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Implementation of e-Government: Advantages and Challenges

M. Alshehri, S. Drew

Abstract — The objective of this paper is to review the updated and available literature about e-government implementation stages, its challenges and benefits. Depending on literature, it reviews several relevant issues regarding e-government such as the definition of e-government and e-readiness, implementation stages, advantages of e-government implementation and it focuses on the challenges of e-government implementation.

Index Terms — e-Government advantages, e-Government challenges, e-Government stages

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1 INTRODUCTION

E-government has become a popular focus of government efforts in many countries around the world. More and more governments around the world have implemented and introduced e-government systems as a means of reducing costs, improving services, saving time and increasing effectiveness and efficiency in the public sector. E-government and Internet has made an essential change in the whole society structure, values, culture and the ways of conducting business by utilizing the potential of ICT as a tool in the daily work. The purpose of e-government is not only the conversion of traditional information into bits and bytes and making it reachable via the internet websites or giving government officials computers or automating old practices to an electronic platform. But it also calls for rethinking ways the government functions are carried out today in order to improve processes and integration. Governments have different strategies to build e-government. Some have created comprehensive long-term plans. Others have opted to identify just a few key areas as the focus of early projects. In all cases, however, the countries identified as most successful have begun with smaller projects in phases on which to build a structure. E-government researchers divide the process of e-government implementation into phases or stages. This paper presents different studies of e-government implementation; it will illustrate the advantages of implementing e-government systems and the most important challenges that effect the implantation operation of e-government system.

2 DEFINITIONS

2.1 E-government

There are many definitions for e-government such as "The delivery of government information and services online through the Internet or other digital means" [1: 863]. Moreover, [2:1] define e-Government as using the internet and the world-wide-web for delivering government information and services to citizens, business and other government agencies. Also, another definition was given by [3] as the utilising of information and communication technologies (ICT) for developing and improving the relationship between government, citizens, businesses and other government entities. Finally, [4] describe the e-government as the use of information and communication technologies (ICT), particularly the Internet, as a tool for delivering better government services to the citizens, businesses, and employees.

2.2 E-readiness

It is very important to introduce the e-readiness term (electronic readiness) in this paper while it has been considered as one of the most important partner in e-government implementation process. E-readiness is the ability to use "information and communication technologies (ICT) to develop one's economy and to foster one's welfare" [4]. Moreover, e-readiness as [6] defines it, as "a measure of the quality of a country's information and communications technology (ICT) infrastructure and the ability of its consumers,

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businesses and governments to use ICT to their benefit". In general, there are several benchmarking indices at the global level those calculated by the United Nation, The Economist Intelligence Unit (EIU), World Bank and many others.

3 STAGES OF E-GOVERNMENT

The implementation of e-government has several stages. This section reviews the stages of the implementation of e-government as obtained from the existing literature. It includes research done by Gartner Research (2000), United Nations (2001), Layne and Lee (2001) and World Bank (2002).

3.1 UN/ ASPA Study – Five Stages of E-government Model

In [2] study "Benchmarking E-government: A Global Perspective, Assessing the Progress of the UN Member States" identifies the five stages for quantifying progress of e-government. Study identifies e-government stages as representative of the government's level of development based primarily on the content and deliverable services available through official websites.

Stage 1: Emerging: An official government online presence is established through a few independent official sites. Information is limited, basic and static.

Stage 2: Enhanced: Government sites increase; information becomes more dynamic. Content and information is updated with greater regularity.

Stage 3: Interactive: Users can download forms, e-mail officials, interact through the web and make appointments and requests.

Stage 4: Transactional: Users can actually pay for services or conduct financial transactions online.

Stage 5: Seamless: Full integration of e-services across administrative boundaries. Total integration of e-functions and services across administrative and departmental boundaries.

3.2 Gartner Study - Four Stages of E-government Model

To measure progress for e-government initiatives and to establish a road map to achieve the desired levels of constituency service, [7] study titled "Gartner's Four Phases of e-Government Model" classifies e-government into four distinct phases. This can serve as a reference to position where a project fits in the overall evolution of an E-government strategy".

"Stage 1: Presence: This stage is classified by a simple information-providing web site of a passive nature, sometimes described as "brochure ware," indicating the same level of functions as a paper brochure.

Stage 2: Interaction: The interaction stage offers simple interactions between governments and citizen (G2C), government to business (G2B), or government agency to government agency (G2G). Interaction stage web sites provide e-mail contact and interactive forms that generate informational responses.

Stage 3: Transaction: The transaction stage enables transactions such as paying for license renewals online, paying taxes or fees, or submitting bids for procurement contracts.

Stage 4: Transformation: The highest stage, most closely aligned with the concept of governance, involves a reinvention of how government functions are conceived and organized.

3.3 Layne & Lee Study – Four Stage E-government Model

To help public administrators think about e-government and their organizations, [8] provided a four stage e-government development and propose a 'stages of growth' model for fully functional e-Government.

Stage 1: Cataloguing: In stage one of cataloguing, initial efforts of state governments are focused on establishing an on-line presence for the government.

Stage 2: Transaction: In the transaction stage, e-Government initiatives will focus on connecting the internal government system to on-line interfaces and allowing citizens to transact with government electronically.

Stage 3: Vertical integration: Vertical integration refers to local, state and federal governments connected for different functions or services of government.

Stage 4: Horizontal integration: Horizontal integration is defined as integration across different functions and services. In defining the stages of e-government development, the vertical integration across different levels within similar functionality is posited to precede the horizontal integration across different functions".

3.4 World Bank study - Three Phases of E-government Model

To assist decision and strategy makers in devising their own plans and initiatives, [9] "divides the process of e-government

implementation into three phases. These phases are not dependent on each other, nor need one phase be completed before another can begin, but conceptually they offer three ways to think about the goals of e-government".

"Publish: Publish sites seek to disseminate information about government and information compiled by government to as wide an audience as possible. In doing so, publish sites serve as the leading edge of e-government.

Interact: Interactive e-government involves two-way communications, starting with basic functions like email contact information for government officials or feedback forms that allow users to submit comments on legislative or policy proposals.

Transact: Allowing citizens to obtain government services or transact business with the government online. A transact website offers a direct link to government services, available at any time. Transact sites can enhance productivity in both the public and private sector by making processes that require government assistance or approval simpler, faster, and cheaper".

3.5 Comparison between E-government Stages

In previous sections different stage models have been proposed from different sources. Despite their differences in terms of the number of proposed stages, there are many similarities between these stages. For example, presenting government information is commonly perceived as a first step to implementing e-government, despite the different names assigned to it (i.e. publish, cataloguing, presence, emerging and information publishing). Another common stage is the one in which all transactions are conducted online. This stage goes by different names such as transact, transactional and transaction.Moreover,two-way communication between government and other parties is also a common later stage, as observed within the [2],[7] and [9] models. Also,[8] refer, albeit implicitly, to this stage when they state in their transaction stage that citizens can interact with the government electronically. On another hand, there are some differences between these models. For example, an enhanced stage is only mentioned by [2] which seeks to increase the number of websites and update process. So, it focuses on the growth of the e-government websites only through this stage of development. This reflects the importance of the internet as essential to the implementation of e-government. While [8] divide integration into

vertical and horizontal stages. In the vertical stage, local, state and federal governments connected for different functions or services of government, so citizens are able to access the service at the higher level of governments (State and Federal) from the same entry as the municipal portal because the local systems are directly connected to upper level systems. At the horizontal stage, however "systems are integrated across different functions and services. For example, if any citizen made a transaction in one government department, this will lead to an automatic check against data held in other government departments [8]. In conclusion, it is clear that there is no specific number of stages of e-government since it is different from one researcher to another. Due to a diversity of technological, social, organizational, economic, and political reasons. E-government involves multiple stages or phases of development and is not a one-step process.

4. ADVANTAGES OF E-GOVERNMENT IMPLEMENTATION

Advantages and benefits of e-government implementation are the same for both developed and developing countries [10]. However, e-government applications have many benefits for citizens, business and government entities. E-government applications allow people, businesses, and government sectors to access to available government information 24 hours a day, 7 days a week, which improves the quality of these services [10]. According to [11] implementation of e-government will reduce cost and levels of organizational processes by streamlining and re- organizing operating procedures. Moreover, the using of e-government systems will improve the performance of government agencies and that it will deliver the public service effectively and efficiently for all customers [12]. In addition, [13] declared that e-government has great benefits regarding economizing and improving of governments service operations, including efficiency, reduced transactional costs, increase the transparency and increased services for citizens. Furthermore, [14] identifies e-government benefits as follows:

- reduction of customers' and organisations' time, effort and costs
- improvement of service delivery and citizens' satisfaction
- increase of users' ICT skills , internet knowledge and computer usage
- creation of new business and work opportunities

In addition [15] identified many advantages of e-government implementation such as:

- improves efficiency of government agencies in processing of data
- improves services through better understanding of users' requirements, thus aiming for seamless online services
- share information and ideas between all government agencies and department to build one mega data base.
- assists a government's economic policy objectives by promoting productivity gains inherent in ICT and e-commerce
- improving transparency, accuracy and facilitating information transforming between government and customers.
- helps in building trust between governments and citizens, an essential factor in good governance by using internet-based strategies to involve citizens in the policy process, illustrating government transparency and accountability.

To conclude, it is clear that implementation of e-government not only saves resources, effort and money but it can also extensively increase service quality levels and reducing time spent in government departments [16].

5. CHALLENGES OF E-GOVERNMET IMPLEMENTATION

There are several challenges and barriers that can delay progress of e-government implementation. The variety and complexity of e-government initiatives implies the existence of a wide range of challenges and barriers to its implementation and management. This section, will briefly introduce the most important and common challenges and barriers based on literature review as shown in Table 1.

TABLE 1

E-GOVERNMENT BARRIERS

Category	Barriers
Technical	ICT Infrastructure
	Privacy
	Security
Organizational	Top management support
	Resistance to change to electronic ways
	Collaboration
	Lack of Qualified Personnel and Training
Social	Digital Divide
	Culture
Financial	High Cost

5.1 Technical Barriers

The implementation of e-government faces some technological difficulties such as lack of shared standards and compatible infrastructure among departments and agencies. Also, privacy and security are critical barriers in implementation of e - government in citizen concern. The guarantee by the government will not suffice unless accompanied by technical solutions, transparency of procedures and possibly independent auditing [15].

5.1.1 ICT Infrastructure

"Lack or weakness of ICT infrastructure is one of the major challenges for e-government implementation. Internetworking is required to enable appropriate sharing of information and open up new channels for communication and delivery of new services [10]. For a transition to electronic government, an architecture, that is, a guiding set of principles, models and standards, is needed. Many developing countries suffer from the digital divide (digital divide refers to the gap in opportunity between those who have access to the Internet and those who do not [15]), and they are not able to deploy the appropriate ICT infrastructure for e-government deployment. The digital divide between richer countries and developing ones is large with high-income economies having 416 personal computers per 1,000 people and low-income economies only 6 per 1,000 [17]. However, an ICT infrastructure does not consist simply of telecommunications and computer equipment. E-readiness and ICT literacy (ICT literacy is: using digital technology, communications tools, and/or networks to access, manage, integrate, evaluate, and create information in order to function in a knowledge society) are also necessary in order for people to be able to use and benefit from e-government applications. Having the education, freedom and desire to access information is critical to e-government efficacy. Presumably, the higher the level of human development, the more likely citizens will be inclined to accept and use e-government services [10].Therefore, governments should work closely with the private sector to establish a modern infrastructure that will provide access opportunities to disconnected groups and individuals. This lack of infrastructure is cited as one of the primary barriers to e-government implementation. Certain e-government applications require considerable investment in national IT infrastructure".

5.1.2 Privacy

Privacy is a critical issue in the implementation of e-government in both developed and developing countries. Layane and Lee [8] identified privacy and confidentiality as critical barriers on the way to the e- government implementation. Privacy refers to the guarantee of an appropriate level of protection regarding information attributed to an individual [18]. Seifert and Bonham [16] emphasised that e-government should be approached with an eye toward the protection of individual privacy. Both technical and policy responses may be required when addressing the privacy issue in an e-government context. The difficulty of protecting individual privacy can be an important barrier to e-government implementation. In addition, there is a need to deal effectively with privacy issues in e-networks in order to increase citizen confidence in the use of e-government services. Citizen confidence in the privacy and careful handling of any personal information shared with governmental organizations is essential to e-government applications. Moreover, citizens are deeply concerned with the privacy of their life and confidentiality of the personal data they are providing as part of obtaining government services. Thus, they pointed out that privacy and confidentiality must remain priorities when establishing and maintaining web sites in order to ensure the secure collection of data. Since privacy protections are difficult to interject once an e-system has been built, the planning and design of e-government systems must include privacy considerations. A comprehensive privacy policy should specify citizens' rights to privacy and mandate that personal data be collected and processed only for legitimate purposes [19]. At the centre of most e-government projects is the collection and management of large quantities of citizen data such as names, addresses, phone numbers, employment histories, medical records and property records. It is important to note that different countries have different legal and cultural understandings of what constitutes privacy [16].

5.1.3 Security

In fact, the security is one of the most significant challenges for implementing e-government initiatives. Many studies have found that security is one of the most important obstacles .Security means protection of all information and systems against any disclosure to unauthorized access, or unauthorized modifications or devastation [20: 165]. Thus, it refers to protection of the information systems, assets and the control of access to the information itself [18]. It is a vital component in the trust relationship between citizens and government. Security issues may present the largest obstacle to the development of e-government services. Thus, security policies and standards that meet citizen expectations are an important step toward addressing these concerns [21]. Smith [22] emphasised that the use of security solutions, including digital signatures, encryption, user names, passwords, customer unique numbers, bank account numbers, and others being transmitted over the Internet and stored electronically can help in fulfilling security goals in e-government applications. Furthermore, [16] point out that information security, referred to as cyber security or computer security, is an important e-government challenge. In addition, security involves continuous vigilance and protection against the increasing danger of worms and viruses. Also, people need to be educated on the importance of security measures, such as private passwords, to ensure their own protection. Teicher and Dow [23] illustrate on the published record and a benchmark survey of Australian and US public managers to point out that security is considered to be a major barrier to the implementation of e-government by 36.8% of Australian respondents and by 37% of US respondents, with Australian respondents, ranking it the second most important obstacle to e-government implementation. Feng [24] advised that, a body of security professionals should be setup to respond to threats and breaches. Also the need for authority and an infrastructure encryption system has to be given top-priority.

5.2 Organizational Barriers

The implementation of e-government is not a pure technical issue only, but rather an organizational issue [24]. Organizational challenges include: Top management support, Resistance to change to electronic ways, Collaboration and Lack of qualified personnel and training.

5.2.1 Top management support

The implementation of e-government needs the support from the leaders and top management of government for successful implementation. Top management support refers to the promise from leaders to accept, support and adopt the e-government systems and applications. Therefore, it plays a

significant role in the adoption and implementation of e-government [25]. In fact, leadership is one of the main driving factors in every new and innovative project or initiative, so it is necessary for the implementation of e-government [26]. The support from high-level, is vital to e-government development, the gaining of required resources and training, the cooperation and coordination between partners and stakeholders for a successful of e-government implementation [16].

5.2.2 Resistance to change to electronic ways

E-government is a new phenomenon which in the work place means the transformation from manual methods of work to electronic ones. These new changes will create a new advanced environment completely different to what has been used for many years in government departments [24]. Realin [27] mentioned that many employees see the e-government implementation as a threat to their positions and fear losing their jobs and power. However, to decrease the resistance to e-government systems employees have to understand the importance and significant of e-government and make sure that they won't endanger their jobs, but through retraining and skill developments, the employees can be reassigned new roles. Moreover, It is important that e-government leaders identify the sources of resistance and create a plan for treat them [28].

5.2.3 Collaboration

Collaboration and cooperation between all partners is a critical factor in the e-government implementation process in order to gain a successful e-government system [13]. Ndou [10] emphasized that cooperation between public and private sectors is necessary to provide resources, plans, skills and experiences that the government may not otherwise have. Government should encourage all sectors to participate in e-government and implementation and development.

5.2.4 Lack of qualified personnel and training

The lack of ICT skills is a major challenge to an e-government implementation, especially in developing countries [10]. The e-government system can be implemented successfully if qualified personnel are available to take the role of start and develop the e-government system [21]. In general, it is

vital to focus on training and education programs for enhancement the progress of e-government projects. However, training is a fundamental prerequisite as the rate of change increases and new technologies, practices and competitive models appear. The full economic benefits of ICT depend on a process of training and learning skills, which is still at an important stage for all governments [15].

5.3 Social Barriers

Social issues are mainly concerned with the usability by a large variety of people. This implies that the interface must be usable by all kinds of people within the government. Social obstacles include many factors such as digital divide, culture, education and income. In this area the first two factors will be illustrated.

5.3.1 Digital Divide

The digital divide refers to the gap in opportunity between those who have access to the Internet and those who do not. Those who do not have access to the Internet will be unable to benefit from e- government services [15]. Thus, digital divide is "the gap between those with access to computers and the internet and those without" [29:50]. Therefore not all people have the suitable access to computers and Internet, whether due to a lack of income, necessary skills, or internet access. Smith [22] recommended that making computer available in public locations, such as libraries, post offices and shopping centres, could help in addressing the digital divide. Feng [24] points out that the lack of Internet access among the society was considered the most important barrier to e-government development.

5.3.2 Culture

The main barriers to the implementation of e-government are not technical, but cultural implications of new technologies [24]. Culture was defined as a set of important assumptions, beliefs and values that all members of a society share in common [30]. According to Davison and Martinsons [31:3] "culture is difficult to study partially because it is not an easy concept to define". Cultural differences and individual behavior patterns play a role in the acceptance and use of new technology [32]. Chang [33] identifies different factors of culture: social structure, education, language, religion, economic philosophy and political philosophy. Swartz [34] found that cultural issues have negatively affected the

acceptance and adoption of e-government system in some developed countries such as the UK and Japan. However, cultural issue is not easily tangible, it must be given more planning so that technical change is implemented successfully [35].

5.4 Financial Barriers

Moon [36] declared that the lack of financial support is considered as significant obstacle to the implementation of e-government in many countries.It is necessary to ensure the availability of the existing and expected budgetary resources in order to achieve the goals. The most serious and significant barrier to the implementation of e-government is a lack of money; e-government implementation is expensive. Since every government budget is already overburdened with every possible expense budget makers can fit into it, the suggestion to expend the considerable sums that an excellent e-government will cost is a non-starter, in budgetary terms, and in budgetary politics [15]. Carvin et al., [37] stated that because of the high cost of implementation and maintenance the computer systems, many countries become in dilemma of funding e-government programs, even when a government entity has a plan for effective and accessible e-government. Feng [24] stated that a major obstacle to e-government is the lack of finance for capital investment in new technology. West [32] noted that the abilities of government offices to place services online and to use technology for democratic outreach are hampered by budget considerations. Finally, the total cost, including the high cost of systems hardware and maintenance, softwares, training and education, are always seen as major barriers inhibiting agencies and governments from using the technologies.

6 Conclusion

In summary, this paper highlights the different stages of e-government implementation, advantages and barriers to successful implementation of e-government system. It is clear that e-government involves multiple stages or phases of development and it has many advantages to all sectors of government, citizens and business. However, the implementation of e-government is not an easy job it faces many challenges and barriers which have to be treated very carefully.

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