Abstract

Electronic voting (e-voting) is a sub-component associated with the broader area of electronic government (e-government). Broadly defined, e-government refers to the use of information and communications technology (ICTs) to improve the operation of government (OECD, 2003). Specifically, e-voting refers to the use of ICTs to facilitate the voting process. The e-voting phenomenon has not been widely adopted in the United States as the standard method for voting. However, there are selected areas of interest in different levels of government. The objective of this study is to conduct an empirical analysis of the factors affecting the adoption of e-voting. The technology adoption literature forms the theoretical foundation for this analysis. We examine the impact of perceptions about government, perceptions about web technology, and individual characteristics, on the individual’s intention to adopt e-voting. Our study seeks to extend the current literature on e-voting by examining e-voting at multiple levels including local, state, federal, and opinion polls instead of at a generic single level.
Introduction:

There are many issues involved in the use of information and communications technology (ICTs) to support governmental processes. These continue to dramatically change the nature of how constituents interact with government entities. Electronic government (e-government) is one of the primary ways that a government uses ICTs to have an impact on public administration and public policy issues. We begin the paper with an overview of the e-government phenomenon, and then following with an examination of e-voting. E-voting is examined from both historical and theoretical perspectives.

Next we discuss concepts related to the adoption of a technical innovation. The innovation diffusion theory (Rogers, 1995) and the technology acceptance model (Davis, 1989) are two important foundation elements in this study. Thirdly, we present a theoretical model for our study. This paper presents a research-in-progress model for the examination of the primary factors affecting the adoption of e-voting.

Overview of E-government:

In order to understand the application of technology with respect to public policy issues, it is important to consider the nature of e-government. In general, e-government can be viewed as the process of providing public value through the use of ICTs (Capati-Caruso, 2006). A recent report from the Council for Excellence in Government states that e-government “has the greatest potential to revolutionize the performance of government and revitalize our democracy” by enhancing efficiency, decreasing transaction time, bringing people closer to their government, and enhancing methods for citizens to participate in governmental affairs (Dearstyne, 2001, p. 17). Additional definitions of e-government are defined below:

1. The use of the Internet and other digital technologies to simplify or enhance the method by which citizens, employees, business partners and other government organizations interact and transact business (Koh and Prybutok, 2005).
2. The leveraging of the capabilities and power of IT to deliver services provided by governments at local, municipal, state and national levels (Grant & Chau, 2005).
3. The use of information and communication technologies, particularly the Internet, as a tool to achieve better government (OECD, 2003).
4. The use of information and communication technologies in all facets of the operations of a government organization (Koh & Prybutok, 2003).
5. The use of the Internet by governments to deliver services, to collect data, and to enhance democratic processes (Bretschneider, 2003).
6. The emerging reliance of government on digital information to make information and services available and to engage citizens in a way that meets their needs and reduces apathy and suspicion of government (Dearstyne, 2001).

Government entities and public policy administrators cannot ignore the changes that occur as a result of the use of ICTs. In the early 1990s, Freeman (1993) identified the important role that ICT would have in shaping public policy, and cautioned governments about neglecting its significance. Because e-government continues to evolve rapidly, it is important to continue to examine its adoption and impacts on different stakeholders. This study is primarily concerned with the citizen’s view of e-government. From an evolutionary perspective, e-voting is one of the later stages in the development of e-government (Siau and Long, 2005).
E-government constituents include citizens, employees, businesses, and other governments, and leads to four categories of e-government: G2C, G2E, G2B, and G2G. The first category of e-government, and the one most closely related to e-voting processes, is government-to-citizen (G2C). This refers to electronic communications and transactions that occur between a government and one or more of its citizens. Governments tend to focus on this type of interaction because a founding principle of governance is to serve its citizens. One recent international study indicates that governments around the globe recognize that a customer-centric focus is critical for e-government success (Hunter & Jupp, 2001).

Government-to-employee (G2E) initiatives involve the human resource management aspect between government and its employees. Three main benefits of G2E projects are improved strategic planning, cost reduction, and service improvements between management and employees (Ruël, et al., 2004). Government-to-business (G2B) initiatives refer to communications and transactions facilitated by electronic means between a government and a non-profit or for-profit organization. For example, the collection of corporate taxes would be a G2B process. Lastly, government-to-government (G2G) initiatives refer to entities of governments interacting with other governmental entities. G2G occurs both vertically, where information is exchanged between hierarchical levels of government, as well as horizontally, where one department interacts with another similar branch of government (Layne and Lee, 2001).

Overview of E-voting:

E-voting is often identified as one of the more advanced developmental stages of e-government. The process of e-voting can also be characterized as an occurrence of electronic democracy. Traditional democracy is considered to be the set of political processes in which citizens apply their sovereignty through their intervention in government with the goal of improving their own conditions (Moreno-Jimenez & Polasek, 2003). The future of direct democracy may be related to the number of citizens who choose to participate and how accurately their votes represent the interests of society as a whole (Morse & Hodges, 2002).

Recent forms of direct democracy are evolving into what is termed deliberative, or participative democracy. This evolution involves a transition from a passive, traditional voting system to an active, participative one. Deliberative democracy is based on a system in which citizens more actively participate to discuss a problem and accept a consensus.

Kakabadse, Kakabadse & Kouzman (2003) describe electronic democracy as an alternative model which involves “the capacity of the new communications environment to enhance the degree and quality of public participation in government” (p. 47). This work identifies four proposed models of electronic democracy: electronic bureaucracy, information management, populist, and civil society; all of which are made possible by the use of interactive information technologies.

According to Kakabadse et al. (2003), electronic bureaucracy refers to the electronic delivery of government services; the information management model of electronic democracy involves more effective communication, which connects individual citizens and decision makers; the populist model allows citizens to communicate their views on current issues; and finally the civil society model refers to the “transformation of political culture”. Kakabadse et al. (2003) analyzes each of these models in terms of their applicability and impact on democratic governance, thus offering alternative views to the area of
e-government. Conceptually, e-voting can be relevant to all four models of this electronic democracy framework.

Looking more specifically at voting processes, balloting methods have achieved significant progress since the 2000 presidential elections and changes are expected to rapidly continue (Morse, 2002). Although there have been many difficulties to overcome, e-voting has been established as a viable alternative to the varied and problematic voting methods of the past. The 2002 Help America Vote Act has provided states with some of the funding that has been needed to pursue these changes. The use of new technology has increased the accuracy, expedience, and convenience of election processes and has opened the door to additional technology upgrades in the future (Morse, 2002). There is a need to consider the future of democratic voting with respect to the use of technological progress in order to provide greater opportunities for citizen participation (Morse & Hodges, 2002).

The impact of e-voting on our democratic system is only now beginning to be researched and understood. Although there are numerous problems to overcome, involving logistics, security, secrecy, privacy, legal obstacles, equal access, and equal representation, there are also numerous potential benefits. These benefits include enhanced participation, reduced costs, and ease of registration. These potential problems and benefits are considered in more detail in Morse and Hodges (2002).

Morse and Hodges (2002) also provides a thorough review of past and present voting methods used in different countries, and they also consider the question: if political participation becomes easier and more convenient, will voting participation increase? Facing voter turnouts at or below 50% in most elections, the United States is among the lowest participating democracies of any in the world (Morse & Hodges, 2002). It may be possible to improve the level of participation by providing more voting options, as well as to make better use of technology as part of an e-voting process. Some arguments for e-voting in many states are derived from the idea that it is more convenient than traditional voting methods, and would possibly increase voter turnout (Delk, 2001).

Several states, including Arizona and California, have already taken significant steps toward achieving a phased implementation of e-voting (Morse & Hodges, 2002). Developing and implementing policies that are based on verifiable research on models related to technology diffusion and acceptance may provide a smoother transition to e-voting.

**Technology adoption and governance:**

The situation in which a citizen or consumer chooses an electronic service delivery method over other traditional methods is an issue involving technology adoption. Research in this area can be viewed as varying along a continuum from applying existing theories in a technology context to the development of specific technology adoption approaches (Gilbert, Balestrini & Littleboy, 2004). Gilbert and colleagues (2004) identify three main approaches that have reliable theoretical and empirical foundations for adoption. The first of these is the diffusion of innovations (DoI) approach by Rogers (1995); the second is technology acceptance models such as the technology acceptance model (TAM) by Davis (1989); and the third is the application of diffusion to technology service quality by Dabholkar (1996). A fourth construct pertaining to technology adoption and governance is that of trust. Trust, though a commonly referenced construct, can consists of several different components. The following paragraphs discuss the above four mentioned components pertaining to the adoption of a technological innovation such as e-voting.
Rogers (1995) states that, "the innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (p. 11) and that adopters are classified into five groups ranging from innovators to adopters. DoI theory is often used to assess the effect of various attributes related to a particular innovation and its adoption. The concept has been applied to such fields as economics, marketing, sociology, anthropology, medicine, and others (Brown, 1981; Hagerstrand, 1967).

One important caveat about the diffusion theory is that it is not a single theory, but instead – a unified one. It is composed of a number of theories from a variety of disciplines, each focusing on a different aspect of the innovation process. In combination, these create a meta-theory of diffusion (Surry, 1997). The nature of diffusion theory includes the acceptance of new objects as well as ideas. Some consider diffusion to be the main driver of change in society (Bell, 1968). In this regard, diffusion is related to the concept of technology-as-tools as well as the concept of technology-as-organized-intelligence (Waller, 1982).

Other related models, known as substitution models, focus on the demand for technological innovations as a substitute for existing methods. One well-known and widely used diffusion model is the Bass model, which involves the timing of adoption of an innovation and first-purchase demand (Bass, 1969). Another substitution model the Fisher-Pry model (Fisher & Pry, 1971) is based on three assumptions, each of which is applicable to e-voting adoption. The three assumptions are as follows: 1. many technological advances can be considered as viable substitutions for other products; 2. often new technologies completely replace previous ones; and 3. the rate of substitution of new technologies for older ones is proportional to the amount of the old technology that remains.

Having considered the diffusion of innovation approach, the second main approach to technology adoption is TAM, which is an extension of the theory of reasoned action (TRA) to technology. The TRA is from the social psychology literature (Ajzen & Fishbein, 1980) and involves an individual’s evaluation of the potential to perform a specific task. The TAM model proposes that beliefs have an impact on attitudes about information technology, which then lead to intentions and behaviors related to actual technology usage. The beliefs that predict the use of technological systems include perceptions about the usefulness of the technology related to improved performance, and perceptions about the ease of use of the technology (Davis, 1989).

Although most research related to technology adoption and the use of the Internet considers the positive effects of other factors on this behavior, O'Cass and Fenech (2003) have studied the factors that discourage individuals from adopting the technology. There is an increasing recognition of the need to research attitudes with respect to Internet-related adoption. Finally, several of the attitude-based theories, such as the TRA, theory of planned behavior, and theory of trying, have been integrated with external factors, such as perceived risks, to try to explain why individuals may prefer self-service options that are based on the use of technology (Bobbitt & Dabholkar, 2001). Each of these theories has some relevance, either direct or indirect, to the adoption of e-voting systems.

In the first two approaches, DoI and TAM, the perceptions of potential users and adopters of technology are beliefs that determine the behavior about a product, service or technology. Their focus is on perceptions of technology and their effect on the intent to use or adopt that technology. More recently, a third approach has been developed that involves using intentions of individuals based on service quality to explain service delivery through
the use of technology. With service quality, perceptions can relate to the evaluation of service performance after the technology is used.

In a study of consumer evaluation of self-service delivery through technology, Dabholkar (1996) proposes two models to determine the impact of service quality on the intention to use the technology. One model is based on various attributes of quality while the other is based on predetermined attitudes about the technology. The attribute model uses dimensions that are similar to those used in other service quality literature. The results of this study show that speed of delivery, ease of use, reliability, enjoyment, and control were all significant factors in assessing expected service quality. Other comparative models show that consumers compare the innovative technology service delivery with traditional alternatives (Meuter et al., 2000; Szymanski & Hyse, 2000).

The fourth approach to technology adoption involves trust theory. Trust can be defined along two dimensions: (a) as an assessment of a current situation, or (b) as an innate personality trait or predisposition (Driscoll, 1978). Trust is an important aspect of user decision making. For example, one’s level of trust is an important factor affecting purchase or transaction decisions. More recently, trust has been examined with respect to electronic commerce (e-commerce) (Jarvenpaa, Tractinsky, & Vitale, 2000; Koufaris & Hampton-Sosa, 2004). A citizen that has previously not established trust in the area of e-commerce may transfer that lack of trust to other electronic domains such as e-government.

The successful diffusion and acceptance of public administration functions via e-government requires two levels of trust: trust of the government and trust of the technology that supports the interaction (Carter & Belanger, 2005; Lee & Turban, 2001). Thus, if a constituent has limited trust in either the technology or government, the use of an e-government process such as e-voting, can be limited. Trust, along with financial security, are two critical factors limiting the adoption of e-government services (Gilbert et al., 2004). Therefore, it is important to maintain effective security within e-government systems to promote and protect consumer trust and confidence.

Researchers have recently begun to integrate the previous approaches into models to identify the major factors influencing the adoption of online government services by citizens on various levels. The integration of approaches can reduce the limitations of the individual approaches (Gilbert et al., 2004). Carter and Belanger (2005) have developed a comprehensive e-government adoption model that combines constructs from DoI theory (Rogers, 1995), TAM (Davis, 1989), and web trust theory (McKnight et al., 2002). Schaupp and Carter (2005) have extended this framework to explore the intention of citizens to use an online voting system. The results indicate that user perceptions of compatibility, usefulness, and trust significantly impact the intention of young citizens to use an e-voting system (Schaupp and Carter, 2005).
Theoretical Framework and Proposed Methodology:

We propose a theoretical framework (figure 1) for the examination of an individual’s intention to use e-voting. Voting, and ultimately e-voting can occur at several levels in the United States, including local, state, and federal. As part of this study, we propose that voting at each of these three levels has varying degrees of significance to the citizen. Voter turnout in local level elections is generally lower than that in federal level elections. Additionally, through the use of ICT, citizens can participate in the democratic process by participating in online polls that are not necessarily associated with electing an official. Based on this information a citizen’s intention to use e-voting can be influenced by the level and/or impact of the election.

Figure 1: Multilevel E-voting Framework

There are three main factors affecting the user’s intention to use e-voting. The first factor is user perception about government. Perception about government has two components: trust and experience. We use experience to determine whether the individual has had an overall positive or negative experience with government. The second variable in the model is perception about web technology. The four relevant components are: usefulness, ease of use, security, and privacy. Security and privacy are two factors that recur as concerns for individuals using web technologies, and they are particularly relevant to voting.

Lastly, we expect that individual user characteristics will influence their decision to use e-voting. The two characteristics included in our framework are level of trust and risk propensity. A person’s innate sense of trust will also affect their trust of others. Also, a risk-averse individual may be less likely to try an innovation, such as e-voting.
The development of a valid instrument for this proposal has been adapted from previous related work including but not limited to measures of PU and PEOU from Davis (1989); intention to use adapted from Van Slyke et al. (2004) and Davis (1989); measures of trust in government and trust in technology have been adapted from Van Slyke et al. (2004) and McKnight et al. (2002). Demographic information such as age, income, education, and technology experience will also be collected as part of the user background information.

We will pilot the instrument on a sample group of 25 users to determine if it is clear and understandable. Once we have resolved any associated design limitations we plan to distribute our survey instrument to a population of approximately 200 undergraduate students. A quantitative methodology will be used in the collection and analysis of the data.

Limitations and Conclusion:

E-voting will likely receive more attention, both in research and in practice, as the supporting technologies are developed. The objective of this study is to examine the factors affecting the adoption of e-voting at multiple levels. However, there are several limits of our proposed study. Our first challenge is the use of a student population for the data collection since college students may not represent the traditional voting demographic. However, to overcome this limitation we suggest that students are very technology literate, and may ultimately be some of the early adopters of e-voting systems. Secondly, our study is a survey with no direct incentive for user participation. Ultimately, there may be some selection bias by the respondents that fill out the survey.

E-voting is an area of governance that will likely have far reaching implications in the future. In spite of the identified limitations, this study can provide important insights to both researchers and practitioners in the field. E-voting may soon become one of the main ways to link electronic government and the implementation of public policy, and it will continue to attract the attention of researchers, policy analysts and other stakeholders in the public sector in the future. It is hoped that this proposed research, and related efforts, will produce the information necessary to support a successful transition to electronic governance and the use of e-voting.
References


