

## The Impact of Trust and Relative Advantage on Internet Voting Diffusion

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### Abstract

Internet voting is an emerging e-government phenomenon. In the United States, several state and local governments have experimented with Internet voting. This study presents a model of Internet voting adoption that integrates diffusion of innovation theory, institution-based trust and e-government utilization. To test the model a survey is administered to 372 citizens. The results of structural equation modeling indicate that relative advantage, Internet trust, and e-government information utilization have a significant impact on intention to use Internet voting. In addition to these direct effects, disposition to trust has a significant impact on Internet trust and accessibility has a significant impact on relative advantage. Not only are citizens interested in using the Internet to obtain government information, but also to cast their ballot. As a result, opportunities for Internet use in the political process are constantly emerging. Government agencies should take advantage of technological innovations to improve the accessibility of the electronic ballot, to communicate the advantages of this phenomenon and to engender trust among the citizenry.

**Keywords:** Internet voting, Technology adoption, Trust, Diffusion of innovation, Technology acceptance

## 1 Introduction

E-government services are growing in importance to both agencies and constituents. In 2010, federal spending on information technology (IT) in the United States grew from 73 million in 2009 to 75.7 million in 2010, an increase of 4% [3]. Technological advancements have enabled government agencies to offer citizens more expedient services via the Internet. Not only is government spending increasing, but also citizens are taking advantage of these technological services. Virtually one third (31%) of online adults use Internet-based platforms such as blogs, social networking, email, and text messaging to get government information [87].

One emerging facet of e-government is Internet voting, or I-voting [88], [91], [98]. Oostveen and Besselaar [75] define Internet voting as “an election system that uses encryption to allow a voter to transmit his or her secure and secret ballot over the Internet [75]”. Since 92 percent of the voting age population in the United States now has Internet access at some location [30], the potential exists for Internet voting to have a major impact on society. Done [30] suggests that citizens could save time while reducing pollution if I-voting is adopted nationally, even if voters traditionally spent only one hour and drove one mile to vote. If just 1 percent of votes cast in the 2000 U.S. presidential election had been cast online, the nation would have saved more than 26,000 hours and thousands of pounds of auto emissions [30].

According to the Report of the National Workshop of Internet Voting [17] Internet voting can be grouped into three categories: poll site, kiosk, and remote. Poll site Internet voting involves casting ballots at public sites where election officials control the voting platform and the physical environment. In kiosk voting, voting machines are located in convenient locations such as malls, libraries, community centers, supermarkets, post-offices, train stations or schools. The voting platforms are still under the control of election officials. The physical environment can be monitored and modified as needed to address security and privacy concerns and prevent coercion or other forms of intervention. Remote Internet voting maximizes the convenience and accessibility of the polls by enabling voters to cast ballots from virtually any computer with an Internet connection. Voting is not limited to the area in which the election takes place. This means that voters who in the past had difficulties voting, such as military personnel, and housebound, institutionalized or disabled persons, may be able to do so. Also voters who know they will be out of town or unable to visit an election site on the day of the election, may use a remote Internet connection. Remote Internet voting will be the focus of this study.

Internet voting differs from the traditional voting systems in several ways. First, unlike previous voting systems, I-voting is not limited by geography. I-voting systems enable voters to cast a ballot from any location as long as they have access to a computer with an Internet connection. Internet voting systems also require citizens to possess some technical skills. Unlike completing a paper-and-pencil ballot or a punch card, citizens must have both computer and Internet skills in order to use online voting systems. In addition to some degree of technical efficacy, online voters must also have some level of trust in the Internet. Voters using less technical methods, such as paper and pencil, do not have to possess the same level of trust in the voting method itself.

There are many potential advantages of Internet voting. According to Oostveen and Besselaar [75] Internet voting will increase voter participation, especially among young adults, overseas personnel, business and holiday travelers, and institutionalized or housebound voters. It will also provide more citizens with access to the election process. Proponents of Internet voting argue that the current voting system is unfair because many people have work or have other schedule conflicts that prevent them from visiting the polling place on election day. Internet voting would offer these individuals an option that they previously did not have, enabling them to exercise their right to vote [70].

To this point, research in the area of Internet voting has focused primarily on security [10], [23], [31], [48], [55], [62], [64], [69], [72], [78], [100]. A few studies have begun to explore the effects of the Internet on political participation [7], [9], [54], [66], [84], [88]. However, more research is needed on the key factors that influence Internet voting adoption. Hazlett and Hill [52] write “it is essential to investigate what kinds of factors influence consumer attitudes and behaviors towards e-services.” The United States ranks at the bottom, or just above last place, in voter involvement when compared to other democratic nations [103]. After the 2000 election, the Census Bureau listed the top ten reasons that non-voters gave for not voting. “Too busy, conflicting work or school schedule” was identified as the most common reason for not voting and 61.3% of the reasons listed could be impacted by the Internet (see Table 1).

I-voting would be an ideal option for many citizens. Done [30] argues that one of the most important social impacts of Internet voting is the effect it could have on voter participation. A survey conducted at the University of Arizona suggests that 62 percent of the unregistered voting age population would register to vote on the Internet. The survey results also suggest that Internet voting would increase voter participation by about 42 percent while conserving costly resources. These increases would be realized across all sex, age, ethnicity, and education groups [30].

Table 1: Top ten reasons for not voting

	Reason	Percent	Potential I-voting Impact
1.	Conflicting work or school schedule	22.6%	YES
2.	Illness or disability	16.0%	YES
3.	Not interested	13.2%	NO
4.	Out of town	11.0%	YES
5.	Didn't like candidates or issues	8.3%	NO
6.	Problems with registration	7.4%	NO
7.	Forgot to vote	4.3%	NO
8.	Inconvenient polling place, hours and lines	2.8%	YES
9.	Problems with transportation	2.6%	YES
10.	Bad weather	0.7%	YES

In light of the increasing demand for e-government services [56], [59], [61] the gradual implementation of I-voting systems [7], [30] and the need for research on I-voting implications [30], [52], [73], [75] the research question of interest is: *what is the impact of technology acceptance factors and trust perceptions on one's willingness to vote via the Internet?*

Although research suggests that Internet voting could be used to increase participation [6], [30], [33], few studies have identified the unique characteristics of the Internet that make it an appealing option. This study presents a model of Internet voting diffusion. The model integrates technology acceptance factors, such as, relative advantage and compatibility along with trust and accessibility to explore Internet voting adoption.

## 2 Background Literature

Muhlberger [73] argues that by reducing the marginal cost of political participation, technology has the potential to substantially mobilize political action. Internet voting will reduce the perceived costs of voting by increasing both the accessibility and convenience of the "ballot box" and information on the choices available. Previous improvements to voting technology such as, mechanical level machines, punch cards, optional scan devices and direct recording electronic devices have had little effect on turnout [63]. However I-voting is significantly different from former innovations. In the aforementioned improvements citizens were still required to come to the polls. They were still affected by the same geographical and temporal constraints, which are eliminated by Internet technology. Pending a sufficient level of trust in this medium, many citizens welcome the opportunity to vote online [87], [90]. The following section introduces each of the adoption factors that are of interest to this study: relative advantage, compatibility, accessibility, institution-based trust and disposition to trust.

### 2.1 Technology Adoption

In the field of information systems, technology adoption has been explored extensively [98]. Davis' [28] technology acceptance model and Roger's [82] diffusion of innovation theory are two of the predominant adoption models used in IS research.

The diffusion of innovation (DOI) theory is used in this study since it is a more comprehensive model [98], [79]. It is based on a popular theory in psychology, the theory of reasoned action (TRA), which posits: people's attitudes influence their intentions and their intentions influence their actions [35]. The IS literature posits that three DOI constructs -relative advantage, compatibility and complexity - are among the most relevant constructs to technology adoption research [2], [96], [97]. Recent studies of e-service adoption substantiate the importance of relative advantage and compatibility for online systems [40], [53], [84], [104], [105]. However, perceived ease of use does not significantly impact use intentions in many studies of online behavior [40], [53], [76], [84], [104]. According to recent studies of e-service adoption, perceived ease of use is task dependent for online systems [34], [40].

Gefen and Straub [40] use the Technology Acceptance Model (TAM) to determine if the importance of perceived ease of use (PEOU) is related to the nature of the task when evaluating e-commerce adoption. They state perceived PEOU is a dynamic construct with various effects depending on whether the task is intrinsic or extrinsic to information technology (IT). An intrinsic task refers to one in which the technology provides the primary end, while an extrinsic task refers to a task for which technology is merely the means to achieve the primary product or service. Their results indicate PEOU affects intended use when a website is used for intrinsic tasks, such as information gathering and inquiry; but it does not affect intended use when the site is used for purchasing (an extrinsic task). Casting a vote online is synonymous to making a purchase online; it is an extrinsic task. With Internet voting the technology is not the central component of the process. It is a means to an end but not the end itself.

Fang et al. [34] corroborate the findings of Gefen and Straub [40]. The authors find that task type impacts the effect of technology acceptance factors. They identify three types of tasks: general, gaming and transactional. General tasks include communication and information acquisition. Gaming tasks are those whose primary purpose is to

entertain and transactional tasks involve completing financial transactions. Fang et al. [34] posit that transactional tasks are IT extrinsic. Their results indicate that perceived ease of use does not impact one's intention to complete transactional tasks. Voting via the Internet represents a transactional, IT extrinsic task.

Based on the aforementioned literature [34], [40] and in the interest of parsimony, we include only the DOI adoption constructs that are most consistently identified by the literature as significant predictors of electronic service adoption: relative advantage and compatibility. Accessibility, which is frequently explored in political science research, is also included as an adoption factor since Internet access will have a major impact on the diffusion of this innovation [20]. Ease of use is not included in this study due to its inconsistent behavior and the nature of this study. It is difficult for individuals to make assessments on how easy or difficult a system is to use if they have never actually used the system. Many studies that incorporate ease of use provide participants with a system and then elicit their perceptions of that particular system. Since participants in this study have not used an I-voting system, the construct was not included in the model. Hence, the following Internet-specific adoption factors are predicted to have an impact on Internet-voting: relative advantage, compatibility, accessibility and trust.

### 2.1.1 Relative Advantage

Relative advantage is "the degree to which an innovation is seen as being superior to its predecessor [82]." This construct has been explored extensively in the literature and is known by many names: perceived usefulness, extrinsic motivation, job-fit, relative advantage, and outcome expectations [98]. Recent literature has shown that the aforementioned concepts are extremely similar [98]. Commonalities have been noted between relative advantage and usefulness [28], [71], [79], usefulness and extrinsic motivation [61], usefulness and outcome expectations [27], [28]. Venkatesh et al. [98] found this factor to be the strongest predictor of intention, which is consistent with previous model tests [2], [27].

*H1: Relative advantage (RA) will positively influence intention to use Internet voting (USE).*

### 2.1.2 Accessibility

Before citizens can realize the relative advantages of a remote Internet voting system, they must have access to the Internet. Benbasat and Barki [12] call for more research on the antecedents of relative advantage. In this study, I posit that Internet accessibility will impact citizen perceptions of the advantages of I-voting. Gimpel and Schuknecht [45] view accessibility as "the reciprocal of the costs of moving people and goods between points in space. Travel costs are essential because the less time and money spent in travel, the more places that can be reached within a certain budget [45]." Many studies have found that accessibility had a significant impact on turnout [32], [43], [68], [92].

The Internet will greatly enhance the accessibility of the ballot box for many Americans. In 2003, over 90 million Americans took advantage of e-government services, which suggests that a large number of citizens have access to the Internet [22]. Offering elections online will also make voting more accessible for young disenfranchised citizens. Harwood and McIntosh [51] found the young (18-24) and not surprisingly their parents (45-54) report the highest levels of home Internet access, reaching better than 61 percent. Seven of the top 10 reasons why people didn't vote (see Table 1) can be alleviated through the application of internet technology to improve accessibility.

*H2: Accessibility (ACC) will positively influence relative advantage (RA).*

### 2.1.3 Compatibility

Compatibility is one of Rogers' [82] diffusion of innovation theory constructs. It posits that one will be more likely to adopt an innovation if it is consistent with her values, views, beliefs, and customs. The Internet is one innovation that has become a major part of citizens' daily lives. In 2003, 29.6 million households in the U.S. took advantage of online banking, more than one-third of all stock transactions took place over the Internet, and the number of telecommuters rose to 23.5 million, a 100 percent increase from 1997 [50]. Henry [54] found Internet voting to be most appealing to citizens who use the Internet frequently.

In addition to the population at large, compatibility is one factor that will be especially appealing to younger voters, the group with the lowest turnout rates [37], [44], [54]. Alvarez and Hall [6] write "Internet Voting should solve many of the pressing problems with U.S. elections and may actually stimulate the interest and participation of some groups... If a twenty-something banks online and shops online and pays taxes online, he or she will want to vote online [6]." Eggers [33] writes "younger voters who grew up on the web could vote using a more comfortable medium for them than punch cards, thereby holding the potential for increased voter turnout. I suspect for anyone under forty, polling day is the only point in the year when they actually see a pencil stub and that's probably why its tied to a piece of string, because it's so rare and they might pocket it as a souvenir [33]". These statements suggest that Internet-voting will be a welcomed option by citizens who use the Internet for other transactions. I-voting should be especially appealing to the younger generation that frequents the Web to shop and chat.

*H3: Compatibility (CT) will positively influence intention to use Internet voting (USE).*

## 2.2 Trust

In addition to adoption constructs, research suggests that trust is a vital component of electronic service adoption [4], [26], [85], [95]. In particular, trust of the Internet and one's general disposition to trust are important elements of I-voting adoption. Citizens must believe that the government has the ability to implement and integrate various systems to accurately and safely support I-voting. This interoperability is an important element of e-government diffusion as it promotes the seamless and accurate integration of diverse government systems and processes [49], [77].

### 2.2.1 Trust of the Internet

Trust of the Internet is consistently identified as a key predictor of e-service adoption [9], [20], [39], [67], [99], [101]. Frequently this concept is referred to as institution-based trust. Institution-based trust refers to an individual's perceptions of the institutional environment, such as the structures, regulations, and legislations that make an environment feel safe and trustworthy [67]. In the context of e-government, the Internet constitutes the institutional environment. Adoption is contingent upon citizens' belief that the Internet is a dependable medium, capable of providing accurate information and secure transactions. Several researchers [31], [48], [62] stress the importance of security and reliability to I-voting adoption.

Although the potential advantages of Internet voting are enticing, the security risks are challenging. Moynihan [72] suggests e-government is associated with making services and information more accessible; whereas, I-voting is associated with a fundamental civic right. Failure of an e-government service may create an inconvenience for the individual citizen; however, the failure of I-voting technology has profound consequences for the reliability of public confidence in our electoral system. Hence, a certain level of confidence in the Internet as a viable medium for conducting transactions is a precursor to Internet-voting adoption. For many people that are used to spending money and manipulating investment portfolios online, this level of confidence has been achieved, especially when compared to the low-cost and low-benefits of voting.

*H4: Trust of the Internet (TOI) will positively influence intention to use Internet voting (USE).*

### 2.2.2 Disposition to Trust

Disposition to trust is defined as one's general propensity to trust others. It is composed of two concepts: faith in humanity and trusting stance. Faith in humanity assumes others are good-natured and dependable. Trusting stance assumes better outcomes result from dealing with people as if they are well meaning and reliable [63]. Therefore, trust is the result of psychological dispositions that are beyond the immediate control of any government agency. These perennial propensities deal with the life-long socialized tendency to believe in social entities and to believe that better results will occur if one trusts others [83], [99].

Disposition to trust is sometimes referred to as personality-based trust because it refers to one's general tendency to believe or not to believe in others [39]. This disposition is especially important in the initial phases of a relationship [67], [83]. Although e-government initiatives are growing in popularity, e-government is still in its infancy. Citizens are just beginning to acquire more meaningful information about the benefits and consequences of completing transactions with the government online. Hence, one's general propensity to trust will have an impact on e-government adoption through its influence on trust of the Internet and trust of the government.

*H5: Disposition to trust (DT) will positively influence trust of the Internet (TOI).*

## 2.3 Previous Use of E-government

Regarding e-government services in general, research suggests that those who have participated in e-government in the past are more likely to use e-government innovations [84]. The literature posits that Internet-based innovations will be appealing to citizens who use the Internet frequently [11], [54]. Schaup and Carter [84] found that individuals who have used e-commerce systems or e-government services were more likely to adopt an e-government innovation. Citizens are already using the Internet to retrieve information about the political process. According to [91], 48% of internet users in the U.S. have looked for information about a public policy issue online. Regarding I-voting, the Internet will greatly enhance the accessibility of the ballot box for many Americans [30]. Understandably, citizens who complete government and transactions online are more likely to use an I-voting system than those who do not have experience with e-services. Hence, I predict that those who have used the Internet to obtain information from or complete transactions with the government will be more inclined to vote online.

*H6: Use of e-government information (EINFO) will positively influence intention to use Internet voting (USE).*

*H7: Use of e-government services (ESERV) will positively influence intention to use Internet voting (USE).*

### 3 Research Model

Based on the aforementioned literature, we propose the following research model. Relative advantage, compatibility, trust of the internet, previous use of e-government services, and previous use of e-government information are predicted to have a significant impact on intention to use internet voting. Accessibility is predicted to have a significant impact on relative advantage. And disposition to trust is predicted to have a significant impact on trust of the internet. The model is presented in figure 1.

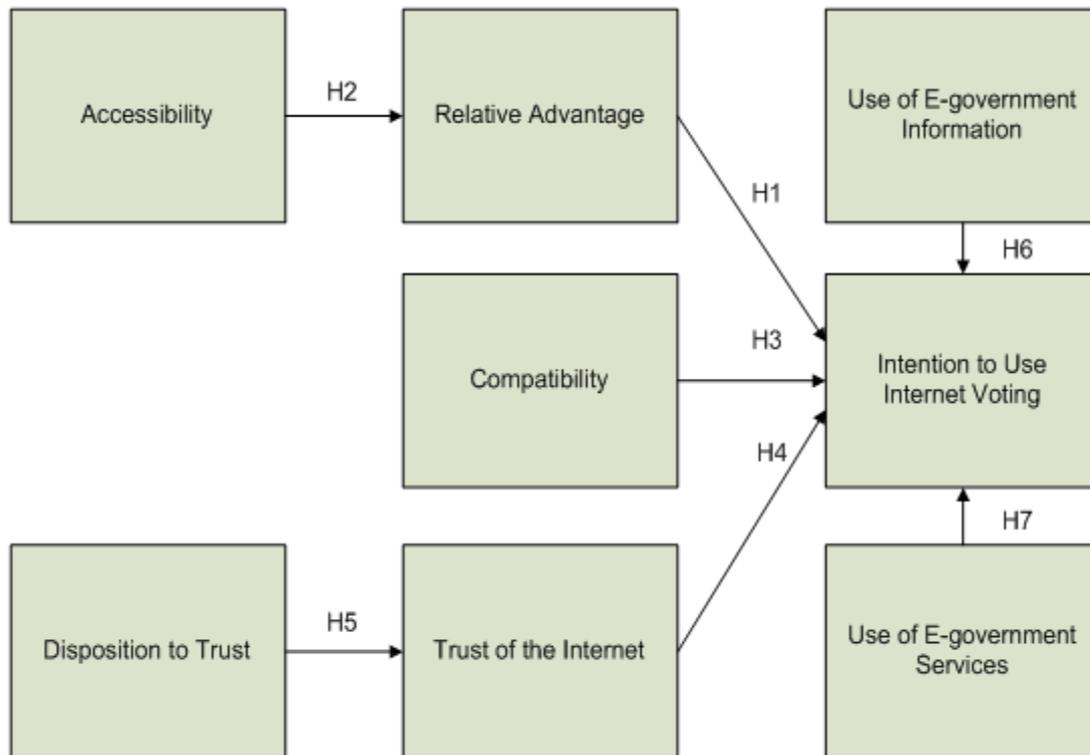


Figure 1: Model of trust and accessibility in Internet voting

### 4 Methodology

To test the model, a survey was administered to a diverse group of citizens. Before the primary data collection, the instrument was pre-tested to eliminate errors and improve readability and then pilot tested with two undergraduate classes to establish an average time of completion and check item reliability and validity. Online and paper-based versions of the instrument were administered. There were several sources of data collection for each version. The paper version of the survey was administered to members of a church choir, students in a religious seminary class, attendees of a symphony concert, and employees in a county agency. The online version was posted on a local website, disseminated through a graduate student listserv at a university, and sent to the listserv of a community fitness group. In addition to the three sources mentioned above, the online survey contained an “other” option for people to indicate how they found out about the survey. Several participants indicated they were forwarded a link to the survey from friends and co-workers. As a result, an additional category was added as the fourth source for online respondents. Since we do not know how many people were forwarded a link to the survey, we are unable to calculate the response rate. This represents a limitation of the study and an opportunity for future research.

A total of 372 surveys were used for data analysis: 133 paper responses and 239 online responses. An ANOVA was used to assess any differences between online and paper responses. There was a difference in the perception of convenience and compatibility; however, there were no differences with regards to the dependent variable. Since the groups did not exhibit differences for the dependent variable –intention to use an I-voting system (F1.582, p=.209) - a combined sample was used in the following data analyses.

#### 4.1 Sample Demographics

The age range of participants is 18 to 75 years with an average of 33 years. Most participants (78%) have a college degree and the reported income range is well distributed. In addition to the demographics mentioned above, general

information about the participants was collected. The sample was 63% female. A majority of the subjects were Caucasian (64%). African-Americans accounted for 26% of the sample and Hispanic, Asian and Native Americans accounted for seven percent of the sample. The remaining three percent of the subjects did not report ethnicity. Ninety (90) percent of the sample has purchased a product or service online. Ninety-one (91) percent has access to the Internet at home. Seventy (70) percent has completed a government transaction online and 82% voted in the 2004 presidential election.

#### 4.2 Instrument Development and Validity

The instrument utilized newly developed and existing measures from information systems literature. The measures were adapted to fit the context of interest: I-voting. The items were adapted from [9], [67], [71]. The adoption items were measured on 7-point Likert scales. See the Appendix A for a list of the items. Use of e-government information and services was measured on a 4-point scale where: 1=Several times a week, 2 = Several times a month, 3 =Less than once a month, and 4 =Never.

#### 4.3 Data Analysis

The research model was tested using structural equation modeling (SEM) techniques, which is a comprehensive approach to testing hypotheses about relations among observed and latent variables [57]. Specifically, confirmatory factor analysis of multi-item scales and the estimation of fit indices for the structural models were performed with the AMOS 18 software package. AMOS models were estimated with a covariance matrix and the maximum-likelihood estimation method. This estimation method has been shown to provide good parameter estimates [25].

### 5 Results

Means, standard deviations, and ranges for the variables are reported in Table 2. In order to compute descriptive statistics, multiple-item scales were averaged.

Table 2: Means, standard deviations, and ranges (n = 372)

Variable	Min	Max	Mean	Std Dev.
Relative Advantage (RA)	1.00	7.00	4.94	1.63
Accessibility (ACC)	1.00	7.00	6.55	1.03
Compatibility (CT)	1.00	7.00	5.24	1.60
Trust of the Internet (TOI)	1.00	7.00	3.85	1.82
Disposition to trust (DT)	1.00	7.00	4.71	1.08
Use of E-gov Info (EINFO)	1.00	4.00	2.41	.968
Use of E-gov Service (ESERV)	1.00	4.00	3.22	.629
Use Intentions (USE)	1.00	7.00	4.78	1.94

The following correlation matrix indicates the correlations between constructs (see Table 3).

Table 3: Correlation matrix

	ACC	DT	ESERV	EINO	CT	RA	TOI	USE
ACC	1.000							
DT	0.000	1.000						
ESERV	0.000	0.000	1.000					
EINFO	0.000	0.000	0.401	1.000				
CT	0.000	0.000	0.000	0.000	1.000			
RA	0.075	0.000	0.000	0.000	0.896	1.000		
TOI	0.000	0.134	0.000	0.000	0.611	0.708	1.000	
USE	0.069	0.028	-0.006	0.055	0.809	0.939	0.771	1.000

Convergent and discriminant validity of the scales were tested with confirmatory factor analysis. Convergent validity is assessed with three ad hoc tests recommended by Anderson and Gerbing [8]. Table 4 lists the standardized loadings, composite reliabilities, and variance-extracted estimates. Standardized factor loadings are indicative of the degree of association between scale items and a single latent variable. The loadings are highly significant. Composite reliabilities, similar to Cronbach's alpha, range from 0.82 to 0.95, well exceeding the minimum limit of 0.70. Variance-extracted estimates are measures of the variation explained by the latent variable to random

measurement error [74] and ranged from 0.62 to 0.83. These estimates exceed the recommended lower limit of 0.50 [36]. All tests support the convergent validity of the scales.

Table 4: Results of confirmatory factor analysis

Construct Items	Std. Loading	Comp. Reliability	Variance Extracted Estimate
<b>Use Intentions</b> Use1 Use2 Use3 Use4	0.897 0.940 0.932 0.861	0.949	0.825
<b>Relative Advantage</b> RA1 RA2 RA3	0.962 0.858 0.591	0.855	0.670
<b>Accessibility</b> ACC1 ACC2 ACC3	0.901 0.918 0.776	0.901	0.752
<b>Compatibility</b> CT1 CT2 CT3 CT4	0.908 0.864 0.712 0.852	0.903	0.701
<b>Trust of the Internet</b> TOI1 TOI2 TOI3 TOI4	0.863 0.907 0.829 0.908	0.930	0.770
<b>Disposition to trust</b> DT1 DT2 DT3 DT4	0.539 0.598 0.592 0.883	0.819	0.622

Discriminant validity was assessed with the test recommended by Anderson and Gerbing [8]. The squared correlation between a pair of latent variables should be less than the variance extracted estimate of each variable. Every combination of latent variables was tested, and each pairing passed, providing evidence of the discriminant validity of the scales.

The overall model fit is good, as can be seen from Table 5. The test of overall model fit resulted in a chi-square value of 563.81 with 239 degrees of freedom and a probability value of less than .001. The p-value being significant indicates the absolute fit of the model is less than desirable. However, because the chi-square test of absolute model fit is sensitive to sample size and non-normality, a better measure of fit is chi-square over degrees of freedom. This ratio for our model is within the suggested 3 to 1 bracket [24], [38].

Typically, researchers also report a number of fit statistics to assess the relative fit of the data to the model. Descriptive fit statistics compare a specified model to a baseline model, typically the independence model, in an attempt to demonstrate the superiority of the proposed model. Jaccard and Wan [60] recommend the use of at least three fit tests. We report Goodness-of-fit index (GFI), the adjusted GFI (for sample size) (AGFI), the Tucker-Lewis Index (TLI), and the Comparative Fit Index (CFI). The GFI, TLI and the CFI compare the absolute fit of a specified model to the absolute fit of the independence model. The greater the discrepancy between the overall fit of the two models, the larger the values of these descriptive statistics. Research by Gerbing and Anderson [42] identifies the CFI as one of the most stable and robust fit indices. We also report RMSEA (Root Mean Square Error of Approximation), which measures the discrepancy per degree of freedom [91].

The GFI should be at or above 0.90 [57], while the AGFI should be at or above 0.80 [24], [86]. The CFI statistic should be at or above 0.90 [13], [78], but a CFI above 0.95 is considered to be an exceptional fit [13], [57]. TLI is more restrictive, and requires a value of 0.95 or above [58]. Finally, RMSEA should be below 0.10 [16], but has also been suggested to represent a very good fit if below the more restrictive threshold of 0.08.

Table 5: Model fit summary for the proposed research model

Fit Index	Model	Recommendation
Chi-square	563.81	n/a
Degrees of freedom	239	n/a
P	<0.001	non significant
Chi-square / df	2.36	< 3.00
GFI	.89	>.90
AGFI	.86	> .80
Comparative fit index (CFI)	.95	>.90
Tucker-Lewis Index (TLI)	.96	>.95
Root mean square error of approx. (RMSEA)	.06	<.10

Given the adequacy of the model's fit, we examined individual path coefficients corresponding to our hypotheses. This analysis is presented in Table 6. Five of the seven hypotheses are supported.

Table 6: Path coefficients and hypothesis testing

	Relationship	Coeff.	p-value	Supported
H1	RA → Use	10.172	< .0001	YES
H2	ACC → RA	2.915	0.004	YES
H3	CT → Use	-1.909	0.056	YES
H4	TOI → Use	5.483	< 0.001	YES
H5	DT → TOI	3.271	0.001	YES
H6	EINFO → Use	2.911	0.004	YES
H7	ESERV → Use	-1.409	0.159	NO

Five of the seven hypotheses are significant (see figure 2). Relative advantage, trust of the Internet, and use of e-government (EINFO) information had a significant impact on intention to use Internet voting. Accessibility had a significant effect on relative advantage, and disposition to trust had a significant impact on trust of the Internet. However, neither compatibility nor the use of e-government (ESERV) services had a significant impact on intention to use Internet voting. Although the alpha value for compatibility is moderately significant ( $p < .10$ ), the sign is not in the predicted direction. This suggests that people who use the internet for other services are not necessarily inclined to adopt Internet voting. Both compatibility and previous use of e-government (ESERV) services should be explored in future studies to verify these findings, especially considering the significance of previous use of e-government information.

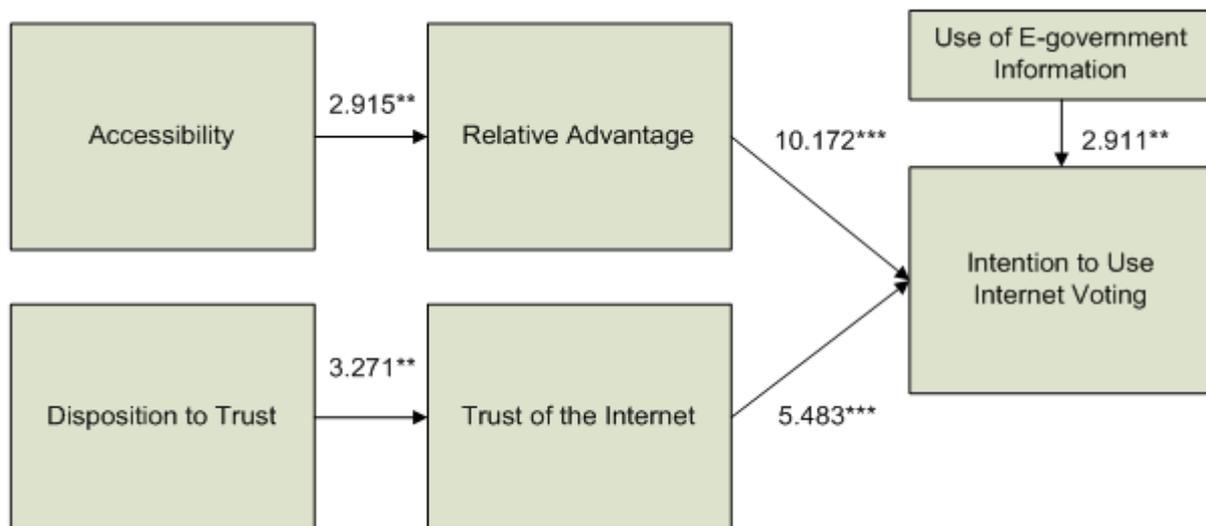


Figure 2: Significant results and path coefficients, \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

## 6 Discussion and Conclusions

According to rational choice theory [5], [14], a citizen decides to vote or not to vote if the anticipated benefit outweighs the anticipated cost. The cost includes the amount of time one feels she needs to spend acquiring and processing the information about candidates and parties in order to decide which party or candidate to vote for. It also includes the time spent going to the poll, voting, and returning [6], [5], [29].

### 6.1 Significant Results

This study focuses on the later set of costs. Aldrich [5] argues that voting is a low-cost, low-benefit, decision-making problem. Hence, small changes in costs or benefits can make a big difference. According to Aldrich [5], since both benefits and costs are so small, it is a close call for many citizens to vote or not to vote. Muhlberger [73] argues that by reducing the marginal cost of political participation technology has the potential to substantially mobilize political action. Technology increases the convenience of casting a ballot for many citizens. This relative advantage may represent one marginal cost reduction that has the potential to mobilize voters. The Internet makes government-related information and transactions more accessible. Regarding trust, this study supports the existing literature that highlights the significance of trust on technology adoption.

### 6.2 Non-significant Results

Surprisingly, H3 and H7 were not supported. Neither compatibility nor previous use of an e-government service had a significant impact on use intentions. Regarding compatibility, this finding may be due, in part, to the sample. As aforementioned, ninety (90) percent of the sample has purchased a product or service online. Ninety-one (91) percent has access to the Internet at home. And seventy (70) percent has completed a government transaction online. Most participants in this sample use electronic services. Future studies should continue to explore the impact of compatibility on I-voting by recruiting a sample that has more variance with regards to electronic service utilization. Regarding previous use of an e-government service, unlike electronic tax filing or online license renewal, Internet voting contains unique societal implications. Perhaps the unique nature and consequences of Internet voting distinguish it from other e-government services. Hence, previous use of an e-government service will not necessarily result in I-voting adoption. As I-voting systems and research is still evolving, future research should continue to explore these relationships.

### 6.3 Implications for Research and Practice

Oostveen and Besselaar [75] write "we are only beginning to understand how technologies may support democracy and therefore we need a better knowledge of the micro dynamics of political participation and communication, and how ICTs [Information Communication Technologies] intervene in these processes [75]." This study integrates e-government acceptance literature into a parsimonious model of technology adoption and trust. In particular, it introduces accessibility as an antecedent of relative advantage. This model can serve as a spring board for future I-voting adoption studies.

In addition to research implications, there are various implications for practice. Americans now use emails and text messages to contribute to the political debate. The integration of electronic services into the political process is increasing over time and future opportunities for Internet use in the political process are constantly emerging. Not only are citizens interested in using the Internet to obtain information but also to cast their ballot via a phenomenon called Internet voting. Government agencies should take advantage of technological innovations to constantly improve the ease and convenience of casting a ballot. As I-voting evolves and becomes more prevalent additional options, such as mobile voting, should be explored.

Opponents of Internet voting in Arizona's 2000 Democratic primary said that due to the lack of Internet access for certain citizens, the implementation of I-voting is unfair. Obviously, due to the lack of Internet access among certain segments of the population, many voters would have to travel to reach the polls [46]. Hence, I-voting practitioners and researchers should explore the impact of this initiative on the digital divide. For instance, in 2007 Honolulu offered Internet voting as an option for its thirty three community advisory boards. Two years later, to save money, it eradicated in-person voting for those neighborhood boards and used only the Internet and phone. Unfortunately, participation dropped from 24% to 6% [102]. As I-voting services are implemented, government agencies must ensure that citizens on the other side of the divide are not left behind. Until the digital divide is eliminated, traditional voting methods should be made available to those who do not have the access, skills and confidence necessary to utilize these systems.

## 6.4 Limitations

In this study, we used self-reported voting intentions and behaviors. Surveyed participants typically inflate their voting behavior and intentions [1], [21]. By asking respondents for self-reports of their own election behavior, many nonvoters are able to report that they voted [18]. This implies that survey data may be misleading when studying voter turnout. Results of survey-based research on voter participation should be interpreted in light of this limitation. Also, given the data collection method common method variance may be an issue. Future research that employs diverse methods is needed to validate the findings presented in this study.

Regarding the sample, it is diverse in terms of participant age and income; however, it is not diverse with regards to participant education level. Most participants (78%) have a college degree. This number increases to 99% if I include participants who have attended college and/or completed high school. Research states that education beyond high-school increases the likelihood of voting by almost 15% [65]. Alvarez and Hall [6] found that individuals who have attended college are approximately two times more likely to vote than individuals without a high school education. These findings illustrate the importance of obtaining responses from people with diverse educational backgrounds. Future studies should seek to collect data from individuals with diverse educational backgrounds; an ideal sample would include those who have a high school diploma and those who do not.

In addition to education level, the variance in age range was not representative of the U.S. population. As aforementioned, only 12 percent of the sample was over the age of 55. However, 21 percent of the citizens in the U.S. are 55 years of age and older. Future research should employ stratified random sampling to achieve the desired variance in both age and education.

## 6.5 Suggestions for Future Research

The literature suggests that the act of voting itself may be habit forming. Research shows that those who have voted in the past are more likely to vote in upcoming elections [15], [41], [47], [80]. The act of voting also has an impact on other political attitudes such as, political knowledge and political interest [29], [41], [47], [80]. Longitudinal studies should be conducted to shed light on these bi-directional relationships. Future research should also explore additional antecedents of both use and trust. Factors such as privacy, security, and efficacy may impact I-voting utilization. Regarding trust, future research should consider developing a trust and I-voting model that explores the impact of trust antecedents on I-voting use intentions.

Given the rise in social networking utilization by various segments of the population, future studies should explore the impact of social media on I-voting diffusion [81]. Advances in technology make e-participation easy and alluring to certain demographics. The membership of social networking sites such as Facebook and Twitter are growing steadily. Future research should assess the role of social networking on internet voting.

This study presents a model Internet voting adoption. It identifies a unique feature of the Internet, Accessibility, that makes this medium such an appealing option for political participation. As local and state governments begin to experiment with Internet voting, now is the time to identify the Internet-specific characteristics that will attract non-voters and retain habitual voters. Knowledge of the factors that impact one's decision to use an Internet-voting system, such as, relative advantage and trust can aid government agencies as they solicit and test I-voting systems.

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## Appendix A: Survey Items

### Relative Advantage

1. The disadvantages of using an Internet voting system far outweigh the advantages.
2. I would find an Internet voting system useful.
3. I think an Internet voting system would provide a valuable service for me.

### Accessibility

1. The Internet is readily accessible to me.
2. It would be easy for me to cast my vote via the Internet.
3. I have easy access to the Internet.

### Compatibility

1. Using an Internet voting system would fit well with the way that I like to do things.
2. An Internet voting system would fit into my lifestyle.
3. Using an Internet voting system would be incompatible with how I like to do things.
4. Using an Internet voting system is completely compatible with my current situation.

### Institution-based Trust

1. The internet has enough safeguards to make me feel comfortable using it to cast my vote online.
2. I feel assured that legal and technological structures adequately protect me from problems on the Internet
3. In general, the Internet is a robust and safe environment in which to vote.
4. I feel confident that encryption and other technological advances on the Internet make it safe for me to cast my vote online.

### Disposition to Trust

1. I generally do not trust other people
2. I generally have faith in humanity
3. I feel that people are generally reliable
4. I generally trust other people unless they give me reason not to.

### Intention-to-Use

1. I would use the Internet to vote.
2. I would use voting services provided over the Internet.
3. Voting via an Internet system is something that I would do.
4. I would not hesitate to vote online.