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# Factors influencing the process of e-government diffusion a conceptual framework

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**Abstract**
The diffusion process of e-government becomes one of the central research issues in many countries. This study intends to investigate the internal and the external factors affecting the process of e-government diffusion. The study provides theoretical framework through explaining each element and supporting literatures that contribute to develop the conceptual model. we develop a conceptual model that shows how e-government adoption by government impact the level of corruption, the service efficiency, employees training, and therefore the implementation, and then how these factors impact citizens trust in government and internet, therefore their attitude to adopt e-government service. The model of technology acceptance (TAM), diffusion of innovation (DOI), and theory of reasoned action (TRA) play an important role in developing our conceptual model. The conceptual model provides a foundation for further empirical testing for the factors influencing the diffusion of e-government services.

**Keywords:** E-government Diffusion; E-government Adoption; Services efficiency; Employees Training; Citizen Attitude; E-government Implementation

## 1. Introduction

In recent years, information and communication technology (ICT) is rapidly improving all over the world. This improvement led to transformations in the method of delivering businesses and governments' services to customers and citizens. Due to the rapid and continuous improvement of technology, people have gained more knowledge and experience through utilizing the internet and e-Services from the private sector. This increases the citizens' expectation for better service from their related governments (Silcock, 2001) [1]. Consequently, governments have embraced e-government as the most effective procedure for communicating with citizens and responding to their needs, which accordingly enhances the efficiency, effectiveness, and accountability of governments (Gonzalez *et al*., 2007; Bannister and Connolly, 2015) [2,3]. However, when governments adopt e-government service, it is very important that they understand the factors leading to successful e-government diffusion. The success of e-government services depends on government support in implementing the service and depends on citizens' willingness to accept and adopt these services (Carter *and* Bélanger, 2004) [4]. Therefore, governments and researchers need to understand that the diffusion of e-government services depends on two distinct but linked processes. The first is the adoption of e-government within the government organization itself and the second is the adoption of the e-government service by the citizenry.

Prior research on e-government adoption and diffusion largely focused on how the efficiency of the service and the acceptance of citizens affected the diffusion of e-government. However, very few studies discussed the adoption process and the internal determinants influencing the diffusion of e-government such as employees training and service implementation by governments. A study by Ndou (2004) [5] mentioned that core internal (organizational) factors affected the implementation stage of e-government and noted the need for more study on issues such as change management, strategy, and human capital (employees). Zhu *et al*. (2006) [6] discussed the process of innovation assimilation of internet based e–business by firms in different countries and argued that technology readiness, integration and other contextual factors affect the process of innovation adoption in different environments. Thus, there is a need to study the mechanism of successful e-government diffusion, and to understand the linkage between the internal and the external factors that promote e-government adoption and the diffusion process. Therefore, one of the contributions of this study is to develop a conceptual model of the internal and the external factors affecting the adoption of e-government on the diffusion of e-government services.

Another contribution of this paper is that we argue that the diffusion of an innovation in the general society is a function of the adoption decisions made by individuals. The rich literature related to the diffusion of innovation (DOI) is concerned with the attributes of an innovation and how these affect its acceptance into a population. Other literatures, such as the theory of reasoned action (TRA) and Technology Acceptance Model (TAM) have examined how individuals decide to adopt or not. In our conceptual model, we link these two processes. We develop a model that begins with a government's decision to adopt e-government, and examine the factors that affect its implementation within the government. We focus our attention on the factors that influence the implementation of the government's decision to adopt, such as employee training and how these influence citizen's decisions to adopt the e-government services through increases in service efficiency, and decreases in the level of corruption. In addition, we argue that the efficiency of service increases citizens' trust in government and in the internet that then positively influences citizens' attitude that, in turn leads to encouraging the adoption of e-government by citizens and diffusion throughout society.

In this paper, we explain the conceptual model and supporting literatures. We examine each element of the conceptual model

before presenting the full model. Measurement of the model and empirical evaluation of the model will be presented in later papers.

We structure the remainder of this paper into five sections. The following section provides a brief definition of e-government. In the last four sections, we present on outline of DOI, TRA, and TAM and we then build the conceptual model through a review of the relevant literature especially as it relates to DOI, TRA and TAM. We then provide a description of our full conceptual model, and end with our conceptual contributions and expected results.

## 2. Literature Review of Theories Used in Conceptual Model Development

Many studies were conducted and several models and theories were developed regarding the adoption and diffusion process that describe and identify variables or characteristics that affect it. This study focuses on three models (the Technology Acceptance Model (TAM), Theory of Reasoned Action (TRA), and Diffusion of Innovation (DOI). We use these models in order to identify the variables affecting the attitudes that citizens have and the attitudes that government employees have in adopting e-government services.

### 2.1 Diffusion of innovation theory (DOI)

Although there is a rich research literature related to the diffusion of innovation (Katz, Levin, Hamilton, 1963; Kaur and Kaur, 2010) [7,8], we focus on the work of Rogers first published in 1962. Many researchers adopted Rogers's conceptual framework, which identifies the characteristics of an innovation that influence the acceptance of that innovation (Rogers, 2003) [9]. Rogers (1983) [10] described the characteristic of an innovation in general terms. He defined innovation as "an idea perceived as new by an individual" and defined diffusion as "a process by which an innovation is communicated through certain channels over time among the members of a social system". Rogers' model focuses on the process of diffusion of innovation among categories of individuals. The innovation creates an individual reaction towards it. When considering diffusion of an innovation, the process that it takes to develop attitudes and beliefs and then the decision to adopt or not adopt this innovation, is considered as an innovation-decision process (Karahanna *et al*., 1999) [11].

### 2.2 Theory of reasoned action (TRA)

Theory of reasoned action (TRA) is widely studied in social science and information systems (Venkatesh, *et al*., 2003) [12]. TRA was developed by Ajzen and Fishbein (1975) [13] to examine the relationship between a person's attitudes and their behavioral intention to engage in an activity. TRA determines an individuals' intention to perform the behavior and is used to predict individuals' behavior based on existing attitudes and behavioral intentions (Rogers, 2003) [9].

TRA models play a role in e-government diffusion's research. TRA has been used in several studies related to e-services (including e-government services) acceptance to determine factors that influence the adoption of e-government by individuals (Carter *and* Bélanger, 2004) [4]. The TRA model promoting the decision making of the innovation-decision process outlined in Rogers diffusion model.

### 2.3 Technology acceptance model (TAM)

Technology acceptance model (TAM) is an adaptation of (TRA), it was developed by Davis (1985) [14] to identify the factors influencing behavioral intention or decision by individuals to adopt or use technology (Davis, 1985) [14]. TAM was designed initially to be applied to an organizational setting. It was also applied to user acceptance of computers (Davis *et al*., 1989) [15]. According to TAM, a technology acceptance behavior is influenced by two main factors; perceived usefulness (U) and perceived ease of use (EOU). These factors influence an individual's intention to adopt and use the technology (Greenfield and Rohde, 2009) [16].

TAM has been used in several studies to evaluate an individuals' acceptance of a new technology in the technology acceptance and IS (Information System) research fields (Greenfield and Rohde, 2009) [16]. In the e-government area, several studies explore the role of TAM in identifying factors influencing individuals to adopt e-government system. Some studies suggest that both factors of perceived usefulness (U) and perceived ease of use (EOU) associate with individuals'' intention to adopt a system (Amagoh, 2015) [17]. Usefulness (U) is related to relative advantage and compatibility and ease of use (EOU) is related to the complexity, trialability, and observability elements on Rogers' diffusion model.

## 3. Literature Review, Hypotheses and Conceptual Model Development

### 3.1 Adoption and Diffusion of E-government

Adoption and diffusion are considered as critical issues for evaluating e-government success (Zhang *et al*., 2014) [18]. Many recent studies discussed the diffusion of e-government. According to Zhang *et al*. (2014) [18], these studies of e-government diffusion are focusing on four aspects: 1) factors that affect e-government diffusion; 2) applications of e-government diffusion; 3) the effect of the diffusion of e-government on government agencies and employees; and 4) the effect of ICT infrastructures on the diffusion of e-government. Most of these studies mentioned DOI theory to support the causal arguments such as framing the challenges or the factors influencing e-government diffusion (Zhang *et al*., 2014; Al-Hadidi and Rezgui, 2010) [18, 19].

Amagoh (2015) [17] studied the factors that affect e-government diffusion in Nigeria using three theoretical models of innovation diffusion. The study found that e-government diffusion confirmed the effect of perceived usefulness, perceived ease of use, and perceived attribute of innovation (relative advantage, compatibility, ease of use, usefulness, trust in internet, technological infrastructure, and skill human capital) on citizens' intention to adopt e-government services. Ease of use, fitness, and user evaluation toward e-government are associated positively with the diffusion of e-government (Zhang *et al*., 2007) [20].

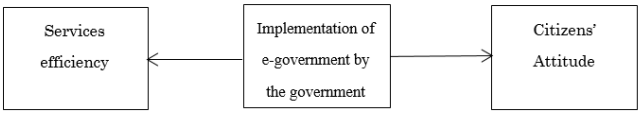
Many studies analyzed the factors predicting the adoption of e-government by citizens. Since e-government is heavily technology-driven, then the variables that related to technology become very important as much as the traditional variables for predicting e-service use generally (Al-Adawi *et al*., 2005) [21]. Factors from TAM, DOI, and TRA models play a role in the acceptance of e-services (including e-government) that affects consequently the adoption of e-government by citizens (Gefen *and* Straub, 2000; Warkentin *et al*., 2002; Carter *and* Bélanger, 2004*)* [22, 23, 4].

From our review, we find that the main factors that contribute to the diffusion of e-government include: trust issues (trust in the internet and trust in government), citizen attitude, efficiency and corruption issues. We will discuss each of these factors as these relate to our model in the section below.

### 3.2 E-government Implementation

Many studies have discussed the challenges for the successful implementation of e-government. Ndou (2004) [5] discussed the challenges of e-government implementation including some factors related to the efficiency level. In his paper, he argues that more complexity means less efficiency. He found that e-government functions that are more complex present challenges to its implementation.

Several studies discussed the challenges of implementing successful e-government generally. The argument in these studies is that e-government's successful implementation not only depends on government support, but citizens' readiness for accepting and adopting e-government services as also important for successful implementation (Rokhman, 2011) [24]. The following graph explains the relation between the variables, therefore lead to propose the following hypotheses.




**$H_1$:** *The implementation of e-government by the government affects positively the service efficiency.*

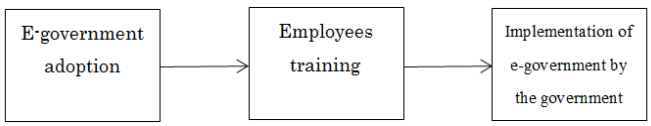
**$H_2$:** *The implementation of e-government by the government affects positively citizens' attitude.*

### 3.3 Employees Training

Training can positively affect the attitudes of employees toward adopting and using new technology for service delivery. David and Stephen (1989) [25] described employee training as a tool that contributes to organizational effectiveness and efficiency. A study done by Al-Busaidy and Weerakkody (2009) [26] focused on identifying the most salient factors that affect e-government diffusion in Oman. The study found that government employees' knowledge, skills, and capability have indirect impact on citizens' trust in using e-government services in Oman.

Ndou (2004) [5] identified human capital as one of seven categories (ICT infrastructure, policy issues, change management, strategy, leadership role, partnership and collaboration, and human capital development) that present challenges for e-government implementation. Moreover, Azeez *et al.* (2012) [27] highlight that human capital development present challenges of successful implementation of e-government in Nigeria. These studies identified human capital, that is, the employee's abilities and training as most central to the successful implementation of e-government.

Therefore, the following graphic interpretation clarifies the relation between the variables in the above study, hence lead to propose the following hypotheses.

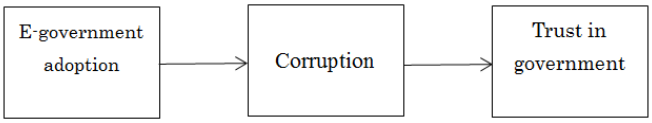



**$H_3$:** *The adoption of e-government by the government positively affects employees training.*

**$H_4$:** *Employees training positively affect the implementation of e-government by government.*

### 3.4 Corruption

Many researchers study the corruption issue and its effect on e-government. One of the advantages of e-government is that it reduces the corruption level and it provides better services for the citizens. From the TAM model, corruption influences the perceived usefulness (U) of an innovation because corruption degrades the effectiveness of government and hence the trust in government. Sapanjeet and Kamalkant (2012) [28] conducted a study about the impact of e-governance on corruption and argued that e-governance helps in reducing the corruption level and increasing the level of transparency, efficiency, and accountability for all services provided by government. Moreover, e-government helps in increasing transparency of the decision making process, since it offers opportunities for citizens to provide their ideas and suggestions openly in online communities (Ndou, 2004) [5]. The following graphic interpretation explains the relation between the variables that discussed in the above studies, therefore lead to propose the following hypotheses.



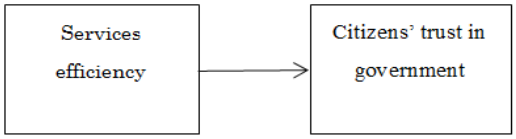

**$H_5$:** *The adoption of e-government by the government negatively affects corruption.*

**$H_6$:** *Corruption negatively affects the trust in government by citizens.*

### 3.5 Trust in Government and Trust in Internet

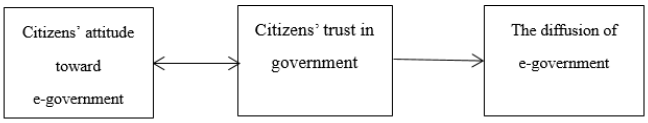
Trust is considered an important element for organizations as it sustains the relationships that form the components of coordination (McKnight et. al., 1998) [29].

Trust in government is a public evaluation for the government based on their perceptions of the integrity and capability to provide services that fit citizens' expectations (Carter and Bélanger, 2005) [30]. E-government influences trust in government, trust in government is linked to what government agencies and programs do (Tolbert and Mossberger, 2006) [31]. A study done by Nye (1997) [32] shows that, low trust in government is associated with perceptions of inefficiency of the government, which means that as the e-government services increase efficiency then citizens' trust of government increases. This lead to build the relation between these two variables as the following graph.

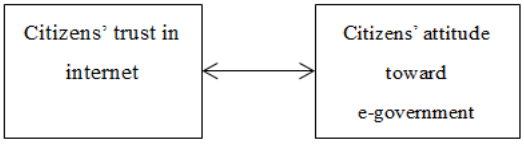



There are several studies supporting the idea of e-government as a solution to increase the communication between citizens and government that leads to increased trust in government by the citizens (Chadwick and May, 2003) [33]. Tolbert and Mossberger (2006) [31] argue that there is a significant relationship between e-government use and citizens' trust in government. Trust in e-government can be increased if e-

government improves its interaction and responsiveness with citizens (Tolbert and Mossberger, 2006) [31]. A graphic interpretation explains the relation between the variables from above studies.




Trust in the internet is considered as a key predictor of e-service adoption (Carter and Bélanger, 2005; McKnight *et al*., 2002; Warkentin *et al*., 2002) [30, 34, 23]. According to Shapiro (1987) [35], trust in internet is about the trust in the security measure, safety nets, and the performance of the internet. As noted earlier, these would include elements of the environmental context as described by Zhu *et al*. (2006) [6]. The adoption of e-government by citizens is dependent on their belief in internet capability to provide information and secure transactions (McKnight et. al., 2002; Carter, and Bélanger, 2008; Amagoh, 2015) [34, 36, 17]. According to Tolbert and Mossberger (2006) [31], using government websites affects positively citizens' attitude toward e-government and consequently improves their trust and confidence in government. The following graph clarifies the relation between the variables that discussed in above studies. Therefore, we propose the following hypotheses.




**$H_{7_a}$:** *Citizens' trust in government positively affects their attitude toward e-government.*

**$H_{7_a}$:** *Citizens' attitude toward e-government positively affects their trust in government.*

**$H_{8_a}$:** *Citizens' trust in internet affects positively their attitude toward e-government.*

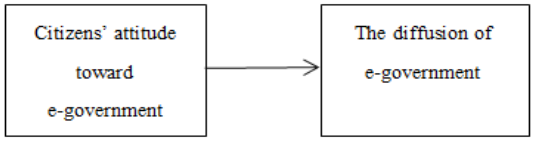
**$H_{8_a}$:** *Citizens' attitude toward e-government affects positively their trust in internet.*

**$H_9$:** *E-government's services efficiency positively affects citizens' trust in government.*

**$H_{10}$:** *Citizens' trust in government affects positively the diffusion of e-government.*

### 3.6 Citizen Attitude and Adoption Decision

Citizens' attitudes and beliefs toward e-government affect its diffusion (Amagoh, 2015) [17]. Negative attitude or dis-trust of government online services might affect citizens' intention to adopt the traditional method (face-to-face method) to interact with government rather than adopt e-government services, therefore affecting e-government diffusion negatively (Vassilakis *et al*., 2005) [37]. A study done by Persaud and Sehgal (2005) [38] examined the attitudes and beliefs of Canadian citizens toward e-government. The study found that attitudes and beliefs are the most significant determinant of citizens' intention to use e-government. Moreover, Al-Hujran *et al*. (2015) [39] examined the effect of citizens' attitude on using and adopting e-government through a survey conducted on 413 Jordanian citizens. The study improves and extends the Technology Acceptance Model through integrating some elements, such as political and cultural constructs. Results of the study showed that citizens attitude toward using e-government services significantly affect their intention to adopt and use e-government services. Citizens perceive the public value or usefulness and the ease of use, which influence their attitude toward using and adopting e-government. The following graph explains the relation between the variables and lead to the following hypothesis.




**$H_{11}$:** *Citizens' attitude toward e-government positively affects the diffusion of e-government.*

## 4. Full Conceptual Model and Hypotheses

Based on our extensive review of the literature, we proposed the following relationships as shown in Figure 1:

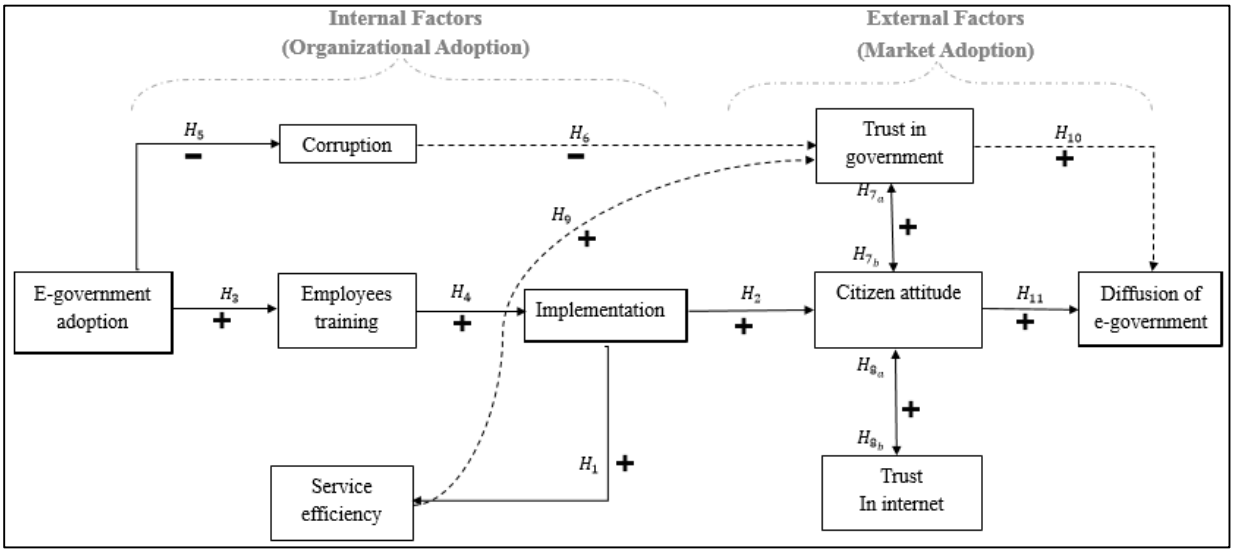



**Fig 1:** Conceptual Mode

## 5. Conceptual Contributions and Expected Results

Based on the theories and literature review used to develop our hypotheses, we have developed a conceptual model that links diffusion of an innovation to individual adoption decisions. Our conceptual model also links the adoption decisions of an organization's employees to the adoption decision of that organization's customers. In future studies we develop measure of each of these variables and will test these relationships in the context of employees in government organizations in Saudi Arabia who are providing e-government services to the citizens of Saudi Arabia. We expect that the adoption of e-government by the government in Saudi Arabia has a positive relationship with both employees' training and service efficiency, and a negative relationship with corruption and then a negative relationship between corruption and trust in government. We expect that employees' training has a positive relation with the implementation of the e-government and that implementation has a positive relationship with service efficiency and citizen attitude toward e-government in Saudi Arabia. Moreover, service efficiency has a positive relationship with the trust in government. Furthermore, both the trust in government and internet has a positive relationship with citizen attitude and vice versa. We also expect citizens' attitude to have a positive relationship with the diffusion of e-government in Saudi Arabia. As we develop our conceptual model incorporating effectuation into existing e-government adoption and diffusion research, we believe our conceptualization will contribute to the research literature by expanding our understanding of the factors influencing the adoption and the diffusion of e-government services.

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