

The Contribution of Information Technology Infrastructure in the Information Systems Success in E-government Agencies

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ABSTRACT: *There are some great innovations in e-government during the past decade. And there is intense competition between some governments and leaders in the supply of services on the Internet. Some countries do not want to stay behind in this area, where many governments have developed detailed strategies to realize the e-government programs. Despite differences in goals behind these programs from one country to another, but there are still many points of convergence between them particularly in information technology infrastructure field. However, Problems associated with the process of application and adoption of e-government due to poor systems and infrastructure construction, which negatively affects the adoption of the public services through the e-government portal, in particular in developing countries. This study argued contribution the information technology Infrastructure in Information Systems success in e-government agencies. Where there are weaknesses in the understanding of this contribution and its importance in many developing countries, so the researcher proposed a model to clarify this contribution, and expected a positive relationship between the information technology infrastructure factors and information systems success, and this affects positively or negatively the adoption of e-government.*

Keywords: *IT Infrastructure, IS success, E-government Adoption, Conceptual Framework, Delone & McLean Model.*

I. INTRODUCTION

In light of the huge flow of information, and in the context of building e-governments, should consider seriously and with interest on information systems success, and their role in the success of e-government adoption and help it achieve its goals, as these systems need to be built a strong infrastructure based on modern information technology and sophisticated. We can say that the use of information technology and information systems in today's organization is growing in a phenomenon way. The advanced sophistication of the new information technologies combined with their yielding benefits are major factors that justify their massive use in almost every type of organization[1].

The increase use of information systems has led to several changes in the workflow of both private and public sections. To date, the private sector's use of information systems for achieving strategic advantages, and gaining financial and business benefits far outweighs that of its public counterpart[2]. Despite lagging behind its private counterpart, there have been signs indicating that the public sector's conservative approach to using information systems has begun to change. The traditional information systems are gradually being replaced by modern systems with more sophisticated software and hardware applications[2].

The concept of e-government is that government agencies use information technology and communications. Since its use promises to lift the level of effectiveness and efficiency of government and affect its relations with citizens. There is a growing realization among policy makers and community leaders of the vital role, which information technology plays in economic and social development. The success of the adoption of e-government depends heavily on successful information systems; these systems need a strong infrastructure.

DeLone & McLean [3] conducted a study which resulted in a proposed model of IS success. Ever since, this study was considered very significant in contributing towards a universal model, which many employed when looking at IS performance. Several attempts have also been made to validate their proposed model [4]. The model comprised of six dimensions, namely, system use, system quality, user satisfaction, information quality, individual impact and organizational impact. The model was also updated in 2003 focusing on the e-commerce context. The authors also pointed that there was a huge gap in the IS studies in which many researchers seems to overlook.

These studies had given small focus on the antecedent factors of the IS success. One of the important antecedent factors of IS success is the infrastructure factor. This paper attempts to provide a conceptual understanding on the effect of information technology infrastructure factors on IS success and its effect on the adoption of e-government. Based on the proposed model, several propositions are formulated as a basis for the study that will follow.

II. RESEARCH PROBLEM

In the past decade organizations and governments have focused on the latest technological innovations to overcome their organizational problems. One such dimension is the implementation of e-government. Eventually, many countries have viewed e-government as a source of development for better delivery of services and information exchange without the constrain of time and space.

According to Alsuwaidi [5] top-management must be ensured before attempts are made to introduce new information technology in a highly tribal and communal society and culture. However, such initiatives are not without challenges. Serving the population through e-Government systems requires Understanding of the factors that Raise the citizen's confidence in e-government, through using modern information technology infrastructure that contribute to the success of information systems, which leads to bring the citizens to adopt the e-government.

III. RESEARCH OBJECTIVES

The goal of this study is to gain a deep understanding of e-government systems success, and to set an example for similar research in the future through the e-government systems success evaluation. Also, the researcher wants to develop a model for e-government systems success evaluation, to inspire other researchers in evaluating e-government systems.

As governments are increasingly spending large sums of money for delivering e-government services and availability of limited studies on assessing e-government systems success, developed our interest to conduct research in this area.

IV. RESEARCH SIGNIFICANCE

Information systems success continues to be a subject of interest among information systems researchers. The literature nevertheless offers limited understanding in regard to infrastructure influencing IS success particularly in e-government agencies.

This study will attempt to provide a better understanding of the impact of infrastructure factors on information systems success in e-government.

The importance of this study as follow:

- Knowledge and understanding of the importance of infrastructure in the information systems success in e-government.
- Develop the right policies and administrative frameworks effective, from the outset to ensure a flexible infrastructure support for the success and development of information systems.
- Laying the foundations for integration between information systems in e-government in a modern way to ensure lifting of government performance.
- Make optimal use of government investment in the use of information and communication technologies for the development of government action.
- Open the domain for other researchers to develop the ideas of this research to demonstrate the importance of infrastructure in the success of information systems.

V. THE PROPOSED RESEARCH MODEL

Despite the availability of other models [6]; [7]this study adapted De Lone & Mc Lean's [3] model to represent the IS success construct. The model was chosen due to its strength in validity and reliability through continuous validation made in many studies. The model had been found to be the most reliable and appropriate for this study. Since its establishment in 1992, more than 200 studies have been reported to cite and test this model [8]. The authors proposed six dimensions of success as the dependent variables - system quality, information quality, system use, user satisfaction, individual impact and organizational impact.

Seddon extended DeLone & McLean's [3] model by replacing IS use into benefits of use. The author used perceived usefulness construct to substitute De Lone & Mc Lean's IS use construct, as did the researchers Hussein, et al [9] in their search. This study adopts Seddon's perceived usefulness as an IS success measure replacing system use as in the De Lone & Mc Lean's model.

Consequently, based on the portion of DeLone & McLean's [3] model, a research model as shown in Figure (1) is developed. From the model, six hypotheses were developed. The relationships between the IT infrastructure factors investigated, namely; Portals, Databases, Interoperability, Security, Knowledge Management, and the four dimensions of IS success; system quality, information quality, perceived usefulness and user satisfaction, are shown in the proposed model (Figure1).

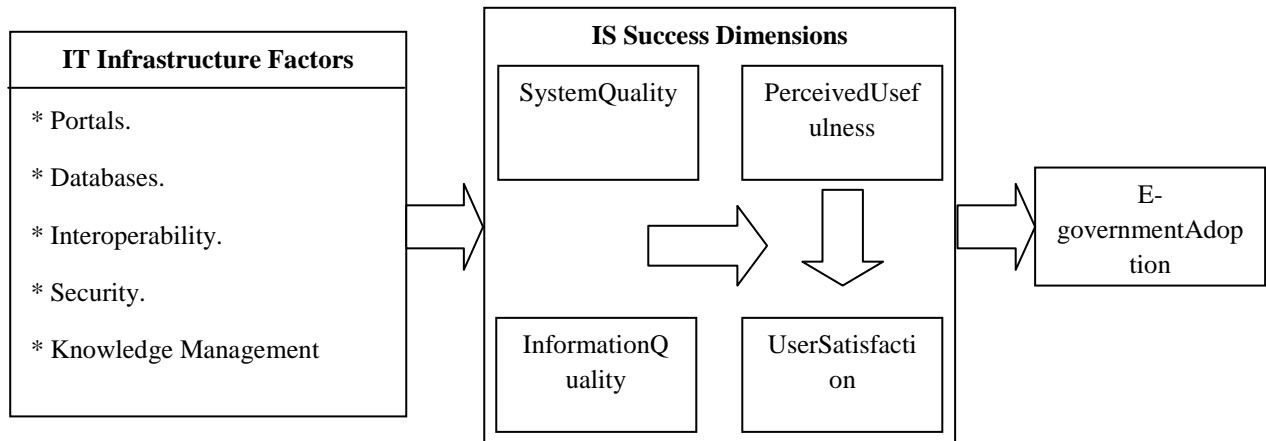


Figure 1. The Proposed Research Model

VI. HYPOTHESES DEVELOPMENT

1. IT Infrastructure Factors

IT infrastructure is a complex entity; it contains the technological and human components, and combinations of both. Despite the fact that IT infrastructure is ever more widely described and presented in an increasing number of academic articles, a more coherent and consistent view is still needed [10]. In particular, IT infrastructure related to the information systems in e-government. The following sub-sections provide detail discussion on each of IT infrastructure factors.

1.1. Portals

The good designed portals bring value and return on investment to information systems. Portals are generally the visible front-end to information systems in e-government, they are the gateways through which users access the public services will made available through e-government information systems. Bajracharya & Pandey [11] argued in their paper that portals play an important role in the success and continued viability of information systems. These portals will serve as knowledge centers or information infrastructures on the specific themes, as well as a forum to build partnerships and on-line communities among different institutions.

Lai & Pires [12] in their study proposed that user perceptions about the e-Government portal influence user attitude towards the portal. It is recommended that portal management needs to ensure ease-of-use, currency and accuracy of the supplied information. Timely information updating is a major concern for the e-Government portal. The content an e-government portal that is perceived by users to be easier to navigate is likely to facilitate satisfaction and reuse. Tan [13] in his thesis said web sites should be built and designed barrier-free accessible.

The results of the study for Wangpipatwong, et al [14] revealed that perceived usefulness and perceived ease of use of e-Government websites and citizen's computer self-efficacy directly enhanced citizen's continuance intention to use e-Government websites. In addition, perceived ease of use of e-Government websites indirectly enhanced citizen's continuance intention through perceived usefulness. Asimwe & Lim [15] said that the Government websites offer great benefits to citizens and governments. Such benefits, however, cannot be realized if websites are unusable. Based on what mentioned above, it is hypothesized that:

H1: Portals will be significantly related with IS success dimension.

1.2. Databases

Database is a collection of information organized in such a way that a computer program can quickly select desired pieces of data. Databases are a national treasure to be reckoned with, as it includes a wide range of data and information such as data of citizens, data and information organizations and bodies of the State, military and civilian data, economic and financial data ... etc., so it must be strong, reliable and highly efficient. And any a weakness in the databases or any wrong use, affect the success of information systems in e-government, in terms of providing the information necessary for the state and the citizen.

Chiang & Hsieh [16] said any e-Government exists to create and capture convenient public services, and much of these services are created through the integration of resource databases and information flows. The results showed that information integration has influenced online public services because of its convenience and efficiency. Meanwhile, automatized services are able to decrease civil servants' administrative loading. In the case study the following three steps were taken to integrate information and provide added values of public services: first, the use of directory services to centralize user account management and to authorize database use;

secondly, to thoroughly audit contemporary databases to check and consolidate operating programs, and to establish a core database and standardized operating database and the related rules; finally to rebuild operating systems and query frames to save information among databases in order to efficiently access information across databases and conveniently print out necessary forms. Against this background, this paper also argue that databases is positively related with level of IS success. It is therefore hypothesized that:

H2: databases will be significantly related with IS success dimension.

1.3. Interoperability

Interoperability means the ability of information and communication technology (ICT) systems and of the business processes they support to exchange data and to enable the sharing of information and knowledge. Information interoperability is the capacity of different information systems, applications and services to communicate, share and interchange data, information and knowledge in an effective and precise way, as well as to integrate with other systems, applications and services in order to deliver new electronic products and services [17].

Interoperability between the different e-government will allow the government to deliver many services to citizens as one-stop shop or one-portal and, share the data between the applications. Integrated Information Systems and one-stop public services to citizens and businesses are heavily dependent on a resolution of the ever-expanding interoperability challenge and the satisfaction of public services' stakeholders. This can only be realistically addressed if the scope of e GIFs is widened, to include service composition and discovery, security standards, certification of public sites and practitioners, as well as unified governmental data models for achieving a common understanding of semantics at a syntax-independent level [18]. In recent years, e-Government interoperability has been a fascinating research and development area in order to facilitate the seamless exchange of information across government sectors. Many researchers have focused on the designing/adopting of Government Interoperability Frameworks (GIFs) and of Enterprise Architectures (EAs) for implementing the interoperability [19]. Accordingly it is hypothesized that:

H3: Interoperability will be significantly related with IS success dimension.

1.4. Security

With the explosion of the public Internet and e-government, private computers, and computer networks, if not adequately secured, are increasingly vulnerable to damaging attacks. Hackers, viruses, vindictive employees and even human error all represent clear and present dangers to networks. Safety and security are two reliability properties of a system. A "Safe" system provides protection against errors of trusted users, while a "Secure" system protects against errors introduced by entrusted users. There is considerable overlap between mechanisms to support each property.

Requirements for rapid service creation have stimulated the development of programmable network infrastructures, where end users or service providers can customize the properties of a network infrastructure while it continues to operate. A central concern of potential users of such systems is their reliability, and most specifically their safety and security [20].

As it know that hackers and cyber-terrorists have pushed corporations and governments to new levels of alert, creating the need for heightened security measures to protect both infrastructure and data. And most IT or IS professionals, know that increasing understanding of risk assessment and security is an ongoing process.

need up-to-the-minute skills to combat threats, prevent attacks and remedy unanticipated casualties. The protection of information systems is becoming increasingly complex, and demand for new and improved services in both the public and private sectors is intense. As enterprises re-invent their infrastructure to meet the demand, cyber-security threats pose a real danger.

E-Government services have to be secure with regards to all aspects, so that the government and the users trust the system and feel confident in using it. Information System Security is thus an essential management responsibility for e-Government, which must satisfy the fundamental security properties of availability, confidentiality, integrity, accountability, and information assurance [21]. Against the aforementioned discussion, it is hypothesized that:

H4: Security will be significantly related with IS success dimension.

1.5. Knowledge Management

Definitions of knowledge range from the practical to the conceptual to the philosophical, and from narrow to broad in scope, which are summarized in [22]. For instance, knowledge is organized information applicable to problem solving [23]; knowledge is information that has been organized and analyzed to make it understandable and applicable to problem solving or decision making [24]; or, knowledge is reasoning about information and data to actively enable performance, problem-solving, decision-making, learning, and teaching [25]. These definitions require clear distinctions between data, information, and knowledge. Several authors try

to distinguish them [26]; [27]. As knowledge management (KM) and information technology (IT) have developed and grown, they have evolved numerous technical terms and phrases that those not intimately involved in these disciplines may find difficult to understand. These terms are useful in efficiently communicating among professionals, but they can be difficult to absorb in a rapid manner, and it can be difficult to obtain consistent definitions. There is a spectrum of tools to address different aspects of the jargon development phenomenon. At the low end of the range are lists that define each letter of an acronym but do not usually provide much else—they are essentially data-level tools. Many glossaries provide short definitions of terms and phrases; they are essentially information-level tools. Unless one has an idea or context already, it is difficult to truly understand when only provided with information [28].

Muganda & Belle [29] proposed an empirically founded framework for building E-Government knowledge infrastructures in transition economies such as those in Africa. The proposed framework builds on the concepts of nomadic information environments. The framework, under the acronym NECE (Nomadic E-Government Co-Evolutionary) framework, caters for the three levels of government: national, regional and local. The new conceptualization of e-government presented in the NECE framework can be seen to have some practical implications. The NECE framework lays emphasis on the building an e-government infrastructure which is linked to the presence of various resources, which on the surface do not appear remotely connected to e-government. The conceptualization advocated for in the NECE framework recognizes that e-government is not only a technology solution, but also a social system that elevates the need for empowered individuals, communities and whole societies through the building of social, human, digital and physical resources. Thus the adoption of e-government should pay attention to the 'localities' within which the artifact is finding expression and that it is difficult to achieve successful implementation as long as it remains foreign and a myth. Against the aforementioned discussion, it is hypothesized that:

H5: Knowledge Management will be significantly related with IS success dimension.

2. Information systems success

Measuring IS success has been one of the prime concern of IS researchers. Various models and frameworks have been proposed and validated in diverse IS implementation settings [30]. Accordingly, based on a review of 180 papers containing empirical IS success measures that had been published in 7 leading journals during the years 1981 to 1987, DeLone and McLean developed IS success model which consists of six inter-relationship dimensions [3]. The model proposed that 'information quality' and 'system quality' singularly and jointly affect both 'use' and 'satisfaction'. In addition, the amount of use can positively or negatively affect the degree of satisfaction, and vice-versa. Both use and satisfactions are direct antecedents to individual impact which in turn may influence or affect organizational impact [30]. Present below are the details of each dimension in the model.

2.1. Information quality

Information quality is highlighted by DeLone & McLean [3] as an important indicator of IS success. Information quality has received increased attention since the advent of the Internet and World Wide Web (WWW) [31]. Lederer [31] found information quality to be a major influence on the perceived usefulness of websites, as suggested by Seddon [32] and as validated by Rai [33] concerning traditional IS. Rai [33] also validated the relationship between information quality and user satisfaction as suggested by DeLone & McLean [3] and Molla & Licker [34]. Information quality is composed of three elements utility, integrity and objectivity; there are several characteristics of information and data, such as accuracy, precision, currency, reliability, completeness, conciseness, relevance, understandability, meaningfulness, timeliness, comparability and format.

2.2. System quality

refers to measures of the information processing systems itself which include convenience of access, flexibility of system, integration of system, response time, realization of user expectation, reliability, ease of use, ease of learning and usefulness [30].

2.3. Perceived Usefulness

Refers to the consumption of the output by the recipient of an IS. According to McLean and DeLone when use is adopted as measure of success researchers must consider the extent, nature, quality, and appropriateness of the system use [35]. Rai [33] in validating the Seddon [32] model demonstrate that perceived usefulness positively influences user satisfaction with an information system.

2.4. User satisfaction

Seddon [32] defines User Satisfaction as a subjective evaluation of the various individual, organizational, and societal consequences of IS Use. He asserts that the User Satisfaction measure is definition

ally, a measure of the net benefits perceived by the information system's stakeholders (individuals, groups of individuals, management of organizations, and society).

2.5. Individual impact

Refers to a situation where an information system has given a user a better understanding of the decision context, has improved his or her decision making productivity, has produced a change in user activity, or has changed the decision maker's perception of the importance or usefulness of the IS [30].

2.6. Organizational impact

Concerned with the changes in the organizational performances as the results of the information systems. It is also described as the effect of information product on organizational performance [30].

As is known, was amended Seddon the IS success model by substituting the use dimension with perceived usefulness which is defined as "the degree to which the stakeholder believes that using a particular IS has enhanced his or her job performance, or his or her group's or organization's performance". The chief difference between Seddon's IS success model is definition and placement of use. This comment by Seddon, the proposed framework will substitute 'use' with 'perceived usefulness'. As perceived usefulness is also professed to be equivalent to perceived impact, we therefore eliminate both individual impact and organizational impact from the IS success model. Hence, the proposed model in this paper, IS success is defined as the inter-relationship of information quality, systems quality, perceived usefulness and user satisfaction. Accordingly, the following hypotheses are formulated:

H6a: Systems quality is significantly associated with perceived usefulness

H6b: Information quality is significantly associated with perceived usefulness

H6c: Systems quality is significantly associated with user Satisfaction

H6d: Information quality is significantly associated with user satisfaction

H6e: Perceived usefulness is significantly associated with user satisfaction

3. E-Government adoption

E-government is a relatively new branch of study within the Information Systems (IS) field. Developing countries have established promising e-Government initiatives with the objective of enhancing the accessibility of government services and information for their citizens. However, governments tend to design and launch online services based on their understanding of what citizens need, surprisingly, without actually measuring what increases citizens' willingness to adopt web-enabled services. Governments must first understand variables that influence citizens' adoption of e-Government in order to take them into account when delivering services online [36].

According to [37] In order to increase the adoption of e-Government websites, their study mainly investigates factors that influence the adoption of e-Government websites directly from citizens. The study confirms that information quality and system quality are significant factors that influence the adoption of e-Government websites. Accuracy, relevancy, and completeness were more significant than timeliness and precision. Efficiency was the most significant factor.

Titah and Barki [38] suggest that apart from organizational factors, individual beliefs of citizens significantly influence adoption of e-government services. In a business to consumer (B2C) ecommerce environment, individual beliefs such as perceived usefulness (PU) and perceived ease of use (PEOU) have been considered as the dominant beliefs that affect the intention to adopt or use the technology in question [39]. These beliefs are the major constructs of technology acceptance model (TAM) proposed by Davis (1989).

It can be concluded that defined organizational and technological requirements that will be necessary for the adoption of e-government in public sector organizations through construct an integrated architecture framework for e-government[41], and the information systems success helps to revitalize business processes, And provide better service, improve business decision-making, and gain competitive advantage from the adoption of e-government.

Against the aforementioned discussion, it is hypothesized that:

H7: IS success dimension will be significantly related with e-government adoption.

VII. CONCLUSION

The propositions presented in this paper an opportunity for further investigation on the effect of information technology factors on IS Success, and the effect of IS Success on e-government adoption through variety of research designs and settings. Certainly, survey research designs employing users and specialists as respondents would best match the requirements for validating the proposed framework. The proposed model should be of interest to IS practitioners, academic community, and decision-makers in e-government. For the

practitioner community, the model will enhance their understandings on the factors that contribute towards IS Success. For the academic community, the proposed model provides ample research opportunity to validate in order to support or refute the proposed propositions. And decision-makers in the e-government, that the proposed model will help them to increase the adoption of e-government by citizens.

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