Linking Citizen Satisfaction with E-Government and Trust in Government

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ABSTRACT

This article asks how Internet use, citizen satisfaction with e-government, and citizen trust in government are interrelated. We first review the literature on trust and explore how radical information technologies may work to alter the production or maintenance of trust. We then develop hypotheses about how citizens' experience with e-government, satisfaction with e-government and government Web sites, and trust in government are interrelated. Moreover, the model for e-government and Web site satisfaction incorporates citizen perspectives on electronic transaction, transparency, and interactivity. Using data obtained from the Council on Excellence in Government, we then develop and test a two-stage multiple-equation model that simultaneously predicts experience, satisfaction, and trust. Findings indicate that government Web site use is positively associated with e-government satisfaction and Web site satisfaction and that e-government satisfaction is positively associated with trust in government. We also find that while citizens are generally satisfied with the electronic provision of information (transparency), there is some dissatisfaction with the transaction and interactivity of Web sites. We conclude that electronic government strategies—transaction, transparency, and interactivity—are important factors that directly affect e-government satisfaction and indirectly affect trust. Individuals who use government Web sites are not only critical consumers but also demanding citizens.

During the past four decades, there has been a decline of public trust in government. The decline offers tough challenges to politicians, public administrators, and citizens because it implies the loss of public confidence in political and administrative performance as well as dissatisfaction with public services. Previous studies examined various factors

that contribute to the decline of public trust: the gap between public expectation and perceived governmental performance, economic performance, the role of mass media, political scandals, changes in social capital and culture, and perceived policy failures (Nye 1997; Peters 1999). In particular, the perceptual distance and information gap between the public and government appears to be one of the major elements that have led to the decline of public trust in government. To some, appropriate utilization of information and communication technologies, especially the Internet, by government has the potential to increase citizen satisfaction with government. Similarly, better, more convenient services, more accessible and complete information, and new and improved channels of communication may reduce the information gap and improve citizen trust in government.

Research has shown that public sector management of information throughout this new era is heavily focused on information dissemination (posting things on government Web sites) and provision of Web services (Musso, Weare, and Hale 2000). However, there has been little deployment of electronic technologies and accompanying organizational mechanisms that more directly engage citizens in discussion, debate, or decision making. This suggests that agencies are using the communication capabilities of the Internet in a selective "one-way" communication strategy and foregoing a more complex "two-way" communication strategy. Some believe this scenario may result in a reduction in the level of communicative interaction between citizens and bureaucrats (Bovens and Zouridis 2002). The extent to which citizens recognize and are satisfied with e-government strategies is not clear; nor is it clear that there is a connection between satisfaction with e-government and trust.

This article first reviews the trends in trust in government in the United States. It then explores how various factors that influence trust may be linked with different facets of electronic government that affect citizens including transactions, information provision, and two-way interaction. We then develop a model and identify hypotheses about how citizen use of government Web sites, satisfaction with e-government, and trust in government are interrelated. Using survey data obtained from the Council for Excellence in Government, a multiple-equation model simultaneously estimates citizen use of government Web sites, e-government satisfaction, and trust. The two-stage estimation technique allows for incorporation of selection bias and endogenous relationships in the model. Generally, findings indicate that trust in government is strongly associated with e-government satisfaction and that e-government satisfaction is associated with citizens' perceptions about online service convenience (transactions), information reliability (transparency), and engaged electronic communication (interactivity). Conclusions interpret the findings for theory and application.

TRENDS IN PUBLIC TRUST IN GOVERNMENT IN THE UNITED STATES: INDICATORS AND EXPLANATIONS

National Election Studies (NES) of the University of Michigan (2004) has collected longitudinal data regarding various political, social, and cultural elements of the public. In the section entitled "Support for the Political System," several indexes represent various aspects of the public's attitude toward government, such as public trust in government,

political efficacy, and governmental responsiveness.[1] Figure 1 shows longitudinal trends for available data for these three indexes, two of which, government trust and political efficacy, have been declining during the last three decades, though there is a significant amount of noise around the declining trend. Based on the data, one could argue that, in general, the American public has been losing confidence and trust in government.

The NES study shows that public trust in government reached the highest point in 1966 before it started diminishing, probably as the public responded negatively to the Vietnam War. Trust plummeted during the 1970s, reaching a low point when the Watergate scandal occurred in 1974, recovered somewhat during the early 1980s, and soon fell again during Reagan's second term in office. From the mid-1990s, public trust began to rise again, thanks possibly to the booming economy under the Clinton administration. The NES (2004) also offers data on public trust in government by demographic groups by gender, race, education, income, vocation, religion, age, political partisanship, and political ideology.[2] The decline in public trust is similarly pervasive across the different demographic groups defined by gender, race, and socioeconomic status (NES 2004).

Scholars attribute the decline in the American public's confidence and trust in government to a variety of different reasons. Peters (1999) asserts that public trust in government declines particularly as a reaction to scandal (e.g., Watergate, Whitewater, Lewinsky), inefficient government performance (e.g., the Savings and Loan crisis, budget deficits), and policy failure (e.g., the Vietnam War). He also points out that economic instability and recession may contribute to the declining public trust as observed in the mid- to late 1980s and early 1990s, though he also sees that economic prosperity does not always seem to promote public trust in a substantial way, as observed in the late 1990s.

1   The public trust in government is calculated based on the four following questions:

    a. How much of the time do you think you can trust the government in Washington to do what is right—just about always (*100*), most of the time (*67*), or only some of the time (*33*)? (*0*) for none of them (volunteered answer).

    b. Would you say the government is pretty much run by a few big interests looking out for themselves (*0*) or that it is run for the benefit of all the people (*100*)?

    c. Do you think that people in the government waste a lot of money we pay in taxes (*0*), waste some of it (*50*), or don't waste very much of it (*100*)?

    d. Do you think that quite a few of the people running the government are (1958–72: a little) crooked (*0*), not very many are (*50*), or hardly any of them are crooked (1958–72: none at all) (*100*)?

The political efficacy index was constructed based on the two following statements:

    a. People like me don't have any say about what the government does. Agree (*0*) or Disagree (*100*)

    b. I don't think public officials care much what people like me think. Agree (0) or Disagree (*100*)

The government responsiveness index is constructed based on the two following questions:

    a. Over the years, how much attention do you feel the government pays to what the people think when it decides what to do—a good deal (*100*), some (*50*), or not much (*0*)?

    b. And how much do you feel that having elections makes the government pay attention to what the people think—a good deal (*100*), some (*50*), or not much (*0*)?

2   For more information, see National Election Studies, University of Michigan (www.umich.edu/~nes/nesguide/gd-index.htm).

Figure 1
Trends in Public Trust in Government
Source: National Election Studies, 1958–2000, University of Michigan (2004).
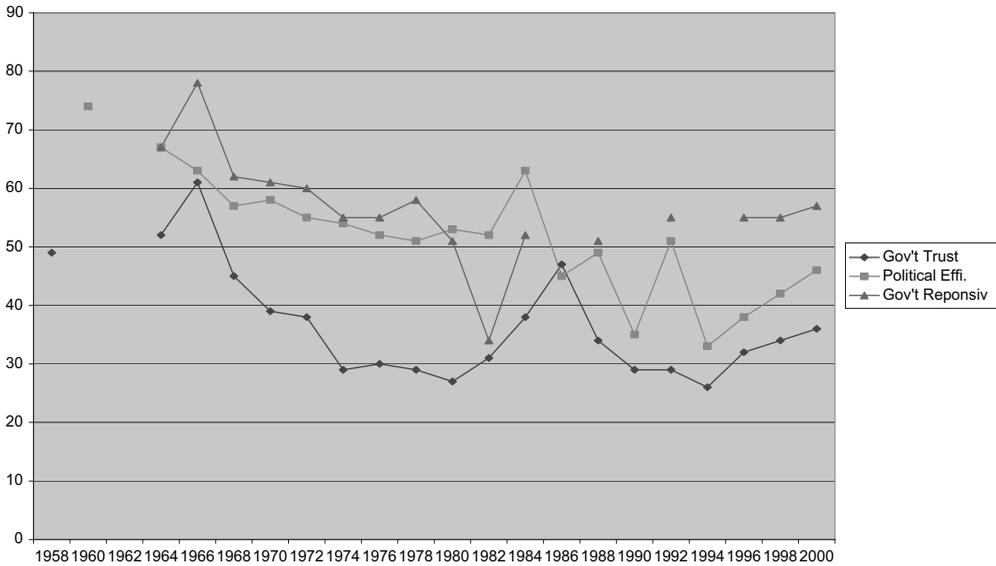
Nye (1997) addresses four important dimensions that might be associated with the level of public trust, including the governmental performance dimension, economic dimension (slow down of economy), sociocultural dimension (i.e., decline in social capital, family crisis, strong sense of individual rights), and political dimension. Each dimension captures a set of associated factors. For example, in the political dimension, Nye identifies factors such as post–Cold War syndrome, poor political leaders, the World War II effect, and mass media that affect public trust. Though Nye suggests that the four dimensions influence directly or indirectly the public's trust in government, he acknowledges that their causal relations with the level of public trust are not necessarily clear because public trust is often perceptual and subjective rather than objective in nature. The citizen perception of trust is a cognitive reflection of the information and data obtained by the public regarding governmental performance. Therefore, for example, the level of an individual's trust may covary with the actual level of governmental performance and with the interpretation of the information about government performance by the individual. In essence, citizens cognitively construct a gap between their expectations and reality. An individual who is frustrated and disappointed with governmental services is likely to report a low level of confidence in governmental services, while the opposite is true of those who are satisfied. Accordingly, trust is a subjective attitudinal indicator rather than an objective indicator of governmental performance.

Citing Putnam's (2000) work, Orren (1997) also argues that public satisfaction (which is closely associated with public trust) with government is a function of both public expectation and perception of governmental performance. He identifies an inverse relationship between public satisfaction and public expectation but a positive relationship between public satisfaction and public perception of governmental performance. Orren suggests

that there are different factors involved in the perception and expectation dimensions that jointly affect the level of public satisfaction with governmental performance.

Rainey (1997) points out that the public often has wrong information and a biased perception of government performance. For example, many citizens overestimate the administrative cost of the Social Security Administration to be 50 percent of its budget, though its actual administrative cost is only about 1.3 percent. It seems that the initial level of public expectation and biased public perception of governmental performance leads to the decline of public trust in government. Often, the degree of psychological and information proximity between citizens and governments affects the level of public trust (Mutz and Flemming 1999). In this regard, diffusion of information technologies in society and increasing the flow of government information to the public may help correct biased public perception and affect expectations of trust by narrowing the information gap between the public and governments.

More than Just More Information to More People

Provision of more information about administration is necessary but does not sufficiently cover the means by which Internet technology can affect citizen trust in government. For example, Nelson (1997) has identified five problems for building trust in cyberspace: security and reliability, identity and authentication, confidentiality, verification, and jurisdiction. Although these concerns continue to be at the forefront of government thinking on deployment of information technology and distribution of information, the problem focuses myopically on the technical systems that enable a customer-oriented government. Other factors that have more to do with matching known capabilities of the technology with citizen expectations of democratic government, such as fulfilling expectations of equity, accountability, and interactive e-governance, may be just as important.

Shapiro (1999) notes that the Internet revolution has produced an information culture in which individuals (citizens) have access to and, hence, expect access to a great deal of data and information. He also finds that the network of networks and the code features of the Internet that allow many-to-many interaction are "hailed as one of the most potentially democratic aspects of the Net because it allows individuals to be creators of content rather than just passive recipients, and active participants in dialogue instead of just bystanders" (1999, 15). To what extent are governments using the capacity of the technology to engage citizens in discussion, deliberation, and decision making? To what extent are citizens expecting more than a nod toward substantive online interaction from their governments?

In a survey of the literature on electronic democracy, Weber and Murray (2002) find that two main questions are currently being posed by research in electronic democracy: Who participates online, and what do (or can) citizens do online? The first question has to do with equity of access and use—the digital divide. The second question has more to do with what is available for citizens online. A fundamental finding of Weber and Murray's survey is that while local government is doing much to provide information and services to citizens, and in many cases doing a very good job, it is far from realizing the full potential of the Internet as a communication and interaction tool.

Findings from Musso, Weare, and Hale (2000) provide some of the underlying evidence. In their study of 270 municipal Web sites in California, they found that local government Web sites were generally more customer oriented—providing services and information to citizens and organizations—while few utilized the communication potential

of the Internet to facilitate citizen participation in public affairs. Stayaert also finds that government Web sites generally "reduce the citizen to a customer" while they neglect the potential interactive capabilities of the technology for engaging citizens in democratic activities: "In this way, [agencies] are developing an electronic government shop rather than the electronic community that some have predicted" (2000, 3). Bovens and Zouridis (2002) are also critical, finding that street-level bureaucracy is gradually being transformed into *screen-level bureaucracy*, such that citizens increasingly interact with a Web site instead of with a public servant. They show that the process of interaction between citizens and bureaucrats is becoming increasingly routinized while the scope of and opportunity for administrative discretion are declining.

Are citizens dissatisfied with the one-way strategy? And how does satisfaction with the strategy contribute to public trust and confidence in government? The next section more closely examines the interplay of trust, information, and interaction.

Trust and Internet Technology

Although there is little agreement in the literature about how to define citizen trust in government or how it is gained and lost, most writers agree that it is an important determinant of public action and cooperation (Ruscio 1996; Thomas 1998). As discussed above, citizen trust in government is built upon expectations conditioned by some type of social context or interaction. Thomas identifies three broad conceptions of trust: "(a) fiduciary trust, which is notable for asymmetric relationships and attendant opportunities for malfeasance; (b) mutual trust, which develops between individuals who repeatedly interact with one another; and (c) social trust, which is embedded within institutions we know in common and take for granted" (1998, 170).

Fiduciary trust is based on principal agent theory, in which the relationship between the citizen and the government is asymmetric; the citizen's knowledge about what the bureaucrat is doing is limited. The citizen trusts that government will work in our best interests by conducting its work effectively and in accordance with "ethical norms of justice and benevolence" (Kass, cited in Thomas 1998, 171). As a result, distribution of information (in all formats) that increases citizen ability to observe and understand government operations—such as details about administrative processes, programs, plans, outputs, and outcomes—could enhance fiduciary trust. However, Thomas also indicates that the citizen recognizes that government operates in a trustworthy manner when, despite a rule-bound institutional context, bureaucrats have discretion to attend to specific citizen needs. Therefore, full-scale electronic routinization that reduces discretion, as in the previously described *screen bureaucracy*, may work against fiduciary trust.

Mutual trust is based on interpersonal interaction that is more symmetric than fiduciary trust. Thomas indicates that mutual trust helps create and enhance relationships among individuals and can reinforce the fiduciary trust an individual feels for an institution or organization. Although mutual trust cannot exist between an individual and an organization, it can serve as a basis of support for fiduciary trust. For example, government officials who interact directly with the public at the street level have the opportunity to develop mutual trust, which can then support the trust that the individual has for the agency. Moreover, officials who utilize the one-to-one or one-to-many interactive capabilities of information technologies to acknowledge and respond to citizen communications may be addressing the concept of mutual trust. Presumably, citizens would react more favorably to

open interaction with government officials in contexts where citizen expectations of disclosure and participation are strong.

Drawing on Grannovetter, Thomas defines social trust as a type of "social capital" that, on the one hand, is created and sustained through the multitude of interactions that take place in society and, on the other hand, facilitates transactions among individuals. Individual actions are both shaped by and create social trust in a dynamic, ongoing process: "Mutual trust, generated through microlevel interpersonal relationships, gives rise to and shapes the character of social trust. In turn, social trust enhances the ability of individuals to develop mutual trust. Social trust also buttresses the sense of moral obligation that sustains fiduciary trust" (Thomas 1998, 178). Employing this social capital framework, Shah finds empirical evidence that Internet use contributes to the building of trust and participation: "Using the Internet for exchange of information is associated with higher levels of interpersonal trust and civic participation" (2001, 491).

Thomas further applies Zucker's three modes of trust production—characteristic-based, process-based, and institution-based trust—to propose ways in which trust can be produced by government. Characteristic-based trust is produced through expectations associated with personal characteristics such as race, age, or gender (Zucker 1986). Process-based trust is garnered through expectations of reciprocity in which the giver essentially obligates the receiver to return goods or services of equivalent "intrinsic or economic value" (Thomas 1998, 180). Institutions engender trust either directly through adoption of professional standards or codes of ethics or indirectly through the observance or administration of laws and regulations.

In the virtual world, characteristic-based trust is difficult to establish as personal characteristics are more hidden, leaving institution-based and process-based trust as primary areas of interest. Increased efforts by government to establish reliable information-exchange mechanisms with citizens may help enhance citizen trust of government. Exchange is a multidimensional activity that could include information provision, transactions (permits, licenses, taxes, applications), or communicatively interactive dialogue, discussion, and debate about important policy-relevant topics. Furthermore, adept and reasonable application of new or existing norms, laws, and regulations to the context within which new technologies are employed increases institutional trust. For example, agencies may increase institutional trust when they enact Internet technologies according to democratic norms of equity, transparency, and interactivity.

Internet Use, E-Government Satisfaction, and Trust

Based upon the above discussions on perceptions, expectations, technology, and trust, we posit the following model (figure 2). Electronic government is now a significantly prominent facet of governance, and the extent of citizen expectations regarding services, information provision, interaction with government officials, and access can be expected to contribute to important outcomes such as trust. However, the relative newness of e-government does not obviate the importance of general expectations. Therefore, the model incorporates both perceived satisfaction with e-government and perceived satisfaction with government in general as contributors to citizen trust in government. In addition the model identifies Web site usage as an important factor that determines e-government perceptions. Finally, the interaction between trust and satisfaction is recursive: trust leads to satisfaction, and vice versa.
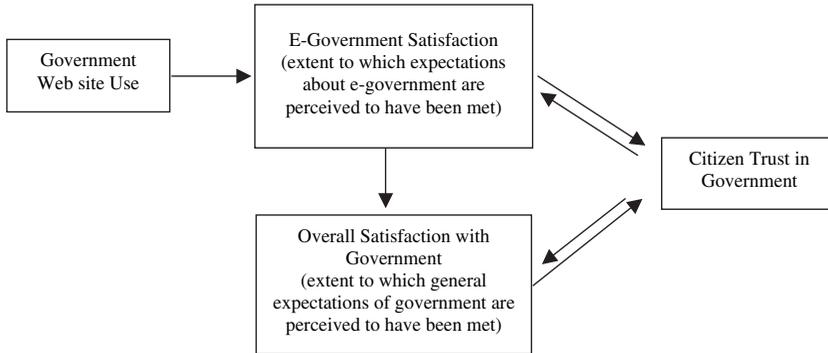
Figure 2
Conceptual Model

Figure 2 hides a great deal of detail. For example, the extent to which an individual visits government Web sites is probably determined by an array of factors including general Internet use, demographic characteristics, and individual needs. In addition, overall satisfaction with government is a multidimensional construct comprising different values such as efficiency, accountability, equity, and effectiveness. While it is important that much of this detail be incorporated into the empirical model, the following paragraphs concentrate primarily on the top part of this model: Web site use, e-government satisfaction, and citizen trust in government.

Second, citizen use of government Web sites probably affects their perceptions about how well e-government efforts fulfill their expectations. Presumably, general Internet use provides a comparative framework for individuals to judge whether or not government Web sites are utilizing technology in ways that fulfill citizen expectations of e-government and of government in general. Because access to government Web sites is highly correlated with use of the Internet ($r = 0.39$; Hart/Teeter 2001), citizens who use government Web sites are familiar with the broader range of existing and potential uses of the technology for information dissemination, online transactions, and interactive communication; they are able to contrast observed patterns of government use of Internet technologies with their knowledge about possible Internet applications and with their expectations about government. Citizen dissatisfaction can arise when government is perceived to systematically employ (or block) use of technology in ways that misinterpret or misrepresent expected cultural, political, or social norms. Therefore, government Web site use is an important indicator of whether or not government is generally fulfilling citizen expectations.

Second, citizen satisfaction with e-government results from more than just Web site use; it is also determined by the perceived level of competence and effort regarding such factors as service convenience and effectiveness, information quality and quantity, ease of access, and interactive communication. To simplify a potentially long list of contributing factors, we designate three main categories: transactions, transparency, and interactivity.

The transactions category comprises the perceived convenience, quality, privacy, efficiency, and security of online transactions with government. Repeated transactions with government may contribute to process trust, as discussed above, when repetitive exchange occurs that does not contravene expectations of convenience, quality, privacy, efficiency, and security. In addition, perceptions that transaction protocols conform to general

business norms on the Internet can contribute to institutional-based trust. Institutional trust may be garnered when governments utilize third-party standards such as TRUSTe's and Better Business Bureau's privacy programs.

Although multiple discussions of transparency and interactivity exist in the literature, our discussions focus on the definitions developed by the Cyberspace Policy Research Group (CyPRG). Transparency constitutes "a layman's basic map of the organization as depicted in the information on the site [and] reveals the depth of access it allows, the depths of knowledge about processes it is willing to reveal, and the level of attention to citizen response it provides" (LaPorte, Demchak, and de Jong 2002, 415; Demchak, Friis, and LaPorte 1998, 2000). The more transparent an organization's Web site is, the more the organization is willing to allow citizens to monitor its performance (Reichard 1998). Allowing citizens to monitor agency activities and decisions may engender greater trust. Of course, exposed agency behavior, processes, and outputs must reasonably conform to expected norms of democratic governance. In terms of the specific discussion on trust outlined above, we expect that when government provides citizens with reliable infor-mation about administrative processes, decisions, activities, outputs, and outcomes, two things, relevant to trust, happen. First, the information gap that engenders distrust is narrowed. Second, as shown in the above section, greater transparency can support fiduciary trust and foster process and institutional trust.

Interactivity "is a measure of the level of convenience or degree of immediate feedback [provided]" (LaPorte, Demchak, and de Jong 2002, 417). Interactivity is one means of describing the willingness or ability of an agency to be responsive to citizens (Demchak, Friis, and LaPorte 2000). Others find that interactivity is more complex than described by CyPRG and must include a two-way interaction, rather than a one-way e-mail "clickability" concept (Fulla and Welch 2002). Here, interactivity can be further clarified to include iterative communication of ideas or information between citizens and bureaucrats that contribute to discussion, dialogue, or debate about public-relevant topics (Rafaeli 1988). Earlier discussion in this article shows that government accomplishments in this domain are relatively limited. Nevertheless, two-way interaction through dialogue has been theorized to be important for demonstrating accountable government (Roberts 2002). Moreover, as the above discussion on trust indicates, agencies that include citizens in discussions and decision-making processes about policy-relevant topics, regardless of whether citizens take advantage of the opportunities or not, appeal to norms of democratic engagement, establish communicative exchange that builds process trust, and encourage interpersonal interaction that supports mutual trust.

As discussed in the literature review above, governments have been found to be doing a good job at providing information (transparency) and setting up effective services but a poor job developing mechanisms for two-way interaction (interactivity) (Bovens and Zouridis 2002; Musso, Weare, and Hale 2000; West 2001). So we posit the following hypotheses:

H_1 Citizens are generally satisfied with government efforts to provide information and services electronically on government Web sites but dissatisfied with government interactivity efforts.

H_2 Increased citizen satisfaction with e-government (including satisfaction with online transactions, transparency, and interactivity) leads to increased citizen trust in government.

Table 1
Summary of Hypotheses

Satisfaction/Trust	Interactivity	Transparency	Transaction
Process	√ (+)		√ (+)
Institutional	√ (+)	√ (+)	√ (+)
Fiduciary		√ (+)	
Mutual	√ (+)		

Table 1 provides a summary of the linkages between the two types of satisfaction and the different elements of trust (social trust is removed as it comprises a combination of fiduciary and mutual trust; characteristic trust is removed because it is less relevant in cyberspace).

EMPIRICAL MODEL, METHODS, AND DATA

To express the relationships among trust, transparency, interactivity, transaction reliability, and government Web site use, we should specify five separate equations to be solved simultaneously. Unfortunately, data limitations require us to express a much more limited approach to this problem, as shown in the three equations below. The first equation models government Web site use as a function of demographic characteristics, general satisfaction with government (including satisfaction with information provision and opportunity for citizen input), and Internet use.[3] The second equation models e-government satisfaction as a function of government Web site use, transaction satisfaction, transparency satisfaction, interactivity satisfaction, and trust in government. The final equation models trust in government as a function of e-government satisfaction, along with other indicators of general satisfaction with government and demographic variables. Thus:

Government Web Site Use = f (Demographic Variables, General Satisfaction with Government, Internet Use)

E-Government Satisfaction = f (Government Web Site Use, Trust in Government, Transaction Satisfaction, Transparency Satisfaction, Interactivity Satisfaction)

Trust in Government = f (E-Government Satisfaction, General Satisfaction with Government, Demographic Variables)

The endogenous nature of this problem, where variables such as satisfaction, trust, and government Web site use are determined within a system of equations, calls for simultaneous equation estimation using two-stage least squares. According to this method, the endogenous variables are first estimated by regressing each on all predetermined variables in the equation systems. Then, in the second stage, the predicted variables are substituted as instruments for the endogenous variables that appear on the right-hand side of the equation (Greene 2000; Pyndyck and Rubinfeld 1991).

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3   These variables are constructed from broad-based questions asked of respondents early in the survey before specific questions on e-government were asked. There are many ways for citizens to get information and participate in government. These questions ask about their general satisfaction with information provision by and involvement in government.

DATA

This article uses a survey data set obtained from the Council for Excellence in Government (Hart/Teeter 2001). The survey randomly sampled 806 adults including an over sample of 155 Internet users. The data were collected between 12 and 19 November 2001 by telephone using the random-digit-dial sampling technique. The sample was stratified by geographic area to ensure a nationally representative sample. According to the final report (Hart/Teeter 2002), the sample was weighted according to the demographic makeup of the U.S. population and the margin of error for results among all adults is ±3.5 percent. The survey queried citizens about their experience with, involvement with, and perceptions of e-government and also asked a number of general questions about satisfaction and trust in government. Because this research is adapting survey data collected for other purposes, we have done our best to select appropriate measures for the constructs that we have identified.

Endogenous variables in the model include citizen use of government Web sites, citizen satisfaction with e-government, and trust in government. Government Web site use is operationalized as the frequency of reported government Web site visitation. E-government satisfaction is operationalized as the individual's overall rating of the effect (positive to negative) of e-government on the operation of government. In addition, the individual's rating of overall government Web site quality was used as a measure of satisfaction. While e-government satisfaction and Web site satisfaction are correlated, the correlation was not high enough to allow a linear combination of the two variables. Therefore, two different statistical trials were run, each substituting a different satisfaction variable. Findings show many similarities and some interesting differences between the two trials. Trust in government is represented as a combination of responses to three questions about the individual's level of trust and confidence in federal and state government (Chronbach's alpha = 0.75).

Exogenous variables in the first equation (Government Web Site Use) include demographic variables (age, male, rural, professional, white collar, black, income, and education). Black, male, and rural are all discrete 1–0 variables, while age, education, and income are constructed interval scales. Due to potential problems of multicollinearity, the highly correlated education and income variables never appear in the same equation. In addition, two other exogenous variables—general satisfaction with government information provision and general satisfaction with government involvement of citizens in decision making (Information Provision and Involvement)—were included to determine individual objectives for accessing government Web sites. It is reasonable to expect that dissatisfaction with either involvement or information provision may lead citizens to the Internet.

In the second equation (E-Government Satisfaction), exogenous variables are categorized into three groups: satisfaction with transactions, transparency, and the interactivity of e-government. The transaction satisfaction group includes seven variables: (1) desire to make e-services and electronic provision of information a priority for government, (2) desire for services that are easier to use, and (3) demand for expansion of Web site services and information, as well as level of concern about (4) identity loss, (5) accidental disclosure of personal data, (6) reduced services for those without Internet access, and (7) less personal privacy (E-Service Investment, E-Service Use, E-Service Expansion, Identity Loss, Personal Disclosure, Reduced Service, and Privacy Reduction). The transparency satisfaction group includes two variables, one asking about perceived levels of reliability

of information on government Web sites and the other indicating demand for online disclosure of more information about government policy and processes (Information Reliability and Transparency Improvement). Finally, the interactivity group comprises four variables: two measuring demand for e-government applications that allow citizens to communicate electronically with government officials (Citizen E-Communication 1 and 2) and two that measure the level of concern respondents have that e-government will result in (1) the reduced ability of government to respond to specific problems and (2) increased impersonal treatment of citizens by government (Problem Response and Impersonal Government).

The third equation incorporates one of the two e-government satisfaction variables (depending on the regression trial) along with four overall measures of citizen satisfaction with government and three demographic control variables (age, black, and education). The four satisfaction variables include satisfaction with (1) the efficiency of government, (2) our security against terrorism (a necessary control variable in light of the 9/11 terrorist attacks on the World Trade Center buildings prior to this survey), (3) information disclosure, and (4) the effort to involve citizens in public decision making. The specific questions associated with these measures are found in the appendix, and their descriptive statistics are provided in table 2. The sample size is lower (509) than the full sample size because we were interested only in those individuals who had used government Web sites.

FINDINGS

We present two tables of findings, which we will discuss in tandem. Overall, both models are highly significant, while the *r*-square values of the equations are moderate (between 0.10 and 0.28).[4] In column one of table 3 and 4, results show slightly different indicators of government Web site use than is typically reported for Internet use (West 2001). Older people, women, and professional and white-collar workers tend to use government Web sites more, while income is not a significant contributor. As expected, level of Internet use is strongly associated with government Web site use. These findings evidence a clear selection bias for government Web site use and validate its inclusion in the overall model. Finally, it is interesting to find that individuals who are dissatisfied with the extent to which government involves citizens in government are more likely to visit Web sites, while those more satisfied with information disclosure tend to visit Web sites. Perhaps this indicates a generally wide recognition of information availability on Web sites along with a hope that Web sites might offer a channel for citizen input and expression.

The second column for both tables reports results for the satisfaction equation in the model. Table 3, in which overall satisfaction with e-government is the dependent variable, shows trust in government and government Web site use to be significant positive contributors. This confirms an earlier expectation that those individuals who trust government more are also more likely to report higher e-government satisfaction. The findings also indicate that overall, people who access government Web sites are pleased with what they experience. Interestingly, none of the e-service variables was significant, perhaps indicating that perceptions of the current state of online services (positive or negative) have

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4   This level of explanatory power is not unusual for social science research in which constructs, such as trust, are particularly difficult to operationalize reliably.

Table 2
Descriptive Statistics ($n = 509$)

Variables	Mean (Standard Deviation)
Trust in Government	7.11 (2.58)
Government Web Site Use	1.96 (0.92)
Overall E-Government Satisfaction	2.52 (0.82)
Government Web Site Satisfaction	2.80 (0.69)
Internet Use	3.40 (0.86)
Satisfaction with Government	
Involvement	2.41 (0.96)
Security	2.79 (0.97)
Efficiency	2.28 (0.96)
Information Provision	2.72 (0.94)
E-Government Transaction Satisfaction	
E-Service Investment	1.83 (0.91)
E-Service Use	2.57 (1.00)
E-Service Expansion	0.20 (0.40)
Identity Loss	8.08 (2.84)
Personal Disclosure	7.65 (2.77)
Reduced Service	5.75 (3.17)
Privacy Reduction	6.92 (3.11)
E-Government Transparency Satisfaction	
Transparency Improvement	0.21 (0.41)
Information Reliability	3.05 (0.93)
E-Government Interactivity Satisfaction	
Citizen E-Communication 1	0.28 (0.45)
Citizen E-Communication 2	0.20 (0.40)
Problem Response	5.17 (3.04)
Impersonal Government	5.16 (3.15)
Demographic Variables	
Age	5.30 (2.76)
Male	0.51 (0.50)
Rural	0.18 (0.39)
Professional	0.34 (0.47)
White Collar	0.23 (0.42)
Black	0.04 (0.19)
Income	5.46 (1.74)
Education	5.16 (1.83)

little to do with the level of citizen overall e-government satisfaction. Of the two transparency variables, only higher levels of information reliability are significantly positively associated with higher e-government satisfaction. Finally, three of the four interactivity variables—demand for greater electronic communication with government, concern about reduced efficacy of problem response, and concern about the greater impersonality of government—are significantly negatively associated with satisfaction. These findings provide some support for our first hypothesis, that citizens are generally satisfied with government efforts to provide information and services but dissatisfied with interactivity efforts (H1).

Table 3
Analysis Results—Overall E-Government Perception

	Government Web Site Use	E-Government Satisfaction	Trust in Government
Trust in Government		0.16 (0.03)****	
Government Web Site Use		0.55 (0.15)****	
Overall E-Government			
Satisfaction			0.73 (0.32)**
Internet Use	0.24 (0.05)****		
Satisfaction with Government			
Involvement	−0.09 (0.05)*		0.32 (0.13)***
Security			0.34 (0.12)***
Efficiency			0.66 (0.12)****
Information Provision	0.11 (0.05)**		0.41 (0.15)****
Transaction Satisfaction			
E-Service Investment		−0.03 (0.05)	
E-Service Preference		−0.03 (0.05)	
E-Service Demand		0.02 (0.10)	
Identity Loss		−0.01 (0.02)	
Personal Disclosure		−0.01 (0.02)	
Reduced Service		−0.01 (0.01)	
Privacy Reduction		0.02 (0.02)	
Transparency Satisfaction			
Transparency Expansion		−0.04 (0.11)	
Information Reliability		0.11 (0.06)*	
Interactivity Satisfaction			
Citizen E-Communication 1		−0.06 (0.10)	
Citizen E-Communication 2		−0.21 (0.12)*	
Problem Response		−0.03 (0.02)*	
Impersonal Government		−0.03 (0.01)**	
Demographic Variables			
Age	0.03 (0.01)**		−0.02 (0.04)
Male	−0.15 (0.08)**		
Rural	−0.15 (0.10)		
Professional	0.33 (0.09)****		
White Collar	0.17 (0.10)*		
Black	0.24 (0.21)		−0.39 (0.53)
Income	0.03 (0.02)		
Education			−0.09 (0.06)
Intercept	0.40 (0.27)	1.11 (0.52)**	1.58 (0.74)**
Adjusted R-Squared	0.10	0.14	0.28
N	509	509	509
Model Significance	****	****	****

****$p < .001$; ***$p < .01$; **$p < .05$; *$p < .10$.

Table 4
Analysis Results—Government Web Site Perception

	Government Web Site Use	Web Site Satisfaction	Trust in Government
Trust in Government		0.14 (0.03)****	
Government Web Site Use		0.21 (0.12)*	
Government Web Site Satisfaction			1.45 (0.48)***
Internet Use	0.24 (0.05)****		
Satisfaction with Government			
Involvement	−0.09 (0.05)*		0.20 (0.14)
Security			0.36 (0.12)***
Efficiency			0.53 (0.13)****
Information Provision	0.11 (0.05)**		0.45 (0.14)***
Transaction Satisfaction			
E-Service Investment		−0.07 (0.04)**	
E-Service Use		0.01 (0.04)	
E-Service Expansion		−0.21 (0.08)***	
Identity Loss		−0.02 (0.02)	
Personal Disclosure		0.01 (0.01)	
Reduced Service		0.01 (0.01)	
Privacy Reduction		−0.01 (0.01)	
Transparency Satisfaction			
Transparency Improvement		−0.05 (0.09)	
Information Reliability		−0.02 (0.05)	
Interactivity Satisfaction			
Citizen E-Communication 1		−0.16 (0.08)**	
Citizen E-Communication 2		−0.28 (0.09)***	
Problem Response		−0.01 (0.01)	
Impersonal Government		0.01 (0.01)	
Demographic Variables			
Age	0.03 (0.01)**		−0.07 (0.04)*
Male	−0.15 (0.08)**		
Rural	−0.15 (0.10)		
Professional	0.33 (0.09)****		
White Collar	0.17 (0.10)*		
Black	0.24 (0.21)		−0.56 (0.54)
Income	0.03 (0.02)		
Education			−0.06 (0.06)
Intercept	0.40 (0.27)	1.84 (0.40)****	−0.22 (1.12)
Adjusted R-Squared	0.10	0.11	0.28
N	509	509	509
Model Significance	****	****	****

****$p < .001$; ***$p < .01$; **$p < .05$; *$p < .10$.

Findings for citizen Web site satisfaction in table 4 show an interesting contrast to the table 3 findings. Similar to the previous findings, trust in government and Web site use are positively associated with Web site satisfaction, although the significance of the Web site use variable is much lower. Moreover, two of the e-service variables are negatively

associated with Web site satisfaction: those individuals who demand service expansion and a greater prioritization of e-services are less satisfied with government Web sites. Clearly, therefore, when the dependent variable changes from a broad e-government question to one about Web sites, service provision becomes important, and many find current services inadequate. Although neither of the transparency variables is significant, we find that two of the interactivity variables are. Citizens calling for greater online one-way communication with officials about information needs and greater online two-way communication of citizen opinions are less satisfied with Web sites. Hence, while the satisfaction findings in table 2 and 3 show some limited evidence for our initial hypothesis (H1), they also show that citizens separate their overall impressions from specific experiences. Moreover, and most important for this article, we find that citizens recognize a lack of interactivity on Web sites and in e-government in general and their perceptions correlate negatively with satisfaction.

The final column essentially provides strong confirmation of our second hypothesis, that high levels of e-government (and Web site) satisfaction will be positively related to trust in government. Both table 3 and 4 show a significant association between their respective satisfaction variable and trust in government. Both tables also show that trust depends heavily on general government satisfaction variables—involvement, security, efficiency, and information provision, although involvement is not significant in the second model. Individuals who are more satisfied with government's ability to involve the public in decision making, provide protection from terrorism, use resources efficiently, and keep the public informed report higher levels of trust and confidence. Because this is a simultaneous equation model, we can also discern indirect effects that operate in the model. For example, negative coefficients on the interactivity and service variables not only represent important direct effects on the satisfaction variables; they also show important indirect effects on the trust variable through the e-satisfaction variables in the trust equation. This may indicate that neglect of citizen desires for electronic interactivity, transparency, and transactions has important and already embedded effects on citizen perceptions of trust in government.

To summarize, it appears that citizens are generally satisfied with the implementation of e-government—Web site use is positively related to e-government and Web site satisfaction. Also, e-government satisfaction and Web site satisfaction are positively related to trust in government, indicating that e-government is becoming increasingly embedded into citizen conceptions of government more broadly (at least for government Web site users). However, there are a few hitches in this otherwise rosy scenario. Individuals with government Web site experience find that government is not fulfilling their expectations about interactivity and in some cases service provision. Results indicate not only that there are direct negative effects on e-government and Web site satisfaction but that there may also be indirect negative effects on citizen trust in government.

CONCLUSIONS

This article sought to explore the relationship among citizen use of government Web sites, their satisfaction with those Web sites, and their trust in government. Demographic findings tend to show that age, gender, and employment characteristics and the extent of overall Internet use are associated with Web site use. Interestingly, however, satisfaction

with information provision and dissatisfaction with citizens' own involvement in government also drive Web site use. This finding may indicate that those individuals who are particularly dissatisfied with their ability to interact overall log on to be able to fill a demand. Nevertheless, the e-government and Web site satisfaction equations show that while government Web site satisfaction is positively associated, individuals with more concern about the responsiveness of government are less satisfied. Together these findings may show that individuals with a greater desire to interact with government go to Web sites; however, once they use them, they are disappointed. Because the data for this study are cross-sectional, we are not able to fully test whether this association is actually causal.[5]

Because information reliability is an appropriate measure of the transparency construct, we can conclude that government, according to citizens, is doing a good job in the transparency area in the United States. Transaction satisfaction is neither a positive nor a negative contributor to e-government satisfaction, although some measures of transaction satisfaction are significantly negatively associated with Web site satisfaction. Possibly, people are pleased with e-government transactions generally but may have specific needs that are not yet met online.

Finally, results show that those individuals who are more satisfied with e-government and government Web sites also trust the government more and those individuals who trust government more are also more likely to be satisfied with e-government. Although we cannot speak directly to the causality of this relationship, the finding of association is important and indicates the fundamental embeddedness of electronic government in social institutions and norms, even at this early stage in the development of Web technologies. Moreover, the simultaneous equation method also allows interpretation of indirect effects: better deployment and integration of applications that engage citizens have indirect positive payoffs for trust in government.

It is possible to conclude that nothing has changed from the perspective of citizen demands. Citizens expect that e-government, just like regular old government before it, must attend to issues of transaction, transparency, and interactivity in order to engender trust. Our findings seem to support the contention that citizens recognize that government is doing a relatively good job with transaction and transparency but has not sufficiently addressed interactivity expectations. The primary strategy of most agencies, at this early stage in the Internet revolution, appears to be one-way dissemination of information and provision of routine services. Development of a two-way interactive strategy may either be of a lower priority or represent a much more complex task.

It is possible to speculate on why government prefers a one-way Internet strategy even though it knows that such a policy is unsustainable. First, the technology may not be well developed or is early in its dissemination process. Second, many-to-many interaction for productive policy and management input would require a great deal of planning from the government's perspective; work processes need to be redesigned to better exploit online interaction. Therefore, the organization must change, and such change requires time. Third, it may be that managers are correct: citizens want ease of service and information first and interaction second. If it is just too early, we may begin to see a much more sophisticated effort by government to interact with citizens in the next five years. Finally, managers and

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5   To fully test many of the hypotheses and relationships presented in this article, the collection of time-series cross-sectional data would be necessary.

bureaucrats find Internet technology a convenient way to manage their workload. Keeping citizens at arm's length may improve their own efficiency and enhance the predictability of government work. Staying away from two-way interaction means faster service times, perhaps. That may be good for the efficiency-minded customer but bad for the democracy-minded citizen.

APPENDIX

Variables Used in Analysis

Trust in Government (Combination of Four Variables; Chronbach's alpha = 0.75)

    a. How much confidence do you have in (fill in i, ii)—a great deal (4), quite a lot, some, very little (1)?

        i. Federal government

        ii. State government

    b. How much of the time do you think you can trust the government in Washington to do what is right—just about always (4), most of the time, some of the time, never (1)?

Government Web Site Use (by Citizens)

How often would you say you visit a government Web site—very regularly (4), fairly regularly, occasionally, or rarely (1)?

Overall E-Government Satisfaction

Overall, would you say that e-government is having a very positive (5), somewhat positive, neutral, somewhat negative, very negative (1) effect on the way that government operates?

Government Web Site Satisfaction

In general, how would you rate the quality of the government Web sites that you have visited—excellent (4), good, fair, poor (1)?

Internet Use

How often do you use the Internet—very often (4), somewhat often, only occasionally, not very often (1)?

Satisfaction with Government (Four Separate Variables)

Would you say that you are frustrated or satisfied with government's ability to (fill in a, b, c, and d)—very frustrated (1), somewhat frustrated, somewhat satisfied, very satisfied (4)?

    a. Involve the public in decisions regarding national policy (Involvement)

    b. Protect the public from terrorist attacks (Security)

    c. Use resources efficiently (Efficiency)

    d. Keep the public informed about national policy (Information Provision)

Transaction Satisfaction

E-Service Use

Given that government will invest your tax dollars, how important is it to you that government invest in e-government that provides individual citizens with government information and services that are easier to use?

E-Service Investment

In your view, how high a priority should it be for government to invest tax dollars in making information and services available over the Internet—very high priority (1), high priority, medium priority, low priority, very low priority (5)?

E-Service Expansion

Respondents were asked to indicate a top priority for government Web sites among four given choices. Those individuals who chose "Expand Web sites to include more information and services" were coded 1; all others, 0.

Identity Loss, Personal Disclosure, Reduced Service, Privacy Reduction

How big a concern is each of the following negative outcomes to e-government to you on a scale from 1 to 10, in which 10 means that you are extremely concerned and 1 means that you are not concerned at all?

  a. Someone stealing your identity by obtaining personal information stored by the government (Identity Loss)

  b. Government making personal information available by accident (Personal Information Disclosure)

  c. People without Internet access would get less government service (Access to Service)

  d. Less personal privacy (Privacy Reduction)

Transparency Satisfaction

Transparency Improvement

Which of the following do you think would be the most important way that e-government could improve government accountability (1 = positive, 0 = negative)?

Give the public more information about the government's policies and decisions.

Information Reliability

In your opinion, how reliable is most of the information provided by government Web sites—very reliable (5), somewhat reliable, neutral, not very reliable, not reliable at all (1)?

Interactivity Satisfaction

Citizen E-Communication 1 and 2

Which of the following do you think would be the most important way that e-government could improve government accountability (1 = positive, 0 = negative)?

  a. Allow citizens to communicate their opinions on major issues to officials quickly and easily

    b. Allow citizens to tell government agencies about the information they need or problems they experience

Problem Response and Impersonal Government

How big a concern is each of the following negative outcomes to e-government to you on a scale from 1 to 10, in which 10 means that you are extremely concerned and 1 means that you are not concerned at all?

    a. It will make it harder to get an answer to a problem (Problem Response)

    b. Government being more impersonal (Impersonal Government)

Demographic Variables

Age: How old are you? Responses in designated five-year categories starting with 18–24 (1) and ending with 70–74 (11) and over 75 (12).

Male: Gender was coded 1 if male and 0 if female.

Rural: What is the best way to describe the area in which you live? A discrete variable representing a positive response to the "rural" category (1 = rural, 0 = nonrural).

Professional: What type of work do you do? A discrete variable representing a positive response to the "professional/manager" category (1 = professional, 0 = nonprofessional).

White Collar: What type of work do you do? A discrete variable representing a positive response to the "white-collar worker" category (1 = white collar, 0 = non–white collar).

Black: What is your race? A discrete variable representing a positive response to the "black" category (1 = black, 0 = nonblack).

Income: What is the yearly income of all members of the family living at home in the previous year? Responses in designated categories: less than $10,000 (1), $10,000–$20,000, $20,000–$30,000, $30,000–$40,000, $40,000–$50,000, $50,000–$75,000, $75,000–$100,000, over $100,000 (8).

Education: What is the last grade that you completed in school? Grade school (1) to doctoral/law degree (9).

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