Electronic government: Understanding factors affecting citizen adoption in Papua New Guinea using the UTAUT

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Abstract

The rapid advancement of information and communication technology (ICT) and the Internet technologies is enabling e-government to provide a way for governments to improve their operational activities to serve their clients more efficiently. In developing countries, adoption of e-government is being affected by various factors. Understanding and addressing these factors is essential for Papua New Guinea (PNG) to successfully implement and use e-government services. This paper discusses the Unified Theory of Acceptance and Use of Technology (UTAUT), which could be used to examine the factors that are influencing adoption of e-government by citizens in PNG and how these factors might be addressed.

Key words: behavioural intention, citizens, effort expectancy, electronic government (e-government), facilitating conditions, information and communication technology (ICT), Internet technologies, e-government services, performance expectancy, social influence, unified theory of acceptance and use of technology (UTAUT), UTAUT model

Introduction

The rapid growth and development of information and communication technology (ICT) and the various Internet technologies are changing the way citizens, businesses, institutions and governments are conducting their daily activities. Examples include selling, buying and marketing by businesses online (e-commerce), offering courses by educational providers (e-learning) and delivering information and services by governments for citizens, businesses and other agencies (e-government).

Electronic government (e-government) refers to the use of ICT and Internet technologies to provide easily accessible client-centric information and services online, which is seen to be providing a way for governments to transform their operational activities to serve their clients more efficiently (Alshihi, 2006). The rate of adoption of e-government in developing countries has been slow compared to that of developed countries due to various issues such as lack of adequate ICT infrastructure.

As a developing country, Papua New Guinea (PNG) needs to explore the factors which influence e-government adoption and address them properly to

successfully implement its own e-government services in order to provide these to its geographically disparately located citizens. To explore these factors, this paper aims to discuss the Unified Theory of Acceptance and Use of Technology (UTAUT), how this theory could be used to understand factors that might affect adoption of e-government by citizens in PNG and how they might be addressed to enable effective adoption. These discussions are based on a literature review which will now be used to discuss the UTAUT model.

The Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT was developed by integrating elements from eight well-known models, which have been used to examine technology adoption (Venkatesh, Morris, Davis, & Davis, 2003). These are the Theory of Reasoned Actions (TRA), Theory of Planned Behaviour (TPB), Technology Acceptance Model (TAM), Motivational Model (MM), combined TAM-TPB, Model of PC Utilisation (MPCU), Diffusion of Innovation (DOI) and Social Cognitive Theory (SCT).

The UTAUT offers a better explanation for understanding user acceptance and use of technology than these other theories (Alshafi, 2009). It posits that a user's intention to use a particular technology is affected by performance expectancy, effort expectancy and social influence (Figure 1). Further, the theory posits that a user's intention to use a particular technology (behavioural intention) and facilitating conditions jointly influence the user's actual use of technology (usage behaviour). These determinants are moderated by demographic variables such as gender, age, experience and voluntariness of use.

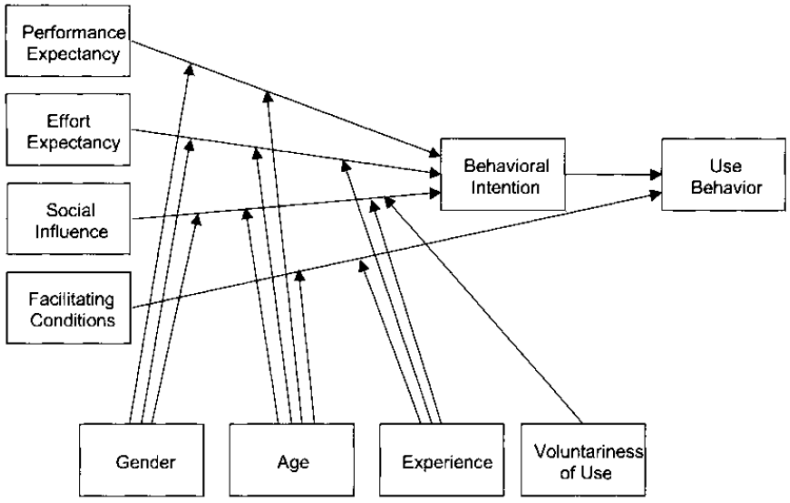

Figure 1: Unified Theory of Acceptance and Use of Technology (Venkatesh et al. (2003, p. 447)

Performance expectancy is "the degree to which an individual believes that using the system will help him or her to attain gains in job performance" (Venkatesh et al., 2003, p. 447). It refers to the extent to which users of a particular system believe in its usefulness and how it will benefit them in their work related tasks. Performance expectancy combines five constructs from other models: perceived usefulness (TAM/TAM2 and combined C-TAM-TPB), extrinsic motivation (MM), job-fit (MPCU), relative advantage (DOI) and outcomes expectations (SCT).

Effort expectancy refers to "the degree of ease associated with the use of the system" (Venkatesh et al., 2003, p. 450). It is the extent to which individuals believe in the ease or difficulty of use the system. Effort expectancy combines perceived ease of use (TAM/TAM2), complexity (MPCU) and ease of use (DOI).

Social influence is "the degree to which an individual perceives that important others believe he or she should use the system" (Venkatesh et al., 2003, p. 451). It refers to the extent of influence other users will have on another in using a particular system. Social influence combines subjective norm (TRA, TAM2, TPB/DTPB and C-TAM-TPB), social factors (MPCU) and image (DOI).

Facilitating conditions refers to "the degree to which an individual believes that an organisational and technical infrastructure exist to support use of the system" (Venkatesh et al., 2003, p. 453). It is the extent to which users perceive that required organisational and technical resources are available to use the system. Facilitating conditions combines perceived behavioural control (TPB/DTPB, C-TAM-TPB), facilitating conditions (MPCU) and compatibility (DOI).

Performance expectancy, effort expectancy and social influence are moderated by variables such as gender, age, experience and voluntariness of use while age and experience also moderate facilitating conditions. For instance, people who have the experience in using technological innovations should find it easy to use similar systems. The UTAUT model is preferred to the eight models (noted above) because it accounts for a higher percentage of the variance in usage intention than the other models account for individually (Venkatesh et al., 2003).

The UTAUT was tested using field studies at four different organisational settings among employees who were introduced to a new technology (Venkatesh et al., 2003). These studies showed that the four determinants (performance expectancy, effort expectancy, social influence and facilitating conditions) significantly determined the acceptance and use of technology. Attitude, self-efficacy and anxiety were posited as not directly determining user's intention (Venkatesh et al., 2003). The UTAUT was also tested for its validity by using data from two additional organisations. It remains now to consider how the UTAUT model has been used in research practice.

UTAUT in research

The UTAUT has been widely used in various research studies in different contexts and settings to understand the adoption of technological innovations (Algahtani, Hubona, & Wang, 2007; Curtis et al., 2010; Im, Hong, & Kang, 2011; Kijsanayotin, Pannarunothai, & Speedie, 2009). For instance, it has been used in e-business and e-commerce (Abushanab & Pearson, 2009) and in other areas such as health care (Alapetite, Boje, & Hertzum, 2009; Duyck et al., 2010).

The UTAUT has provided a theoretical perspective for understanding the factors that influence adoption of different technological innovations by users and clients of various organisations as noted above. It has also been used in e-government adoption studies in different research settings and national contexts to understand the factors that influence such adoption (Ahmad, Markkula, & Oivo, 2013; Alawadhi & Morris, 2008; Almahroqi, 2012; Alshafi, 2009; Bwalya, 2011). This leads now to the need to discuss how the UTAUT model has been used to examine the influential factors on adoption in developing countries.

UTAUT and e-government adoption in developing countries

The use of UTAUT in e-government adoption studies from three developing countries, Pakistan, Kuwait and Qatar, will now be considered as illustrative examples.

Adoption in Pakistan

The government of Pakistan commenced embracing e-government in 2002 but the progress has been slow (Ahmad et al., 2013). Employing the UTAUT model, a study examined the factors influencing the adoption of e-government services in Pakistan. From an online survey a statistical descriptive analysis which was performed on the responses received from 115 Pakistani citizens showed that performance expectancy, effort expectancy, social influence and facilitating conditions were significant in influencing citizens' adoption of e-government. These determining factors were studied using various items of measure as shown in the following table (Table 1).

Table 1: Items used to study the factors affecting e-government adoption in Pakistan

Factor	**Items of measure**
Performance expectancy	Quick completion of work tasks Saves time Easier contact
Effort expectancy	Usefulness Cost effectiveness Easy to learn Easy to use Clear interaction with the use of e-government system
Social influence	More prestige by using e-government services People who are important to the user suggest using it
Facilitating conditions	Awareness Proper help and assistance Internet infrastructure Proper user interface Data privacy

Adoption in Kuwait

Due to a lack of research in exploring e-government adoption in Kuwait, a study adopted the UTAUT model to investigate factors that affect the such adoption (Alawadhi & Morris, 2008). A survey of 880 students using the UTAUT model found that performance expectancy, effort expectancy and social (peer) influence determined students' behavioural intention, while facilitating conditions and behavioural intentions determined their use of e-government services. The determining factors were studied using items of measure as shown in the following table (Table 2).

Table 2: Items used to study the factors affecting e-government adoption in Kuwait

Factor	**Items of measure**
Performance expectancy	Savings time, money and effort Facilitating communication with government Improvement in the quality of government services Providing citizens with equal opportunities to conduct their business with the government
Effort expectancy	Ease of using e-government services Ease of learning how to use e-government services
Social influence	Influence from peers and colleagues Influence from family and friends
Facilitating conditions	Has access to required resources Able to obtain knowledge and necessary support needed to use e-government services E-government fits well into the lifestyle of the user
Behavioural intention	Intend to use e-government Plan to use e-government

Adoption in Qatar

The State of Qatar began adopting e-government in 2000 when the government launched its e-government initiative through a pilot project on renewing residential permits (Alshafi, 2009). Qatar, facing its own challenges in the adoption of e-government used the UTAUT to examine how performance expectancy, effort expectancy, social influence and facilitating conditions determined such adoption. Performance expectancy and facilitating conditions were found to be insignificant while the other factors were significant. The determining factors were studied using items of measure as shown in the following table (Table 3).

Table 3: Items used to study the factors affecting e-government adoption in Qatar

Factor	**Items of measure**
Performance expectancy	Easy access to services Quick completion of tasks
Effort expectancy	Ease of use Ease of learning how to use
Social influence	More prestige from using e-government Influence from colleagues, family and friends
Facilitating conditions	Has necessary resources to use e-government Has knowledge, skills and experience Support and assistance required are provided Security and privacy measures
Behavioural intention	Intention to use e-government services

This section discussed how the UTAUT model was used in three developing countries to understand e-government adoption. It is now necessary to consider an amended model of UTAUT designed in this research to properly understand the influential factors for PNG.

Amended model of UTAUT

As previously explained, the UTAUT model provides a theoretical perspective to explore the factors that affect the acceptance and use of technological innovations such as e-government in developing countries. It could also be expected to provide a useful model for understanding the issues facing PNG.
For the purpose of this paper, the UTAUT has been simplified (Figure 2) to illustrate the determining factors of e-government adoption from a citizen perspective. Only the relationships between the determinants, without the moderating variables in the original model, are included in the amended model.

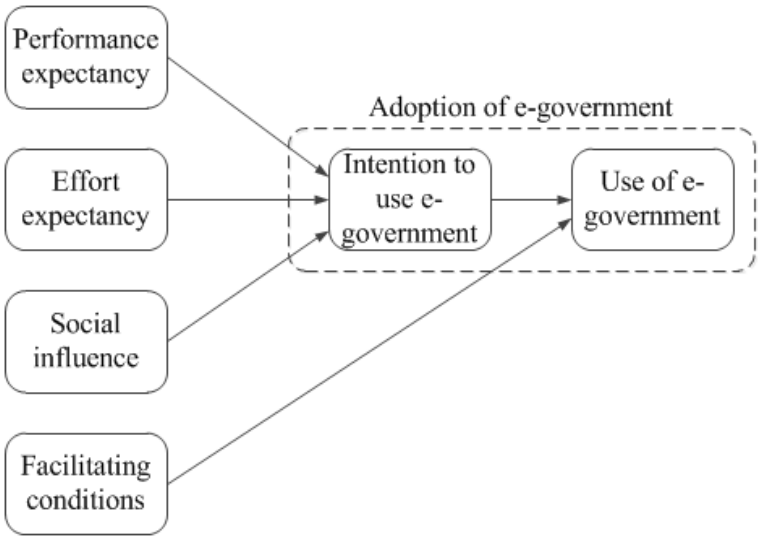

Figure 2: A modified version of the UTAUT model for understanding factors that are affecting adoption of e-government by citizens in PNG. Adapted from Venkatesh et al. (2003)

This leads to a consideration of the use of this simplified UTAUT model to explore and address the factors required to successfully implement and use e-government services.

UTAUT and e-government adoption in Papua New Guinea

As previously noted, from the UTAUT perspective, adoption of e-government by citizens is jointly influenced by facilitating conditions and the citizens' intention to adopt e-government, while the latter is influenced by performance expectancy, effort expectancy and social influence. Those who plan to use e-government would do so if facilitating conditions such as required resources and infrastructure were readily available and easily accessible.

Using the UTAUT perspective, the four determining factors of the acceptance and use of e-government in PNG could be explored using items such as those shown below (Table 4).

Table 4: Items that could be used to study the factors affecting e-government adoption in PNG

Determinant	Items of measure
Performance expectancy	Convenient access to information and services Availability of information and services Saves time, cost and effort in accessing government services Gives citizens equal opportunities to interact with the government Enhancement of ICT skills Beneficial to all citizens
Effort expectancy	Easy to use Easy to learn how to use Easy to browse Easy to find information Easy to find services User-friendly
Social influence	Peer influence or pressure Influence from family and friends Influence from colleagues
Facilitating conditions	Resources Knowledge, skills and experience Opportunities Training, support and assistance Fits lifestyle Information, awareness and promotion Time and money Internet access Internet connectivity Security and privacy measures Cost of Internet access ICT infrastructure Trust and confidence
Behavioural intention	Intend to use e-government Plan to use e-government Decide to use e-government

Citizens may decide to use e-government if they believe that using it will be useful and beneficial. For instance, if they believe that using it will save time, cost and effort in accessing services then they may be inclined to use it. Their intentions may be influenced by issues relating to performance expectancy such as convenience of accessing services, availability of those services, and savings in time, cost and effort in accessing them, and equal opportunities for interacting with the government.

One way to increase performance expectancy and develop a positive attitude in citizens is to provide information, awareness and promotion about the benefits

of e-government. Furthermore, accurate information could be provided on government Web sites to motivate citizens to use the sites if they are seen to assist making informed decisions. To achieve this, e-government sites would need to be updated regularly so that information and services provided are current.

Citizens may also decide to use e-government if they see that it is easy to use. Their intention could be influenced by issues relating to effort expectancy such as ease of use, ease of learning how to use, ease of browsing e-government sites, ease of locating services and the user-friendliness of the sites.

To address issues relating to effort expectancy, e-government sites and applications could be designed so that they have easy-to-use interfaces, are easy to browse and provide easy access to important information and services. Sites and applications with poorly designed interfaces might discourage users from returning to the sites or using the applications. Citizens may avoid using sites that are difficult to use, in terms of browsing and locating necessary services. For instance, browsing through deeper levels in a site to locate information and services is time consuming and could potentially discourage use. Moreover, online services could be improved by providing multiple options such as useful or quick links and search facilities.

Citizens might also plan to use e-government services if other people who are important to them influence such use. Their decision to use could be affected by issues relating to social influence such as peer pressure, positive messages about e-government from social networks and motivation from family members, colleagues and friends. When citizens have successful experiences with e-government, they may possibly influence others. Citizens may also decide on use when they see that people who use e-government experience gain in prestige.

To address issues relating to social influence, e-government sites could be developed in such a way that users will have good experiences so that they can motivate others. Users who have good experiences with using e-government services and benefit from them could also encourage others to use these services. This may speed up the adoption process.

The facilitating conditions factor is very important as it directly affects the actual use of e-government. With a positive intention and favourable facilitating conditions, citizens might be more likely use it. This usage will be influenced by elements relating to facilitating conditions such as availability and accessibility to resources such as money and computers, knowledge, skills and experience, training and support, affordable Internet access and connectivity, guaranteed security and privacy measures, ICT infrastructure, and trust and confidence. Awareness and promotion could also influence the citizens.

To address these issues, awareness and information about e-government services and their benefits should be provided to citizens, which may be done

through government sites, local newspapers, television or radio broadcasting services. Training and support should also be provided by training officers from the government or academic and training institutions through public private partnerships. Lack of ICT infrastructure, high Internet costs and connectivity problems are also seen as main facilitating issues affecting usage. ICT infrastructure and Internet will need to be provided at affordable prices. The government could subsidise Internet costs to allow greater access to access the Internet. Security and privacy would need to be guaranteed. Security and privacy statements could be provided on e-government sites to assure citizens the security and privacy of their information when interacting with e-government services.

Conclusion

Although, the rapid growth of ICT and the Internet technologies has resulted in e-government development, whereby governments are providing electronic access to information and services to their citizens, adoption in the developing countries has been slow compared to that of the developed countries due to various influential factors.

To understand the factors influencing adoption, this paper has discussed the UTAUT model, which posits that the acceptance and use of technological innovations are influenced by four determining factors of performance expectancy, effort expectancy, social influence and facilitating conditions. It has also discussed how this theory was used in developing countries to understand the factors affecting adoption of e-government by their citizens. Further, this paper has provided a modified UTAUT model and described how it could be used in PNG to understand the factors affecting adoption by citizens. Finally, the paper has proposed some of the actions which could be taken in order to address the issues relating to these factors so that citizens could adopt and gain from the potential benefits of e-government.

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Glossary

E-commerce	Electronic commerce – use of ICT and Internet technologies to facilitate marketing, buying and selling activities online
E-government	Electronic government – use of ICT and Internet technologies to provide unified, client-centric information and deliver services online
Effort expectancy	Degree of ease associated with the use of a particular system or technological innovation
E-government service	Services provided online through e-government systems such as online registration and licence renewals.
E-learning	Electronic learning – use of ICT, Internet technologies and learning management system to facilitate teaching and learning online
Facilitating conditions	Degree to which an individual believes that an organisational and technical infrastructure exist to support use of a particular system or technological innovation
ICT	Includes networking and telecommunications, hardware and software, databases and applications, standardisation and interoperability, privacy and security, access networks, and policies and regulations on the use of technology
Performance expectancy	Degree to which an individual believes that using the a particular system or technological innovation will help him or her to attain gains in job performance
Social influence	Degree to which an individual perceives that important others believe he or she should use a particular system or technological innovation
UTUAT	Unified Theory of Acceptance and Use of Technology – technology adoption theory that can be used to understand the factors that are affecting adoption of e-government by citizens.

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