



Citizen interaction with e-government: From the streets to servers?

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Abstract

This article examines citizen interaction with e-government. Much of the existing work on the development of e-government has explored it from a supply-side perspective, such as evidence presented from surveys of what governments offer online. The demand side explanation, which is relatively unexplored, examines citizen interaction with e-government and is the focus of this article. E-government presently has evolved into two identifiable stages. The first stage is the information dissemination phase in which governments catalogue information for public use. The second phase is transaction-based e-government in which there is e-service delivery such as paying taxes online. This article argues that the information and transaction phases are closely intertwined with the street-level bureaucracy literature. Various attributes of citizen interaction with electronic government will be tested in this article. One notable finding was that the Internet improved the ability for e-citizens to interact with government, acknowledging some initial movement from street-level to system-level bureaucracies.

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1. Introduction

The Internet is one communication tool that has the potential to radically change the face of government in the 21st century. There has been some movement from what has been

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commonly labeled street-level bureaucracies to system-level bureaucracies because of information and communication technology (ICT). Street-level bureaucracies are public servants who have direct contact with citizens and system-level bureaucracies are the information systems that have replaced street-level bureaucracies through automation of their decision-making processes. This article explores the advent of system-level bureaucracies through evidence presented in a survey conducted by the Pew Internet and American Life Project.¹ Survey respondents indicated that they do more information gathering than transactions with e-government (or government open for business 24 hours a day, 7 days a week as a result of the Internet).

This study is different from most of the existing literature on e-government because it takes a demand side perspective: examining citizen interaction with e-government. Most of the existing literature uses a supply side perspective analyzing surveys of e-government offerings.² This study uses the street-level bureaucracy literature as a theoretical framework to identify how citizens interact with e-government. This article identifies the key characteristics of e-citizens (or citizens that access government Web sites) so that policy makers can market their e-government initiatives towards these groups. Most importantly, this study found evidence that e-government has improved citizens' interaction with government.

In order to examine citizen interaction with e-government, this article is divided into several sections. The first section briefly discusses the literature on street-level bureaucracies and system-level bureaucracies. It also outlines the existing survey literature on e-government adoption to identify the current stage of its development. Second, a framework is developed that incorporates the literature on street and system-level bureaucracies and stages of e-government growth. Third, an overview of survey results is provided, which describes some of the more notable observations from this data set. Fourth, theoretical expectations for the models to be tested are outlined. Fifth, three models of e-citizen interaction are tested and the major findings are outlined. The last two sections provides recommendations and conclusions.

2. Theories

There are two theoretical streams of literature that can be used to first understand the interaction between citizens and government and second to explain the stages of e-government adoption. Towards the end of this section, I provide an overriding framework that shows a connection between these two literatures.

2.1. *From street-level bureaucrats to system-level bureaucrats*

The Internet potentially allows for the replacement of what has traditionally been labeled street-level bureaucracies with system-level bureaucracies. Theoretically, with a simple personal computer and Internet connection, citizens can contact government anytime and anywhere, without going through a street-level bureaucrat. The discussion that follows

illustrates potentially how things could become if there was a movement from street to system-level bureaucracies because of e-government.

ICT potentially takes away discretion by using predetermined decision making rules. There is also a tendency to downgrade the work of these street-level bureaucrats with the hollowing-out of their discretion.³ The consequences of the changing circumstances of these street-level bureaucrats for the citizens are that the cases are processed more quickly. The equity in these case handlings is better secured. The strict monitoring of the performance of the street-level bureaucrats and of the organization to which they belong is also enhanced.⁴ Scholars have even argued that “today, a more true-to-life vision of the term ‘bureaucracy’ would be a room filled with softly humming servers, dotted here and there with a system manager behind a screen.⁵” The Internet has replaced many street-level bureaucracies. Presently, the discretion in the implementation of some public policy comes into play in the design of the software programs that automates the decision-making process. Therefore, any remaining discretion has shifted to the back room of information system departments.

Often system-level bureaucracy members of the organization are no longer involved in handling individual cases.⁶ They focus their attention toward system development and maintenance, toward optimizing information processes, and toward creating links between systems in various organizations. Sometimes street-level bureaucracies’ contacts with citizens no longer take place in meeting rooms, or from behind windows, but through cameras, modems, and Web sites. Expert systems can replace many professional workers.

Potentially, the process of issuing many public decisions can be carried out virtually from beginning to end by information systems. Only when a citizen emits some kind of signal, or the information system cannot handle nonroutine decision premises, will a specialized street-level bureaucrat enter into the picture.

The system-level bureaucrats have the discretionary power to convert legal frameworks into concrete algorithms, decision trees, and modules. Required transparency is relevant with ICT since the algorithms and computer processes should be known to policy makers. In the end, the street-level bureaucrat is deprived of the possibility of manipulating information.⁷ Snellen⁸ argues that when all decisions are automated, the traditional street-level bureaucrat could entirely be taken out of the process.

The literature on the movement from street to system-level bureaucracies over-emphasizes its claims that street-level bureaucrats will be entirely replaced. This is especially evident since the Internet has not broken down the traditional silos of information dissemination. However, with the increased rationalization of resources from fiscal stress, many governments will turn to automating systems through the Internet.⁹ Of course, much of this is dependent upon solving current issues of privacy and security of information transmitted over the Internet.

The movement from the street-level to system-level bureaucracies can be related to the level of development of e-government. The following section will show the current progression of e-government adoption.

2.2. *Information, transaction, and e-citizens*

Layne and Lee¹⁰ were one of the first to outline stages of e-government development, two of them are applicable to this study. The first stage is the cataloguing of information on a Web site and the second phase is transactions being completed online. The first stage of growth involves the initial efforts of governments to establish an online presence, presenting information about their activities on the Internet. At this stage, the information is nontransactional in nature because there is not a two-way interaction between government and the citizen. An Internet presence reduces the workload of street-level bureaucrats because it is a functional equivalent to being open 24 hours a day, 7 days a week.

The second stage of e-government adoption is the transaction phase. By putting databases online, government allows citizens to transact with the system-level bureaucracy through paying taxes, fines, or fees. This is different from the information stage in that there is two-way interaction between the citizens and government. This stage will empower citizens to deal with government online anytime, saving hours of paperwork, the inconvenience of traveling to a government office, and time spent waiting in line. In this article, I incorporate two of Layne and Lee's¹¹ stages of e-government adoption and apply it to citizen interaction with government. There is a limited amount of survey evidence, mostly at the local level, demonstrating that governments are indeed within these two stages of e-government adoption.¹²

3. Existing empirical evidence of e-government adoption

There are several survey analyses that demonstrate the evolution of e-government adoption. The two streams of e-government adoption are the supply side, which examines e-government offerings, and the demand side, which examines citizen interaction with e-government. Since there are many more supply side studies of e-government adoption, they will be mentioned first.

3.1. *The supply side perspective*

One important supply side analysis of municipal e-governments in the United States was done by Moon.¹³ This author concludes that major advances into the transaction phase of e-government adoption were not evident in the survey results. Edmiston¹⁴ extends the analysis of Moon by examining both city and county e-government. One of the most pressing issues that Edmiston discusses is the digital divide. Although e-government has expanded access, there are certain racial groups that are still left out. Similar to Moon's findings, Edmiston also found limited evidence of e-government adoption; local governments had barely surpassed the information dissemination stage. Edmiston's results found that e-government in cities was primarily informational, although there is some initial movement into online transactions. Holden et al.'s¹⁵ work was an extension of the descriptive studies of local e-government done by Moon and Edmiston, but the former

authors focused on statistically testing factors of e-government adoption. Ho¹⁶ in his empirical reinventing government study combines content and survey methodologies to American cities. Ho found some evidence that e-government was past the initial stage of information dissemination; some cities were very advanced with evidence of horizontal and vertical integration. However, his results were based more on a survey of larger cities, which have more resources to devote towards e-government.

3.2. The demand side perspective

Compared with the supply side perspective, the demand side perspective has been relatively unexplored. One demand side perspective is Thomas and Streib's¹⁷ study of citizen interaction with e-government. The results of their research reveal that citizens access governmental Web sites more often to obtain information than to transact. In addition, more experienced users were more likely to visit government Web sites for information and to complete transactions. Unlike the survey that Thomas and Streib conducted of Georgia citizens, the data used for this study are collected from a national survey.

The results of the existing supply and demand side surveys of e-government indicate limited development past the initial stages of cataloging information on the Web.¹⁸ In addition, most of the existing survey work focuses on supply side e-government. In this study, I focus on a demand side two-stage model of e-government adoption and test an e-government index against a series of predictor variables. This has not been previously done in the literature. This study is especially interested in the extent of development of e-government relationships in the information and transaction phases and I develop and test models for these stages. This study is trying to determine the key factors that influence citizen interaction with electronic government. The street-level bureaucracy literature provides clues on the type of citizen interaction. The framework that is used to understand the relationship between these literatures is presented in the following section.

4. A framework of bureaucratic discretion and interaction with citizens

A framework of the level of bureaucratic discretion and interaction with citizens is presented in [Table 1](#). In this table in Quadrant I, we notice that street-level bureaucracies wield a high amount of discretion in implementation of public policies and a low amount of interaction with citizens. In this case, Lipsky¹⁹ argues that street-level bureaucrats have discretion in implementation of public policies. In Quadrant II, there is a high amount of discretion of the street-level bureaucrat and high level of interaction with citizens ([Table 1](#)). This is the most common conception of street-level bureaucrats found in the literature.²⁰ Quadrants I and II can be found in bureaucracies that do not rely on the Internet for information and e-service delivery.

We can compare street-level bureaucracies to system-level bureaucracies or Quadrant III in [Table 1](#). In this case, we have low discretion and a low level of interaction. Quadrant IV has low bureaucratic discretion and a high level of interaction ([Table 1](#)). This is where e-

Table 1
Level of bureaucratic discretion and interaction with citizens

		Level of discretion	
		High	Low
		Street-level bureaucracies	System-level bureaucracies
Level of interaction	Low	I (High, low) Example: City Visitor's Bureau Office	III (Low, low) Example: City Visitor's Bureau Web site
	High	II (High, high) Example: Vehicle Registration Office	IV (Low, high) Example: Vehicle Registration Web site

Note. Discretion, interaction.

government comes into fruition, entirely replacing the street-level bureaucracy and creating a system-level bureaucracy.

I am not saying that system-level bureaucrats do not wield discretion; they do because they design the software programs that implement public policies. However, their discretion may be curtailed compared to the power of the traditional street-level bureaucrat.

The most appealing phase in terms of the government's perspective would be Quadrant IV because of the reduction in bureaucratic discretion. In addition, it is also desirable to have a high level of interaction since this will reduce transaction costs for government. However, from the clients' perspective, the story is different since they desire discretion in determining the merits of their individual cases and want a high level of interaction with government.

This framework implies that having more transactions completed online is one indication of a shift from street to system-level bureaucracy. The public sector must maintain equity, which often translates into parallel processes, since not all citizens have access to the Internet. Ideally, one factor that should shed light on the movement from street to system bureaucracies is the overall level of satisfaction that citizens have with e-government offerings. If citizens feel that they can successfully interact with government online, then this could potentially eliminate much of the need for street-level processing.

5. Survey methods

The data set used in this study was taken from the Pew Internet and American Life Project survey of American adult users of government Web sites.²¹ This telephone survey asked questions about a citizen's use of the Internet. For the survey data, telephone interviews were conducted by Princeton Survey Research Associates between September 5 and 27 (no calls were made on September 11), among a sample of 815 Internet users, 18 years and older, who

had ever gone online to look for information from local, state, or federal government Web sites.

Interviews for this survey were completed from a prescreened sample of Internet users who in past surveys identified themselves as government Web site users. Once the household was reached, interviewers asked to speak with the individual who had recently completed a telephone survey. Once the targeted person was on the phone, he or she was asked a few screening questions to make sure that the person had ever gone online to look for government information. At least 10 attempts were made to complete an interview at every household in the sample. The calls were staggered over times of day and days of the week to maximize the chances of making contact with a potential respondent. Interview refusals were recontacted at least once in order to try again to complete an interview. The final response rate for this survey was 51%. The total number of responses for this survey was 815.

Because of the low response rate, the interpretation of the results should be viewed with caution. Some of the demographic statistics reveal that 49.6% of respondents were male, 50% were in the age range of 30–49, the northeastern United States was modestly underrepresented, and the south was slightly overrepresented, 47.8% of respondents had at least a college education, and 83.9% of the respondents were White. Black and Hispanic Internet users were underrepresented, fewer than 5% of the sample. Therefore, the results should be viewed with caution.

6. Hypotheses

There are three hypotheses that can be used to explain citizen interaction with e-government, each of them will be summarized and then explained in detail. They can be grouped into three categories: social–demographic, e-democracy, and citizen interaction, specifically they are as follows:

1. *Social–demographic*—White, male, college educated, government workers, with income greater than US \$75,000, and experienced Internet users will have a positive impact on citizen adoption of e-government. While those in the age range of 55–64 will decrease e-government adoption.²²
2. *E-democracy*—Republicans that trust government and want to change government will have a positive impact on e-government adoption by citizens.²³
3. *Citizen interaction*—Citizens who are able to get information they want over the Internet, had a positive outcome from using the Internet, often use government Web sites, feel that interaction has been improved as a result of e-government will have a positive impact on Internet adoption. This implies a greater reliance on system-level bureaucracies.²⁴

6.1. *Social-demographic*

In terms of the social–demographic factors, one variable is the citizen's race. There is evidence in the digital divide literature that White Internet users are more likely to engage in e-

government.²⁵ Another explanation is the e-citizen's gender. Are males more digitally enabled in e-government than females? Is a college graduate more likely to engage in e-government because of his or her education attainment? A person's level of education strongly predicts the probability that he or she will use the Internet for financial, political, or government information.²⁶ If the respondent is a government worker, is he or she more likely to use government Web sites? These workers will be more familiar with this type of organization, which may lead to greater Internet use of government Web sites. Another variable is if the citizen is between the ages of 55 and 64, which indicates the digital divide. If they are in this age range, they may not want to get involved in e-government since they are approaching retirement and soon out of reach of the corporate work environment.²⁷ The age variable is anticipated to have a negative coefficient and all the other social–demographic variables should have positive impacts. Howard et al.²⁸ argue that citizens who are more experienced with the Internet are likely to use more e-government services. These authors argue that veteran users of the Internet who have at least 3 years of experience online are more likely than newcomers to have done more Internet activities. Veteran users are more likely than newcomers to have performed transactions online. If citizens use government Web sites frequently, they are more likely to use e-government information and services.

6.2. *E-democracy*

The e-democracy variables examine trust of government, political party affiliation, and e-citizens desire to change government policy. If the individual trusts the different levels of government, is he or she more likely to engage in e-government? If someone is a Republican is he or she more likely to use e-government? Evidence has shown that Republicans are more likely to be interested in e-government than Democrats.²⁹ Changes in communication technology such as the Internet may play a role in influencing electoral behavior, and Tolbert and McNeal found evidence for this occurrence. Shah et al.³⁰ found that Internet use for information exchange was positively related to individual differences in interpersonal trust, civic engagement, and contentment. Individuals who use the Internet for information exchange reported higher levels of interpersonal trust and civic engagement. Weber and Bergman³¹ found evidence that those individuals who engaged in Internet activities were more likely to engage in a variety of political activities. I anticipate all of these political variables to have positive impacts on citizen interaction with e-government. Are citizens who are more civically engaged more likely to use government Web sites to change policy?³²

6.3. *Citizen interaction*

The citizen interaction factors examine whether or not citizens are able to get the information or services that they were seeking. These variables measure the success of citizen interaction with e-government. Are citizens having a positive experience when they use e-government? Do citizens who frequently use government Web sites engage more in transactional e-government? I anticipate that all these citizen interaction independent variables will have positive coefficients.

One of the most important variables in this study is labeled interaction improved. It measures whether citizen interaction with government has improved because of the Internet. A positive response for this variable indicates some initial movement away from street to system-level bureaucracies, since citizens may eventually not find it necessary to deal with street-level bureaucrats.

The following section describes some of the characteristics of citizen interaction with e-government.

7. Some characteristics of e-citizens

Some of the characteristics of e-citizens are presented in Figs. 1–4. Around 23% of respondents use the Internet to look for information on local, state, or federal government Web sites several times a month. In addition, 22% do so every 2 months (Fig. 1). These results reveal that citizens look for information occasionally on government Web sites. They are not frequent consumers of government information indicating that the automated bureaucracy is a long way off.

One can measure performance of e-government if citizens are able to get information that they are seeking. When citizens go online, most of the time they (44% of respondents) are able to get information or services they are seeking (Fig. 2). Around 14% said they were always able to get information. Citizens are achieving results in their interaction with e-government. Less than 5% of e-citizens were hardly ever able to get information or services they were seeking.

Another benchmark of e-government performance is shown in Fig. 3. It reveals the outcomes of those who visited government Web sites. This figure shows that 60% of respondents were able to do what they wanted on the government Web site they visited. Only 6% said that they could not do what they wanted; While 7% simply ran out of time. It appears that citizens are accomplishing their tasks when going online to government Web

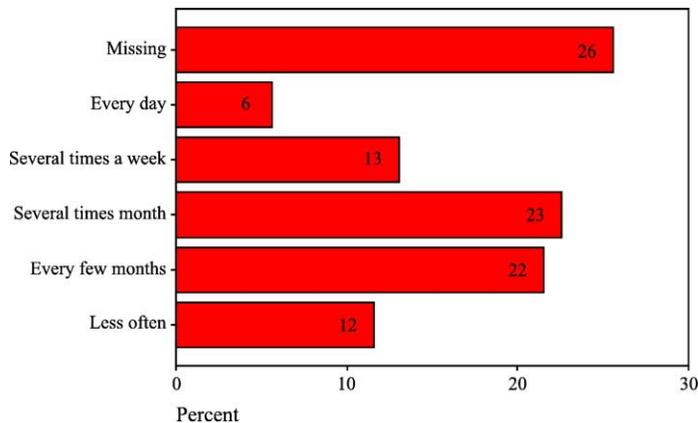


Fig. 1. How often do you use the Internet to look for information from a local, state, or federal government Web site?

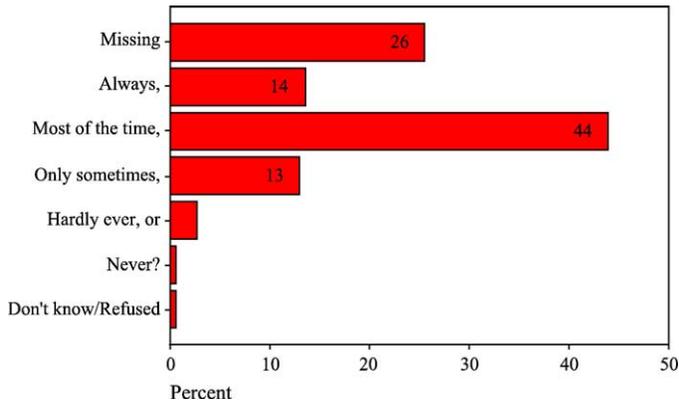


Fig. 2. When you go online to government Web sites, how often are you able to get information or services you are seeking?

sites. However, if 6% are still not able to get the information they want, this goes against the movement from street to system-level bureaucracies.

An e-democracy measure is whether individuals are able to change government policy. Only 14% were able to use the Internet or e-mail as part of a group trying to change government policy (Fig. 4). Since 61% said that they were not able to affect government policy from the Internet or e-mail, the Internet has provided only a marginal outlet for some citizens in their attempt to change government policy.

8. Information, transaction, and e-citizen survey data

Some of the most interesting results of the survey in terms of citizen interaction and phases of e-government adoption can be found in Table 2. Most of the exchanges between government and citizens are found in information dissemination stage as shown in Table 2. For instance, getting tourism and recreational information was the most common response for

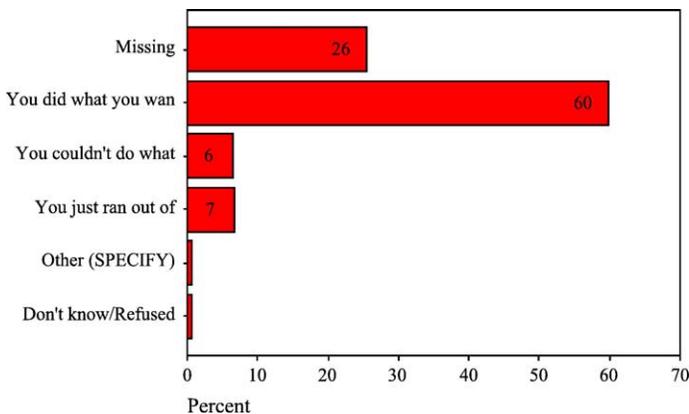


Fig. 3. Which of the following best describes the outcome of your last online use of a government Web site...

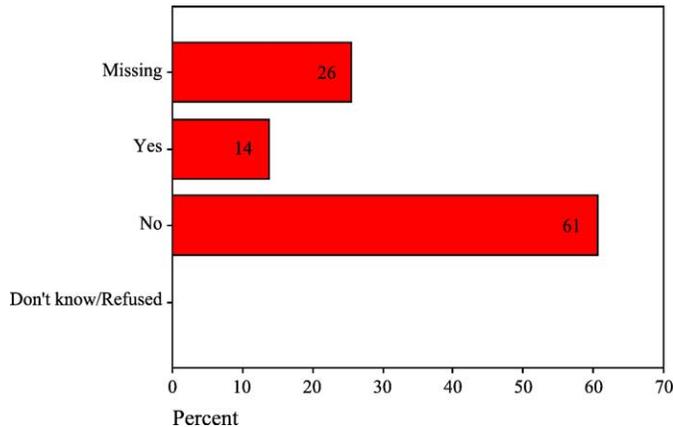


Fig. 4. Have you ever used the Internet or email as part of a group trying to change a government policy?

individuals going to a government Web site (77.3%). The second most frequent request for information by e-citizens was using a government Web site to do research for work or school (69.8%). Other common e-citizen areas were seeking information about a public policy or issue of interest to the citizen, downloading government forms, and discerning services a government agency offers. The results indicate that citizens are able to get a fair amount of online information about government. However, completing transactions with government is not that common.

The impact of transaction-based e-citizens are also reported in Table 2. The most common transaction was filing taxes online at only 15.7%, followed closely by renewing a driver's license or auto registration at 11.5%. Paying a fine was only done by 1.7% of e-citizens. The results show that information-based e-government is much more common than transaction-based e-government. This is consistent with other studies on the supply side of e-government offerings, indicating that e-government presently is mostly cataloging information for citizens. As citizens grow accustomed to receiving many of their services online such as banking, shopping, and so forth, there will be more pressure for governments to put their services online.

9. Potential demand for e-government

A survey by Hart-Teeter for the Council for Excellence in Government³³ reported that Americans now are using e-government for information but express strong interest in using e-government to conduct transactions. Nearly two thirds of e-government users report using government Web sites generally to find information such as office addresses or a list of services provided by an agency, whereas a quarter log on to conduct transactions such as filing taxes or renewing their driver's license.

However, when respondents were asked whether they were interested in using transactional services that they are not already using, their interest was extremely high. For example, two thirds of Internet users believe that they would be very or somewhat interested in changing their address online with one government agency and having that

Table 2

Information and transaction-based e-citizens; Question: Have you ever gone to a government Web site to . . .

	Frequency	Percentage
<i>Information-based e-citizens</i>		
Get tourism and recreational information?	630	77.3
Do research for work or school?	569	69.8
Download government forms?	513	62.9
Find out what services a government agency provides?	512	62.8
Seek information about a public policy or issue of interest to you?	504	61.8
Get advice or information about a health or safety issue?	396	48.6
Get information about potential business opportunities relevant to you or your place of employment?	276	33.9
Send comments about an issue to a government official?	273	33.5
Get information or apply for a government job?	192	23.6
Get information about elections, such as where to vote?	179	22.0
Get information that helped you decide how to vote in an election?	173	21.2
Get information about a lottery?	167	20.5
Get information about or apply for government benefits?	164	20.1
<i>Transactions-based e-citizens</i>		
File your taxes?	128	15.7
Renew a driver's license or auto registration?	94	11.5
Renew a professional license?	55	6.7
Get a fishing, hunting, or other recreational license?	33	4.0
Pay a fine?	14	1.7

Note. Total number of responses for each category was 815.

change automatically disseminated to other government agencies that they specify. Other potential demands for e-government are 64% would like to respond to jury summons online, renew driver's license online was 61%, and birth certificate or marriage certificate online was 60%. The transition from informational e-government to transactional e-

government is significant because it requires an information exchange between citizens and government.

The most interesting result of the Council for Excellence survey in terms of citizen interaction with government is that half of e-government users report that they are very or fairly satisfied with their interactions online, while 37% say that they are very or fairly satisfied with their interaction through the mail, 36% in person, and 26% over the telephone. This evidence supports the theory that e-citizens are becoming more comfortable interacting online with government; this could potentially replace street-level bureaucrats. However, the results also show that when you count all adult Internet and non-Internet users, then 25% prefer to interact with government online, 38% want to interact in person, 17% by mail, and 15% by telephone. Therefore, it appears that we are a long way off from replacing street with system-level bureaucracies. Since over a third of the populace still wants to personally interact with the bureaucracy, this undercuts the movement from street to system-level bureaucracy.

10. Dependent variables

In order to determine what factors indicate why citizens engage in e-government, I constructed indexes to measure the degree of citizen interaction with information and transaction e-government. I also composed an e-citizen index, which is the addition of information and transaction e-citizen responses. The three indexes are modeled as the dependent variables to be tested with Ordinary Least Squares (OLS) regression.

For each category located in the questions in [Table 2](#), a “yes” response to a list of information or services received one point. Therefore, the maximum obtainable score for information e-citizen was 13 and the maximum score for transaction-based e-citizens was 5 ([Table 3](#)). The mean score for information e-citizen was 5.58. Therefore, on average over five informational services were used by a citizen out of a possible 13. By contrast, the average score for transaction-based e-government was a modest 0.40, implying that e-citizens used less than one service. The total e-citizen score was 5.98 on an 18-point scale. The results indicate that there is ample room for improvement in terms of citizen interaction with e-government. To make it easier to interpret the data, I converted these points into percentages, which are not reported in [Table 3](#).

The following section reports the results of the tests of three models of citizen interaction with e-government.

Table 3

Descriptive statistics of dependent variables information, transactions, and e-citizens indexes

Dependent variables	<i>N</i>	Minimum	Maximum	Mean
Information index	815	0	13	5.58
Transactions index	815	0	3	0.40
E-citizens index	815	0	14	5.98

Note. For the OLS regression, these indexes were converted into percentages for easier interpretation.

11. Model results

The information, transaction-based, and e-citizens model results are presented in Table 4. The information e-citizen index was used as one dependent variable and the predictor variables examine the social–demographic, e-democracy, and citizen interaction with electronic government. The results in Table 4 reveal that if the e-citizen is a government worker he or she is more likely to engage in searching for information online on government Web sites. A greater number of years of online experience indicated that e-citizens would more actively engage in information e-government.

Citizens between the ages of 55 and 64 were less likely to participate in information searches. This is explained by the digital divide literature.³⁴ This age group is approaching retirement and may not feel as compelled to be as Web savvy as younger generations.

Citizens surveyed were able to get the information for which they were searching when they went online. Many of those who did information searches were socially active and wanted to change government policy and the Internet accomplished this goal. If citizens often consumed online government information, they would engage more in Internet information searches. In addition, if the e-citizen trusts state governments, he or she is more likely to engage in e-government information searches. This information e-citizen model had an R^2 of 0.48 and the F statistic was significant at the 0.01% level.

Transaction-based e-citizens and their social–demographic, e-democracy, and citizen interaction attributes are also presented in Table 4. Some of the findings reveal that citizens who conduct online transactions with government are more likely to be White and have incomes greater than US\$75,000. They are also more likely to trust their state governments. Transaction-based e-citizens are also more inclined to want to change government policy. This grouping has a greater number of years of online experience. The transaction-based e-citizen model had an R^2 of 0.24, much lower than informational e-government. The overall model was significant at the 0.05% level with an F statistic of 2.33.

The results for the e-citizen model, which is the combination of the information and transaction-based e-citizens, is presented in Table 4. A high index score indicates greater e-government-enabled citizens. The characteristics of e-citizens in this model reveal that they are more likely to be government workers, they trust state governments, and they have high incomes. A negative impact was from e-citizens in the age range of 55–64, demonstrating a digital divide. E-citizens are also able to get the information they wanted to change government policy, have a greater number of years of online experience, and are frequent consumers of government Web sites. The R^2 for this model was 0.49 and the F statistic was 12.51, which is significant at the 0.01% level.

When comparing transaction with information models, we notice that transactions e-citizens are more likely to have incomes greater than US\$75,000 and they are more likely to be White. There is a digital divide when it comes to transaction-based e-citizens. Typically, higher income groups will transact more online than lower income groups. The most interesting and highly significant finding was that e-citizens believe that citizen interaction

Table 4
Information, transaction, and e-citizens OLS regressions

Independent variables	Information-based e-citizens			Transaction-based e-citizens			E-citizens		
	Beta	<i>t</i> statistic	Significant	Beta	<i>t</i> statistic	Significant	Beta	<i>t</i> statistic	Significant
Constant	17.69	4.80***	0.00	3.85	0.83	0.41	17.25	4.76***	0.00
Social–demographic									
White	0.00	−0.07	0.95	0.07	1.68*	0.09	0.01	0.40	0.69
Male	0.03	0.83	0.41	0.01	0.32	0.75	0.03	0.87	0.38
College graduate	−0.04	−1.12	0.26	0.00	0.02	0.99	−0.04	−1.06	0.29
Government worker	0.10	2.90***	0.00	−0.03	−0.77	0.44	0.09	2.53**	0.01
Income >75K	0.05	1.26	0.21	0.10	2.55***	0.01	0.07	1.90*	0.06
Age 55–64	−0.12	−3.32***	0.00	−0.05	−1.20	0.23	−0.12	−3.46***	0.00
Amount of online experience	0.13	3.70***	0.00	0.08	2.00**	0.05	0.14	4.04***	0.00
E-democracy									
Republican	0.01	0.19	0.85	0.00	0.00	1.00	0.01	0.18	0.86
Trust Federal government	0.04	1.11	0.27	0.02	0.52	0.61	0.05	1.19	0.23
Trust state government	0.10	2.36**	0.02	0.11	2.45**	0.02	0.12	2.90***	0.00
Trust local government	0.03	0.83	0.41	0.00	0.11	0.92	0.03	0.81	0.42
Want to change government	0.15	4.18***	0.00	0.05	1.37	0.17	0.15	4.32***	0.00
Citizen interaction									
Able to get information wanted	0.08	2.13**	0.03	−0.02	−0.44	0.66	0.07	1.89*	0.06
Got positive outcome	0.02	0.53	0.59	−0.02	−0.57	0.57	0.01	0.35	0.73
Often use government Web sites	0.20	5.63***	0.00	−0.02	−0.39	0.70	0.19	5.21***	0.00
Interaction improved	0.23	6.30***	0.00	0.11	2.65***	0.01	0.24	6.67***	0.00
<i>N</i>	648			648			648		
<i>F</i> statistic	12.07***			2.33**			12.51***		
Adjusted <i>R</i> ²	0.48			0.24			0.49		

* Significant at the 0.10 percent level.

** Significant at the 0.05 percent level.

*** Significant at the 0.01 percent level.

with government has improved because of the Internet. This supports the argument of an initial movement from street to system-level bureaucracies.

12. Recommendations

There are three key recommendations of this research for those devising e-government policies.

12.1. *Portals for e-government services*

The first recommendation is to make the experience for citizens when they go online more personalized and user friendly. One way to do this is through a government Web portal, which is a gateway to government services. This is currently being done by the federal government with *firstgov.gov*. In addition, state and local governments are increasingly doing so since this survey was conducted in 2001. Portals should facilitate more transaction-based e-government in the future.

12.2. *Marketing online government services*

There is also a necessity to market online services that governments offer to citizens. Specifically, governments should be marketing their online transaction-based services more effectively.³⁵ Making citizens aware that they have alternative means of conducting transactions by the Internet should facilitate more demand for transaction-based e-government.

12.3. *Digital divide*

Government should also take into account the digital divide because the results indicate that Whites and the wealthy are more likely to take part in Internet transactions with their governments. Governments should place kiosks in public places in order to provide access to their online services for citizens who do not have Internet access, which is around one third of the U.S. population.

12.4. *Implications*

The traditional focus on e-government research and policy, until the recession of 2001, was on what governments offer citizens. When there was more money for e-government innovations the focus was on supply, but when resources became scarce there is increased emphasis on demand. This is especially evident with the Government of Canada, which according to research by Accenture³⁶ in their benchmarking study of e-government, found Canada for the fourth year in a row as the most e-government-enabled country. The most likely reason for this is Canada's regular surveys of citizens and businesses of attitudes and needs that appear to be the most extensive of the countries Accenture surveyed.³⁷ With the increased

focus of governments on demand issues, this should lead to more research on what citizens want online and provide a greater connection between demand and supply for e-government.

13. Conclusions

This article has investigated demand side explanations of e-government adoption, while most of the existing literature focuses on the supply side. It is vital to understand the demand of citizens for e-government because this provides a barometer of how developed governments are with respect to the Internet. Governments may be supplying online information and services, but demand may not materialize.

This study has also theoretically examined the interaction of citizens with e-government. There has been a marginal shift from street-level bureaucracies to system-level bureaucracies in the provision of some government services. The framework argued that the public sector benefits from e-government by reducing the discretion of street-level bureaucracies and this enhances bureaucratic accountability. Digital government also cuts the transaction costs of not having to staff agencies through the automation of the provision of public services.

The results reveal that informational e-citizens are very prevalent, while transaction-based e-citizens are not common. This is consistent with the existing supply side and demand side literature on e-government adoption. Presently, citizens frequent government Web sites to search for information such as tourism and recreational information. Transactional-based e-government is done less frequently, with only 15% of e-citizens filing their taxes online.

The results of this model can be related to the framework outlined in [Table 1](#). I did find evidence that e-government has improved citizen interaction with government. Indeed, the majority of e-government users prefer to interact with government over the Internet as opposed to in person or the telephone.³⁸ This has potential ramifications for replacing street-level bureaucrats with a system-level bureaucracy. However, the Pew survey results revealed that only 23% of the population use government Web sites several times a month. It seems that the automated bureaucracy is a long way off.

Some of the key attributes of citizens that are more e-government engaged include that they work for the government, are wealthy, and trust government. They are generally able to get information for which they are searching, are more socially active, have a greater number of years of online experience, and use government Web sites several times a month.

13.1. *Limitations and future research*

Some caution should be noted when interpreting the results for transaction-based e-government. First, this survey was directed towards Internet users only and the percentage of those using the Internet for transactions was very small. The results should be viewed as very preliminary.

Another limitation of this research is that the survey was conducted in the summer of 2001 and the Internet has seen many changes. A future study might incorporate the impact of broadband technology on the use of government Web sites. Greater numbers of transactions

can be completed online with high speed Internet access. The impact of mobile technology on citizen interaction with government is another possible area for future research. Issues such as privacy and security have not been addressed in this survey and should be incorporated in future work.

Future research might compare the differences in perceptions of citizens that use government Web sites to private sector Web site users. Are there public perceptions of quality differences between these two sectors? Another area of future research would be to conduct a focus group asking e-citizens if a particular government has supplied what they were demanding, which would allude to connections between supply and demand for e-government.

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