation between the data utilized as a part of the e-government extend and the data utilized as a part of the government as of now.
- **Technology:** Represents a comparison between the technology requirements of e-government application design and the real situation now. In this thesis, we will focus on this dimension in our evaluating process.
- **Process:** Compares the processes exist in the design of e-government project and the current reality.
- **Objectives and Values:** Compares the key stakeholders' goals for successful implementation of the e-government application and their current real goal.

- **Staffing and Skills:** Compares staffing levels and types needed in the government for the design of e-government application and the current reality.
- **Management and structure:** Represents the comparison between the requirements of management and structure for the design of the e-government application and the current reality.
- **Other resources:** Represents the time and/or the money needed for the design of e-government application compared with the time and/or money in the current reality [50].

4.2.4 Assessing E-government using Design-Reality Gap analysis:

Now after we learned the dimensions characteristics of the model, we will assess the e-government project by rating questions related to them. The rating could be any number from (0-10), and we can classify the rating numbers into three categories as below:

- 0 means there is no change between the reality situation and the requirements and assumptions of e-government design.
- 5 means there is a degree of change between the reality situation and the requirements and assumptions of e-government design.
- 10 means there is extreme change between the reality situation and the requirements and assumptions of e-government design.

In the rating process, it is recommended to classify the rating numbers into five categories to get best accurate outcomes (as it explained later in Chapter 5).

After rating each dimension separately, the analyst sums the ratings for all dimensions to outcome with overall rating to the project. Table (6) below indicates the overall rating and the related result: [50]

Total Rating	Results
57 – 70	Except if action is taken to reduce the gap, the e-government project could certainly fail
43 – 56	Except if action is taken to reduce the gap, the e-government project could well fail
29 – 42	Except if action is taken to reduce the gap, the e-government project could fail totally or partially
15 – 28	Except if action is taken to reduce the gap, the e-government project could has a partial failure
0 – 14	The e-government project could succeed

Table 5. DRG rating table [50]

4.2.5 Gap Reduction techniques:

a) Generic Gap Reduction Techniques:

- **Validation and mapping reality:** Represents the understanding of the current reality. It means that the stakeholders should recognize the ideal model they try to reach and the current situation to avoid e-government failure. [50]
- **Customization to match reality:** Means that the stakeholders should change the design of the e-government project to match the current reality especially in the situation that indicates a unique reality for some countries. This leads to the term of “Adaption” instead of “Adoption”. [50]
- **Client-Vendor relationship management:** Refers to the development of new skills and roles, involving relationship building, contract facilitation and monitoring, and vendor

development. It also means a renewed emphasis on other roles that should remain in-house such as strategic management, business analysis and change administration. [50]

- **Step-by-Step modularity and incrementalism:** When the size of e-government is big the probability of the risk increases. Therefore, the developers should reconfigure the project according to the extent of the change they have. For instance, the project could provide a single function in the beginning and then during the development other functions can be provided [50].

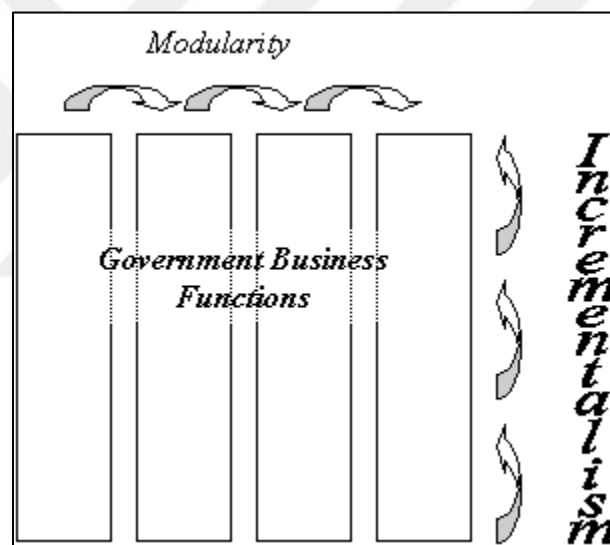


Figure 29. Systematic Modularity [50]

- **Hybrids and “tribrids”:** Failure could happen in the e-government project for the reason that either the IT professionals are not understand the governmental or business processes or the managers are not capable with technology. To handle this, projects can use “Hybrid” professionals who know the both or they called “tribrid” professionals as they combine three aspects: understanding the technology, understanding the business of government, and the role of information in the government [50].

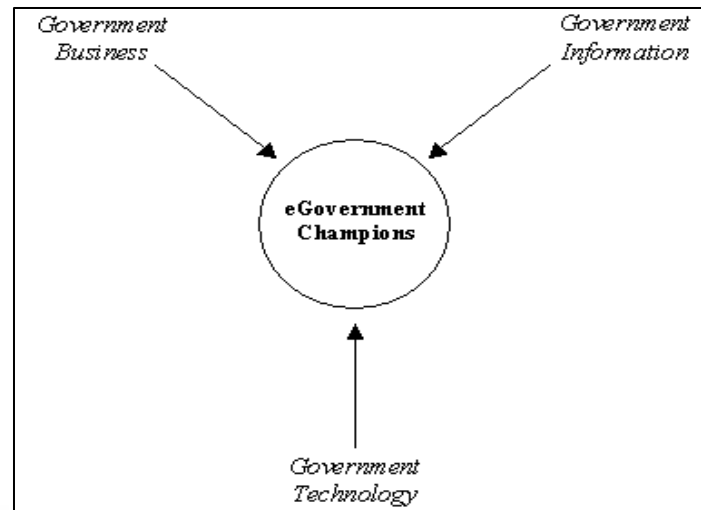


Figure 30. Tribrid Model [50]

- **Scope Limitation (KISS and automation):** “Keep It Small and Simple”. This indicates that the design of an e-government project should be simple because it serves different level of citizens in term of technology. Besides, the developers should avoid changing too many things at once when they design the project [50].
- **Reality-Supporting and not rationality-imposing application:** It represents the gap between two extreme concepts. The first is the rationality-imposing applications such as decision support applications that include a series of information, processes, ...etc. Either they provided as pre-condition for successful projects or they imposed. The second is reality-supporting applications such as word processing and emails, which require fewer rational pre-conditions and impositions. The e-government project will success if it focuses on the reality-supporting applications [50].

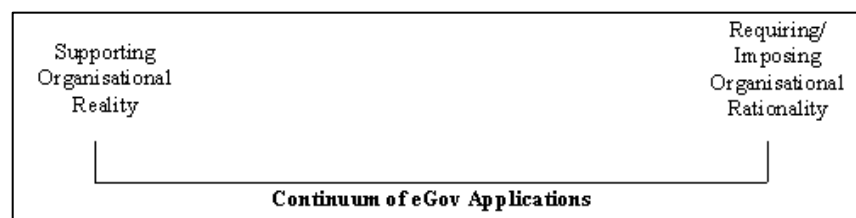


Figure 31. Gap between two extreme concepts [50]

b) Specific Gap Reduction Techniques:

- **Information dimension:** Pledges a professional requirement analysis to map true information needs of stakeholders [50].
- **Technology dimension:** Looking for methods that enable the government reforms could be done without ICTs and using the current infrastructure [50].
- **Process dimension:** Trying to keep doing the processes in the same way but in addition of some technologies and avoid process reengineering [50].
- **Objectives and values dimension:** Using rewards and punishments to alter the stakeholder objectives and values [50].
- **Staffing and skills dimension:** Represents outsource contracts to improve the current reality competence, training the current reality staff, making external consultants [50].
- **Management and structure dimension:** Making a clear obligation to retain the existing management systems and structures within e-government application design [50].
- **Other resources dimension:** Building the e-government projects that will maximize the revenue of the government prior of others. In addition, looking for additional financial support from donor or central government agencies, loaning from private sectors, scale-down the ambitions of the project, extending timescales of the project, and making the use of open source software for the e-government creating in order to be available to everyone [50].

5. EVALUATING E-GOVERNMENT OF THE GENERAL DIRECTORATE OF TRAFFIC IN IRAQ USING DRG MODEL (CASE STUDY):

5.1 INTRODUCTION

In the late years, Iraqi government focused on developing ICT use in government ministries and organizations. The attempt was a step after the initiative of the government to build an effective e-government system. Therefore, the ministry of interior affairs started to build its e-government through the directorates of nationality, traffic and customs. The directorate of nationality has many services such as national ID and passport; it already provides these services online through the web site of the directorate. The ministry had a plan to design an effective e-government project for the general directorate of traffic (GDT). The services that are provided by GDT such as issuing driving license, renewing the license and checking the fines amount were the primary services, which planned to be online. These types of services, which can be reached by citizens considered as an essential services. The next steps represent connecting the website of GDT with other governmental institutions like ministry of financial affairs for vehicle tax payment. In other words, creating a G2G e-government.

5.2 STRUCTURE OF THE GENERAL DIRECTORATE OF TRAFFIC (GDT)

The directorate contains the following departments [71]:

- Department of planning.
- Department of IT.
- Department of licenses.
- Department of electronic archive.

- Department of martyrs and wounded employees.
- Traffic training center.
- Vehicles registration centers on the country.

5.3 WEBSITE

Like other departments of the Ministry of Interior Affairs, GDT has a website launched since 2006. The site represents a brochure for the citizens that could read and get benefits from the laws and regulations published on it like the regulations of driving and traffic signs. Besides, the website contains the news and events at the directorate, which are up to date. [71]

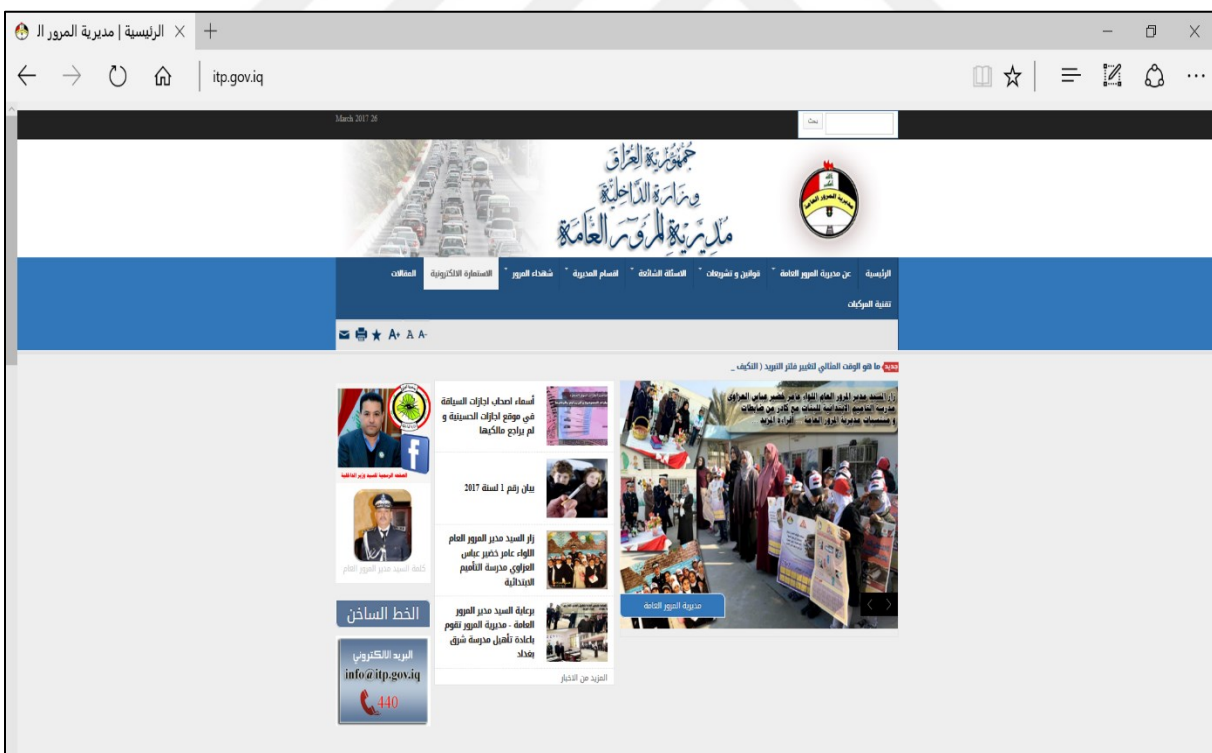


Figure 32. Official website of GDT in Iraq [71]

Table (6) below indicates the technical features of the website are:

Feature Name	Value
Sever type	Apache
Response code	200
SEO score	60%
Links	148

Table 6. Technical Features of GDT Website [54]

The table above shows that the website uses Apache web server, which is open-source webserver and free. The disadvantage of this type of webserver is that each simultaneous connection requires a thread so it afford considerable overhead while providing services for citizens.

5.4 DO WE NEED E-GOVERNMENT FOR TRAFFIC SERVICES?

According to the strategy of the government in applying e-government on many sectors in the country, the people in charge at GDT wanted to join to the e-government project through their website to provide the services we mentioned above online with the help of the modern technology within the national ICT. To avoid failure, we will assess the risk in this project by applying DRG Model.

5.5 ASSESSING RISK METHODOLOGY

This is the first time that a project of e-government in Iraq evaluated using assessing risk method, and our case study is the e-government project of GDT. To represent the DRG model in effective way, we created Google Forms for asking DRG model questions. The information that we gathered composed from asking the stakeholder and the managers in the directorate

directly obeying the rules of the DRG model. From the perspective of an engineer, we will focus on technology dimension and analyze the answer that we asked about this dimension.

5.5.1 Designing Questions Form for DRG Model

The form represents the questions of DRG model, which asked to the stakeholders and managers in GDT. The number of questions are seven, which are equivalent to the number of the dimensions (ITPSOMO) of DRG model. Each question asks the gap degree between the e-government project and the current situation considering particular dimension. We built a Google form contains the seven questions. The concerned user who represents the stakeholder or manager can select one of the below answers for each question:

- Very Large
- Large
- Medium
- Small
- Very Small

We divided the gap into (5) categories to make the answers in a systematic manner, each choice represents (2) degrees out of (10). Because the stakeholder represents many people in the directorate like the manager, the assistances, IT employers, manager of financial affairs ... etc., we used the questionnaire approach, which can comprise all these categories and at the same time the approach as the stakeholder want hides their names. The answers then collected and integrated to be ready for rating. Thus, the rating process will identify the level of risk for creating an e-government project in the sense of DRG model.

The screenshot shows a Google Forms interface in a web browser. The title of the form is 'The General Directorate of Traffic'. Below the title, there is a subtitle 'Applying DRG Model' and a red asterisk indicating a required question. The main question asks: 'What is the gap between the assumptions/requirements of the e-government system design about information quantity (how much information will be needed), and the quantity of information currently in use in reality? *'. There are five radio button options: 'Very Large', 'Large', 'Medium', 'Small', and 'Very Small'. Below this question, there is another question that is partially visible: 'What is the gap between the assumptions/requirements of the e-government system design about computer (Hardware, Software, Network, Manufacturing), and the computer systems currently in use in reality? *'.

Figure 33. DRG Model question form

5.5.2 Integrating answers

After the stakeholder categories answered the questions of DRG model (the total are 11), Google questionnaire collected the answers and we have the following results:

- **Information:** The results were (54.5%) for small gap, (18.2%) for medium gap, (18.2%) for very small gap and (9.1%) for large gap. We conclude there is a small gap between information and assumptions provided for the e-government project and the information provided for the services currently since the largest rate was for small gap. For instance, to issue a driving license citizens should fill a form contains all the information that required such as full name, address, age and others. Citizens will fill the same form on the website except some extra information. Thus, the information that gathered from users are at most the same in the reality.

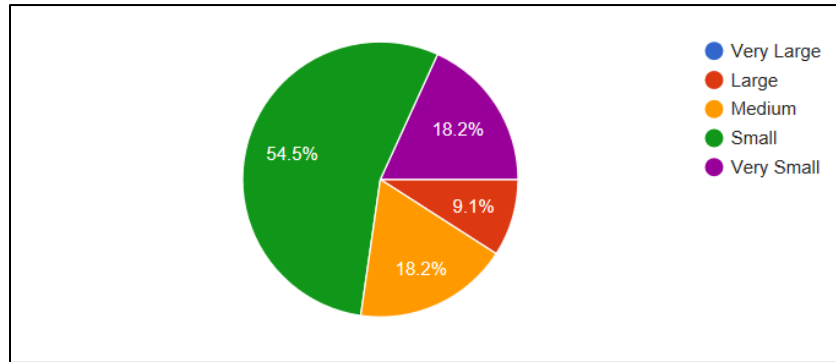


Figure 34. Information question results

- **Technology:** This is the most important dimension in our thesis. The results show that the percentage of large gap is (63.6%), very large gap is (27.3%) and for medium gap (9.1%). Thus, the technology that designed for the e-government project is extremely different from the current situation of used technology.

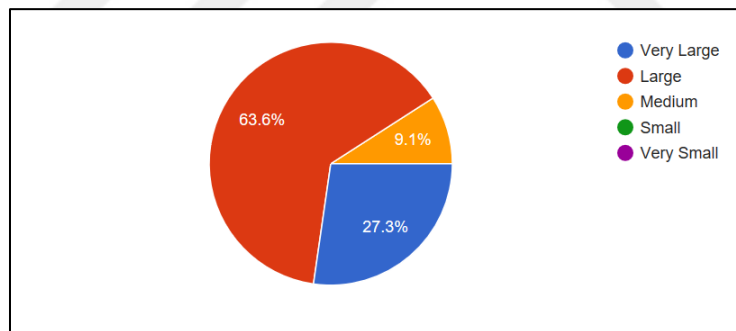


Figure 35. Technology question results

The difference in technology dimension represents the followings:

- Webserver's type required for the official website.
- Network infrastructure in the directorate like cabling, switches and routers.
- Applications used to implement the project. The new e-government applications are different from the current applications.

- Number of computers used for the project.
 - Communications techniques used for the project.
- **Process:** The results show that the percentage of small gap is (54.5%), very small gap is (36.4%) and for medium gap is (9.1%). Therefore, there is a small gap between the work process proposed for the e-government project and currently used work process except that the services delivered electronically.

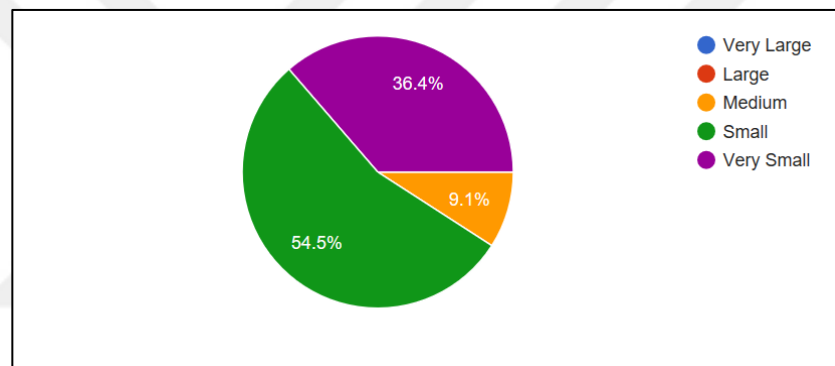


Figure 36. Process question results

- **Objectives and values:** The results show that the percentage of the medium gap is (45.5%), small gap is (27.3%), large gap (18.2%) and for the very large gap is (9.1%). Therefore, there is a medium gap between the objective and key values that planned for the e-government project and the objectives that already the directorate aim to achieve, because the project goal is to provide more services in modern way. In other word, improving the service number and type in the new e-government project increases the gap between the design and the current reality.

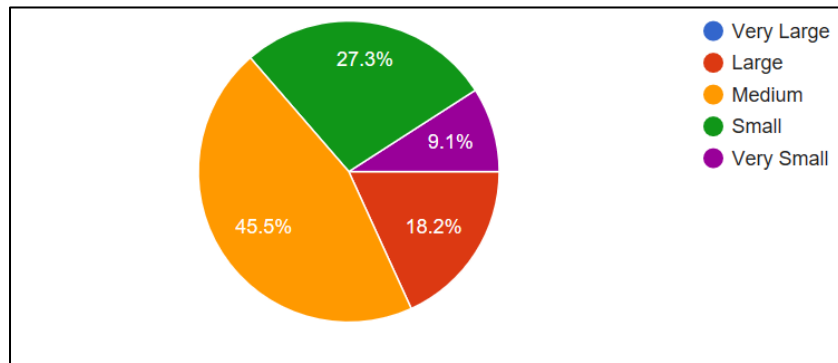


Figure 37. Objectives & Values question results

- **Staffing and skills:** The results show that the percentage for the medium gap is (54.5%), small gap is (18.2%), large gap is (18.2%) and for very small gap is (9.1%). Thus, there is a medium gap between the staffing and their skills dedicated for the e-government project and the staffing already provide services in the directorate. The e-government project requires more skills to learn new techniques especially in the using computers and Internet.

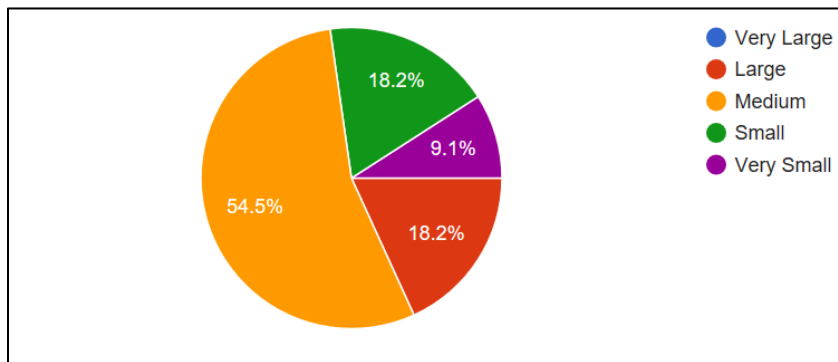


Figure 38. Staffing & Skills question results

- **Management and structure:** It is obvious from the results that the percentage of small gap is the highest than others. For small gap the percentage is (54.5%), very small gap is (36.4%) and for medium gap is (9.1%). That means, there a small different between the management and its structure for the e-government project and the current management and structure. The new e-government will not change the structure of the directorate.

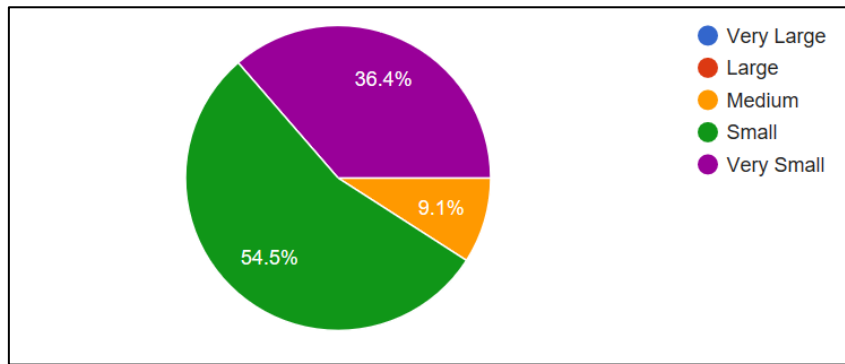


Figure 39. Management & Structure question results

- **Other resource (Money):** The results show that the percentage for medium gap is (58.3%), small gap is (33.3%) and no gap is (8.3%). Thus, there is medium gap between the money dedicated for the project and currently funding in the directorate, that because there is additional funds will provided for technology facilities and staffing skills development. Besides, implementing the project in all cities on the country requires funds for infrastructures and maintenance.

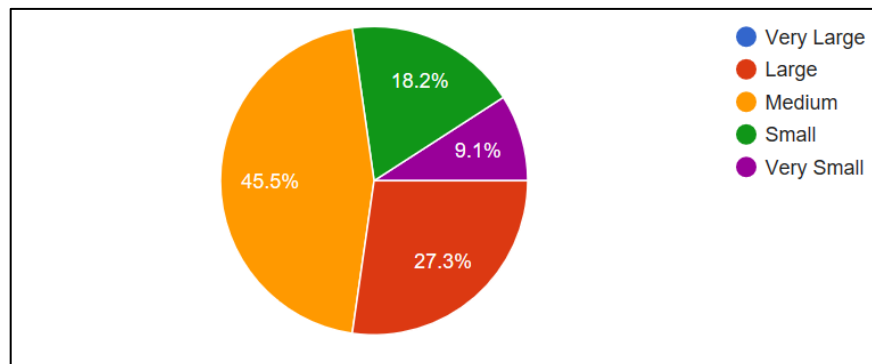


Figure 40. Other resources question results

5.5.3 Rating Process

Rating process is the most important step in DRG model because the outcome of this process indicates the total gap size between the design of the e-government process and the current situation in GDT. The dimension rating is out of (10) and we got various rates for each question from the forms that we created, we have to extract a single rating for the gap exist in that question. To achieve that, we created a program in MATLAB determines the largest rate in each question result and represents that rate in the respect of the size of the gap using gap rating scale. For example, if we have a rate of (70%) for medium gap the program indicates that the rating of the gap is (5.4). Where the range of medium gap rating is between (4) and (6), and (70%) represents (1.2) of (2) which the difference of the beginning and the ending of the gap. Figure (41) shows the gap rating scale.

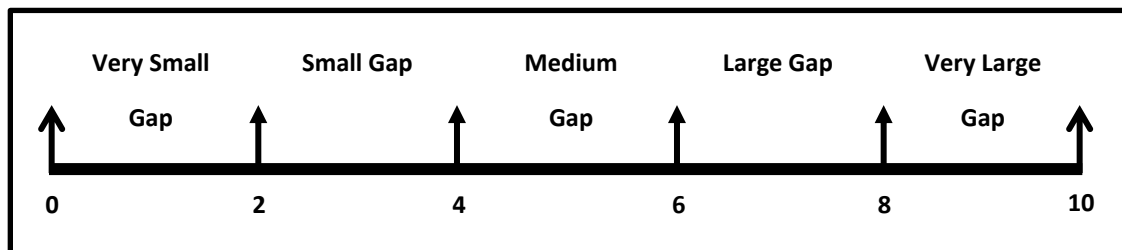


Figure 41. DRG Gap Rating Scale

The reason behind using this technique is that the answers are gathered from more than one person (11 persons), and each one may has different answer. Therefore, depending on the largest rate and representing this rate on the gap scale will produces results that are more precise. Eventually, we have seven results (ratings) for seven dimensions; simply summing these results will give us the total rating for our e-government project.



Figure 42. DRG Model rating program created by Matlab

According to DRG model, the rating of (31.45) refers to a totally or partial failure of the e-government project unless an action taken to decrease the gap.

5.5.4 Taking Actions

Taking actions represents reducing the gap that we have in our e-government project, we should emphasize on the dimensions that have at least a medium gap. Thus, for our case study project, the dimensions of technology, objectives and values, staffing and skills and other resources (Money) are the dimension that require reduction. Reducing the gap as we mentioned in Ch.4 may affect the design, the current situation or the both. Besides, decreasing one dimension may influence to another. Therefore, we apply specific Gap Reduction Techniques as below:

- **Technology:** The thesis emphasizes on this dimension for two reasons. The first is because it represents the largest gap among other dimensions. The second is because it represents the ICT dimension. In other words, the dimension is consist of several terms related to computers and network in the respect of software and hardware facilities. Consequently, the actions include changing in the current situation. The actions are:
 - Developing the network infrastructure of the directorate and improving the intranet network to involve all the cities in the country.
 - Improving the webserver instead of Apache, which currently used for the official website of the directorate and its open source. For instance, Microsoft webserver IIS version 7.5 support many protocols that needed for e-government projects such as HTTP, FTP and SMTP since providing services require transferring files and email. As a first step, the stakeholder could change the webserver type before creating the e-government project.
 - Using new and effective applications especially database applications. For example, currently the IT employees are using Microsoft Access as a main program for database, which is not effective when the data goes larger.
- **Objectives and value:** in this dimension, the reducing of the gap represents changing in the design. Thus, to get a successful e-government we propose to decrease the number of services and keep the services that already delivered in the directorate. For instance, GDT could provide the service of navigation in the future.

- **Staffing and skills:** Unfortunately, we cannot reduce the gap in this dimension because improving the application used in current situation requires a staff that can handle the new programs and techniques. Therefore, this gap will not change.
- **Other resource (Money):** We can reduce this dimension by putting strategies of funding. In other words, the e-government project could be implemented within at least two years by several stages, so the funding program also will be partial for each stage of implementation. In this case, we not have to dedicate a large amount of money by a single installment. Thus, the reduction in this dimension represents changing in the design.

5.5.5 Summary

Our e-government project has a risk of implementing especially on the dimension of technology unless actions taken by the stakeholder. These actions represent the reduction of the large gap, which exists in this dimension. However, an evaluation process for our e-government project could be more powerful if we add the contribution of the citizens since they represent the target of the project. Citizens who will use this project also have their rights to know what type of services provided to them as the main feature of e-government projects is the transparency. Therefore, to complete the evaluation process we will propose a technique for assessing the e-government project of GDT.

6. EVALUATING E-GOVERNMENT OF THE GENERAL DIRECTORATE OF TRAFFIC IN IRAQ USING MODIFIED ASSESSMENT TECHNIQUE (CASE STUDY):

This work aims to evaluate the e-government of the General Directorate of Traffic (GDT) in Iraq by using survey technique. An integration of survey assessment with what we did in Ch5 will produce results that are more dependable.

6.1 WHY SURVEY?

The survey technique helps to understand what citizens require from the government since e-government concept simulates citizens daily life. To minimize the risk that we had in Ch5, we have to know users opinions about the traffic services in Iraq. Consequently, stakeholder could improve their project to provide more services in an effective way.

6.2 METHODOLOGY

We created a questionnaire survey using Google Forms to assess the project and get citizens' opinions about the current website of GDT; asking if they have the willingness to build an e-government for traffic services and what type of services they want to be include. In this survey, we emphasized on technology facilities to build a successful e-government project.

6.2.1 Assessment Survey Form

This form represents the general questions, which asked to a sample of citizens (customers), related to the current website of GDT. The questions are:

- Asking the age of the customers to specify which age category is more likely to access the e-government project.
- Does the user have a car? To know if the e-government project is interested by citizens that do not have a car or not.
- Does the customer use a computer? Specifies the percentage of citizens that use computer in their daily life.
- What is the opinion of the citizens about the current website of GDT?
- Does the customer agree to create an e-government project for GDT or not? Specifies the willingness of citizens to deal with an automated system instead of doing the processes by paper.
- What type of services do you want to include? Specifies the number and type of services provided online in the e-government project. The types listed in the answer section as checkboxes.
- Asking the type of communication between the system and the citizen. Does he/she prefer email address or phone number or the both?

- Asking the accessing method to the system. Which type of interface is more suitable for the citizen (Website, Phone application or both)?

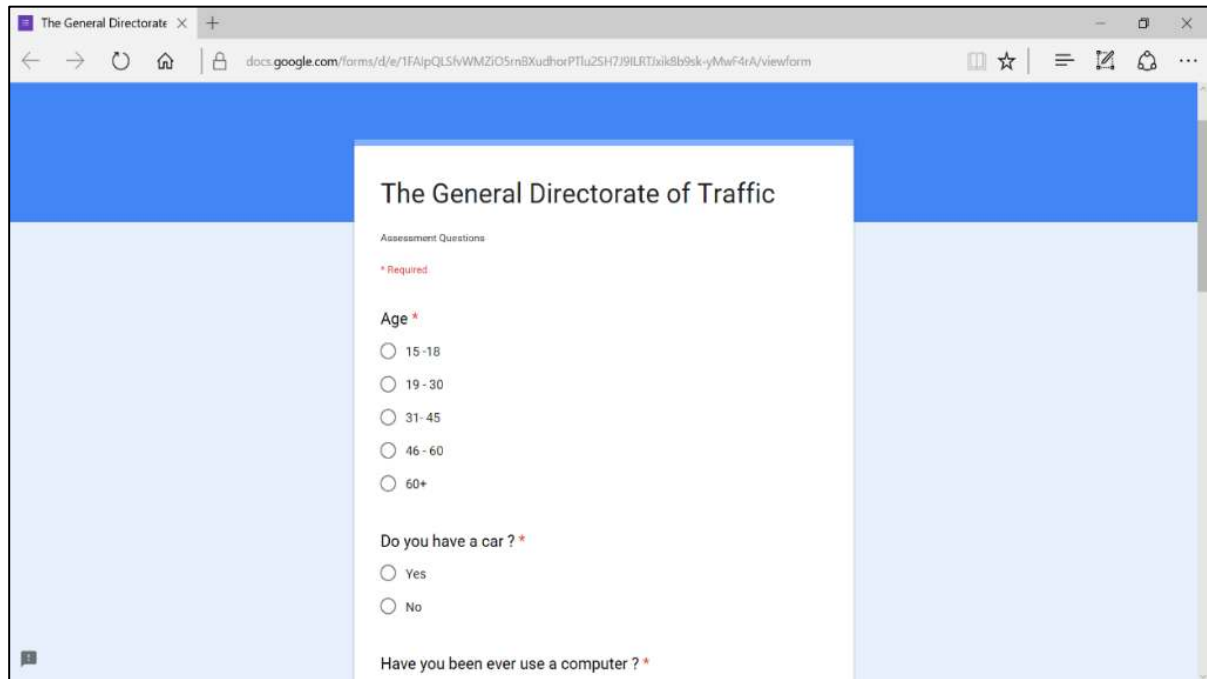
The image shows a web browser window displaying a Google Form titled "The General Directorate of Traffic". The form is titled "Assessment Questions" and includes three questions, all marked as required with a red asterisk. The first question is "Age", with radio button options for "15-18", "19-30", "31-45", "46-60", and "60+". The second question is "Do you have a car?", with radio button options for "Yes" and "No". The third question is "Have you been ever use a computer?". The browser's address bar shows the Google Forms URL, and the page has a blue header bar.

Figure 43. Assessment Question Form

6.2.2 Survey Process

To enable the forms that we designed, we shared the link by social networks to reach more people in Iraq. The receipts represent citizens with different occupations and ages to assess the whole project from the perspective of citizens (users). Besides, the receipts represent a sample of citizens who will get benefit from the claimed e-government project. After collecting the answers an analysis performed to specify the willingness extent of building an e-government project in GDT and what type of services the citizens requested to be included within the project.

6.2.3 Survey Results

There were (137) participants in our survey. The results were:

- **Age:** The majority of participants were at the age (31-45) according to survey results, where they composed (48.2%) of the total number of participants. This indicator refers to the range of ages that concerned with the services provided by the e-government systems.

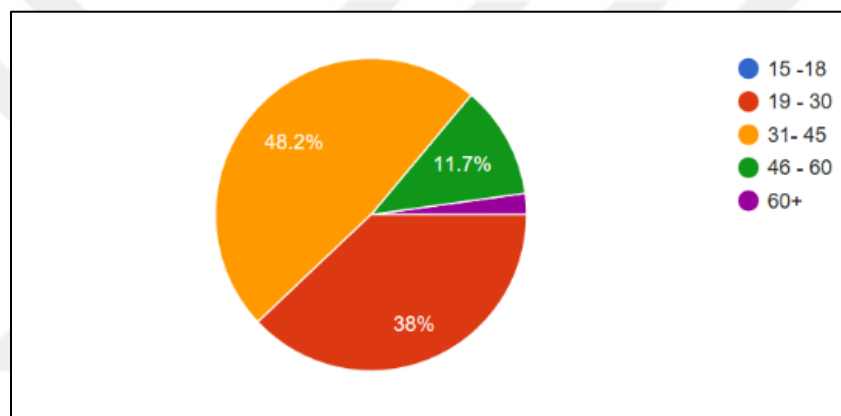


Figure 44. Age question results

- **Owning a car:** Although the results show that (93.4%) of participants had a car, we intended asking this question to reveal that citizens who are not have a car could interest with traffic services, especially navigation services, and their percentage was (6.6%).

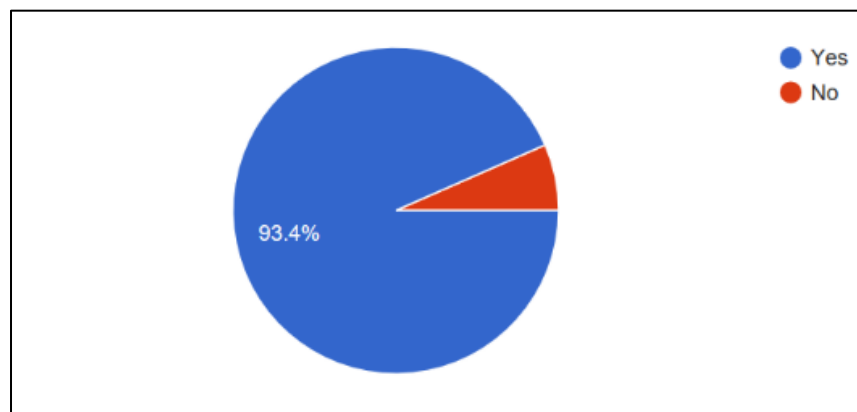


Figure 45. Having car question results

- **Using the computer:** The reason behind asking this question is to know the level of computer use among the citizens and the extent of getting benefit from the services that provided by the e-government project. The results show that (91%) of the participants are using computer.

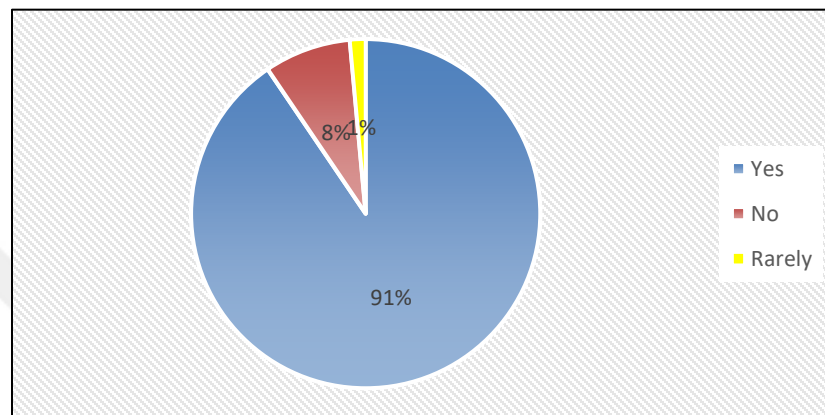


Figure 46. Computer using question results

- **Website assessment:** GDT has a website as we mentioned before. Firstly, we wished to ask the opinion of citizens about the website; how they assess it before implementation the e-government project. Most of the participants gave (Poor) option; their percentage was (56.9%). This reflexes the website effectiveness especially it does not provide services for citizens.

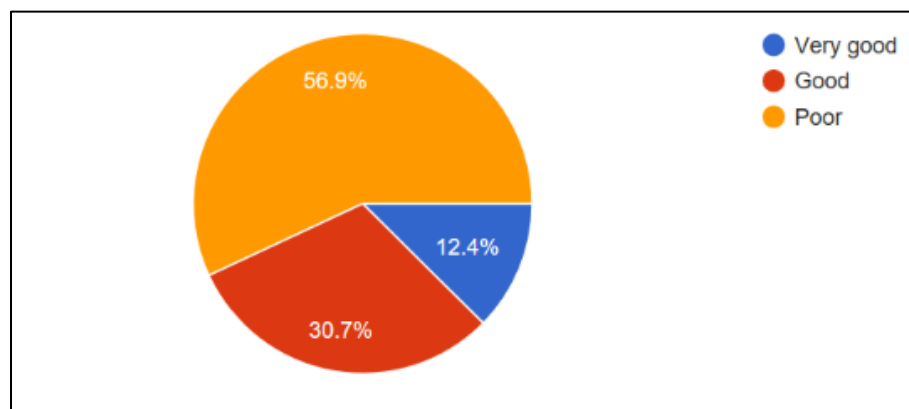


Figure 47. Website question results

- **Applying E-government:** About (96.4%) of the participants agree with applying e-government project for GDT in Iraq. They either agree with (Yes) or (Yes, Strongly), which means that only (3.6%) of them do not agree. This agreement is due to the need of online services and in the same time they get rid of work processes that done by paper.

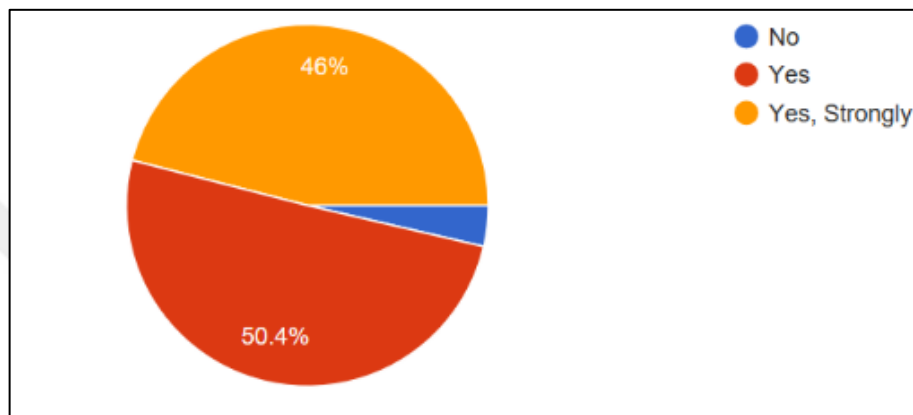


Figure 48. Applying e-government question results

- **Services types:** In order to build a successful e-government project, we asked citizens of service types that they want to be include in the project. (59.9%) of the participants checked the service of (Checking fines), while (46%) and (45.3%) of them checked the services of issuing driving license and renewing driving license respectively. This is because citizens believe that those services are most important services and if it provided online, a lot of time will saved. In other hands, we note that only (14.6%) of them checked editing complaints because they believe that there is no feasibility of this service in the presence of corruption. The service of navigation did not get great checks also as most of the streets and landmarks not registered in the international electronic maps.

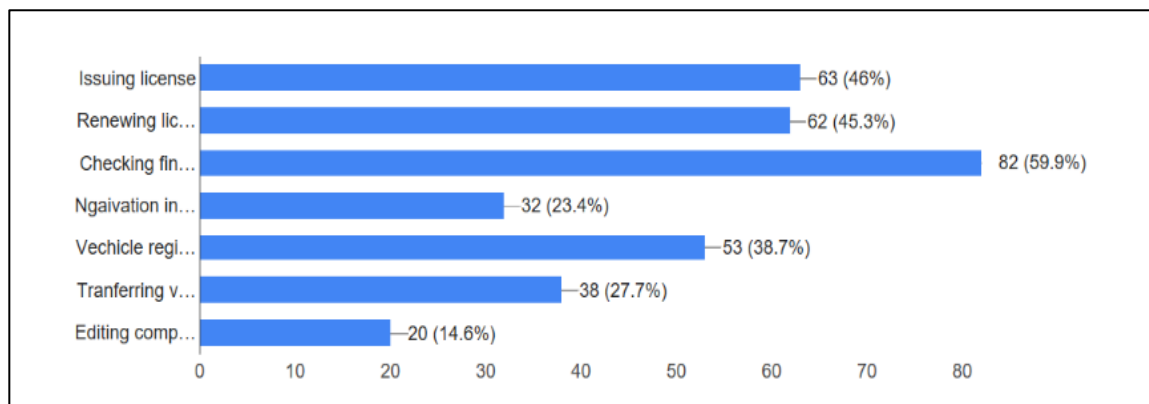


Figure 49. Service types question results

- **Communication type:** The results show that (56.9%) of the participants want to use both types of communication (Email, Phone number). While (38%) of them ask to use phone number only. The unwillingness of using email as communication type by the citizens is because most of them do not have or do not use emails constantly.

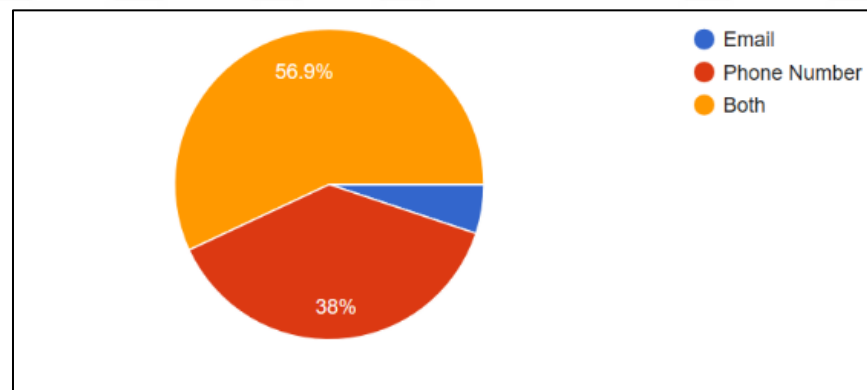


Figure 50. Results of communication type question

- **Interface type:** The prevalence of smart mobile phones among people affected the choices of the participants where (56.2%) of them checked for (Both) types and (39.4%) of them checked for (Smart phone application). While only (4.4%) chose (Ordinary website) because most of them prefer using mobile application since it used daily, anytime and anywhere.

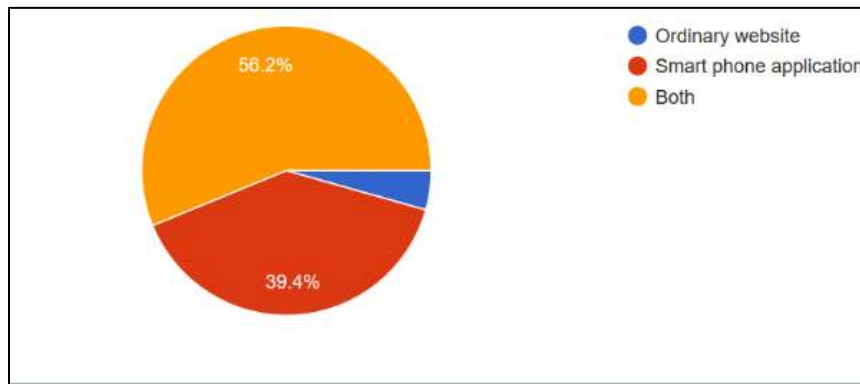


Figure 51. Interface type question results

6.2.4 Results Analysis

Based on the results above, we can find out that the citizens have the willingness for creating an e-government project for traffic services in Iraq. They require the main services that already provided in GDT to be online. Besides, they recommend to use their phone number as communication type between them and the directorate. In addition, they prefer to use the e-government project through smart phone than ordinary websites. This indicates the prevalence of smart phones among citizens. In the other hand, most of the participations in the survey checked poor choice for the current official website since it lacks important services. Therefore, all these requirements and recommendation should take into account by the stakeholder and the people in charge of GDT e-government project.

7. CONCLUSIONS AND FUTURE WORK

The evaluation of any e-government project could not be carried out by a single technique. However, risk assessment avoids the government and even stakeholder building an unsuccessful e-government project. Besides, it emphasizes on the weak points that could represent a reason for failure. Thus, when actions taken to remove these points, the road to an effective project will be paved. Additionally, an assessment survey helps the stakeholder to understand what the citizens want from the proposed e-government project. Therefore, the both techniques together create a reasonable road map for a successful e-government project. By applying DRG model risk assessment on the e-government project of GDT in Iraq and then the integration with assessment survey, we have the following conclusions:

- The total rating of DRG model was (31.452) as we found in Ch5, which means there is a partial failure if the stakeholder implement the project of e-government in GDT.
- The results of the assessment survey show that the citizens focus on the main traffic services to be provided by the project. Besides, they recommend using an application on their smart phones instead of using computers. (Chapter 6)
- The technology used in GDT including hardware and software needs significant steps of evolution.
- The staff in GDT has a lack of knowledge of ICT concepts since there is a medium gap in the staffing and skills dimension (Chapter 5).

- The infrastructure of network and communications in Iraq requires great efforts of development especially in our case study the GDT as we considered the poor infrastructure one of the challenges of e-government in Iraq (Chapter 3). It does not represent the concepts of GSI and PSN since they are the main elements of any e-government networks.
- The funding program of e-government project in GDT needs to a review to avoid spending too much money on useless results (Chapter 5).
- The failure of applying the e-government strategy influenced the development of e-government projects in Iraq (Chapter 1).
- There is not a serious intent from the government in Iraq to develop the steps that taken in the e-government projects (Chapter 3).
- The absence of the e-government portal handicaps the connection between e-government projects and complicates the process of providing online services for citizens by using an independent websites (Chapter 3).
- There is no quite enough awareness by the citizens in Iraq of e-government benefits (Chapter 3).
- The great rate of digital-divide or e-exclusion in Iraq decreases the use of e-government in general (Chapter 3).
- The lack of transparency in Iraq influences the development of e-government in general (Chapter 3).

- The corruption in Iraq especially in the last five years affected to the development of the e-government project. That is clear in the absence of the e-government portal, which existed before three years from now, as we mentioned before (Chapter 3).

Based on the conclusions above, we have the following recommendations:

- The officials in The General Directorate of Traffic should decrease the gap between the design model and the current reality by using the reduction techniques mentioned in Chapter (5) to avoid any failure rate in the project.
- The officials in GDT have to take into account the requirements of the citizens for the provided services, as they represents the users of the e-government project.
- The officials in GDT should develop the technology used currently before applying the e-government project. At the same time, the staff should also have a knowledge of both ICT concepts and management skills related to traffic services. The level of knowledge has to be sufficient for implementing the e-government project without the need of ICT employees. In other words, the “tribrid” concept should exist.
- The Ministry of Communications should rebuild the infrastructure of the network and communications in Iraq starting from the capital city as a first stage, which contains the ministries and major institutions. The government could get benefits from other countries experiences (Turkey, UK) and apply their network infrastructure model to improve the performance the e-government as a result.

- The government have to put a strategy for financial aspects not only for GDT but also for the e-government projects in general, especially in the shade of the current financial crisis in Iraq.
- The government have to reactivate a new strategy of the e-government under new conditions and implement the missed stages.
- The government should reactivate and maintain the portal of the e-government in Iraq (egov.gov.iq) to comprise all the independent e-government projects in ministries and institutions. The new portal should include an account for each citizen according to his/her national ID number to simplify the process of providing online services.
- The government has to encourage citizens to use e-government services by increasing the awareness via advertisements and conferences presented by government itself or even by non-governmental organizations.
- The government through the Ministry of Communications and other concerned institutions should decrease the digital-divide and increase the rate of Internet use to achieve the e-government goals.
- The government should Increase the transparency to reinforcement the trust of citizens while using e-government services.
- The government have to decrease the corruption in the governmental agencies by activating the role of auditing offices, which leads to improve the quality of e-government projects.

7.1 FUTURE WORK

The future work of e-government evaluation may include additional techniques together with the risk assessment presented by DRG model. Some of these techniques could be the followings:

- The evaluation could involve the implementation outcomes. In other words, any e-government project can contain a log of activity within the website during a limited period. For instance, a log file could record the activity of the online navigation service for one month. The log analyzed by the stakeholders to identify the benefit of the navigation service. If the service not used frequently, the stakeholders should identify either there is a difficulty in the use of the service and they have to simplify it or the service is useless so they should remove it. In Iraq, this technique could be in the ministries that already implements e-government project and provides services online such as the Ministry of Higher Education and Scientific Researches.
- The evaluation could include a comparison technique, which evaluates any e-government project by comparing with a successful and high-ranking e-government project. A comparison between the e-government of Iraq and the e-government of Turkey may be meaningful because both are in the Middle East region and the e-government of Turkey considered one of developed e-government projects in the region. The comparison can involve many aspects like strategy, funding, infrastructure, technology, and others. Thus, the government in Iraq will identify the flaws of their e-government and to which aspect it belongs.

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