CHALLENGES AND OPPORTUNITIES OF E-GOVERNMENT IMPLEMENTATION IN THE IRAQI MINISTRY OF OIL

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ABSTRACT

Although the execution of e-Government has reached superior levels in developed nations, it is still in its beginnings in many developing countries. Indeed, there is an increasing need to exploit the opportunities created by the new emerging Information Communication Technologies (ICTs) to implement e-Government systems in developing countries, specifically, the countries who have not yet initiated an e-Government initiative or these who are in early phase of the e-Government initiatives development. Generally, information system has ability assistance for corporate sustainability in developing countries and regions at various development levels. The organizations of greater level sustainability are most likely to see voluntary Information System-enabled cooperation among employees, while those still at the infancy stage need to supply more incentive and assistance from top management. Lately, In Iraq government has the tendency to adopt e-Government initiatives to entrench Good Governance and improve public sector efficiency. Despite the passage of more than sixteen years for the application of Iraqi e-Government strategy, Iraq is still at rank 143 out 192 countries; in the e-Government development index of 2020. However, various obstructions are preventing successful implementation of this technology. The current investigation aimed to highlight issues that hinder successful implementation of e-Government systems in Iraq generally, and in the ministry of oil especially with recommend feasible solutions to tackle them. A sample of five managers was selected based on both convenience and representation: Two of them work in the Ministry of Oil as Inspection Director and Information Technology manager, while the remaining three work as Chief Executive Officers (CEOs) of ministry establishments. The semi-structured interviews were the method used in the study to obtain various perspectives on the challenges that faced the Ministry of Oil to implement the e-Government system. The method of analysis chosen for this study is a qualitative approach of thematic analysis. This supplied in-depth comprehending to the present status of e-Government in the Ministry of Oil in Iraq and highlighted key hindrances of its effective application. According to this investigation, the research proffered many recommendations that needs to be considered in order to completely benefit from e-Government technologies.

Keywords: *ICTs, developing countries, e-Government, challenges of e-Government Implementation, e-Government in Ministry of Oil.*

1. INTRODUCTION

Every government in the world strives to use ICT in offering the possibility of effective and efficient government [1]. Although many useful development insights have been provided to date on this topic [2], [3], the failure of the e-Government initiative continues to escalate in various developing countries, which becomes a quite common situation [4], [5]. According to Glyptis et al. [7], information systems in general and e-Government projects in particular, have many diverse and complex challenges that are not easy to overcome. According to Yang et al. [7] the organizations need to incorporate IS resources, supply chain and employee efforts for the improvement of sustainability capabilities. Mosweu and Kenosi [8] stated that in some institutions in developing countries, electronic management system is problematic because of the lack of established policies, and the lack of support from qualified, experienced personnel. Moreover, Mokone et al. [9] argued that the fact that systems which are interconnected in e-Government poses a unique challenge for implementation because requirements stretch across different departments or agencies. Therefore, the sharp decrease in the

indicator of failure of the e-Government projects of most developing countries has mainly been attributed due to its failed strategies to develop e-management systems of the institutions [10], [11];.

The successful implementation of information systems for the e-Government initiatives in some forerunners countries like the United States or the United Kingdom, and Denmark in Europe, or Republic of Korea in Asia [12], [13], [14], have led other countries in the world to adopt and develop e-Government initiatives. The positive economic, environmental, and social changes can be attained by utilizing Information system as long as they are utilized to identify unsustainable activities and enable optimistic change [15]. However, successful implementation faces many problems and obstacles to success need be clearly identify obstacles. For example, Mittal and Kaur [16] confirmed about a study conducted to determine such obstacles in implementation of information systems for the e-Government initiatives in India. They found that lack of integrated services, change management of the institution, services are not accessible easily, low ICT literacy, recognition of applications, and user friendliness of government websites were issues in India. Another study conducted by El-Seoud and Taj-Eddin [10], to determine such obstacles in development of information systems for E-management in Egypt. They found that poor governance, insufficient ICT infrastructure to develop information systems, lack of integrated systems, limited knowledge level and knowledge sharing, low ICT literacy, and a lack of IT specialists in organizations were issues in Egypt. Medaglia [17] has emphasized that the use of ICT tools in implementation of e-Government processes within the frameworks of developed countries models remains deficient in terms of a comprehensive discussion in the implementation of e-Government processes in developing countries.

In the case of Iraq, despite the early start that Iraq had in the e-Government project and its launch in 2004, the pace of development is rather slow [18]. Past studies showed several obstacles that faced the development of e-Government in Iraq such us limit of using information systems, poor of transaction management, lack of privacy in the implementation of transactions, and institution readiness to develop e-Government initiative [18], [19], [20], [21]. Thus, the development of information systems tools in Iraqi ministries, especially the Ministry of Oil, which is the main source for the Iraqi economy, needs to identify the obstacles to implementing and developing e-Government in the Ministry of Oil.

Furthermore, the factors that influence the discovery of a suitable communication channels among employees and develop a platform that helps to execute the government transactions must be identified. Hence, the development of an e-Management model in the oil Ministry of Iraq is necessary to promote public sector performance and organize government transactions.

2. OBJECTIVES

The key aim of this research is to review the challenges of e-Government in Iraq with analysing and explaining the current state of the e-Government services in oil establishments of Iraq and underline an importance of implementing sustainability development aims through the development of the innovation technology in its establishments. Further, the current state of implementation of e-Government initiatives in the Ministry of Oil and its establishments, and reviewing of the Back-Office systems development. Additionally, the research question are addressing about what are the challenges that facing the development of e-Government in the oil sectors and what are the themes that influence the adoption of the e-Government systems in Iraq generally, and in the ministry of oil especially. Lastly, identifying challenges that can affect the adoption and success of such systems is an essential step to achieve this goal. Accordingly, this research aims at:

- to identify the current state and level of e-Government in Iraq;
- to identify the barriers prevent successful implementation of e-Government in Iraq;
- to identify the barriers prevent successful implementation of e-Government in Ministry of Oil in Iraq;
- to identify the themes that will reflect the main points that obstruct to improve the current e-Government systems in Iraq generally, and in the ministry of oil especially; and
- recommend feasible practical solutions that may be adopted to address this kind of barriers.

3. LITERATURE REVIEW

3.1 The E-Government in Iraq

Since the beginning of the Millennium, the Iraqi government has embarked on plans to adopt ICT to implement e-government in three phases, consisting of the establishment of an ICT infrastructure, service

provision to employees, and service provision to citizens [22]. Thus far, the Iraqi government has succeeded in developing government websites and providing a number of services to citizens, such as the Iraq e-Gov portal, e-Passport Record, and e-Driving Test [19]. It is therefore clear that the Iraqi government has given significant attention to its e-government system. However, there are still many barriers to e-government that need to be overcome in Iraq. According to Salman et al. [20], the challenges of Iraqi e-government consist of limitations that could be directly opposed to the original purpose of e-government. A replication of the e-government experience could lead to several issues in the implementation phase, due to varying user demands, and the restrictions imposed by the community and governments. Consequently, without clear goals prior to the implementation phase, e-government projects could even be considered as failed experiments [4]. The failure of the post-implementation phase can mean that e-government projects have little impact on the lives of citizens, compared to their initially estimated impact [23]. Once the implementation phase is complete, the development phase begins, with the intention of meeting users' needs. However, despite being launched in 2004, e-government in Iraq is still more or less in its infancy, compared to other countries [18]. According to a United Nations [24] e-government survey, Iraq ranks 143 out of 192 countries in the e-Government Development Index (EGDI), with a score of 0.4360, compared to the world average of 0.5988. This indicator demonstrates a decline in the development of e-government in Iraq, thereby reflecting negatively on the government's performance and its role in providing services to citizens.

In general, the benefits of e-government for society are considerable, especially in terms of saving time and money, which enhances efficiency [25], [26], promotes citizen participation [27], [28], and increases transparency [29]. However, e-government projects do not always deliver all their promised benefits. According to Gunawong and Gao [4], most e-government projects fail because the gap between initial design and actual implementation remains wide. Although past studies have discussed the issues of e-government implementation and development, different countries have adopted diverse e-government strategies [30]. Therefore, the challenges and obstacles that prevent the development of e-government vary from one case to another. Several previous studies have addressed the challenges and obstacles impacting on the

development of e-government in Iraq. For example, Al-Yawer and Ahmad [18] conducted a systematic review to identify the technical challenges that obstruct the progress of e-government in the context, identifying six main obstacles: poor IT skills, an outdated telecommunications infrastructure, absence of e-government database, absence of security measures, lack of user participation, and poor website design and performance. Another study conducted by Mohammed et al. [19] addressed the importance of e-government, clarifying the main challenges facing e-government in Iraq and revealing a weakness in information-sharing between government agencies, as well as a low level of security in information systems. Furthermore, it was evident that the efficiency of e-government needed to increase through the application of new technologies such as IoT and cloud computing. While Hassan [31] covered the general obstacles to e-government adoption in Iraq, Thabit and Jasim [21] performed a SWOT analysis, examining the strengths, weaknesses, opportunities, and threats. It was found that the technological aspects of e-government were hindered by cost, lack of IT skills, data incompatibility, and absence of IT standards. Conversely, Salman et al. [20] identified four types of obstacles to the application of e-management in Iraqi government institutions, summarizing them as organizational, technical, human, and financial. Nevertheless, although these studies offer insights into the barriers to e-government in Iraq, they present an overview of the challenges, without addressing a specific institutional issue. Table 1 summarizes the extant studies on the topic of barriers to e-government in Iraq.

3.2 Implementation of e-Government in the Ministry of Oil

Iraq's economy is heavily dependent on oil revenue, which accounts for most of the country's foreign exchange earnings and gross domestic product (GDP) [20]. According to Dag et al. [32], the oil sector is the heart of the Iraqi economy, with 95% of the state's revenue coming from oil production. Therefore, Iraq's oil sector is central to its fiscal position, and critical to the vitality of its economy and ongoing reconstruction efforts, particularly with regard to infrastructure and development. More specifically, the Ministry of Oil is responsible for the federal government's oil and gas industry, including the overseeing of sector investments, infrastructural operation, planning, and recommending and overseeing policies [33]. However, the Ministry has incorporated several national oil and gas companies,

to which it has delegated some of its discretion in the upstream, downstream, transportation, distribution, and marketing sectors [20]. The Ministry of Oil has also adopted an ICT strategy to manage its business and communication with citizens. This includes the development of Web applications to display the Ministry's activities and disclose information for the purpose of transparency, as well as to advertise tenders. All the Ministry's entities have adopted the same strategies by developing such applications. Unfortunately, the services provided through the Oil Ministry's website are still limited, and there are problems related to the site's maintenance. Figure 1 shows the homepage of the Ministry's website.

Figure 1. Main page of the Ministry of Oil's website

The Ministry of Oil comprises the usual administrative departments, such as a legal division, ICT centre, technical directorate, administrative directorate, economic and financial directorate, and audit directorates. In total, the Ministry of Oil has more than 120,000 employees [33], across various entities that can divided into three main arms: refining companies, public companies, and training centres. There are three main refining companies, four training centres, and 15 public companies, including service companies (for example, oil product distribution, state gas-filling and services, and state oil project companies), and operating companies (for example, oil pipeline, Iraqi oil tanker, state heavy engineering equipment, and oil exploration companies). Figure 2 shows the Ministry of Oil's organizational structure and institutions [33].

3.2.1   Ministry Establishments

The Ministry of Oil in Iraq has 15 establishments that perform various activities in the oil sector. In this section, the focus will be on three main service companies, which deal directly with citizens.

3.2.1.1 Oil Product Distribution Company (OPDC)

The Oil Product Distribution Company (OPDC) is an Oil Ministry entity that is responsible for the distribution of oil products in Iraq. The OPDC provides services to citizens through the administration and operation of more than 1,400 fuel stations, and over 1,800 gas and oil stations [34]. The Company is divided into four main branches on a geographical basis: the Baghdad Distribution Authority, Southern Distribution Authority, Middle Furat Distribution Authority, and Western Distribution Authority. However, there are secondary branches in each Province. Figure 3 shows the main page of the OPDC website.

Figure 2. Main page of OPDC website [34]

3.2.1.2 State Gas Filling and Services Company (SGFSC)

The State Gas-filling and Services Company is one of the most important pillars of the Ministry of Oil, with the aim of contributing to the national economy in the oil sector. This Company provides several services to citizens such as operating gas plants, filling liquid gas cylinders, and producing full gas cylinders for consumers [35]. The Company also manufactures and maintains gas cylinders; adds

liquid gas systems to cars; builds filling stations for liquid gas, and sets up liquid gas networks. The Company has branches in every Province, runs 53 government factories, and supervises 237 private factories [35]. The Company also has a website that reviews its activities, posts news, and makes announcements. Figure 4 displays the main page of the SGFSC website.

Figure 4. Main Page of SGFSC Website [35]

3.2.1.3   State Company of Oil Projects (SCOP)

The State Oil Projects Company (SCOP) was established in 1964 in Baghdad. The SCOP is an engineering consultancy, design, and executive company, specialized in implementing oil sector projects in Iraq. The Company includes five main geographic authorities: the Southern Projects Authority, Middle Projects Authority, North Projects Authority, Baghdad Projects Authority, and Karbala Refinery Authority [36]. A Web application has been developed to manage SCOP's services and activities, displaying news about the Company's activities and current projects. Moreover, the website advertises for tenders. However, the information and services provided on SCOP's website are very limited. Figure 2.5 displays the main page of the SCOP website.

Figure 3. Main Page of SCOP Website [36]

3.2.1   Back-Office Systems Development

The back office represents "the internal operations of an organization. These are seen by clients and citizens, they can help manage and control users' input and provide them [with] the appropriate output" [37]. Every government strives to deliver public services effectively. When governments focus on the back office to enhance the effectiveness of service delivery, it is common for their efforts to include some form of integration between government offices [38]. Back-office transformation refers to rethinking and redesigning internal processes and systems, based on citizens' needs. Therefore, instead of merely modifying the interface, back-office transformation pays closer attention to fundamental processes and information flow that will support any type of government service, even when the service itself cannot be delivered electronically [39]. Coordination and collaboration between agencies constitute another key issue for the back office. Central coordination can be necessary to facilitate information-sharing between multiple governmental agencies, while implementing the proper security measures [40].

Akgul [41] mentions that governments nowadays attempt to provide better-quality services, focus on citizens' needs, embrace more efficient and effective work practices, and improve administrative processes. These goals have motivated the Iraqi government to develop various forms of e-government, i.e. Internet websites and portals, which enable online access to government services and

information. However, these e-government services provided by government agencies are still limited, which means that e-government back offices are weak, and their online work is confined to a small number of specific areas. This is likewise true of websites for the Ministry of Oil and its entities. The services that are available on these websites have been evaluated in this study, falling into three main categories: information provision, transactions [42], and transparency [43]. The results show that the e-government services provided through the websites of the Ministry of Oil and some of its entities mostly involve providing information to citizens, while transactions and transparency are very limited, as illustrated in Table 2.

4. RESEARCH METHODOLOGY

Governments over the world recognized the potential opportunities offered by ICTs to increase efficiency in internal processes and offer better services to citizens [44]. Consequently, governments that ignore the value of the emerging ICT technologies may suffer crucial competitive disadvantages. Generally, there are several challenges that impact the implementation of e-Government in Iraq, therefore, the next subsections focus on the key problems and challenges of developing and implementation e-Government in the Ministry of Oil by conducting interviews with officials in the ministry.

4.1 Context of the Interviews

Qualitative interviews were selected as the data collection method in this study, in order to obtain various perspectives of the challenges facing the Ministry of Oil in its attempt to implement an e-government system. According to Folkestad [45], qualitative interviews give new insights into a social phenomenon, as they allow the respondents to reflect and reason on a variety of subjects from different angles. Consequently, conducting interviews with policy-makers and administrators was seen as an option, in that it could give insights into the phenomenon under investigation.

The interview questions were adapted from a previous study by Twati [46]. The method of analysis chosen for this study was the qualitative approach of thematic analysis. Thematic analysis is the most widely used qualitative approach for analysing interview data. The conceptual framework for the thematic analysis of interview data in this study was mainly built upon the theoretical positions of Braun and Clarke [47]. According to the above authors, thematic analysis is a method of "identifying, analysing, and reporting patterns (themes) within the data" [47]. The reason for selecting this method was that a "rigorous thematic approach can produce an insightful analysis that answers particular research questions" [47].

In this sub-section, the issues and problems faced by Iraq's oil entities in the context of developing e-government services are identified, especially in the development of information system management at the level of the employee. The primary method selected for this multi-site case study was the interview, in order to be able to gather multiple perspectives, augmented by documentary sources of evidence. According to Creswell and Poth [48], a minimum of five and maximum of 30 interviews is adequate for qualitative research, provided 1) a semantic saturation point is reached, and 2) the participants have advanced knowledge of the research topic. Therefore, a sample of five managers was selected based on both convenience and representation. Two of these managers worked at the Ministry of Oil, one being an inspection director and the other an IT manager, while the remaining three were CEOs of Ministry entities. Table 3 presents the profiles of these selected experts.

The interview was conducted personally on 20th of December 2020 with Inspection Director /Ministry of Oil in Iraq and on 18th of November 2020 with IT Manager/Ministry of Oil in Iraq. While the interview was conducted personally on second of December 2020 with CEO of the Middle Furat / Oil Products Distribution Company and on 24th October 2020 with CEO of the Middle Furat / Oil Projects Company. Lastly, the interview was curry out personally on 26th of October 2020 with Deputy CEO of the Middle Furat / Gas Filling and Services Company.

Information systems play a major role in developing the work of organizations. According to Laudon and Laudon [49], the emphasis in information systems includes both a technical and behavioural approach to understanding the wider institution, management, and IT dimension of systems and their power to provide solutions. Therefore, perspectives of information systems may be captured in three main dimensions: technology, the organization, and management.
Symons [50] argues that work in the area of information systems requires an interactionist perspective, because the interactionist approach has

important implications for the management and appraisal of IT. On this basis, the interviews focused on four primary areas: the information system used, transaction management, privacy in transactions, and readiness, in order to identify the problems and challenges faced by implementing information systems at the Ministry of Oil, as illustrated in Figure 6.

4.2 Process of Thematic Analysis

The data collected through interviews with officials at the Ministry of Oil and its entities were analyzed as per the three-stage procedure suggested in the literature [51]: transcribing the data in preparation for analysis, reducing the data to themes, and coding and representing those themes. Braun and Clarke [47] highlight how patterns may be identified through a rigorous process of data familiarisation, data-coding, development of themes, and revision. The interviews in this current study were analyzed using the NVivo tool for the sake of time-saving and efficiency. The processes of analysis used in this study followed the approach developed by Braun and Clarke [47].

- In the first step, familiarization with the data was internalized through translation and transcription of the interviews. Five interviews with respondents were reviewed a number of times to ensure their accurate transcription and translation. All interviews were translated verbatim into English by the researcher and a sworn translator (see Appendix A). Translation of the interviews is important for two reasons: the first is to understand meaning rather than linguistic features (language), while the second is to be able consider the coding process and development of themes.
- In the second step, the transcripts were imported into NVivo. Through NVivo, the researcher conducted the data analysis in two stages to begin generating codes. The aim was to look at the transcripts from two perspectives, as described earlier. In the first approach, the coding procedure was guided by the aspects identified in Figure 2.6. When satisfied that the codes generated from five of the scripts were consistent with the interview goal, which was to identify the challenges and problems involved in implementing information systems at the Ministry of Oil, the codes would be deemed fit for purpose. Data-driven coding then followed with a focus on identifying patterns of meaning. Working through the data, more nodes and sub-nodes were developed to explain the

patterns of the challenges. For example, one node was labelled 'initial system', with the sub-label, 'limited information provision', and a further sub-label: 'not easily accessible'.

- The third step involved developing the themes. In this step, the coded nodes in NVivo were read and re-read to identify potential themes. The preliminary analysis presented 11 major categories, such as traditional data exchange, limited service provision, cost, employees' skills, the complexity of performing transactions, transaction security, the initial system, administrative abuses, corruption, employees' experience, and institutional readiness. However, these 11 categories were aggregated into eight and then further reduced to the six most frequently referenced categories: the initial system, complexity of performing transactions, administrative abuses, institutional readiness, employees' experience, and transaction security. Thomas [52] points out that "most inductive studies report a model that has between 3 and 8 main categories in the findings", which was achieved in this analysis.

Out of the six categories of emerging themes, Figure 7 presents a model that demonstrates the theme of challenges to the development of information systems at the Ministry of Oil. These categories are discussed in the next section.

5. Results and Discussion

The development of e-government at the Ministry of Oil in Iraq faces a number of challenges. Therefore, these need to be addressed to take Iraq's e-government system to the next level. In this study, challenges to the development of e-government at the Ministry of Oil in Iraq were identified using an interview method, conducted with five experts from the Ministry of Oil and its entities. The challenges were found to fall under six main themes, as shown in Figure 7. These themes reflected the main obstructions to the improvement of Iraq's current e-government system overall, but especially at the Ministry of Oil. The themes comprise the complexity of performing transactions, transaction security, institutional readiness, employees' experience, administrative abuses, and the initial system.

5.1 The Initial System

The initial system refers to the essential stage of adopting an information system at the Ministry of Oil. One interviewee from the Ministry explained:

"The website applications in the Ministry of Oil and its institutions provide information about the ministry and the activities carried out by the ministry, but there are no direct services provided to citizens because the back office needs rehabilitation." (Expert 2)

In this regard, Al Azzawy [53] and Mohammed et al. [19] clarified that e-government websites in Iraq suffer from inadequate content and the absence of important services and functions. Furthermore, Faaeq et al. [54] declared that website applications are poorly designed and their performance is not optimized. Two interviewees from Ministry entities stated:

"The design of the current websites applications is simple and does not provide adequate facilities to provide services to citizens." (Expert 4)

Furthermore, the success of an e-government programme is determined by the degree to which public organizations can develop information systems and meet users' needs. An interviewee from the Ministry of Oil mentioned:

"There is a need to develop an integrated information system in the ministry, especially with the beginning of foreign companies competing in investment with the Ministry" (Expert 1)

Based on the above, the Ministry of Oil needs to develop information systems (front- and back-office) that will promote administrative work efficiency and the rapid completion of transactions. Therefore, the Ministry could take advantage of the benefits of ICT, providing government services via the Internet and influencing e-government adoption by the public.

5.2 Administrative Abuses

Administrative abuses are illegal actions that violate normal procedures or involve the inappropriate exercise of discretion, such as taking bribes, preferentially processing paperwork, and cronyism [55]. Aladwani [56] emphasized that corruption is identified as a major reason behind the failure of e-

government projects. Interviewees from the Ministry of Oil mentioned:

"Administrative errors always occur, and since transactions in the ministry still depend on paperwork, administrative abuses and corruption cannot be reduced." (Expert 5)

Arayankalam et al. [57] observed that e-government could restrict corruption to some extent. Venkatesh et al. [58] claimed that e-government was transparent and allowed citizens to obtain information about services through passive, active, and interactive information-seeking strategies. Two interviewees from Ministry entities explained:

"Developing information systems in all Ministry institutions will save effort and reduce administrative errors." (Expert 3)

Nevertheless, information systems help employees reduce their uncertainty about service tasks and workflow. One interviewee from the Ministry of Oil mentioned:

"The Ministry of Oil is considered one of the most important ministries and an important contributor to the state's income. Therefore, developing and using modern information systems makes work more streamlined and provides continuous monitoring of the performance of employees within the ministry and its institutions." (Expert 4)

According to the above statement, employees' preference for paperwork and a tendency towards corruption appeared to be the main challenges facing the development of information systems at the Ministry of Oil. Hence, the success of an e-government programme would be determined by the degree of collaboration between employees, and the extent to which public organizations could meet users' needs, thereby providing better and more efficient government services.

5.3 Transactions Security

Security and privacy are critical elements of concern in the establishment of e-government [59]. In particular, these elements can be an obstacle to the application of e-government in Iraq. Interviewees from the Ministry of Oil stated:

"There is a fear of information being stolen easily from institutions when implementing the information systems" (Expert 5)

Al Azzawy [53] defines security as protection from unauthorized access, modification of data, and disclosure of information to third parties. In developing countries, citizens have little confidence in the security and privacy of their information in website applications and e-government portals [60]. An interviewee from the Ministry of Oil stated:

"The citizen is very skeptical and tries to collect all his transaction papers for fear of losing them or showing them to non-employees" (Expert 2)

Additionally, the usage of e-government services will be at minimum levels, with no proper security measures. Arpaci [61] confirmed that in developing countries, there tends to be a lack of proper strategies to assure employees and citizens that their information is protected from an unauthorized third party. Three interviewees from Ministry entities stated:

"The top management has to think a lot about the safety factor when planning the implementation of an e-Government project. Unfortunately, I feel they are not taking any consideration regarding the data even though it did prepare the project" (Expert 1)

Based on the above, the government need to draft policies that will promote security and privacy in online transaction procedures, ensuring citizens' privacy, and inspiring confidence in their safety, while also keeping government information secure. Therefore, privacy and security are among the main challenges to the development of information systems among Iraqi government institutions in general, and the Ministry of Oil in particular.

5.4 Institutional Readiness

The challenge associated with novel technology and its adoption is one that has figured for many years in the development of institutions. This challenge may be further broken down into technology readiness, management support, and cost. Technology readiness is defined as "the technological characteristics available in the organization for the adoption of technology including both structural aspects and the specialized human resources" [62]. In this regard, one interviewee from the Ministry of Oil stated:

"The environment is prepared in the ministry to implement information systems, but there is a need to develop employees' ICT skills and prepare them to use modern information systems." (Expert 5)

The establishment of e-government requires high financial investment in the system on the part of the state. For example, it involves purchasing ICT equipment and the necessary software for proper delivery of services to citizens and businesses [63]. Additionally, the government needs to hire ICT professionals who can use and maintain an e-government system [64]. One interviewee from the Oil Ministry stated:

"Applying the applications is harder than certainly planning because main question is that does the ministry sufficiently able to organize the work technically and financially. However, most of the ministry establishments can implementation the project; we only need to allocate top management" (Expert 3)

However, the senior management of government institutions have contributed to the difficulties involved in implementing e-government. According to Wu et al. [65], e-government projects are not effective in the developing world, because in the context of developing countries, departmental managers are rarely committed to establishing e-government. In Iraq, there is some misunderstanding between top managers, regarding the priority and importance of developing information systems at the Ministry of Oil. Two interviewees from Ministry entities stated:

"this project faced so several difficulties and obstacles because some of the top managers think that this project is a way matter of wasting public money while others think it is the means of development" (Expert 4)

"Even if the money is available, I don't think this project will be taken as a high priority over any other important projects or initiatives" (Expert 2)

Hence, despite the Ministry of Oil's willingness and financial capability to implement an ICT system, there remains the need to develop employees' ICT skills and gain support from the senior management for the implementation of such a project.

5.5 Complexities of Transferring Transactions

In the present study, a transaction refers to the cooperation of two or more governments or governmental agencies who exchange information and collaborate with each other using ICT tools, which can lead to effective services, and the

realization of mutual monitoring [66]. The Ministry of Oil in Iraq has 15 entities, and most of these have branches in every Province. Therefore, managing and executing a transaction within an institution can meet with numerous difficulties. One interviewee from a Ministry entity stated:

"Unfortunately, we still use paper correspondence, and we currently use email and fax to manage files within the institution" (Expert 3)

Furthermore, the management of transactions and information across the Ministry's entities also collides with multiple obstacles. Interviewees from the Ministry of Oil stated:

"Actually, ministry establishments such as Oil Products Distribution Company, Oil Projects Company, and Gas Filling and Services Company have their own systems, therefore, when all these establishments are connected together and then to the Ministry of Oil, the portal will become a real and services will be provided in all levels as well to the citizens" (Expert 2)

Thus, one of the key challenges to developing an information system is the difficulty of managing and completing a transaction within the Ministry's entities. The development of an information system for a single institution does not help, because every institution has branches that need to exchange information with each other to manage transactions. Furthermore, the Ministry has several entities, which need to be able to exchange information to increase the productivity and performance of their operations.

5.6 Employees Experience

Meanwhile, employees' experience in this study refers specifically to an employee's ICT capabilities. For ICT users at the Ministry of Oil, the lack of requisite ICT skills among employees to manage and undertake transactions is essentially what presents the challenge:

"...In fact, many employees find using a computer extremely difficult, thus, they prefer to use documents. This kind of employees includes a number of managers, which makes them obstacle to develop the ICT projects" (Expert 2)

In light of the above, employees who lack the necessary background and competence in using a computer are likely to be hesitant to support the integration of ICT into the work of their institution. Thus, the lack of ICT skills among employees is an obstacle to the development of information systems at the Ministry.

6. RECOMMENDATIONS AND FUTURE WORK

Although this study has significant contribution, it is not free of limitations. For depth in understanding, this study was used qualitative method with five mangers from the Ministry of Oil. The result of study can validate and support by using quantitative method in forthcoming studies. Furthermore, it may be obviously pointed out that a successful adoption of e-Government is not something that may be accomplished by, for instance, implementation an e-Government and supplying access for all citizens'. Nevertheless, a set of preliminary steps must precede e-Government application. This research offers some recommendations for further future researches that may be followed to be able to fulfil the goals of e-Government implementation in oil establishments in ministry of oil in Iraq and endeavour of investigation its establishments' sustainability. These recommendations were influenced from the managers and employees comments.

- A systematic technique should be implemented to adopt and implement e- government in all oil establishments in ministry of oil in Iraq. Because it is a fresh experience for Iraqi ministries, extremely recommend collaboration with many developed countries, which have achieved superior steps in information system application in their organizations.
- Should be increase the budget for developing an integrated IS/ICT infrastructure as well as information system and it is applications must be prioritized, and other essential requirements. Adopting e- government may reduce cost and enhancement information sharing in all Ministry of Oil and its establishments.
- Looking for professional technological employees is an essential step so as to maintain e- government system. If employees face any difficulties, quick assistance should be supplied to avoid staff disruption. The establishment will undoubtedly have more powerful and certainty throughout the process of usage ICT tools, when IS staff in the establishment has sufficient skills and knowledge for adopting new technology. Therefore, IS personnel plays a significant role to develop ICT applications in this establishment.

- Strenuous training programs are required. To familiarize employees with e- government functionalities and enhance their self-confidence within using it.

7. CONCLUSION

Given the significance of the oil sector on Iraqi's economy, this study emphasizes the oil sector policymakers' views toward adoption of information systems and focuses on the factors that help to develop e-Government system. The current study aimed to shed light on major obstacles that hinder effective application of e-Government in Iraq as general and ministry of oil especially to realise the full potential of e-Government benefits. A case was chosen Iraq because e-Government has been lately implemented in some ministries. Results exhibited that utilize of e-Government in Iraq is still at a very earlier stage. Additionally, it was highlighted that most institutions have started limited attempts to implement either custom or open source e-Government applications, but the greater part of employees still do not have sufficient skills and knowledge to use it properly; moreover, e-Government reports clarified that the failure of e-Government initiatives are increased. The success of e-Government depends on the ability to match the available benefits with the demands of the stakeholders to shared vision of organization sustainability. It will be easier to come up with the plans needed to implement the required projects with the knowledge of experts in the field. These plans are then translated into realistic designs that follow the same demands direction as the benefactors. The interview method with five experts is the technique used to determine the themes of challenges. The findings showed six major themes which are complexities of transferring transactions, transactions security, institution readiness, employees experience, administrative abuses, and initial system. Demonstrating the contribution that research can make to the practical application of information systems in government. For this, one can see a value in development of model that help span the gap between theory and practice through determine the challenges facing the development of e-Government in Iraq.

Based on the reviewed obstacles, many recommendations were supplied. We wish that following them can guide to effective e-Government integration in ministry of oil in Iraq. Regardless of the determined challenges, there is an encouraging consideration from the ministry of oil in Iraq and establishments to develop e-Government implementation. It is wished that in the around future we will witness development in the e-Government sector as in other neighbouring countries. This target cannot be accomplished without initiatives started by ministry of oil in Iraq, managers, and employees. Hence, the development of an e-Government in the oil Ministry of Iraq is necessary to promote public sector performance and organize government transactions.

Most of the past studies in the e-Government literature focused on the adoption of the e-Government initiative. Therefore, these studies failed to address difficult issues such as organizational and environmental aspects in the development of information systems. The strength of this research is the development of an e-Government in ministry of oil by addressing the limitations that face this ministry and proposing a more comprehensive recommendation that can help organizations, decision-makers, and stakeholders to improve the performance of the oil sector. The findings of this study are expected to contribute to the oil information system literature within the environment of e-Government by providing empirical evidence regarding the impact of adopting oil information system on the performance of the oil sector. The results of the current study are expected to support policymakers in designing and implementing relevant measures to improve oil sector processes.

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Table 1. Review of challenges of e-Government in Iraq

Authors	Objectives	Analysis Technique	Challenges and Obstacles
[18]	This study aimed to identify the main themes emerging from the technical challenges that hinder the development of e-government in Iraq.	Systematic review	The results of the study revealed six themes relating to challenges: • Outdated telecommunications infrastructure • Poor IT skills • No e-government database • Lack of security measures • No user participation • Poor website design and performance
[31]	This study aimed to determine the obstacles to implementing e-government in Iraq.	Literature review	The result of the challenges that have faced or may face the implementation of e-government in Iraq may be summarized as follows: • Lack of ICT infrastructure • Barriers in policy and law • The digital divide • Computer illiteracy • Lack of trust in e-government • Physical inability to access the Internet • Loss of privacy when using e-government • Security • Corruption and lack of transparency • Interoperability of systems
[19]	This study aimed to explain the challenges facing e-government in Iraq.	Literature review	The results of the study showed several challenges facing the implementation of e-government in Iraq, such us: • Lack of security • Weakness in information-sharing • Need to apply new technologies
[20]	This study aimed to identify obstacles to the application of e-management in Iraqi government institutions	Survey technique	It was concluded from the results of the study that the obstacles to e-administration are as follows: • Organizational obstacles, including the lack of necessary legislation, lack of good planning to implement information systems in institutions, and lack of support for information system projects • Technical obstacles, including a lack of ICT infrastructure, incompatible integration systems between departments, and lack of accurate and integrated databases

| Authors	Objectives	Analysis Technique	Challenges and Obstacles
			• Human obstacles, including the lack of specialized staff, fear of losing sensitive information, and absence of decision-makers to convince of the usefulness of information system projects • Financial obstacles, including a lack of financial support
[21]	The objective of this study was to analyze the main challenges facing the adoption of e-governance in Iraq as a developing country	SWOT analysis	The analysis focused on four aspects (politics, society, economy, and technology). However, only the results of the technological aspect are illustrated in this study, consisting of: • A shortage of skilled IT personnel • High cost of the Internet • Heterogeneous data • Lack of IT standards • Cost of software licenses
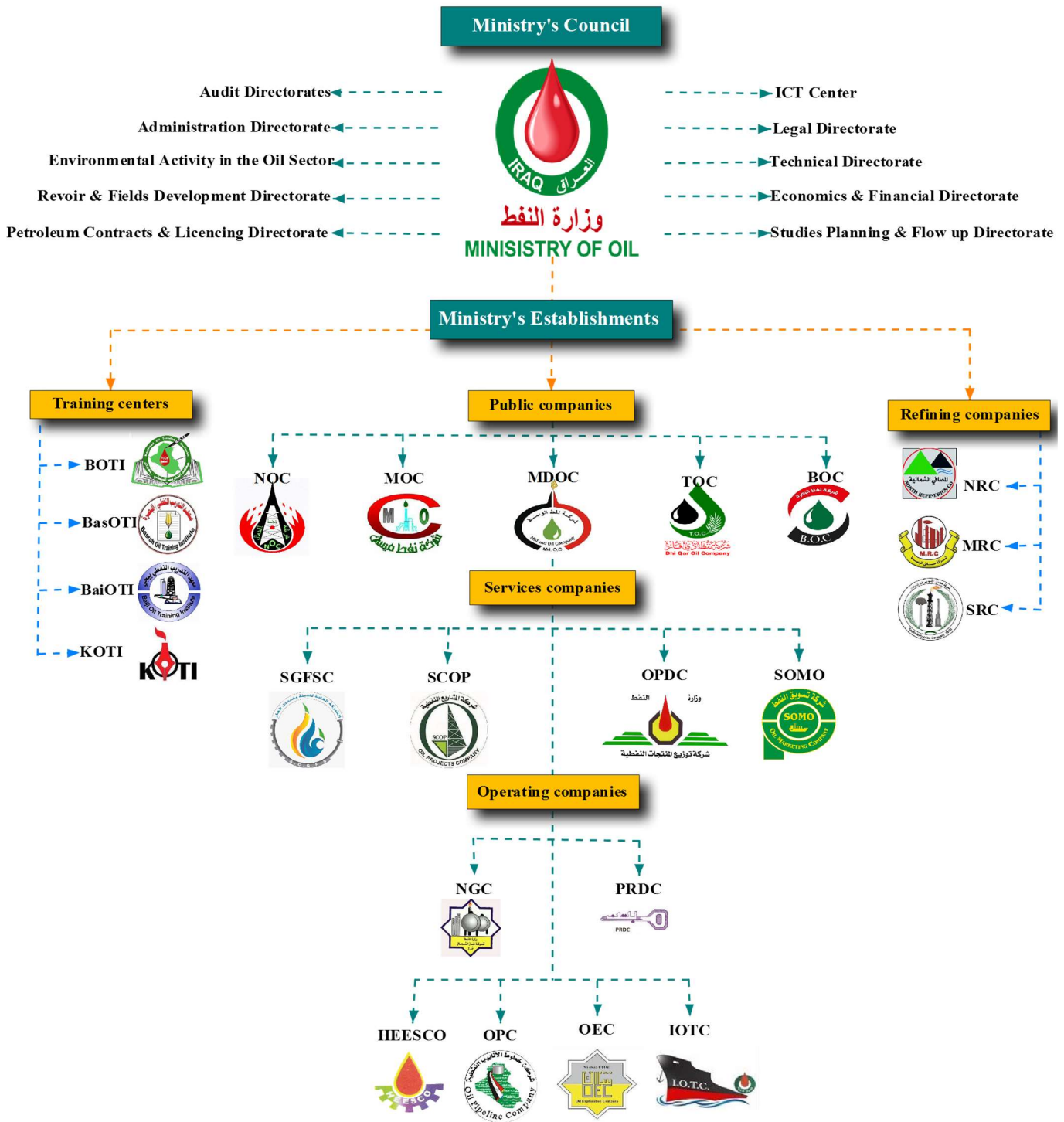
Figure 2. Organization Structure for Ministry of Oil (MoO, 2020)

Table 2. E-Government services provided in the Ministry of Oil and its establishments

	Service Provision	**Main site**	**OPDC**	**GFSC**	**OPC**
Information provision	General information	√	√	√	√
	Documents required for transactions	×	×	×	×
	Announcement	√	√	√	√
	Update information	√	√	√	√
Transaction	Transactions online	×	×	×	×
	Citizen follow up of transactions	×	×	×	×
	Notification for citizen about transactions	×	×	×	×
	Steps to implement any transaction	×	×	×	×
	Query online	√	√	√	√
Transparency	Disclosure of the budget	×	×	×	×
	Complaints online	√	√	√	√
	Tendering process online	×	×	×	×
	Announcing the annual plan	×	×	×	×

Table 2. Experts' Profile

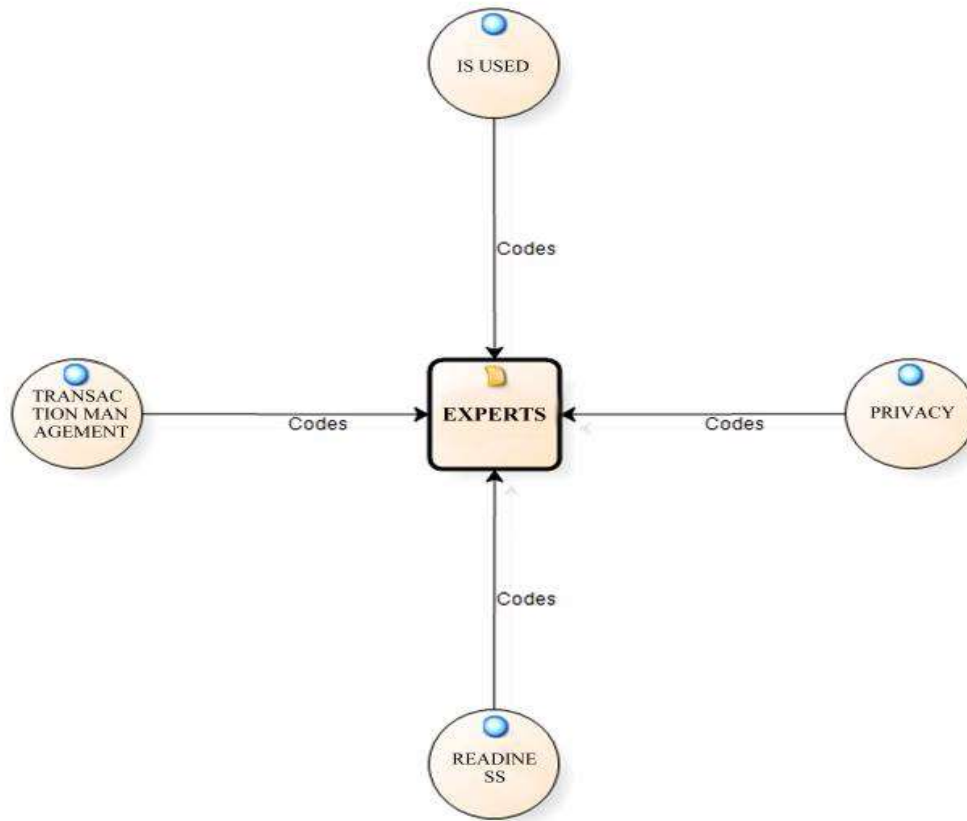| **Experts**	**Position**	**Location**
Expert 1	Inspection Director / Ministry of Oil	Bagdad
Expert 2	IT Manager / Ministry of Oil	Bagdad
Expert 3	CEO of the Middle Furat / Oil Products Distribution Company	Babylon
Expert 4	CEO of the Middle Furat / Oil Projects Company	Babylon
Expert 5	Deputy CEO of the Middle Furat / Gas Filling and Services Company	Babylon

Figure 4. Interview Session According to the Four Aspects
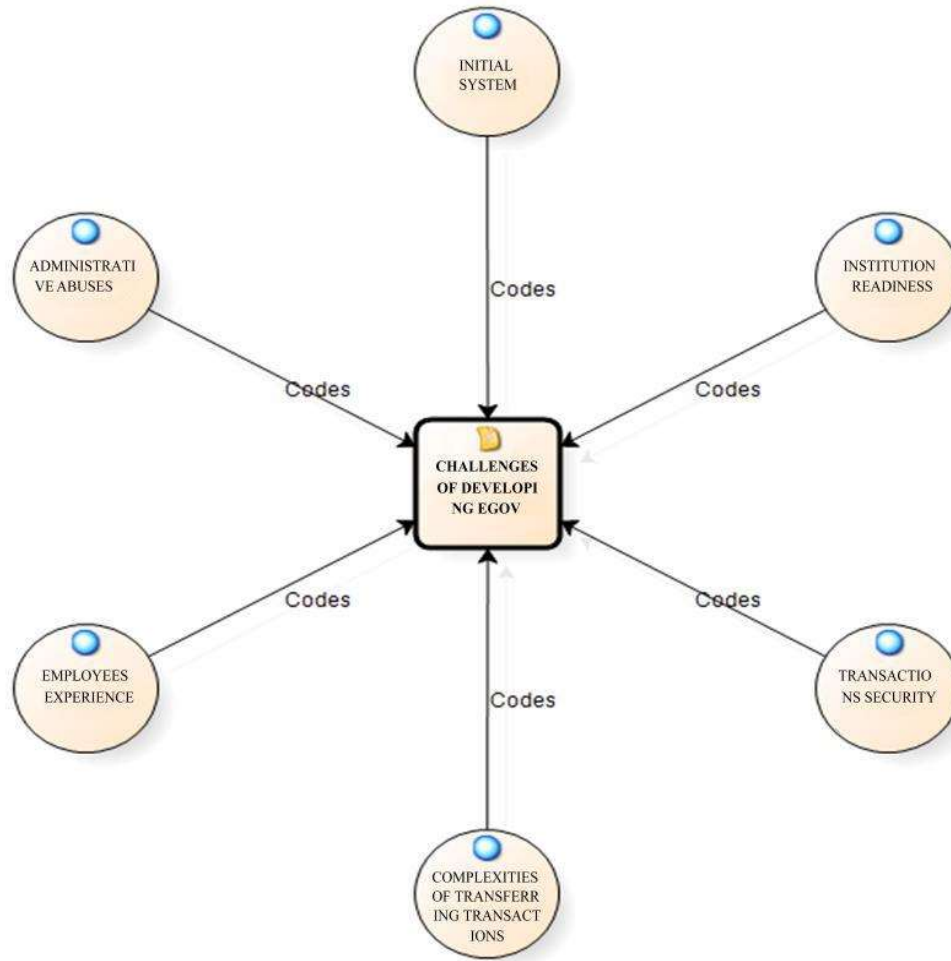
Figure 5. The interview based on the themes