

# Factors Influencing E-government Implementation in Least Developed Countries: A Case Study of Yemen

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## Abstract

Few - if any- studies have investigated the factors that might contribute to the implementation of Yemen e-government. A sample of 169 government employees from different ministries in Yemen responded to our survey to identify important variables that governments must consider when delivering services online. This paper examines the relative importance and significance of five important factors affecting Yemen e-government: ICT infrastructure, government employee's adoption of e-government, government portal websites, social network websites and external assistance. In addition to the survey, an empirical investigation of several official websites in Yemen has been studied to from different perspectives. The research findings suggest that implementing ICT not only involves a step towards an increase in the use of e-government services by people, but also provides numerous opportunities for their civic engagement. The main conclusion of this study is that although ICT can leverage the adoption of e-government, it cannot create alone engagement with traditional activities of the local government.

**Keywords:** Adoption, external assistance, least developed countries, portal websites, Yemen

## 1. Introduction

During the past few decades many governments around the world have included e-government projects in their plan in order to improve the way they operate and provide public services to citizens. Some of these countries like the US, South Korea, UK, and Canada have succeeded in implementing e-government, and have gained many benefits. Several others, in particular, those from emerging parts of the world i.e. transiting economies and developing countries are relatively slower in incorporating or implementing such features (Shetty, 2003; Princely, 2011 ). The digital divide between developed and developing countries is deeply embedded and closely correlated to GDP (Gibbs et al., 2002). World Development Reports recently reported that a person from a high-income country is over 22 times more likely to be an Internet user than a low income country; this is significant as 37% of the world's population lives in low-income countries (David H. Brown et al,2011). In the case of least developed countries the divide is yet larger with access 10 times less than developing countries (UNCTAD, 2005; World Bank, 2007b). Yemen like other least developed countries its needs and experiences differ from developed economies and it is this difference that has implications for theory and practice. The slow diffusion and implementation of e-government services on the least developed countries are attributable to a number of obstacles. Among those mentioned most often are the lack of infrastructure, low literacy rates, slow and low economic development, and a variety of cultural factors.

Simply, e-government refers to the use by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing) that have the ability to transform relations with citizens, business, and other arms of government the resulting benefits can be less corruption, increased transparency, greater convenience, revenue growth, and/or cost reductions (The World Bank, 2007a).

Prior researches have investigated e-government issues in some developing countries. For example, (Behrouz Zarei et al, 2008) encapsulates the essential principles for heuristic architecture of G2G e-government initiatives resulting from a project in the case of Iranian e-government development. (Dada, 2006) used the 'archetypes of failure' by (Heeks, 2003) and discussed the literature on what often goes wrong within the context of e-government in developing countries. (Lau et al, 2008) used a conceptual framework to examine the adoption and development of E-gov services in Latin America.

Contrary to other researches which have presented successful case studies for e-government implementation in some developing countries (e.g. Jamaica: David H. Brown et al,2011 and China: Adela J. Chen et al., 2009), this study demonstrates unsuccessful e-government implementation in least developed countries represented in Yemen case study in order to aid stakeholders in reducing any barriers to implementing e-government. It introduces an empirical research that closely investigates the e-government weaknesses in least developed countries from different perspectives focusing on ICT infrastructure, government portal websites and government users' (or citizen) adoption, social network websites and external assistance. Since e-government results from the interaction between government employees and citizens, it is important to know how government employees perceive e-government, and to what extent they are aware of all aspects related to the e-government projects, to their viability and potential impacts (Cegarra-Navarro et al, 2012).

Thus, this study relies on Yemen government employees respondents and investigation of some Yemen official websites. We have provided empirical evidence of the links between ICT, employees adoption, government website portals and e-government from the perspective of government employees. This paper focuses on one country only among least developed countries, but in despite of this, it – on one hand - emphasizes and covers different aspect related to e-government implementation in its case study instead of discussing only one factor. On the other hand, this paper combines both qualitative and quantitative approaches to strengthen the study (Creswell, 2009) using both secondary sources (official government of Yemen documents, Yemen portal websites and UN surveys) and primary sources (semi-structured interviews and survey questionnaire).

## 2. E-government Readiness in Yemen:

The literature has provided various definitions to e-readiness, (Sunil Bhatia, 2001) defined it as “the degree to which a community is prepared to participate in the digital economy”, while (Danish Dada, 2006) defined it as “a measure of the degree to which a country, nation or economy may be ready, willing, or prepared to obtain benefits which arise from information and communication technologies (ICTs)”. Both macro and micro measures have been considered but key elements include infrastructure, telecommunications, Internet connections and human skills (David H. Brown et al,2011). According to e-government surveys (2012) conducted by the United Nations Department of Economic and Social Affairs (UNDESA) Yemen has the lowest ranking among Asia western countries. As illustrated in Table 1, Yemen e-government development index has a low rank among the world. It ranks the 167th although it was the 164th in 2010. Which in turn gives more attention to find out the main factors that affect the electronic readiness in Yemen. Figure .1 also shows that e-government in Yemen has almost the same level during the past 10 years. Three sub-indices – online service index (OSI) which used to be called web measure index (WMI) in UN survey (2008) and before, telecommunication infrastructure index (TCII) and the human capital index (HCI) – are used to form the e-Government development index (EGDI) which used to be called E-government Readiness Index (EGRI) in the previous UN surveys. For calculating the (EGDI), all three sub-indices are allocated equal weights (Anteneh Ayanso, 2011; Ali A. Al-wazir et al,2012)

Index	2012	2010
EGDI (Rank)	0.2472 (167)	0.2154 (164)
Online service index	0.1765	0.0476
TCII	0.1011	0.0298
HCI	0.4642	0.5739

Table-1: E-government Ranks of Yemen

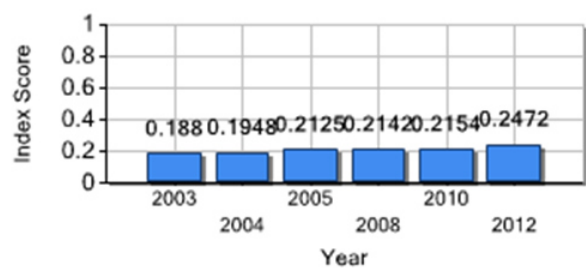


Figure.1 Yemen E-government Index Trend

Source: United Nations Department of Economic and Social Affairs (UNDESA)

(Ali A. Al-wazir et al, 2012) assessed and analyzed the current electronic government readiness in Yemen according to United Nations e-government readiness surveys from 2003 until 2010. They also clarified the most weak parts on the e-government in Yemen and gave suggestions from some countries which have gone through this experience.

## 3. Literature Review

A few researches discussed e-government in Yemen. Al-Hagery [17] highlighted twelve challenges facing the task of the transition to e-government in the current stage in Yemen. Then, suggested that it is possible to implement e-government in Yemen in case of achieving several criteria. In addition, Mahdy [18] emphasized the technology element in Yemen e-government and came up with two proposals. The first proposal includes the national infrastructure for wide area network, channels of access to electronic services and the integration between information system merged within the e-government. The second proposal components are the framework of services and web portals, government e-mail, information portals, service web portals for electronic applications and services. Beside that a number of research papers in e-Government were published in recent years to help practitioners to improve government service quality, responsiveness, convenience and accessibility to both citizens in urban and rural area (O.K. Lean Lean et al., 2009). It is beyond the scope of this paper to review these and other contributions in depth. Rather, focus is given in the context of this paper to three main overlapping issues that frame the discussion of factors influencing e-government implementation in developing countries and guide the selection of literature which are: citizen adoption; ICT infrastructure and government portal websites.

### 3.1 Citizen Adoption:

There is no clear definition of e-government adoption (Kumar et al., 2007). Researchers refer to it as the ‘intention’ (Carter and Bélanger, 2005; Warkentin et al., 2002) or ‘willingness’ (Gilbert et al., 2004) to use e-government information and services. Warkentin et al. (2002, p.159) define e-government adoption as “the intention to ‘engage in e-government’, which encompasses the intentions to receive information, to provide information, and to request e-government services”. Some researches discussed the citizen adoption in a specific country. (Cegarra-Navarro, 2012) has discussed the case of Spanish municipalities. It indicates that adequate e-government implementation is a necessary precursor for civic engagement and citizens to be able to use and benefit from ICT. Another papers from some developing countries such as Sri Lanka, Tanzania, Jordan, etc (Rajapakse, 2011;; Yonazi J et al, 2010; Samer et al,2009) also discussed citizen adoption in their countries. Others have focused on national culture and its implication on e-government readiness and citizen adoption (Omar E.M. Khalil, 2011; Al-Hujra et al., 2011). Previous research has found that factors from technology acceptance model (TAM), and diffusions of innovation theory (DOI) play a role in user acceptance of electronic commerce in the public sector (Warkentin, 2002). (Carter et al, 2004) integrates constructs from the technology acceptance model (TAM), diffusions of innovation theory (DOI) and web trust model to form a parsimonious, yet comprehensive model of factors that influence citizen adoption of electronic government initiatives. Figure.2 shows the model that has been constructed by (Mofleh et al, 2008) based on similar models reviewing the adoption of e-Government mostly tested in the developed world. Authors used this model to test different variables that might affect Jordanian citizen’s demand on e-government.

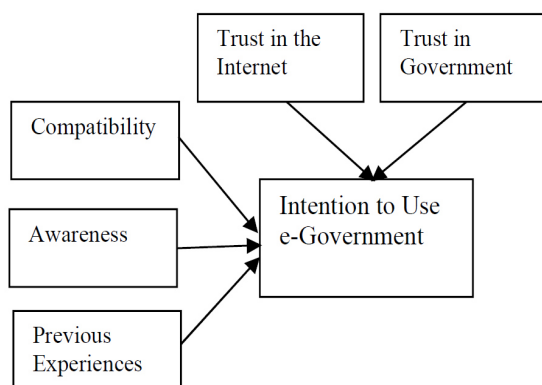


Figure.2 Factors Influencing Citizens’ Adoption of e-Government Services (Mofleh et al, 2008)

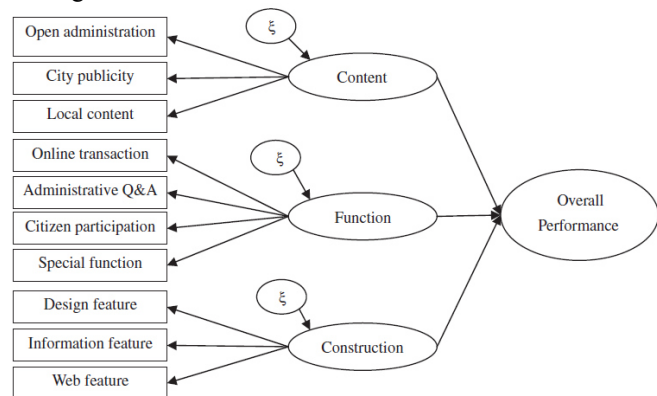


Figure.3 The structural relationship among the three dimensions of GPPA (Liu Yuan et al., 2012)

In fact, the bureaucratic nature of organizations has created a culture in which data sharing is often regarded as a relinquishing of power and authority (Koh et al, 2008). In this paper, we adopt and use some variables from last studies to examine Yemen public sector employees adoption of e-government and its relationship with other factors affecting e-government implementation.

### 3.2 Government portal websites:

Government portal websites are interfaces between government and government, government and business, government and internal employees, and government and citizens (Liu Yuan et al., 2012). Portal websites are able to deliver more advanced services, because they usually integrate resources and services based on the demands of the user (Torres et al. ,2005). Accordingly, it is reasonable to state that the design and operation of government portal websites is a direct reflection of government strategy. Some studies analysed and discussed the government websites portal in one country. (Liu Yuan et al., 2012) studied the portal websites of the governments of 30 provincial capital cities in China. They proposed a “Government Portal Performance Architecture” (GPPA) illustrated in Figure.3. Some other studies like (Rorissa, 2010; Kaaya, 2004) discussed the government websites in many countries. For example, (Rorissa, 2010) described the status of e-government services in 53 African countries through analysis of 582 relevant e-government service websites with respect to the type of e-government websites and services they provide, the features available through the websites, as well as the level of development of e-government service for each country.

#### External Assistance:

China is reported to have invested 1 trillion Yuan (US\$ 121 billion) in e-government applications, ranging from office automation and e-commerce promotion to government websites (Yong,2003).

In contrast, for developing countries the starting point has been different. For these countries it is highly likely that any progress in e-government will be wholly or partially funded through aid programmes of the World Bank or related development agencies. Such financial assistance is required to meet specific criteria. Helen Margetts (2006, p. 263) reports annual spending in Britain of about £ 14 billion on e-government (David H. Brown et

al,2011).

#### 4. Research Methodology

##### 4.1 Sample and data collection

In previous study (Ali A. Al-wazir et al, 2012), we relied on United Nations E-Government Surveys (2003 – 2010) and some Yemen government's official reports to evaluate e-government readiness in Yemen comparing with other countries in the region. In this study, primary and secondary data were collected regarding to the constructs mentioned above. The first part of the study was the survey questionnaire which was distributed, either in hard copy or soft copy, to 400 government employees from 25 government agencies in Yemen. We received 204 employees responded over a period of 8 weeks, of which 168 were finally used for a response rate of 42 percent. The survey covered the main government sectors such as communication, education, health, etc. Most of the respondents are from the ministry of finance (21.9%), ministry of planning and international cooperation (17.8%), ministry of justice (10.7%) and ministry of water and sanitation (9.5%). In addition to the survey questionnaire, several personal interviews have conducted with some IT directors and official employees, a total of 14 interviews. One of the authors is government of Yemen (GOY) employee in the ICT field. This was helpful and made the main point more easy to be specified. Secondary data was based on the content analysis of 29 relevant ministries' websites for 24 important ministries and 5 main cities in Yemen. All of these websites are in Arabic language which in turn made the analysing process easy and more accurate.

##### 4.2 Instrument development and Reliability & Validity Analysis:

This study employ mixed method research approach that includes quantitative and qualitative data collection and analysis techniques. We combined scales from several other relevant empirical studies, mentioned above, with new items to make an initial list of 30 items (8 items concerning the use of ICT infrastructure in the public sector, 13 items relating to the use of government portal websites, 5 items relating to GOY employees adoption, 2 items to social area networks and 2 items relating to external assistance). Some items were modified due to different economic and policy situation in least developed countries. We used a 5-point Likert scale to conduct the satisfaction evaluation. E-government advantages and challenges were also included in the survey to examine GOY employees expectation and the main challenges facing e-government implementation in Yemen. The questionnaire was developed in English and then translated into Arabic, and back into English by other people than those who performed the initial translation.

To ensure the consistency or stability of the items, the reliability test was conducted. Cronbach's alpha coefficients range between 0 and 1 was used to evaluate the reliability of the instrument items. The outcomes of the statistical analysis, shown in Table 2, demonstrate satisfactory reliabilities. Cronbach's alpha for the overall scale of each of the factors ranged from 0.719 to 0.867.

Table 2. Reliability Analysis

Factors	No. of Item	Cronbach's Alpha	Mean	Std. Deviation
ICT Infrastructure	8	.734	2.0877	.58350
Portal Website	13	.837	2.6938	.55886
Citizen Adoption	5	.719	2.4151	.76873
Social Network	2	.799	2.1168	.48265
External Assistance	2	.867	4.7778	2.11269

To test the validity of the instrument, KAISER-MEYER-OLKIN (KMO) has been used. The result of KMO is 0.749, shown in table 3. This high value (between 0.5 and 1.0) indicate factor analysis is appropriate which in turn prove the instrument validity.

Table 3. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.749
Bartlett's Test of Sphericity	Approx. Chi-Square	1142.031
	Df	276
	Sig.	.000

#### 5. Analysis and Finding

##### 5.1 Secondary Data:

E-government development model (EGDM) was used to analyse GOY ministries websites. There are several well known EGDMs such as The UN web presence measurement model (UN Global E-government Survey, 2003), Gartner four-stage model (Baum & Di Maio, 2000), Layne and Lee's four-stage model (Layne and Lee, 2001), etc. We used Gartner four-stage model to analyse the case study in this paper although (Zarei et al, 2008) suggested a nine-stages model for developing countries. The four sages are: presence, interaction, transaction and proposed.

- Presence, in which governments starts publishing information online:

Despite of the large amount of data published online on the most of GOY ministries websites, there are some ministries don't have website published and only 3 governorates, from 21 governorates, have their own official websites online. The main content of all of these websites are the news and some rules and regulations reports. As shown in table 4, there are 21 databases in total, 19 of them are used for news purposes. In addition, only 7 websites have English pages and no one of them, even the ministry of media and ministry of tourism, has audio or video clips on it.

- Interaction, in which two-way communications can develop:

A very simple communication option is included on these government websites which is "contact us" form. The email contact is the technical personal email for most of them. Thus, there is no way to get contacted with other official employees throw these websites. Ministry of Finance and Ministry of Civil Services have offered a search services that could be used to follow up official documents procedures.

- Transaction, in which web sites can provide direct links to government services:

Unfortunately, there are only some links to pay electricity bills and water bills online, but no one of them is working. However, online service index of Yemen according to the latest UN survey (United Nations E-Government Survey 2012) is 0.1765 which is very low comparing with the border countries (Saudi Arabia: 0.7974 and Oman: 0.6667) and with the world average rate.

- Transformation, in which web sites and portals allow people to do their transactions online.

Unfortunately, no one of the government ministry websites included in this stage. Table4 shows that total websites for online payment is zero.

Table 4. Type of services present on the websites (n=29).

Type of Services	Minimum	Maximum	Total	Mean	Std. Deviation
Publications	0	187	821	41.05	54.039
Databases	0	2	21	1.05	.686
Audio/Video clips	0	0	0	.00	.000
Trends Ads	0	64	114	5.70	15.349
Foreign language	0	1	7	.35	.489
Job listing	0	3	7	.35	.933
Application for benefits	0	3	9	.45	.887
Online Payment	0	0	0	.00	.000
Email Contacts	0	5	24	1.20	1.152

However, Yemen government portal website was designed on 2009 to provide electronic services and information to the citizens (<http://www.yemen.gov.ye/portal/>). After analysing the portal, we found that it gives introduction information about the country, the government ministries and some governorates. It has 38 documents published, 12 of them are ministries reports, 8 ministries bulletins, 6 researches and studies, 4 worksheets and 18 books and magazines. The portal supports only Arabic language. Hence, all the publications, pages and information were only in Arabic. It has a page for each government ministry which includes the ministry basic information: tasks and functions, structure and regulation, strategies, laws and decisions, tenders & adv. and news. Lack of services is very clear in this portal since no one of the online services links is working. UN web presence measurement model with five stages: emerging, enhanced, interactive and transactional. This model was also applied to show e-government implementation in Yemen in summery. Table 5 illustrates that only the first stage was done completely. For stage two, there were some imperfections such as non-updated data. The last three stages are almost non exist for our case study.



Table 5. The current situation of GOY ministries websites according to web presence measurement model

E-government development model	Stages	Stage's Explanation	E-government Of Yemen
The UN web presence measurement model	emerging	The country is committed to establish an e-government, and to set up an official site with a limited domain to provide users with access to political and organizational information.	✓
	Enhanced	Increasing the number of official web sites which consist of up-to date information, policies, databases, laws and regulations.	Some official websites
	Interactive	An extensive interaction takes place between the citizens and service providers, search possibilities in data-centres are enhanced, and accessibility to various forms and ability to transfer via the Internet is increased.	Only two official websites
	Transactional	Services including the attainment of Visas, passports, driving licenses, and the payment of taxes, which demand a two-way communication via the Internet.	x
	Networked	The capacity to access any kind of service, at any time	x

#### 5.1.1 Primary Data Analysis:

Majority of the respondents were between 23-33 years old, which was 53.8% of the total respondents. From the gender perspective, only 11.2% of the respondents are female which shows a big difference. This is due to the particular culture that affects Human Capital Index (HCI) which in turn affects e-government implementation negatively. In term of the respondents' education, 76.3% of the respondents were university graduates and 10.1% were post-graduate while the remaining were high school and diploma graduates. More than 50% of the respondents have been using PC in their work place more than 5 years, which contributed 52.7% to the total respondents. Majority of the respondents have been working more than 5 years and most of them are direct managers while nearly 14% of the total respondents had less than three years of working experiences.

#### 5.1.2 ICT Usage:

Although 88.2% of the respondents has internal network at their work place, only 68.1% can access it and only 45% has been using the internal network more than 3 years. Majority of the respondents were able to access the internet, which contributed 71.6% to the total respondents and the remaining of 28.4% are not able to access the internet at their work place. Most of the internet users in these ministries (52.1%) are using the internet for both work and private purposes while around 6% are using it for only private purposes.

Table 6. ICT Usage in the GOY ministries

ICT Usage		Frequency	Percentage	Missing data
Internal network access	Yes	112	66.3	6
	No	51	30.2	
Internet connection	Yes	121	71.6	4
	No	44	26	
Job related emails received per a week	0	93	55.7	2
	1-5	35	21	
	5-10	23	13.8	
	10-20	11	6.6	
	20-50	1	0.6	
	>50	4	2.4	
Permission to use Information System (IS)	Yes	88	52.1	3
	No	78	46.2	

A very interested finding is that email is not often used by government employees in Yemen although they have the infrastructure (PCs, internet, network, etc) to use it. Table 6 shows that the majority of the respondents (55.7%) are not sending emails related to their job and only 2.4% of them send more than 50 emails per a week. In terms of information system (IS), 52.1% of the respondents are using internal systems such as accounting, secretary and some particular systems for particular ministry. For example, Ministry of Financing is using some particular systems individually such as AFMIS, LGMIS and DMFAS for budgets, loan and other purposes while Ministry of Planning and International Cooperation is individually using DevInfo to evaluate and monitor the

plan.

### 5.1.3 Government Websites Usage:

The second major factor for the computation of e-government indexes and rankings is the number of online executable services. Hence, beside the secondary data we collected from the ministries' websites, GOY employees responses regarding their organization and other government organizations websites were also collected from different perspectives. The investigation focused on the benefits, usage, design, functions and services of these websites from the employees' point of view. Most of the positive responses received were from those employees who work in IT field while most of other respondents were moderate. For example, nearly 50% of the total respondents believe that their organization website is very useful for their work while most of other respondents are moderate (16.6%) or disagree. The high percentage of moderate respondents regarding to government websites quality, design, update, interaction, etc is because many employees don't often use these website. However, only 13.7% from the total respondents are satisfy with current e-government services in Yemen.

### 5.1.4 Employees Adoption:

The items of this factor were adopted from some previous literatures and models such as Technology Acceptance Model (TAM). Very few respondents have problems in using the computer and internet. On the other hand, most of them would like to use IS to handle their daily work. However, nearly half of the total respondents don't trust the internet neither the government. Eighteen interviews with some official employees emphasise that national culture matter in term of using ICT to handle daily work. In addition, around 40% of the total respondents use manual reports to collect job related data and to handle their daily work.

Nevertheless, official employees expect several advantages from e-government: reduce corruption, transparency, improve the efficiency, better communication and convenience. Reduce corruption got the lowest selected number while convenience got the highest, shown in Figure 4.a. Also, respondents were asked to select the strongest problem and the weakest one among five challenges facing e-government in Yemen: lack of leadership, lack of IT skills, lack of budget, resistance to change and technical problems. Figure 4.b shows that from the employees perspective, lack of leadership was the strongest problem while resistant to change got the lowest

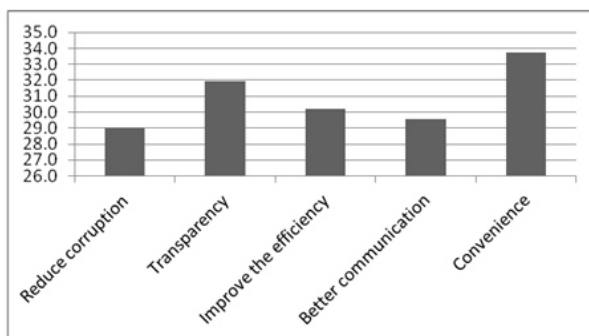


Figure4.a GOY employees expectation of e-government advantages

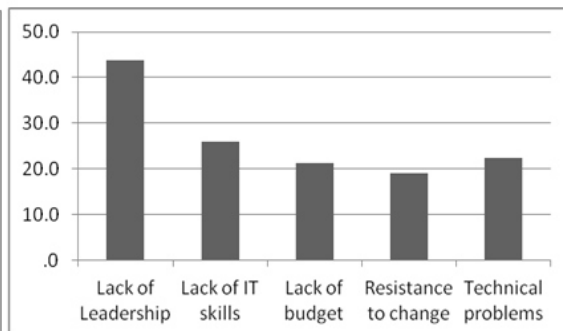


Figure4.b Yemen e-government challenges from official employees perspective

### Social Network Websites:

Investigating the influence of social network websites (SNW) to the development of e-government is an interesting direction in this area (Liu Yuan et al., 2012). Most of the respondents (75.7%) use social network website such as Facebook. In addition, 60% of the total respondents think that SNW is more easy to use than government websites. Secondary data for this factor were collected from (Socialbakers, 2013).

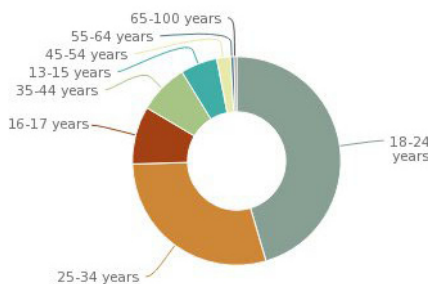


Figure5.a User age distribution on Facebook in Yemen. (Socialbakers, 2013).

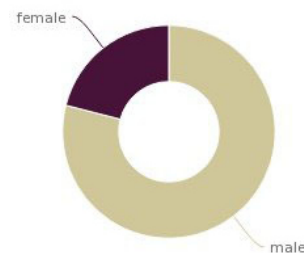


Figure5.b Male/Female User Ratio on Facebook in Yemen. (Socialbakers, 2013).

They mentioned that Facebook penetration in Yemen is 2.62% compared to the country's population and 20.73% in relation to number of Internet users. The gap between male and female is big in using IT as mentioned above. Figure5.a shows that this gap is also clear in using SNW while Figure5.b is showing the age distribution.

## **6. Discussion and Resulting research model:**

In this section, we discuss the implications of our findings. Despite of the importance of ICT in helping the adoption of e-government projects by their users (Dunleavy et al., 2006; Layne & Lee, 2001; Holmes, 2001), most of the government employees in Yemen do not sufficiently use the technology in their job. Our study proved this from different areas such as using email, using ministries websites, and other internal systems. From several interviews with IT employees in different ministries and from the questionnaire's responses, we realized that the ICT infrastructure in the government ministries is not enough to implement the e-government. Most of the employees have the main ICT infrastructure such as computers, network, and internet. A very clear example of this problem is the national systems such as DevInfo, DMFAS, and Development Project system that some focal government ministries and organizations should use. These international systems were developed under United Nation support and requirements. DMFAS was supposed to be used in three main government organizations: Central Bank of Yemen (CBY), Ministry of Planning and International Cooperation (MOPIC), and Ministry of Finance (MOF). 30 days training for around 30 employees was taken in MOPIC on 2004. In spite of the high cost that GOY has spent for the training and the system, DMFAS has never used till this moment at this ministry. Another national database for all development projects and donors was analysed and developed internally. After 2-3 years of developing the system, only some data from agriculture sector was entered!

The previous results indicated that the characteristics of the current reality of information in Yemen and its impact on the levels of various activities of state bodies and institutions, therefore, highlights the many challenges facing the task of the transition to e-Government in the current stage. However, from these unsuccessful case studies we can see that ICT infrastructure (computers, network, database) and training is there although the technology was not used. Figure 4.b in previous section shows the five challenges included in our questionnaire. 5-point Likert scale was used to evaluate the most affected challenges from GOY employees' point of view. They considered Lack of leadership is the first challenge. This is due to some reasons such as some weakness in the system components of institutional and structural rules of procedure of the administrative units. Decision makers should rethink about the way they can implement technology and e-government. There is some weakness in the system components of institutional and structural rules of procedure of the administrative units. This in turn contributes to devote to rely on traditional methods (paper - manual) in all work and activities of agencies and institutions. Therefore, leadership should enforce using emails, systems and electronic reports to ensure implementing and using the ICT.

Another analysis result which is the high percentage of Yemen employees using the social networks also proves our perspective. Last section mentioned that most of the respondents use Facebook more than using government portals or internal database. This is also due to lack of leadership or lack of managing the technology. E-governemnt and ICT implementation can't be succeed by providing only network, training, software and hardware. Government leaders should ask for reports and outcomes coming from these systems, employees daily work must use the technology, and government departments interactions should use the networks and emails for better communications. This can't be done if the leaders don't start to use ICT outcomes themselves.

The relationship between the factors influencing e-government in least developed countries was built based on analysis results and some of abovementioned literatures regarding citizen adoption (Carter and Bélanger, 2005), portal websites (Liu Yuan et al., 2012) and measuring ICT, with special focus on Yemen situation and least developed countries in general. Figure.6 illustrated the three main factors, their connection and their sub-items. Due to overwhelming response in using social networks, the government could have their social network page to let the citizens and the government employees know the online services provided and to have a direct interaction with users. This in turn will help to improve e-government citizens adoption. Unlike other developed countries, least developed countries rely on external assistance in such big projects like e-government due to lack of budget and technical. And from other similar experience in some developing countries, this study expect some resistance at the initiation and at some points during the implementation.



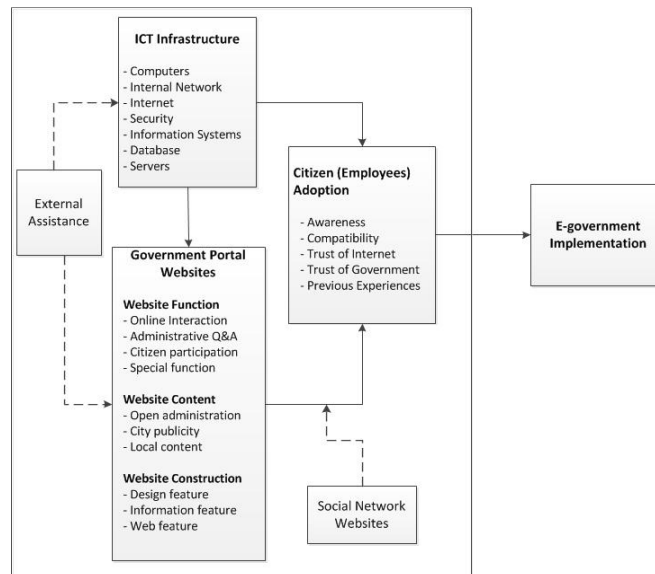


Figure.6 The structure relationship among the main factors influencing e-government implementation in least developed countries.

## 7. Conclusions

This study provides an analytical explanation of the current situation of e-government in Yemen and the least developed countries in general in order to catch up with the development of knowledge-based economy, which has become characteristic of our age. The government of Yemen is aware of the importance and sophistication of IT to develop e-government projects through the construction of ambitious ICT strategies, but these strategies and plans have not been implemented. Therefore, this study highlighted that there is an urgent need to find out the main factors influencing e-government implementation on the public institutions through studies and research process that takes into account the experiences in least developed countries similar to Yemen. The findings show that there are many factors to consider before actually starting the real implementation process. The e-government implementation is not an easy process, but rather a very long and complex process in which the whole government needs to change the way it is doing the day-to-day activities, and as a result, all government's activities need to be reengineered accordingly. One of the important result of this research is that in some situations the technology and training are available but the employees still don't use it (such as email, websites, and computer systems). If e-government can't make the inter-agency interaction (G2G), it would be very hard to make interaction with private sector (G2B) or with citizens (G2C). Therefore, We recommend the stakeholders in the governments of least developed countries to take the initiative of using the e-services and other technologies that enhance the work efficiency and to ask for its outputs.

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