ABSTRACT

PAVLICHEV, ALEXEI. The effects of internal characteristics of municipal government agencies and environmental factors of municipalities on the scope and the quality of municipal e-government initiatives: Developing an integrated approach. (Under the direction of G. David Garson.)

The objective of the research has been to determine which internal characteristics of municipal government agencies and which environmental factors of the municipalities across the U.S. affect the quality and the scope of adoption of municipal electronic government (e-government) initiatives. To accomplish this objective, an integrated approach was developed. The approach combined theoretical methodologies of three frameworks applied to the public sector agencies: innovation theory, information and communication technology, and e-government. It was hypothesized that theoretical premises of these frameworks complement each other in their ability to explain municipal e-government initiatives and their combination would help to address the drawbacks that characterize the present research on municipal e-government. The dependent variable in the present research is municipal e-government score. The dependent variable measures the scope and quality of municipal e-government initiatives. The research concentrates on two sets of predictor variables: internal municipal government agency characteristics and external environmental factors of municipalities. Correlation/regression analyses were performed to explore bivariate and multivariate relationships between the dependent and predictor variables and to accomplish the following goals: (1) describe the relationship between the dependent variable and the two sets of predictors (internal municipal agency characteristics and external environmental factors); (2) determine the effects of individual predictors in explaining the rate and the scope of adoption of e-government initiatives; and (3) compare the two sets of predictors in their

power to explain the rate and the scope of adoption of e-government initiatives. The results of these analyses demonstrated that external environmental factors are significantly better predictors of the quality and the scope of local e-government initiatives, as measured by the e-government score, both individually and as a set.

THE EFFECTS OF INTERNAL CHARACTERISTICS OF MUNICIPAL GOVERNMENT AGENCIES AND ENVIRONMENTAL FACTORS OF MUNICIPALITIES ON THE SCOPE AND THE QUALITY OF MUNICIPAL E-GOVERNMENT INITIATIVES: DEVELOPING AN INTEGRATED APPROACH

by

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BIOGRAPHY

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CHAPTER ONE: INTRODUCTION

STATEMENT OF THE RESEARCH PROBLEM

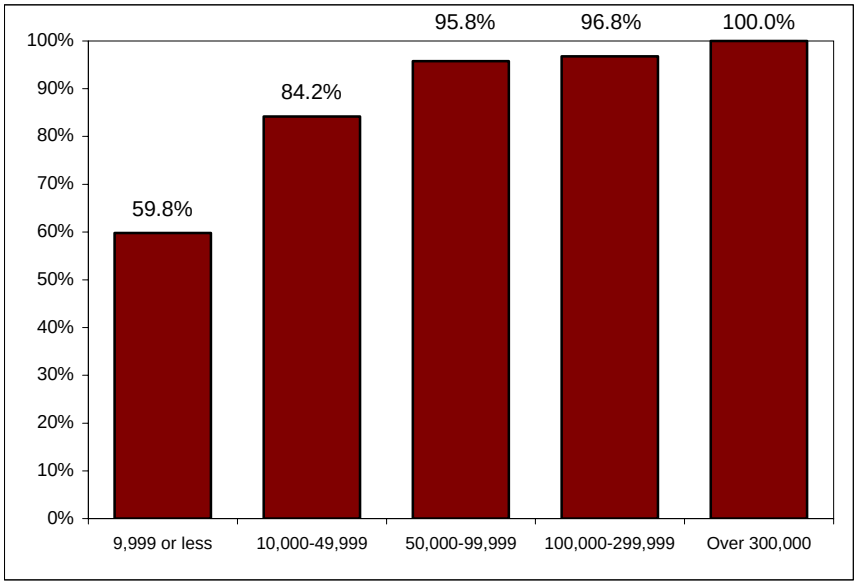
Contextual Background

Similarly to e-commerce in private sector, e-government has been receiving much attention from both researchers and practitioners. Going virtual can not only enable private companies to reduce costs, increase profits, and make their products more available to consumers, it can also help government agencies to improve efficiency of their services, adopt a more customer-oriented approach, and save on operating costs, which becomes increasingly important under current economic conditions. In fact, according to the National Electronic Commerce Coordinating Council (2000a), government agencies can save up to 70 percent in costs by moving their services online. On the other hand, citizens can also benefit from e-government by being able to access all government information and services through a single portal at any time and from any location equipped with Internet access.

The benefits of e-government are acknowledged at all levels of government. At the federal level, e-government has become one of the key elements in the five-part President's Management Agenda for improving performance of federal government. At the state level, both e-government initiatives and information and communication technology (ICT) expenditures are expanding. According to the results of the 2003 State and Federal E-government Survey conducted by Darrell West with the Center for Public Policy (West, 2003b), the number and variety of services provided through state e-government portals is increasing dramatically. Around 44 percent of state-level web sites offered at least some fully executable online services in 2003. The year before only 25 percent of the website had online services.

The situation is different on the local level, however. Online initiatives of local governments are relatively widespread. The results of the 2002 E-government Survey conducted by the International City/County Management Association (ICMA, 2002) demonstrated that more than 74 percent of municipal governments had their own web sites. However, there are significant discrepancies among local governments with regard to the level of implementation of e-government initiatives. For example, the size of local jurisdiction is strongly associated with having a website (Figure 1). According to the survey, around 97 percent of local jurisdictions with the population over 100,000 had websites, while this number decreased to 60 percent for jurisdictions with population of 10,000 or less. Jurisdiction size was also related to the size of e-government budget as well as the number and types of online services. Such characteristics as geographic region, where the municipality is located, its form of government, and the sources of e-government funding also seemed to have a significant affect on the state of e-government initiatives.

Figure 1.1: Municipalities with Websites, by Municipality Size



Source of Data: *ICMA 2002 E-government Survey*, Washington, D.C.: ICMA

Understanding which factors affect adoption of e-government initiatives on the local level is important, both from academic and practical perspectives. Local government has the most direct effect on citizens' lives. There are 87,525 local governments in the U.S., according to the 2002 Census of Governments. Of these, 19,429 are municipal governments. Most of the direct government services are provided to citizens on the local level (Kettl, 2000). Therefore, for the average citizen, the most frequent personal interactions with government are at this level (Beaumaster, 2002). Yet, according to a report by the Pew Internet & American Life Project (Larsen & Rainie, 2002), citizens express more dissatisfaction with the results of their online interaction with local government than from interactions with state or federal governments. Though local governments attempt to be as efficient and customer-oriented as governments at the other two levels, current economic climate affects them most significantly, often making it more difficult to find additional resources to maintain the quality of service provision. At the same time, citizen demands for local government services remain high (Kettl, 2000; London, 1995). In fact, some researchers argue that citizens prefer to interact with their local governments more than with the state or the federal governments (Fountain, 2003b).

Under these circumstances, implementing e-government initiatives may seem like an attractive option for local governments that are looking for ways to decrease the cost of providing services while simultaneously increase their efficiency. However, local governments are facing more constraints in their attempts to implement e-government initiatives than state and the federal governments. Thus, in addition to being more susceptible to economic downturns, local governments are facing the problem of having less qualified personnel. Local government officials have lower education and less expertise than state and

federal government officials or private sector employees (Beaumaster, 2002). Local governments also often lack the resources for training and development necessary for successful e-government approach.

Policy Relevance of the Research

E-government affects the way government agencies operate and interact with citizens, changing the way many government services are delivered. Recent research indicates that e-government, especially on the local level, is likely to have a profound direct effect on the democratic processes, citizens participation, and governance. An article by the Center for Technology in Government at the University of Albany (Dawes, 2002) argues that the concept of e-government is often limited to delivering government services over the Internet. However, according to the article, e-government is a significantly broader concept. The article distinguishes four major dimensions of e-government:

- **E-services** – the electronic delivery of government information, programs, and services.
- **E-democracy** – the use of electronic communications to increase citizen participation in the public decision-making process.
- **E-commerce** – the electronic exchange of money for goods and services.
- **E-management** – the use of information technology to improve the management of government.

Though Dawes separates e-commerce into a distinct dimension, an alternative approach is to consider e-commerce as a part of the process of administering online government services that involve provision of private goods. That is, e-commerce is integrated with e-services, reducing the number of dimensions to three.

The discussion on the policy relevance of the present research distinguishes the following three dimensions of e-government:

- Using e-government initiatives to improve delivery of government services.
- Using e-government initiatives to facilitate democratic processes and governance through citizen participation.
- Using e-government initiatives to restructure organizational processes of government agencies (reengineering)

Improving Delivery of Government Services

Improving delivery of government services is a fairly straightforward dimension of e-government. It involves treating citizens (including businesses) as customers; focusing on satisfying their needs; and using information and communication technologies (ICTs), primarily the Internet, to provide the customers with an alternative to access online all or most of the information, products, and services traditionally provided by the government "over the counter," putting citizens and businesses that interact with government "online, not in line" (CNET News.com, 2001).

For citizens, being able to access government information and services online is beneficial for two major reasons. First, online services and information are meant to be provided non-stop around the clock, on the "24/7/365" basis, which means that citizen may use these services and information at any time from any location provided they have Internet access. This opportunity may considerably reduce for citizens economic and social costs of using e-government services associated with investing time and other resources in order to physically get to government offices and to adjust their schedules to do so during business hours (Kingston, Carver, Evans, & Turton, 2000; Edmiston, 2003).

Another advantage of providing government information and services online is that, with the proper approach, these services are provided through a government website, or web portal, in an intuitive and integrated fashion, which facilitates their easy retrieval (Detlor & Finn, 2002). This means that government web portals are supposed to be structured in such a convenient way that it is easy for citizens to locate the service or product they are looking for using basic logic, rather than familiarizing themselves with often intricate structure of government agencies. A formal OMB (2003b) goal is for citizens to be able to access online government services and information "within three clicks." Full-scale government portals are also supposed to have an integrated architecture so that government customers do not have to input or update personal data more then once, after which these data are automatically synchronized in all databases that use them.

While moving towards providing government services and information over the Internet increases overall efficiency and convenience of their provision for a large group of government customers, it also has a potential to create digital divide, or inequalities between the "information- rich" individuals and businesses that can gain access to the technology necessary to use the online services, and the "information poor," who cannot. Digital divide is exacerbated by a possibility that, once a government agency establishes an active Internet presence, it may be more difficult for it to continue providing services over the counter, even though many citizens still lack Internet access (Fountain, 2003a).

Using e-government to improve service delivery over the Internet is the most visible and measurable dimension of e-government. Thus, many assume e-government is solely about delivering government services online (Dawes, 2002; Larsen & Rainie, 2002b). According to Dawes (2002), this assumption narrows the vision for e-government and ignores

substantial effect e-government has in other areas, such as citizen participation and overall democratic processes.

Facilitating Democratic Processes through Governance and Citizen Participation

Some authors argue that e-government, through the use of ICTs, has a potential to enhance the degree and quality of public participation in government. E-government can improve interaction between government institutions, elected officials, and citizens and affect the nature of democratic governance (Kakabadze, Kakabadze, & Kouzmin, 2003).

In the course of the discussion of e-government's potential to affect the governance process, a concept of *e-governance* has emerged within the e-government theory. E-governance differs from e-government (NECCC, 2003a; Riley, 2003a; Riley, 2003b) in a similar way as government differs from governance in the traditional sence.

Kettl (2002: xi) makes the following distinction between government and governance:

> *Government* refers to the structure and functions of public institutions. *Governance* is the way government gets its job done.

Riley (2003b:14) expands this distinction by saying that government is more concerned with making actual decisions, while governance is more related to continuous interactions between public officials, politicians, and citizens:

> Governance is distinct from government in that it concerns longer-term processes rather than immediate decisions. Governance is a set of continuous processes that usually evolve slowly with use rather than change dramatically (as with a change of government). There are three categories of processes to cover the interactions between the government, the public service, and the citizenry. The engagement process covers the interaction between citizens and government; the consultation process covers the interaction between public servants and citizens; and the implementation process covers the interaction between the government and the public service.

Thus, "traditional" governance seeks to engage citizens, directly or through a form of media or association, into formulation and implementation of public policies and legislative processes (Fountain, 2003b; Riley, 2003a; Riley, 2003b).

When citizens neglect to participate in governance, there is a threat that politics becomes the domain of a subset of society, which may eventually begin tyrannizing atomized and apathetic citizens (Tocqueville, 1937; Klein, 1999; Kakabadze, Kakabadze, & Kouzmin, 2003). This tyranny may take two forms (Klein, 1999). One form is the "tyranny of the majority," which occurs when the majority obtains control of government institutions and uses this control to oppress minority. A second form of tyranny takes place when the state becomes autonomous of citizens and begins to use its resources against atomized, individually powerless people.

On the local level, the mechanism to prevent these forms of tyranny from happening is for citizens to engage in a forum (Tocqueville, 1945; Klein, 1999). Klein (1999:215) defines forum as "a means of many-to-many communication that allows citizens to actively speak before their fellows and to engage in group decision making." According to Tocqueville, this forum may take two forms: the town hall meeting and the newspaper (Klein, 1999). Of these two forms, town hall meeting is a true forum, which allows citizens to engage in face-to-face communication. Participation in the town hall meeting may, however, be associated with high personal and social costs to citizens. The meetings are always restricted to a specific location and time. Physical presence at such a meeting usually means that people have to adjust their schedules appropriately, sacrificing other activities, such as job, time with family, and leisure. This can limit the number of people who are able to attend, excluding those for

whom the opportunity costs of participation exceed social benefits (Olsen, 1968; Klein, 1999; Kingston, Carver, Evans, & Turton, 2000; McComas, 2001; Riley, 2003b).

Further, town hall meetings often take place in an atmosphere of confrontation. This can discourage participation by less vocal majority resulting in public meetings being dominated by vocal individuals who may have extreme views. These views may not necessarily represent the wider opinions of local people who may have equally, if not more, valid points to make, but who refrain from expressing their concerns, opinions and viewpoints, and rarely if ever emerge as definable stakeholders (Tonn, 1996; McComas, 2001; Kakabadze, 2003; Adams, 2004).

Mass media, which in the times of Tocqueville was limited to newspapers and which later have assumed other forms, provide another means of participating in a forum (Klein, 1999). The benefit of mass media over the town hall meeting is that they can overcome geographic barriers to communication as they, unlike town hall meetings, do not require synchronization of many people's schedules in order to meet at the same time at a specific location.

Klein (1999) points out that newspapers (and other media, one might add) have their own limitations. First, a newspaper is not a true forum because it allows only one-to-many communication. Second, reading a newspaper offers a less participative experience than attending a meeting. Text messages lack the richness of face-to-face communication, which includes facial expression, body language, and verbal intonation (Fountain, 2003a).

Scott London (1994) argues that proliferation of contemporary media in its various forms (including electronic media) has created an environment where the media become the backdrop of politics and replace face-to-face meetings between citizens and government

officials. London (1994) points out that this is a negative tendency which leads to the situation when the "dialogue of politics, policy-making and especially elections has, in effect, become a monologue of glossy visuals, rhetoric and sound bites. In the age of show-business, the dialogue of democracy has become a tune-in, tune-out spectacle that asks nothing of the individual citizen, short of a biannual or quadrennial vote."

Baumgartner & Jones (1993), when referring to the role of the media in politics, also describe their distinct characteristics that point on the lack of depth and comprehensiveness in media's coverage of political debates. According to the authors, due to a complicated nature of many policy debates, the media maintain very selective, temporary, and ultimately distorted focus on political issues focusing on only one side of an issue. Rational consideration of all sides is often too complex. Instead, the media tend to shift from extended coverage of one side of the story to a preoccupation with a contrasting side of the same story. When an alternative perspective on the issue emerges, the media often drop the initial position they maintained and adopt the competing position. Finally, the media pay disproportionally high attention to issues involving conflict, because such issues are interesting to the public.

In describing a negative impact of media on contemporary politics, London (1994) refers to the book *Four Arguments for the Elimination of Television* by Jerry Mander (1978). In his book, Mander delineates seven antidemocratic characteristics of TV: "1) it separates people from one another; 2) it eliminates personal knowledge by removing the natural context in which it is discovered; 3) it eliminates points of comparison; 4) it appeals to sensory rather than conscious awareness; 5) it occupies the mind and removes the space needed for

reflection; 6) it homogenizes knowledge and information; and 7) it encourages lethargy and substance use" (London, 1994).

E-government, on the other hand, through ICTs, such as the Internet, may sidestep the media and provide alternative means of achieving many-to-many communication that characterize face-to-face town hall meetings (London, 1994; London, 1995; Klein, 1999; DiMaggio, Hargittai, Neuman, & Robinson, 2001; Fountain, 2003a; Kakabadze, 2003; Riley, 2003a). This would ultimately affect governance by increasing citizen involvement with policy issues. On the local level, use of ICTs, such as the Internet, within e-government initiatives may address both forms of tyranny: the tyranny of the majority and the state autonomy. The Internet may enhance government accountability and citizen participation in governance by promoting direct communication among citizens as well as between citizens and government in an open and unmediated political debate. The Internet may literally open a possibility for direct democracy, when intermediate actors, such as parties, interest groups, and media, might be bypassed in order for citizens to communicate directly with elected representatives and public officials (London, 1994; London, 1995; Fountain, 2003a; Kakabadze, Kakabadze, & Kouzmin, 2003). Fountain (2003a:14) argues that with the Internet, "public participation, perhaps organized at the neighborhood or community level, might be vastly energized and used more strongly to influence elected and appointed government officials. The results of such direct voting could be displayed by neighborhood or precinct, thereby increasing the transparency and, as a consequence, the accountability of government to its citizens."

London (1995) mentions several other advantages of using the Internet to facilitate direct democracy. The Internet can overcome the spatial and temporal boundaries. It can also

involve with governance the citizens who may otherwise have no opportunity to participate in policy discussions due to the high opportunity costs or because of being less vocal. Also, the Internet can function as a mass feedback system, providing legislators with instant public opinion on issues. Further, the Internet enhances political competence of citizens by involving them more directly in the process of public discussion. It also provides innovative ways of informing and educating the electorate on key public issues.

Thus, in theory, the potential of ICTs to facilitate citizen engagement with governance is revolutionary. Empowered by ICTs, citizens can increase their political activity, make more informed decisions and make direct impact on democratic processes. But does this mean they would actually do so? And if yes, could there be negative effects of the increase in direct democracy fostered by online political activity? Four potential caveats have been identified in the literature regarding the use of ICTs to foster citizen participation: (1) ICTs will not change citizens' indifference to the matters of participation; (2) ICTs may cause fragmentation of citizens' political awareness and make it easier for powerful political stakeholders to manipulate citizens' attention; (3) potential dangers are associated with the promise of direct democracy; and (4) digital divide could emerge in the processes of using ICTs to increase citizen participation. These caveats are discussed below.

For considerable amount of time, some authors have been arguing that there is no empirical evidence that there is a significant shift toward citizen engagement in the political process due to ICTs (Arterton, 1987; London, 1994; Levin, 2002; Norris, 2002; Riley, 2003; Riley, 2003a). Low levels of political activity occur not because the information is hard to find, but because most citizens are not interested in finding it. The Internet makes it easier for people to access political information, but it does not increase people's interest in politics

(Levin, 2002; Norris, 2002). Academics, who were interested in how ICTs affect democratic processes before the Internet, have arrived to similar conclusions. Thus, Arterton (1987) conducted a study that included a series of experiments in electronic meetings. The results of the study demonstrated that even in the most successful cases participation was extremely low. Arterton concluded that there was not enough interest among citizens to sustain a representative participation and that a considerable number of citizens, perhaps as many as two thirds, will likely not participate.

London (1994) provides the following summary of other studies on the issue:

> Richard Hollander, notwithstanding his faith in "video democracy," acknowledges the problem. "The bottom line question," he writes, "concerns participation.... In many communities citizen participation is an embarrassment." The belief that teledemocracy will enhance civic participation because people can, in Hollander's words, "vote on public policy while snuggled under an electric blanket or munching on corn chips" does not seem very realistic or even desirable. Hollander maintains that it can enhance the system and honor the American tradition, but Benjamin Barber disagrees: "A man's home is his castle, a citizen's home is his neighborhood; he can eat, sleep, and pray in the first, but he ought to vote only in the second. A suitable technology, if it is to be democracy's servant rather than its guide, will assist the citizen in doing so." Similarly, Ithiel de Sola Pool says, "it is hard to see what is gained by voting from the home, other than keeping the citizen dry if it rains."

This citizens' indifference to using the Internet as a mechanism for increasing their involvement with politics may, in turn, lead to another problem when vocal minority can dominate political discourse and affect policy outcome even to a larger extend than it is possible in the offline world. Garson (2004), referring to the fiasco with the Santa Monica's e-democracy initiative PEN, warns of a possibility that, for purposes of influencing policies, the Internet may be used by political junkies, rather than by representative majority of population. Crossing Boundaries Political Advisory Committee has raised similar concern in one of its reports (2003:15):

> Although advocates of citizen engagement argue that citizens want to be consulted on a wide range of policy issues, there is evidence to the contrary. Studies also show that they are not interested in being engaged in more than a few key issues. On the other hand, stakeholders clearly do want to be more involved in government policy processes and decision-making. For example, business groups or environmental organizations often have highly paid professionals whose job is to influence government decision-making on policy issues. What if the majority of people who participated in e-democracy processes were, in fact, interested professionals rather than concerned citizens? Would that compromise the initiative? Would it create policy-making processes that are less inclusive and more elitist, rather than the reverse?

According to Levin (2002), not only the Internet has no effect on increasing citizen participation, but it can actually narrow a person's political awareness by shielding him or her from information on alternative solutions about the issue the person is interested in. That is, unlike traditional broad-spectrum media, the Internet promotes narrow-spectrum partitioning of the information marketplace, encouraging individuals to use only specialized channels and limiting political commons provided by local television and newspapers (DiMaggio, Hargittai, Neuman, & Robinson, 2001). This isolating tendency of the Internet may lead to fragmentation of political community into many isolated communities that have narrow perspectives on policy issues. Such techniques as narrowcasting (DiMaggio, Hargittai, Neuman, & Robinson, 2001; Nye, 2002) that allow political actors web-based news agencies to deliver specific messages to each particular segment of their audience, based on the predilections and prejudices of the people within these segments, may exacerbate fragmentation even further than it is possible with traditional media.

Jane Fountain (2003a:10) makes similar argument, adding to the equation the influence financial recourses of organizations that strive to manipulate and fragmentalize the public have on their ability to do so:

> There is growing evidence that wealthy, powerful organizations such as communications firms, multinational corporations, dominant political parties, and governments themselves can marshal the resources of the Internet to capture the attention of users of digital information. The results of search engines, the ability to purchase visibility on popular websites, and the financial power to produce attractive, visually compelling websites make the Internet a tool more easily used and controlled by organizations with financial resources and expertise than by those who lack the ability to produce websites that can gain visibility with the use of commonly used search engines. Research on the global governance of the Internet is a key priority with important implications for all levels of government and civic engagement.

Contrary to the authors who argue that the Internet can eliminate the "tyranny of the majority," there is another group of authors who claim that it can actually facilitate this form of tyranny by replacing representative democracy with direct democracy (London, 1994; London, 1995; Kakabadze, Kakabadze, & Kouzmin, 2003). Kakabadze, Kakabadze, & Kouzmin argue that direct democracy has always been in conflict with constitutional democracy, which is wary of the majority's willingness and ability to protect interests of minorities. The authors further argue that the constitution is designed to protect individual citizens and groups against certain decisions that the majority may make, even when that majority acts in what might seem to be the common interest. Thus, constitutionalism, to a certain degree, may be considered anti-democratic, since the basic function of the constitution is to "tie the community's hands" in situations that involve protecting the interests of vulnerable minorities.

Critics of direct democracy also argue that the average person does not have the resources, time, ability, or inclination to become an expert on political issues (Lippmann, 1963; Scott, 1994; Kakabadze, Kakabadze, & Kouzmin, 2003). Direct democracy, especially if it is facilitated by the Internet, may lead to information overload and, as the result, numb, rather than energize civic engagement and produce confusion instead of knowledge (Fountain, 2003a; Kakabadze, Kakabadze, & Kouzmin, 2003). Lippmann, similarly was

highly skeptical of publics' capacity for direct democracy as early as in 1925, arguing that it would either fail or end up in tyranny. On the other hand, he argued, government, whose actions do not constitute direct translation of people's will, consists of professionals who are better equipped to systematically deal with issues that are of concern to the general public than the public itself when acting directly (Lippmann, 1963: 110):

> [W]hen the public attempts to govern directly, it is either a failure or a tyranny. It is not able to master the problem intellectually, nor to deal with it except by wholesale impact. The theory of democracy has not recognized this truth because it has identified the functioning of government with the will of the people. This is a fiction. The intricate business of framing laws and of administering them through several hundred thousand public officials is in no sense the act of the voters nor a translation of their will.
>
> But although the acts of government are not a translation of public opinion, the principal function of government is to do specifically, in greater detail, and more continually what public opinion does crudely, by wholesale, and spasmodically. It enforces some of the working rules of society. It interprets them. It detects and punishes certain kinds of aggression. It presides over the framing of new rules. It has organized force which is used to counteract irregular force…
>
> …Therefore, instead of describing government as an expression of the people's will, it would seem better to say that government consists of a body of officials, some elected and some appointed, who handle professionally, and in the first instance, problems which come to public opinion spasmodically and on appeal. Where the parties directly responsible do not work out an adjustment, public officials intervene. When the officials fail, public opinion is brought to bear on the issue.

Even long before Lippmann, Plato was concerned that acting directly, people will simply be endorsing their self-interest, which might result in policies that are "nothing more than the lowest common denominator of individual greed and desire for personal gain or security" (Kakabadze, Kakabadze, & Kouzmin, 2003).

Kakabadze, Kakabadze, & Kouzmin (2003) point out to another serious problem of electronic direct democracy. According to the authors, this form of democracy has a potential to divorce responsibility from accountability, which, in turn, creates a twofold

problem. Thus, although individuals who have access to technology and willingness to use it to influence the political agenda would be responsible for policy outcomes, they would not be held accountable for their impact. On the other hand, elected representatives would be held accountable for policies for which they are not responsible and over which they have little influence, with which they might disagree, and for which they may not have had the opportunity to present an alternative.

Finally, differential access of public to computers, ICTs and the Internet, and broad variation in expertise of using them might lead to digital divide, when a considerable number of people would be excluded from electronic participation in governance.

Reengineering of Organizational Processes

A common argument in the e-government literature is that the true potential of e-government initiatives will not be achieved as long as government agencies ICT tools involved in providing these initiatives merely to automate existing processes. Kraemer & King (2003), Fountain (2001a; 2003b), among others, have indicated that, by themselves, ICTs tend to reinforce existing structures of communication, authority and power in organizations rather than automatically cause increases in efficiency. Most scholarly writers now agree that to develop ICT and e-government potential, agencies may have to reevaluate their mission, management practices, and the way their existing tasks are carried out (Kling & Allen, 1996; Heeks, 1999; Margetts, 1999; Seneviratne, 1999; Atkinson & Ulevich, 2000; Fountain, 2001a; Harvard Group, 2001; OMB, 2002a; OMB, 2002b, OMB, 2003a). Heeks (1999) argues that ICT cannot substitute inadequate governance and management practices. It is therefore important that management issues are addressed in advance, through such mechanisms as strategic planning, before an organization starts radical ICT implementation.

Having clearly defined its mission and goals, the organization can consider using ICTs to reengineer its processes to facilitate meeting of its goals as well as to address potential problems.

The importance of integrating ICT with management practices and organizational processes has been consistently brought up in the President's Management Agenda and in OMB reports. Even more significantly, it has been embedded in executive and legislative documents. OMB Circular A-11, the Clinger-Cohen Act, and the Government Performance and Results Act require federal agencies establish performance goals for ICT and link these goals to their strategic plans. E-Government Act of 2002 expands these requirements and mandates agencies to develop performance measures for e-government and ICT that focus on improving productivity and quality of services provided to citizens. Following OMB policy guidance, the implementing these provisions requires public agencies to address organizational restructuring issues.

Naturally, public agencies on the state and local levels have been encouraged to follow the practices of federal agencies.

The purpose of the present discussion on the dimensions of e-government was to demonstrate that implementing e-government initiatives on the municipal level will likely to have implications beyond the simple improvement of the delivery of government services by using the Internet. Therefore, municipalities that are in the process of implementing e-government initiatives or are considering doing so, have to be aware of the possible implications of these initiatives on the democratic processes and governance. Government officials of these municipalities need to be ready to address the possible consequences of these implications.

Theoretical Relevance of the Research

From a research perspective, local e-government is a promising area. One could anticipate wide discrepancies among U.S. municipalities with regard to the scope of e-government implementation, based on such factors as municipality size, amount of slack resources in municipal government agencies, political support for e-government initiatives, or even the geographic location of municipalities. Despite this rich intellectual promise, the paucity of solid research in the area of local e-government on the level beyond a single state, that would produce generalizable findings, is surprising.

RESEARCH STATEMENT

The Research Question

The proposed research focuses on the adoption of e-government initiatives by municipal governments nationwide. The main **research objective** of the study is to determine which internal characteristics of municipal agencies and environmental factors of municipalities across the nation affect the quality and the scope of adoption of their e-government initiatives.

This objective is accomplished by developing and testing an integrated approach to determine factors affecting the quality and the scope of local e-government initiatives. The approach combines theoretical methodologies of three frameworks: e-government, ICT, and innovation theory. It is believed that these three frameworks will complement each other with regard to explaining municipal e-government initiatives and their integration will result in better understanding of the factors affecting adoption of these initiatives. The e-government processes are sufficiently multidimensional to justify combining methodologies from several areas to study the implementation of e-government initiatives. Wilhelm (2000),

for example, points out that the public sphere, as the result of being affected by ICTs, is too complex to yield to the interpretive techniques of any one field of exploration.

The **dependent variable** in the present research is municipal e-government score. The dependent variable measures the scope and quality of e-government initiatives of a municipality by visiting it web portal. The following seven components will be measured to determine the e-government score for each municipality's web portal:

1. Web portal content
2. Web portal usability
3. Online services
4. Digital divide
5. Citizen participation
6. Restricted areas
7. Privacy policies

The current research concentrates on two clusters of **independent variables** for each municipality: internal municipal government agency characteristics and external environmental factors of municipalities. There are 21 independent variables in the research.

Internal Agency Characteristics

1. Outside funding for e-government initiatives
2. A separate budget for e-government initiatives
3. Form of government (council-manager vs. mayor-council)
4. Conducting citizens surveys to determine demand for e-government services
5. Reengineering of business processes
6. Lack of collaboration among agency departments

7. Staff resistance to change associated with implementing e-government initiatives
8. Privacy-related problems associated with e-government initiatives
9. Security-related problems associated with e-government initiatives
10. Developing e-government services in-house
11. Support from local elected officials
12. Having an intranet

Environmental Factors

13. Municipality size
14. Percentage of urban population in the municipality
15. Percentage of residents with B.A. and higher degree
16. Mean per capita income of municipality residents
17. Percentage of municipality residents below poverty level
18. Percentage of nonwhite municipality residents
19. Percentage of non-English-speaking households in the municipality
20. Unemployment rate in the municipality
21. The geographic region of the municipality

The dataset for the research is combined from three sources. The municipalities that responded to the 2004 ICMA E-government Survey constitute the basis of the dataset for the research. The municipalities that responded to the ICMA survey determine the sample for the research. The responses of these municipalities provide measurements for the internal municipal agency characteristics. The data on the external characteristics of the municipalities that responded to the 2004 ICMA Survey are obtained from the 2000 U.S. Census dataset. This approach will guarantee the accuracy of measurements, since ICMA

dataset will include Census codes for each respondent municipality. Finally, the dependent variable, e-government score, is computed by visiting web portals of the respondent municipalities.

Hypotheses

To test the effects of the independent variables on the dependent variable, the following hypotheses were formulated:

H_1: Outside funding for e-government initiatives of a municipal agency is positively associated with its e-government score.

H_2: Having a separate budget for e-government initiatives is positively associated with its e-government score.

H_3: The council-manager form of government in a municipality is positively associated with the e-government score.

H_4: Conducting citizen surveys by municipalities to determine what online services residents and businesses want is positively associated with the e-government score.

H_5: Implementing e-government initiatives that have resulted in reengineering of business processes is positively associated with the e-government score.

H_6: Lack of collaboration among municipality departments is negatively associated with the e-government score.

H_7: Staff resistance to change is negatively associated with the e-government score.

H_8: Having privacy-related problems is negatively associated with the e-government score

H_9: Having security-related problems is negatively associated with the e-government score

H_{10}: Developing e-government services in-house is positively associated with e-government score.

H_{11}: Lack of support from elected officials in municipality is negatively associated with the e-government score.

H_{12}: Having an intranet is positively associated with the e-government score

H_{13}: Municipality size is positively associated with the e-government score.

H_{14}: Percentage of urban population is positively associated with the e-government score.

H_{15}: Percentage of municipality residents with B.A. and higher degree is positively associated with the e-government score.

H_{16}: Mean per capita income of municipality residents is positively associated with the e-government score.

H_{17}: Percentage of municipality residents below poverty level is negatively associated with the e-government score.

H_{18}: Percentage of nonwhite municipality residents is negatively associated with the e-government score.

H_{19}: Percentage of non-English-speaking (linguistically isolated) households in the municipality is negatively associated with the e-government score.

H_{20}: Unemployment rate in the municipality is negatively associated with the e-government score.

H_{21}: The geographic region of a municipality affects its e-government score.

CHAPTER TWO: LITERATURE REVIEW AND HYPOTHESES

E-GOVERNMENT AND INFORMATION AND COMMUNICATION TECHNOLOGIES

In the literature, e-government is associated with the use of (ICTs), such as computers, computer networks, the Internet, etc., to facilitate provision of e-government products and services and to improve interaction between government and citizens (Kim & Lane, 2001; NECCC, 2000a; Fountain, 2001b; Zweers & Planqué, 2001; Dawes, 2002). In the context of e-government, Fountain (2003b:5) defines ICTs as

> the full range of information and communication technologies and applications currently used in digital and electronic government as well as those information technologies, systems, and applications on the developmental horizon.

Linking e-government directly with ICTs, e-government literature, however, consistently points out that, while ICTs represent a central and important part of e-government initiatives, e-government is a considerably wider concept, which, in addition to improving efficiency and effectiveness of providing public services through ICT use, also includes the potential to advance governance and democratic processes by facilitating citizens' direct involvement with and discussion of government practices. E-government also leads to restructuring government agencies and changing information exchange across public agencies as well as between government and businesses, non-governmental organizations, and public at-large (Lane & Lee, 2001; Dawes, 2002; Fountain, 2003a).

The Center for Technology in Government at the University of Albany (Dawes, 2002:1) provides the following definition of e-government:

> E-government is the use of information technology to support government operations, engage citizens, and provide government services.

Similarly, the National Electronic Committee Coordinating Council (NECCC, 2000a:11) defines e-government as follows:

> The transformation of internal and external business processes toward customer-centricity based upon service delivery opportunities offered by new communications technologies (such as Web-based technologies) to better fulfill the purposes of government to provide efficiency and effectiveness as well as fairness and equitability.

The "Policy Relevance of the Research" section of the introductory chapter contains discussion of e-government dimensions.

INNOVATION

The innovation theory has a long history. Its roots trace to Europe about a century ago (Rogers, 2003). Sociologist Gabriel Tarde (France) and Georg Simmel (Germany) are considered the forefathers of the innovation theory. The theory has been operating with different units of analysis. It has been applied to explain propensity to innovate in individuals, organizations (both public and private), and states or countries. The types of innovations the theory has been applied to explain also vary significantly, from state lotteries to organizational adoption of computers and information systems. Being applied so broadly, the innovation theory has generated a vast body of research literature for different units of analysis and different types of innovation. It is easy for a researcher in the field of innovation to feel overwhelmed by the extent of this research. Therefore, it is particularly important for the researcher of innovation to stay focused on the precise subject he or she is interested in and, in the course of literature review, to give preference to the literature that operates with the same unit of analysis and similar types of innovations that the researcher is interested with. The present research is focused on the adoption of e-government initiatives

by municipal government agencies. E-government is treated as innovation in the research. The unit of analysis for the research is a *municipal government agency*. Further, the research builds on the application of the innovation theory to look at the adoption of computer and information systems innovation by municipal governments. There is an emerging body of literature that applies some of the components of innovation theory as well as some of the variables traditionally associated with the theory to explain state and municipal e-government initiatives. This literature is also considered by the research. The rest of this section is organized in the following way. First, the definition of organizational innovation is offered. Then, a distinction is made between the *diffusion* and the *adoption* of innovation. This follows by literature review that addresses possible reasons of organizational innovation, with special emphasis on public agencies. The variables that affect the propensity of organizations to innovate are discussed in the following sections of the chapter.

Innovation literature has offered several, sometimes conflicting, definitions of organizational innovation. The present research adopts the definition of Daft & Becker (1978:5) who define innovation as

> the adoption of an idea or behavior that is new to the organization adopting it. The idea can be either new or old with regard to other organizations so long as it the idea has not been previously used by the adopting organization. The criterion of newness in this definition of innovation concerns the adopting organization's past experience rather than other organizations in the environment.

In considering organizational propensity to innovate, some studies focus on *diffusion* of an innovation among organizations, while other studies consider *adoption* of an innovation. It is important to make distinction between the two concepts. Rogers (2003:11) defines diffusion of innovation as the "process by which (1) an *innovation* (2) is *communicated* through certain *channels* (3) *over time* (4) among the members of a *social system*." This

definition emphasizes that diffusion of innovation is the **process** involving four elements: an innovation, communication channels, time, and a social system. The fact that innovation diffusion is the process, in which time is an important element, requires multi-point or longitudinal study approach, with time being one of the variables (Baker, 1997). Rogers (2003) emphasizes importance of the time element in the diffusion process. According to Rogers (2003:20), the time element involves the innovation-decision process through which a decision-making unit, such as an organization, "passes from first knowledge of an innovation, to the formation of an attitude toward the innovation, to a decision to adopt or reject, to implementation and use of the new idea, and to confirmation of this decision." Rogers (2003:21) further points out that this innovation-decision process "can lead to either *adoption*, a decision to make full use of an innovation as the best course of action available, or *rejection*, a decision not to adopt an innovation." According to this definition, adoption is a **single-point decision** or an act, the measurement of which does not require a time variable. Thus, the research that focuses on adoption of innovation should involve an experimental or survey approach (Brudney & Selden, 1995, Baker, 1997). The focus of the present study is on adoption of e-government initiatives by municipal government agencies, where e-government is considered an innovation.

Mohr (1969:63), in his seminal article on the determinants of organizational innovation, has argued that the propensity of organizations to adopt innovation is "directly related to the motivation to innovate, inversely related to the strength of obstacles to innovation, and directly related to the availability of resources for overcoming such obstacles." His and subsequent research tend to support this hypothesis in overwhelming majority of cases.

Innovation theory posits that organizations innovate to respond to changes in their internal or external environment or to take a preemptive action to influence their environment (Damanpour, 1991). According to Daft and Becker (1978), an economic perspective on innovation suggests that organizations tend to innovate for two major reasons: to preserve or obtain a competitive advantage or to survive in times of a crisis. Behavioral scientists offer an alternative perspective on innovation, which is based on the assumption that organizations resist change. People inside organizations prefer the familiar settings, for which reason organizations value stable environment that is a function of past experience, norms, and established interpersonal relationships. A desire for stability inhibits innovation and change. The "traditional" organizational culture of public agencies, characterized as Weberian bureaucracy, may add another dimension to resistance to change and innovation specific to government agencies. Bureaucratic structure of government agencies is known to be highly inflexible, which inhibits adoption of innovation. Besides, government agencies are destined to serve customers whose interests are often in conflict. They also must take into consideration a broad specter of procedural, political, and legal accountabilities (Heeks & Bhatnagar, 1999; Kraemer & Dedrick, 1997). Under these circumstances, any change is possible only when there is an agreement between a number of individuals and institutions that have their stakes with agencies.

However, government agencies do innovate. In today's constantly changing environment and complex economic climate they probably do so more often than ever before. With regard to e-government initiatives, local governments may adopt them in response to citizens' demands for improved services (influence of the environment). Faced with shrunken budgets, local government may start experimenting with e-government as the way

to save on operating costs (crisis situation). Despite the fact that municipal government agencies do not have to deal with competition the way private companies do and are not as concerned with maintaining competitive advantage, there are times when they act proactively, if for different reasons than their private-sector counterparts. The most obvious example is actions taken by politicians who are trying to get reelected or public executives who are trying to get reappointed. Under these circumstances, they might start implementing e-government initiatives if they believe these initiatives would become popular with their constituents and increase their chances for reelection.

When considering determinants of innovativeness in organizations, innovation theory usually focuses on two groups of variables: those related to internal organizational attributes and external environment in which the organization exists. Current research follows this structure and focuses on two clusters of independent variables for each municipality: *internal agency characteristics* and *environmental factors of municipalities*.

MUNICIPAL E-GOVERNMENT INITIATIVES AS INNOVATION

The present research focuses on the adoption of e-government initiatives by municipal governments nationwide. This objective is accomplished by developing an integrated approach to determine the factors affecting the propensity of local governments to adopt e-government initiatives as well as the quality and the scope of these initiatives. The objective is reached by combining theoretical approaches from three frameworks: e-government, ICT, and innovation theory. It is believed that the three approaches may complement each other with regard to explaining municipal e-government initiatives and their integration will result in better understanding of the factors affecting e-government adoption. E-government research, despite its popularity, is focused for the most part on federal- and state-level e-

government initiatives. At the municipal level, research on e-government initiatives has been sparse and fragmented. On the other hand, implementation of ICTs by municipal governments has been studied more comprehensively and for a longer period of time. With ICTs being a major component of e-government, many findings of ICT implementation on the local level can considerably benefit research on municipal e-government initiatives. However, it is important to keep in mind that that the findings on ICT cannot directly substitute for e-government research. It has been repeatedly pointed out in e-government literature that, despite similarities between ICT and e-government, the two concepts differ from each other, with e-government being a broader, more complex phenomenon. Finally, innovation theory seems to be an appropriate, yet underutilized, approach to look at the adoption of municipal e-government initiatives. Mostly before the era of e-government began, but also after, innovation theory has been applied to study adoption of technological innovation in local government in general and, particularly, adoption of computer technology (Danziger & Dutton, 1977a; Danziger & Dutton, 1977b; Perry & Kraemer, 1979; Brudney & Selden, 1995; Jansma, 2003). Currently, a growing body of literature is emerging that is focused specifically on local e-government initiatives (Stowers, 1999; Weare, Musso, & Hale, 1999; Musso, Christopher, & Hale, 2000; IBM, 2001; LaVigne, Simon, Dawes, Pardo, & Berlin, 2001; Moon, 2002; Streib & Willoughby, 2002; Tat-Kei Ho, 2002; Baker, 2003; Holzer & Melitski, 2003; Northrop, 2003; West, 2003a; West, 2003b; Ho, 2004; Kim & Bretschneider, 2004). Majority of the present research borrows in some way or another from the innovation theory (although in most cases authors do not make explicit references to the theory). Integrating the three approaches in a systematic way into a single model that can be further applied to measuring the quality and scope of local e-government initiatives can

provide a more comprehensive understanding of the mechanisms adoption of municipal e-government initiatives.

This study also addresses drawbacks that exist in current research on local e-government. Three major drawbacks are identified in the study. First, some of the literature on the subject adopts a normative approach focusing on an ideal e-government model and emphasizing what local e-government *should* be, without actually comparing this ideal model to the real situation in local e-government, identifying discrepancies between the ideal model and the reality, and outlining strategies for local governments to address these discrepancies (e.g. IBM, 2001; LaVigne, Simon, Dawes, Pardo, & Berlin, 2001; Streib & Willoughby, 2002; Ho, 2004). Second, when research examines the relationships between the actual state of local e-government initiatives and socioeconomic characteristics of the municipalities that adopt them, it is likely to be limited to municipalities within a single state rather than expanding to a regional or the national level (Weare, Musso, & Hale, 1999; Musso, Christopher, & Hale, 2000; Baker, 2003; Holzer & Melitski, 2003; Northrop, 2003; Kim & Bretschneider, 2004). This obviously raises generalizability concerns and prevents researchers from determining effects of some important variables that might influence adoption and the scope of e-government initiatives by local governments. Thus, focusing on one state makes it impossible to estimate regional effects on e-government implementation, which, according to innovation theory and ICT implementation studies, may play a significant role. One could expect diversity among municipalities within a single state to be lower because political subculture, economic climate and, perhaps, some sociodemographic characteristics among municipalities within the same state are likely to be more homogenous than among municipalities from two or more different states.

Finally, the researchers who focus on municipal e-government initiatives on the national or a state level do so predominantly by examining web portals of large municipalities and without investigating socioeconomic characteristics of municipalities that might influence the level and the scope of these initiatives (Stowers, 1999; Tat-Kei Ho, 2002; Northrop, 2003; West, 2003a; West, 2003b). Limiting research to examining only web portals provides a useful snapshot of online municipal initiatives, but it does not contribute to understanding of socio-economic and demographic municipal characteristics that might facilitate or impede implementation of these initiatives.

Moon (2002) was the only exception to the general rule of focusing exclusively on the web portals without considering socioeconomic or demographic characteristics of municipalities, while looking at municipal e-government on the national level. In his article that summarized the result of the 2000 ICMA E-government Survey results, he has a brief discussion about the affects of the form of government and the size of municipalities that were adopting e-government initiatives. However, his discussion does not include any statistical analysis which would indicate whether the differences in form of government or municipality size are significant. Except government type and municipality size, Moon does not look at any other characteristics of municipalities that might affect the adoption of e-government.

While some of the research that falls under the category of web portal examination expands beyond the limit of a single state, it tends to be constrained to large metropolitan cities, ignoring small municipalities, which constitute the majority. Thus, Stowers (1999) looks at the cities with population of 100,000 and over. Tat-Kei Ho (2002) focuses on 55 most populous cities in the U.S. Northrop (2003), who uses the URBIS dataset of 42 cities

for her research, acknowledges that it is "biased toward medium to large cities." West's (2003b) research examines websites of the 70 largest cities in the U.S. This tendency to focus on large municipalities leads to two major limitations: reduced sample size and the generalizability problem. According to the 2002 U.S. Census of Governments data, large municipalities with population over 100,000 that are most likely to be included in the research on municipal e-government initiatives comprise only 1.25 percent of the total number of municipalities. Smaller municipalities oftentimes can substantially benefit from being included into academic research because lack of resources and training prevents them from conducting their own studies or benchmarking their e-government practices against similar practices of other municipalities in the same geographic region or nationwide.

It is important to address all these drawbacks and limitations by developing a comprehensive approach that can be applied to research municipal e-government initiatives. Such an approach should compare e-government initiatives of municipalities of different sizes across the nation. It should also attempt to determine socioeconomic and institutional characteristics of municipalities that might affect the direction, sophistication, and the scope of their e-government initiatives. Finally, the approach should develop conclusions and recommendations useful both to academics involved in e-government research and practitioners who implement e-government initiatives on local level.

The present research attempts to take a step towards designing such an approach by determining the factors that affect implementation of e-government initiatives by municipalities of different sizes (with population starting at 2,500) across the nation. It does so by integrating innovation theory, ICT, and e-government frameworks. To test this approach, an aggregated dataset is developed that combines data from the 2004 E-

Government Survey conducted by the International City/County Management Association (ICMA) with 2000 U.S. Census data on respondent municipalities. The dataset will be supplemented by additional data obtained directly from the ICMA Survey respondents' web portals.

DEPENDENT VARIABLE: E-GOVERNMENT SCORE OF MUNICIPAL WEB PORTALS

Web Portals: Implementing E-government

E-government products and services are delivered through web portals. Detlor & Finn (2002:104) give the following definition of web portal:

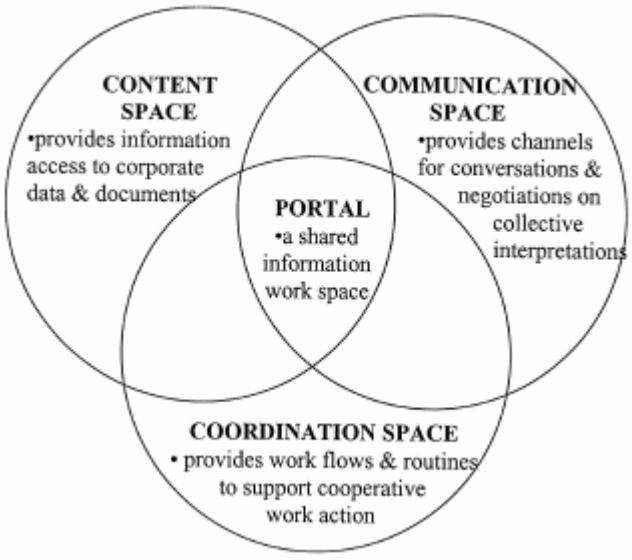
> [Portals] are single-point Web browser interfaces used to promote the gathering, sharing and dissemination of information and provision of services to communities of interest. The primary purpose of a portal is to function as a gateway to information products and services. As such, the goal of a portal is to provide an intuitive integrated view of information products and services. Common portal features include: a classification schema of information categories that help organize information for easy retrieval; a search engine to facilitate more exact and specific information requests; and links to internal and external Web sites and information sources that may be of interest to the targeted community.

Through these features, web portals provide its users, both inside and outside the organization, with a sophisticated shared information work space for the creation, exchange, maintenance, and use of information. Portals provide access to organizational resources and data that can be available only to organizational employees through intranet or can be accessed by both employees and external users through the Internet (Curry & Stancich, 2000; Detlor, 2000; Detlor & Finn, 2002; Benbya, Passiante, & Belbaly, 2004). Literature on web portals defines interanets as private web-based networks, internal to organization, allowing access only to authorized users within the organization. Intranets are protected by firewalls

that allow information to be securely managed inside the organization (Curry & Stancich, 2000; Detlor, 2000).

Detlor (2000:93) develops a model of web portal that divides portal's shared information work space into three components (Fig. 2): "a *content space* to facilitate information access and retrieval; a *communication space* to negotiate collective interpretations and shared meanings; and a *coordination space* to support cooperative work action." Initially Detlor applies his model to examine the intranet section of a business organization portal; however later, Detlor & Finn (2002) use the model to discuss e-government products and services provided to the outside stakeholders through the Internet.

Figure 2.1: Web Portal Model as a Shared Information Work Space



Source: Detlor, B. (2000). The corporate portal as information infrastructure: Toward a framework for portal design. *International Journal of Information Management*, 20: 91-101.

According to the Detlor's model, the content space component of the web portal enables an organization to improve its information storage and retrieval capabilities. Web portals are platform independent, therefore providing their users with broad access to a variety of data

sources, such as databases or web file servers that might be located within or outside the organization.

A communication space of the portal enables its user to engage in conversations with others about various issues. The results of this communication can be stored on the portal and are available for access. The communication space facilitates the processes of information distribution and information interpretation. Detlor defines information distribution as the process by which information from various sources is shared and used to gain new understanding on an issue. Information interpretation is defined as the process by which common understandings are obtained through the sharing and discussion of information from various sources. In case of municipal government portals, the communication space is directly related to facilitating citizens' participation in democratic governance and decision-making processes. Usually, e-government literature identifies the communication space as an online forum where citizens express their opinion on various municipal issues (Musso, Chrisopher, & Hale, 2000; Lane & Lee, 2001; Holzer & Melitski, 2003; West, 2003b).

A coordination space of the web portal is related more directly to improving internal organizational efficiency of government agencies (Dawes, 2002). It is the least visible to external stakeholders, such as general public. However, coordination space improves the efficiency of government services, enabling the "one-stop shopping" approach to the web portal structure. According to Detlor, the coordination space provides a necessary mechanism for cooperation and data exchange between various organizational departments across organizational boundaries of geography and work unit. The importance of this cooperation is discussed further.

When discussing the web portal interface, Detlor (2000) and Detlor & Finn (2002) suggest that the following five key characteristics are utilized:

1) The ability for users of the portal system to personalize the information content displayed and the applications available for use (see also Gant & Gant, 2002; Holzer & Melitski, 2003; OECD, 2003; West, 2003; Benbya, Passiante, & Belbaly, 2004).
2) The quality of the information related to it being timely, relevant, and reliable in terms of its validity and trustworthiness (see also Gant & Gant, 2002)
3) The organization of the information in such a way that it can be easily accessed and retrieved. This is usually accomplished by a robust search engine and an elaborate classification schema, or taxonomy of the portal. (see also NECCC, 2000c; Gant & Gant, 2002; West, 2003; Benbya, Passiante, & Belbaly, 2004)
4) The presence of collaborative tools, such as forums or chat rooms, which support the collaboration and communication (see also NECCC, 2000c; West, 2003)
5) Engagement of these functions to provide an interactive and attractive environment for using the portal (see also Huang & Chao, 2001; West, 2003; Benbya, Passiante, & Belbaly, 2004).

With regard to electronic government service delivery, besides the requirement of the services to be provided in an efficient way, the literature express three major concerns: (1) ensuring confidentiality and privacy in interacting with the government online by preventing government misuse of information and (2) providing sufficient security of electronic transactions related to government services, which includes safeguards against computer hacking, and guaranteeing universal access to on-line services; (3) making the services

available to all stakeholders, including people with disabilities and non-English speakers (Detlor, 2000; NECCC, 2000c; Lane & Lee, 2001; Detlor & Finn, 2002; Holzer & Melitski, 2003; West, 2003; Benbya, Passiante, & Belbaly, 2004)

E-government Score

The present study considers e-government as an innovation and examines adoption of municipal e-government initiatives by applying an approach that combines e-government, ICT, and innovation theory principles. At the first stage of the research, the level of e-government adoption for each municipality will be determined by computing its *e-government score*, which is the **dependent variable** in the present research. The measurements for this variable are obtained from web portals of municipalities that responded to the 2004 ICMA E-government Survey. To compute the e-government score for each municipality in the sample, the municipal web portal was accessed online. The methodology for computing e-government score was developed by combining and modifying three overlapping approaches to evaluate government websites by Huang & Chao (2001), Holzer & Melitski (2003), and West (2003b). In evaluating government websites, these approaches focus on similar website characteristics (Table 2.1).

The methodology used in the present research focuses on measuring the following seven components that will determine e-government score for each municipality's web portal:

1. Content
2. Usability
3. Services
4. Digital Divide
5. Citizen Participation

6. Restricted Areas
7. Privacy Policies

The description of the e-government score components is presented in the methodology chapter.

Table 2.1: Website Characteristics Measured in Earlier Website Evaluation Research

Huang & Chao	Holzer & Melitski	West
• Privacy Policies • User-friendliness of websites interface • Sitemap • Number and types of online government services • Availability of contact information for public servants and elected officials • Availability of office hours for public servants and elected officials • Online access to archives • Disability access • Multimedia materials • Time-sensitive information • Customization option • Citizen participation	• User-friendliness of websites interface • Interface design consistency • Time-sensitive information • Biographies of government servants and elected officials • Online access to archives	• Readability levels of websites • Availability of contact information • Privacy Policies • Security Policies • Online access to archives and databases • Transaction involving use of credit cards or digital signatures • Foreign Language access • Ads and user fees • Restricted areas • Customization • Multimedia materials

INDEPENDENT VARIABLES: INTERNAL AGENCY CHARACTERISTICS

Municipal Agency Size

In most of the innovation literature, organizational size is considered to be one of the most important predictors of innovation adoption (Daft & Becker, 1978; Damanpour, 1992; Brudney & Selden, 1995; Kraemer & Dedrick, 1996; Weare, Musso, & Hale, 1999; Streib & Willoughby, 2002). Literature considers size either as an internal agency characteristic or an

environmental factor (Brudney & Selden, 1995). As an internal agency characteristic, size most often is measured as number of agency employees.

The positive effect of agency size on its propensity to innovate is explained in the literature by the fact that large organizations have more diverse facilities, more slack resources and more professional and skilled staff, all of which allows them to adopt a large number of innovations.

There is, however, an alternative perspective, according to which large size does not necessarily result in greater adoption of innovations (Brudney & Selden, 1995). Small organizations may in fact be more innovative because they have more flexibility, a higher capacity to adapt and improve, and less difficulty in accepting and implementing change.

For the present research, originally it was planned to keep agency size as a separate variables. However, additional review of the literature on innovation and ICT implementation revealed that the agency size variable is often collinear with the municipality size. Therefore, the decision was made to use municipality size as a proxy for agency size. For additional information, refer to the discussion of the municipality size variable in this chapter.

Financial Stability

Similar to size, financial stability, or slack resources, is claimed to be a top predictor of innovation (Rosner, 1968; Mohr, 1969; Danziger & Dutton, 1977a; Danziger & Dutton, 1977b; Daft & Becker,1978; Damanpour, 1991; Brudney & Selden, 1995; Kraemer & Dedrick, 1996; Weare, Musso, & Hale, 1999; Musso, Chrisopher, & Hale, 2000; Streib & Willoughby, 2002; Kim & Bretschneider, 2004). In the context of adoption of municipal e-government initiatives, financial stability may also be considered both as internal agency

characteristic and environmental factor. As an agency characteristic, financial stability is usually measured as difference between revenues and expenditures of the agency, per capita financial resources in municipality, and presence of external funding for e-government initiatives, such as federal or state grants. In the present study study, an additional proxy measure for slack resources can be the size of a separate e-government budget in municipality.

Innovation literature provides several explanations for the reasons financial stability of the agency, characterized by slack resources, is positively associated with innovation. According to Rosner (1968), financially stable agencies "can afford (a) to purchase costly innovations, (b) to absorb failure, (c) to beat the costs of instituting innovations, and (d) to explore new ideas in advance of actual need." Alternative to this explanation is a "problem-solver" perspective on the slack resources-innovation relationship (Danziger & Dutton, 1977a), according to which "the very lack of available resources stimulates the search for innovative procedures or technologies that are expected to be cost-effective." Daft & Becker (1978) provide counter-arguments to the "problem-solver" perspective by arguing that agencies with lack of slack resources are unlikely to be early adopters. Early adopters often have to absorb some failure costs when they test new ideas that have not been proven. Absence of slack resources makes it difficult to cope with the failure costs. On the other hand, later adopters that emulate initiatives successfully implemented by other agencies are facing with a less chance of failure. Streib & Willoughby (2002) further argue that in the time of need (such as crisis) little can be done without adequate resources. This may give affluent municipal agencies an advantage.

Research seems to demonstrate that financial stability and organization's size are often correlated (Damanpour, 1992). Large organizations tend to have more slack resources that allow them to spend on innovations or tolerate potential loss in case the innovation was unsuccessful.

For the present research, financial stability is operationalized as:

- Outside funding for e-government initiatives of the municipality (state and federal grants)
- Having a separate budget for e-government initiatives

The following hypotheses are tested with regard to the financial stability of municipal agencies:

H_1: Outside funding for e-government initiatives of a municipal agency is positively associated with its e-government score.

H_2: Having a separate budget for e-government initiatives is positively associated with its e-government score.

Form of Government

In ICT innovation theory literature, the form of government has been considered an important determinant of innovation adoption (Danziger & Dutton, 1977a; Danziger & Dutton, 1977b; Brudney & Selden, 1995; Streib & Willoughby, 2002; Kim, 2003; Kraemer & King, 2003; Kim & Bretschneider, 2004). For the purpose of this research, form of government is considered an internal characteristic of a municipal agency. From the legal perspective, the form of municipal government is a characteristic that can be changed

internally by a municipal governing board holds ultimate authority to act for the municipality.

Most authors argue that municipalities with the council-manager form of government tend to focus more on maintaining internal organizational efficiency and are more likely to adopt ICT innovation. Empirical findings have been contradictory, however. In case of e-government, it is unclear what the effect of the form of government on the adoption of e-government initiatives might be. As previously mentioned, e-government has a broader and more complex influence than ICT on municipal government operation, which makes it harder to make predictions. According to Kim (2003), in the mayor-council form of municipal government, the emphasis is made on relationship with citizens and meeting citizen needs to assure reelection of elected officials. The major reason why managers of council-manager types of municipality tend to focus on internal efficiency is that their reappointment by the council is related to their ability to operate efficiently within the budget limits. Kim's model would fit an explanation of ICT implementation. However, successful implementation of e-government initiatives produces both effects. The outcome of e-government initiatives – a web portal – is very visible to citizens. E-government improves relationships between elected officials and citizens by providing citizens with a broader and more convenient access to government services online which makes it an attractive goal for council-manager type because of increasing the possibility of their reelection. On the other hand, e-government may increase efficiency of municipal agency operation, which hypothetically makes it popular with the council-manager governments. Though, due to its broad benefits, e-government has the tendency to erase the differences between municipalities with different forms of government regarding their propensity to adopt e-government initiatives, it is more

likely to happen at the more advanced stages of e-government. Because most of the municipalities have not reached e-government stages that advanced, it is likely that the differences are still present.

The present study focuses on municipalities with two forms of government: mayor-council and council-manager. The following hypothesis related to the form of government is tested:

H_3: The council-manager form of government in a municipality is positively associated with the e-government score.

Strategic Planning and Reengineering

Discussions about the importance of strategic planning consistently emerge in literature on e-government, innovation, and information technology implementation (GAO, 1994; Brudney & Selden, 1995; Kling, 1996; Kling & Allen, 1996; GAO, 2000; Fountain, 2001b; Beaumaster, 2002; GAO, 2002a; GAO, 2002b; Moon, 2002; Relyea, 2002; Kraemer & King, 2003; Kim & Bretschneider, 2004). Strategic planning involves setting organizational goals and objectives and developing strategies for achieving them. An important purpose of strategic planning is also to determine the needs of customers and to develop approaches for meeting these needs in the most effective and efficient way. With regard to municipal e-government this would mean finding out what online services residents and businesses of the municipality consider to be most useful. One of the best mechanisms of doing this, most often emphasized in the literature, is to conduct citizen surveys.

Thus, the data on whether municipality has conducted citizen surveys to determine the demand for e-government services is providing a proxy for the strategic planning variable. The following hypothesis with regard to the strategic planning variable is tested:

H_4: Conducting citizen surveys by municipalities to determine what online services residents and businesses want is positively associated with the e-government score.

Strategic planning is directly linked to business process reengineering, which is considered as one of the e-government dimensions by this study. Importance of reengineering is repeatedly emphasized in e-government and ICT innovation literature. As applied to e-government, a major goal of reengineering is to overcome an approach to ICT implementation known as technological determinism. Technological determinism occurs when government agencies merely automate their existing processes with an expectation that this alone would lead to cost savings and increased efficiency. Most scholarly writers now agree that to develop a functional e-government, agencies may have to reevaluate their mission, management practices, and the way their existing tasks are carried out (Kling & Allen, 1996; Margetts, 1999; Seneviratne, 1999; Atkinson & Ulevich, 2000; Fountain, 2001b; Harvard Group, 2001; OMB, 2002a; OMB, 2002b, OMB, 2003). The results of reengineering include, among others, change in the number and role of staff, increased efficiency, reduction in operating costs.

The following hypothesis is tested with regard to the municipal agency reengineering:

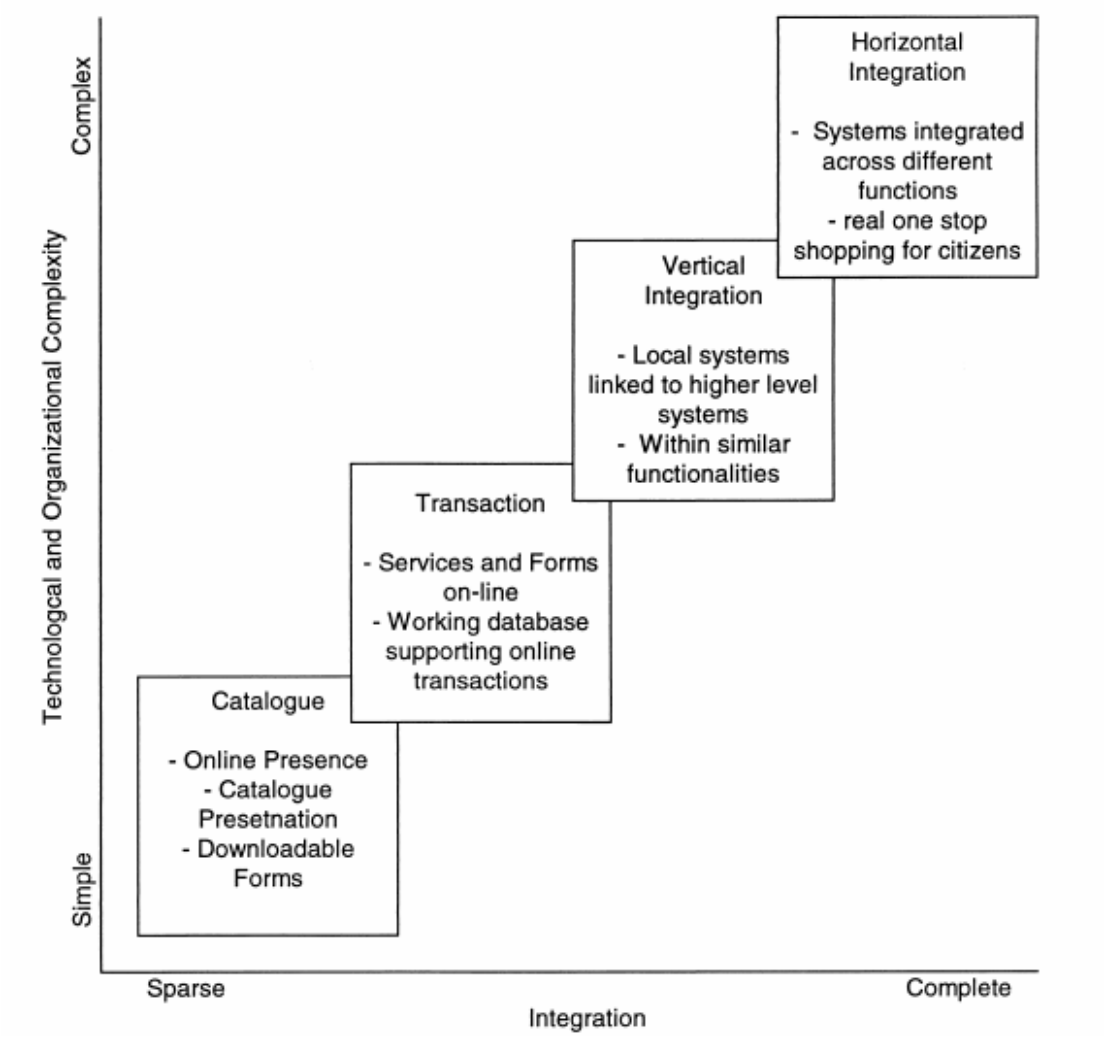
H_5: Implementing e-government initiatives that have resulted in reengineering of business processes is positively associated with the e-government score.

Collaboration among Departments

In their definition of web portal that was presented earlier, Detlor & Finn (2002) put a special emphasis on the importance of accomplishing the dual goal of the portal, which is to organize the products and services in an *intuitive* and *integrated* fashion, also known as a "one-stop shopping" (Detlor, 2000; NECCC, 2003; Fountain, 2001a; Huang & Chao, 2001; Lane and Lee, 2001; Detlor & Finn, 2002; Fountain, 2003b; OMB, 2003b).

The intuitive component is achieved when the web portal is organized on the basis of "service access points" as opposed to functions or departments (Lane & Lee, 2001). Lane & Lee have proposed an e-government development model that includes four stages: (1) cataloguing, (2) transaction, (3) vertical integration, and (4) horizontal integration (Fig. 2.2). Each subsequent stage represents a higher level of complexity and integration of e-government services. Lane and Lee argue that at the lower stages of e-government, such as cataloguing and transaction, online access to e-government products and services is organized by the departments rather than the services. Thus, the overall structure of the web portal at these stages duplicates organizational chart of the agency or agencies that own the portal. Consequently, in order to access a particular product or service, the citizen has to know which department is responsible for this service. Thus, at the lower e-government stages a web portal, in theory, makes government information more accessible to the public. In practice, however, it simply replicates paper-based classification schemes of an organization and therefore merely automates the status quo organizational processes (OMB, 2002a; Fountain, 2003b).

Figure 2.2: Lane and Lee's Four-Stage E-government Model



Source: Lane, K. & J. Lee (2001) Developing fully functional e-government: A four stage model. *Government information quarterly*, 18: 122-136.

The problem of merely replicating organizational structure through web portal may be solved by utilizing a "citizen-centered" rather than "bureaucracy-centered" approach to web portal design by organizing online information in accordance with "mental models" of users (Fountain, 2003b), that is, by the type of service and product. This is normally achieved through the taxonomy feature of web portal. Taxonomy, which is also referred to as classification scheme or categorization scheme, addresses strategies of organizing information on the portal for easy retrieval. This is accomplished by grouping together

similar items into broader topics, which are further grouped into ever-broader hierarchies in such a way that portal users can logically determine the location of a particular information or service (Detlor, 2000; Benbya, Passiante, & Belbaly, 2004). On the federal level, a formal goal is for citizens and businesses to be able to access online government services and information "within three clicks." State and local governments are recommended to follow the suit.

The integration component, the other portal characteristic in the Deltor and Finn's portal definition, can be achieved through establishing interdepartmental and interorganizational networks (Fountain, 2001a; Fountain, 2003b). The emergence of such networks represents the most significant difference between traditional government and e-government approaches. In government, interorganizational networks carry the potential for dramatically increasing efficiency of operation for all agencies within the network. They enable eliminating "stovepiped structures" that exist within and between government agencies (Atkinson & Ulevich, 2000, Fountain, 2003b). Fountain (2003b:29) describes "stovepipes" in government as an inability of public agencies and their departments to communicate across their organizational boundaries "due to lack of interoperability across hardware, software or data systems; professional and cultural norms that prohibit or discourage information sharing; or legal strictures against communication." Organizational networks have a potential to provide an efficient and more customer-centric solution to overcoming traditional stovepiped structures. They enable collaboration among different agencies or among different departments within an agency. Thus, on a municipal level, a project initiated by the planning department may also require data from the tax assessment office, the department of transportation, the public works and utilities department, the department of

parks and recreation, etc. Traditional stovepiped organizational structure would most likely require the planning department to send formal requests to all other departments from which the data are required. It might take a considerable amount of time for these requests to go through hierarchical structures of all involved departments, which afterwards would have to prepare the necessary data and send them back, again through their hierarchies. Network structure eliminates this vertical stovepiped interdepartmental communication. Network efficiency results from sharing organizational databases, which would allow employees from one department seamlessly access data collected and stored by other departments in real time. In addition to streamlining the process of data acquisition, network structure addresses the issue of duplicate data collection by the organizational departments. In characterizing organizational networks, Fountain (2001a) mentions that enabling organizations or departments that are part of the same network to access each other's databases eliminates the necessity to spend resources on collecting redundant data.

Another important efficiency-related benefit of increasingly integrated networking is that at all organizational levels members of the network have instant access to the most current information. A networked environment also prevents information losses that normally occur as information gets filtered when passed in physical form through traditional hierarchical structures.

Customers also potentially benefit from networks as they access government services online through a single web portal, without being concerned about organizational boundaries that determine responsibilities and functions of government agencies and departments or their limited jurisdictions. Full-scale government portals are supposed to be set up in such a way that government customers who submit personal information in the process of obtaining

government services do not have to input the required personal data more then once, after which the data are automatically distributed to all interlinked databases that use them.

Government networks present two major challenges, however. The first is technical in nature and is related to the issue of data standardization. Initially, databases of most public agencies and departments were created without the goal of being shared with outside entities. As such, they were designed in various formats and for different computer platforms. For agencies to be able to seamlessly share data, their databases have to be converted into a standard format (Fountain, 2001a). The second challenge relates to the bureaucratic structure of public agencies. Networks may challenge such fundamental concepts of traditional government as jurisdiction, accountability, and command-and-control hierarchy, as well as undercut monopoly of bureaucratic organizations on the information they traditionally collect and own (Bekkers, 1998; Fountain, 2001a; Fountain, 2001b; Nye, 2002).

Clearly, establishing interogranizational or interdepartmental networks and overcoming challenges of data standardization and institutional resistance of bureaucratic culture in order to provide an intuitive and integrated access to e-government products and services would require considerable amounts of collaboration among departments and agencies.

The following hypothesis is tested with regard to the collaboration of municipality departments:

H_6: Lack of collaboration among municipality departments is negatively associated with the e-government score.

Staff Resistance to Change Associated with Implementing E-government Initiatives

Literature on innovation, ICT, and e-government consistently mentions the possibility of staff resistance when it comes to organizational change or reengineering caused by adoption of any innovation in general or by implementing new ICTs or e-government initiatives in particular (Mohr, 1969; Yin, Heald, Vogel, Fleischauer, & Vladeck, 1976; Dawes, Bloniarz, & Kelly, 1999; Atkinson & Ulevich, 2000; Fountain, 2001a; OMB, 2002a; Tat-Kei Ho, 2002; Edmiston, 2003; Rogers, 2003; Kim & Bretschneider, 2004). In government, there are two major sources of such resistance.

The first source of public personnel resistance to e-government initiatives is the function of the general risk-averse culture of government, rigid bureaucratic structure of public agencies, and their accountability to multiple stakeholders. The general argument is that bureaucratic structure of government agencies is characterized by highly institutionalized hierarchical relationships that discourage innovative behavior. Furthermore, government agencies are accountable to multiple stakeholders with different, oftentimes conflicting, interests. This combination of bureaucratic structure and diffused accountability makes change in government agencies possible only if there is an agreement between a number of individuals and institutions involved (Wilson, 1989; Seneviratne, 1999). All this results in inefficiencies of public agencies, compared to private sector organizations. However, some scholars argue that these inefficiencies were deliberately designed under the constitutional principles of separation of powers and checks and balances to ensure that government acts deliberately, protecting "the fragile values of a vulnerable citizenry form the overbearing concern for efficiency and efficacy" and preventing "arbitrary governmental acts to go unchecked" (Rosenbloom & O'Leary, 1997; NECCC, 2000c).

The second source of possible public employees' resistance to the adoption of e-government initiatives relates to their relatively low skills in the sphere of information technology (Hodas, 1996; Heeks, 1999; Kim & Bretschneider, 2004). The innovation theory (Mohr, 1969, Rogers, 2003) posits that innovation adoption by an organization is a function of the motivation to innovate, the strength of obstacles against innovation, and the availability of resources to overcome these obstacles. Public agencies, particularly on the municipal level, often lack resources for training, attracting, and retaining sufficient and capable staff. Besides, municipal government employees may resist e-government initiatives due to their lack motivation to learn new skills associated with e-government implementation. Bureaucratic structure of government agencies oftentimes does not have effective mechanisms to reward public employees who are enthusiastic about improving their ICT skills, required for successful implementation of e-government initiatives, or to punish those who refuse to do so.

The first source of staff resistance to the adoption of e-government initiatives will persist for as long as democracy remains committed to the principles of constitutionalism. Though this resistance creates inevitable barriers to efficiency in exercising "the will of the majority," it protects interests of vulnerable minorities from "illegitimate exercise of majoritarian power" (Kakabadze, Kakabadze, & Kouzmin, 2003). Thus, in relationship to e-government, this form of resistance can address such important issues as digital divide.

As for the second type of resistance, it is certainly a negative impediment to e-government implementation. On the municipal level, it can be addressed by changing organizational cultures of municipal agencies, leadership support, and political endorsement of e-government initiatives. (Atkinson & Ulevich, 2000; Streib & Willoughby, 2002).

The following hypothesis has been tested with regard to the staff resistance to change:

H_7: Staff resistance to change is negatively associated with the e-government score.

Privacy and Security

National Electronic Committee Coordinating Council (2000b:29) provides the following definitions of privacy and security as they apply to e-government:

> ***Privacy*** – The assurance that information provided for a specific transaction will not be used by the recipient for purposes not authorized by the provider.
>
> ***Security*** – Security is protection from intended and unintended breaches that would result in the loss or dissemination of data.

Ensuring adequate levels of privacy and security is essential for the successful functioning of electronic government. It is important that government protects confidentiality of the personal data citizens are providing online as part of obtaining government services. On the federal level, privacy and security of electronic transactions with government have been given a considerable attention. Thus the Privacy Act of 1974 that addresses a number of aspects of personal privacy was amended in 1988 by passing the Computer Matching and Privacy Protection Act. This later act regulates federal computer matching by determining the instances when electronic data on individuals may be used for purposes other than those prompting their collection. Privacy issue is addressed in the E-Government act of 2002 which contains guidance to federal agencies on posting privacy notices on their websites.

State and local government make efforts to keep up-to-date with federal privacy initiatives. Nevertheless, despite government efforts to ensure individual privacy and

security during online transactions with government, 34 percent of the online users think that the Internet remains a serious threat to privacy (Lane & Lee, 2001). One percent of people who stopped using the Internet completely said that they did it out of concern for their privacy. At least some of these concerns are legitimate. Government agencies have been known for selling information about citizens without citizen permission or knowledge (Atkinson & Ulevich, 2000, NECCC, 2000a). Naturally, the practice of selling personal information without their consent is opposed by citizens. Research consistently indicates that citizen do not want the data collected on them by the government to be used for commercial purposes; it also appears that most people have been unaware that these data have been used that way (NECCC, 2000c).

Online security issues need also to be addressed in a consistent manner. As citizens submit information to governments over the Internet, the risk of it being stolen or misused persists. Thus, it is important that government web portals contain a comprehensive privacy and security policies which specifies citizens' rights and assures that the collected data are used for legitimate purposes (NECCC, 2000a; OMB, 2002a; Holzer & Melitski, 2003).

According to West (2003a; 2003b), the number of web portals that offer privacy and security policies is increasing both on the state and municipal levels. Overall, however, it continues to remain relatively low. Thus, in 2003 only 54 percent of state web portals contained some sort of privacy policy, and 37 percent contained a security policy. For municipal governments, these numbers were even lower: 41 percent and 27 percent respectively. Since in his study West focused only on 70 largest municipalities in the U.S., it is unknown what the situation is like in smaller jurisdictions.

The following hypotheses are tested with regard to the effects of the privacy and security problems on the overall e-government score:

H_8: Having privacy-related problems is negatively associated with the e-government score

H_9: Having security-related problems is negatively associated with the e-government score

Professional Staff

Within ICT innovation literature, it is frequently argued that high professional level of agency staff has a positive effect on innovation adoption (Daft & Becker, 1978; Brudney & Selden, 1995; Streib & Willoughby, 2002). As for the e-government and ICT literature, employing professionals is universally considered as a prerequisite for success. E-government is a technologically advanced endeavor. Succeeding in it requires agency employees who have knowledge and skills in computer hardware and software, as well as management skills for the human side of ICT implementation. Even if part or all of the development of e-government services is outsourced professional staff may be required for routine maintenance.

Developing e-government services in-house is used as a proxy for staff professionalism in the present research. The following hypothesis is tested with regard to the level of staff professionalism in the sphere of e-government:

H_{10}: Developing e-government services in-house is positively associated with e-government score.

Support from Elected Officials

Support from elected officials is regarded as an important factor for the propensity to innovate and innovation success, as well as for the success of e-government initiatives (Danziger & Dutton, 1977a; Daft & Becker, 1978; Berry, Berry & Foster, 1998; Berry & Berry, 1999; Caldow, 1999; Atkinson & Ulevich, 2000; NECCC, 2000b; Chidurala, Kaminskas, Pathak, Sridhar, & Tsfati, 2001; Streib & Willoughby, 2002; Fountain, 2003b). According to Caldow (1999), support from local elected officials translates to adoption of policies that favor e-government. Similarly, Chidurala, Kaminskas, Pathak, Sridhar, & Tsfati (2001) argue that e-government project leaders must continuously seek and cultivate political support to ensure resource availability for e-government.

A White Paper by the National Electronic Commerce Coordinating Council (2000b) recommends that elected officials take the lead in using e-government tools for civic engagement. Using e-government resources, elected officials can reach out to citizens and encourage citizen participation in governance.

Fountain (2003b), while acknowledging that elected officials and their staff exercise significant influence over the shape of e-government and make critical decisions e-government decisionmaking, points out that it is difficult for them to understand and convert the information they receive regarding technology issues into policies, which is potentially detrimental, since, as Fountain argues in her earlier work (Fountain, 2001b), "many issues that appear to be exclusively technical are also deeply political and strategic in nature." The solution, according to Fountain (2001b), is for public officials to become "proficient at the network game."

The following hypothesis is tested with regard to the support from elected officials variable:

H_{11}: Lack of support from elected officials in municipality is negatively associated with the e-government score.

Intranet

Intranet is a set of applications built on an Internet-based infrastructure designed for internal use by employees of a single organization (Datlor, 2000). Intranets use the same protocols as the Internet and are accessible through the Web. Intranets, however, are not open to the public; they are completely separate and secure through firewalls (Caldow, 1999). It has been pointed out earlier that e-government may streamline interdepartmental collaboration by replacing traditional stovepiped approaches of data handling with networked approaches, which may significantly increase efficiency of government operations. Intranet provides the technology infrastructure that enables this nonlinear complex collaboration among departments through electronic work flow and data exchange across departmental boundaries (Caldow, 1999, NECCC, 2000c).

The following hypothesis is tested with regard to the intranet variable:

H_{12}: Having an intranet is positively associated with the e-government score.

INDEPENDENT VARIABLES: EXTERNAL ENVIRONMENTAL FACTORS

Municipality Size

Municipality size is considered one of the strongest predictors of innovation by innovation literature (Mohr, 1969; Baldridge & Burnham, 1975; Danziger & Dutton, 1977a; Danziger & Dutton, 1977b; Stevens, Cahill, & Overman, 1990; Damanpour, 1992; Brudney & Selden, 1995; Weare, Musso, & Hale, 1999; Musso, Chrisopher, & Hale, 2000; Tat-Kei

Ho, 2002; Rogers, 2003). Unlike this is the case when size is internal agency characteristic, there is no alternative perspective that would claim smaller municipalities to be more advanced from the point of view of innovation adoption. Size is usually measured as the number of municipality residents.

Agnew, Brown, & Herr (1978) argue that municipality size often determines the "need" for an innovation. According to the authors, the need for an innovation emerges once certain local threshold conditions have been met, such as population size and associated economies of scale that are necessary to adopt an innovation. For example, a proportion of residence with access to the Internet may influence the decision of municipality to adopt e-government initiatives.

In the present research, the municipality size variable is operationalized as the number of municipality residents. The following hypothesis is tested with regard to municipality size variable:

H_{13}: Municipality size is positively associated with the e-government score.

Municipality size is used as a proxy for agency size, and the agency size variable was dropped. Using municipality size as a proxy for agency size has been done before in research on innovation in public sector (Smith & Taebel, 1985; Baker, 1997) and is considered to be an acceptable method. A major limitation of using municipality size as a proxy for agency size is that it is impossible to test the hypothesis that smaller organizations, being generally more flexible, may in fact be more innovative. However, while positive relationships between smaller size of an organization and higher innovativeness have been established in some of the private-sector research, results of the research that tested size-

innovativeness relationships in public sector virtually unanimously conclude that larger public agencies are more innovative.

Percentage of Urban Population

Urban population has been traditionally associated with higher levels of innovation adoption (Walker, 1969; Grey, 1973; London, 1995; Weare, Musso, & Hale, 1999). Research on e-government has produced similar findings. Weare, Musso, & Hale (1999) have demonstrated that municipalities with higher concentrations of urbanized residents were more likely to have web sites. U.S. Department of Commerce report (2002) indicates that, in 2001, 49.1 percent of central city (urban) residents, 52.9 percent of rural residents, and 57.4 percent of suburban residents had access to the Internet. A research by the Pew Internet & American Life Project (Bell, Reddy, & Rainie, 2004), which looked at the rate of Internet uses for same categories in 2003, produced the following numbers: 67 percent for urban residents, 66 percent for suburban residents, and 52 percent for rural residents.

The following hypothesis is tested with regard to municipality size variable:

H_{14}: Percentage of urban population is positively associated with the e-government score.

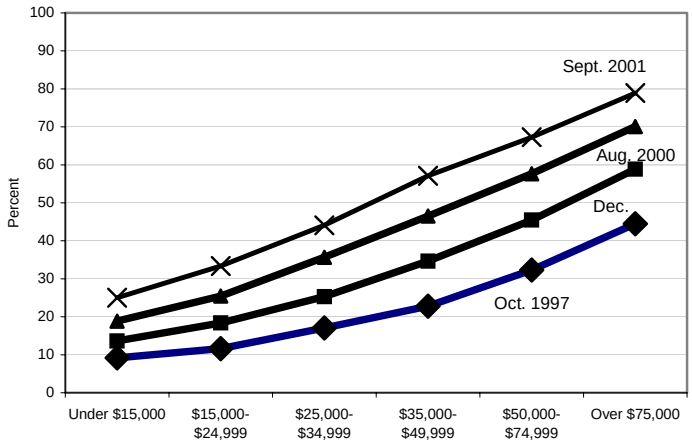
Socioeconomic Status of Municipality Residents

Socioeconomic status (SES) of municipality residents is another strong predictor of its propensity to innovate and to have a higher rate of residents online (Walker, 1969; Danziger & Dutton, 1977a; Danziger & Dutton, 1977b; Stevens, Cahill, & Overman, 1990; Baker, 1997; Weare, Musso, & Hale, 1999; Tat-Kei Ho, 2002; Madden & Rainie, 2003; Kim & Bretschneider, 2004). The e-government, ICT innovation, and generic innovation literature

has consistently demonstrated that favorable public attitudes toward various technologies are substantially higher among higher socioeconomic strata (Danziger & Dutton 1977a; Baker, 1997). As it has been the case with other innovations, demand for e-government services is likely to be higher among people belonging to high SES who tend to be more educated, have higher ICT-related skills, and have access to computers and the Internet. Advanced reading, writing, and analytical skills are important for being able to use the Internet effectively (Norris, 2001; Kakabadze, Kakabadze, & Kouzmin, 2003; Warschauer, 2003); besides, complexity and volume of online government information requires people to be able to extract the information or services they need as well as to evaluate the results of their search (Fountain, 2001b). Several studies of computer and the Internet use by the U.S. Department of Commerce (2002) have demonstrated that individuals who live in high-income households are more likely to be computer and Internet users than those who live in low-income households (Figure 2.3). The same report has linked educational attainment to higher rates of computer and Internet use (Figure 2.4). In 2001, more than 80 percent of the Internet users had some sort of a graduate degree, while Internet use for people whose level of education was less than high school was only 12.8 percent.

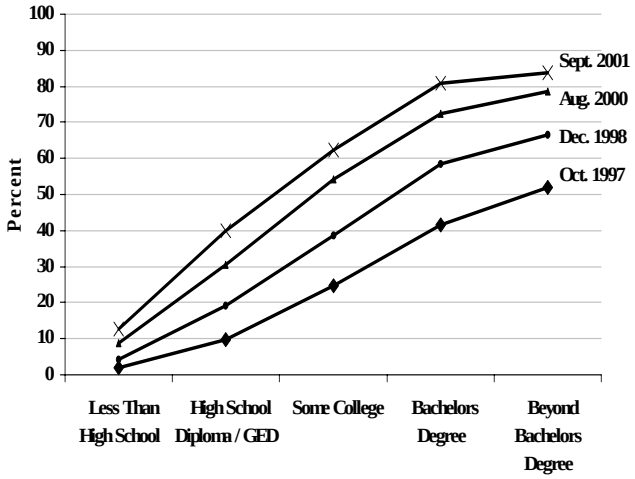
Further the U.S. Department of Commerce reports have revealed positive relationship between household income and accessing e-government services online. For example, in 2001, 28.1 percent of people with income under $15,000 had Internet access. This number was higher for people with income between $35,000 and $49,999 (29.6 percent). Finally, 35.1 percent of people with income over $75,000 accessed government information online.

Figure 2.3: Internet Use by Income, Persons age 3 and Older



Source: U.S. Department of Commerce (2002), using U.S. Census Bureau Current Population Survey Supplements.

Figure 2.4: Internet Use by Educational Attainment, Persons age 25 and Older



Source: U.S. Department of Commerce (2002), using U.S. Census Bureau Current Population Survey Supplements.

Similarly, research by the Pew Internet & American Life Project (Madden & Rainie, 2003) has established that people with higher levels of income and education are in fact more likely to have used government websites.

It would be therefore expected that high SES, which increases demand for e-government services, is also correlated with higher levels of providing these services. In the e-government literature, the social component of SES is addressed by Weare, Musso, & Hale (1999) when the authors discuss its influence on the diffusion rate of the municipal web pages. In their research the social component of SES (to which they refer as "social elitism) was measured as the percentage of residents that have earned a B.A. degree and the percentage of resident workers who have managerial careers. The economic component of SES is commonly operationalized as mean household income, low percentage of people in municipality below poverty level, mean property value, and average rent.

In addition to contributing to understanding of the scope and quality of municipal e-government, SES may also be an indicator of the presence of "digital divide" in a municipality. Digital divide refers to a gap between the "information-rich" and "information-poor" socioeconomic strata with regard to the access these two strata have to e-government services and the benefits they can reap from using them. The digital divide problem is further addressed in the discussion of the next independent variable, ethnic diversity.

For the present research, SES of municipality residents has been operationalized as:

- Percentage of municipality residents of 25 years and over with B.A. and higher degree
- Mean per capita income of municipality residents
- Percentage of municipality residents below poverty level

The following hypotheses are tested with regard to SES:

H_{15}: Percentage of municipal residents with B.A. and higher degree is positively associated with the e-government score.

H_{16}: Mean per capita income of municipality residents is positively associated with the e-government score.

H_{17}: Percentage of municipality residents below poverty level is negatively associated with the e-government score.

Ethnic Diversity

Ethnic diversity is believed to have a negative effect on e-government and ICT initiatives. (Danziger & Dutton, 1977a; NTIA, 1995; NTIA, 1998; NTIA, 1999; NTIA, 2000; Streib & Willoughby, 2002; Tat-Kei Ho, 2002; Madden & Rainie, 2003; Warschauer, 2003). Based on the U.S. Department of Commerce (2002) report, in 2001, around 60 percent of Whites, Asian American, and Pacific Islanders used the Internet, while usage rates were lower for African Americans (39.8 percent) and Hispanics (31.6 percent)

With regard to using the Internet to access government information, in 2002, according to the Pew Internet & American Life Project research (Madden & Rainie, 2003), White Internet users were more likely to do so compared to African-Americans and English-speaking Hispanic users. On a "typical day," 11 percent of online whites sought government information, compared to four percent of online African-Americans and eight percent of online English-speaking Hispanics.

In their research on computer innovation in local government, Danziger & Dutton (1977a), applied "ethos theory" to test negative relationships between computer innovation and ethnic diversity. Ethos theory suggests that higher social class groups tend to support

initiatives and policies, which benefit the general community rather than specific groups, such as implementing computers in municipalities to increase efficiency of government agencies. Certain ethnic groups, on the contrary, are characterized as "private-regarding," which means that they tend to support programs that allocate resources directly to their members. Danziger and Dutton failed to find proof for the ethos theory with regard to computer innovation in local government. With e-government as the dependent variable, ethnic diversity is expected to be negatively associated with the e-government score. However, the association may stem not from the ethos theory explanation of ethnic groups being private-regarding, but from the affect of digital divide. E-government and ICT literature has repeatedly demonstrated that representatives of ethnic groups tend to be less educated, less wealthy, and have less access to the Internet. Percentage of people whose first language is not English is also significantly higher among ethnic groups' representatives. West (2003a), however, found only 13 percent of governmental websites offered any form of foreign language access. Therefore, municipalities that have higher concentration of ethnically diverse groups may score lower on the scope and quality of e-government services because there is an insignificant residents demand for these services (Tat-Kei Ho, 2002).

Ethnic diversity of municipality residents has been operationalized as:

- Percentage of nonwhite municipality residents
- Percentage of non-English-speaking households in the municipality

The following hypotheses are tested with regard to the economic elitism variables:

H_{18}: Percentage of nonwhite municipality residents is negatively associated with the e-government score.

H_{19}: Percentage of non-English-speaking (linguistically isolated) households in the municipality is negatively associated with the e-government score.

Unemployment

According to the U.S. Department of Commerce 2002 report, "A nation online: How Americans are expanding their use of the Internet," people who are employed use both computer and Internet more often. Thus, in 2001, 73.2 percent of employed people (age 16 and older) were computer users and 65.4 percent were Internet users. In contrast, only 40.8 percent of people who were not employed were computer users and 36.9 were Internet users.

In the present research, the unemployment rate is operationalized as the percentage of municipality residents that have no disability and are unemployed. The following hypothesis is tested with regard to the unemployment variable:

H_{20}: Unemployment rate in the municipality is negatively associated with the e-government score.

Geographic Region

The hypothesis that the geographic region where an administrative jurisdiction is located affects the jurisdiction's innovativeness has been repeatedly tested within the models of policy innovation research. The hypothesis has also been tested in studies on innovation adoption by the states and municipalities (Walker, 1969; Gray, 1973; Danziger & Dutton, 1977a; Danziger & Dutton, 1977b; Savage, 1978; Berry, 1994a; Berry, 1994b; Berry, 1994c; Berry & Berry, 1999). Empirical evidence of the regional effect has been contradictory, at least partially because of the different approaches to creating models of regional affects on innovation adoption. Before the models are described, it should be mentioned that regional

effects on innovation is related to the diffusion theory of innovation adoption. According to the diffusion theory, administrative jurisdictions, such as municipalities or states, learn from each other by borrowing each other's innovation perceived as successful. Thus, according to the Berry & Berry's (1999) summary, several innovation diffusion models exist to test for regional effects.

The national interaction model posits that geographic region has no effect on innovation adoption. According to the model, public officials from all jurisdictions across the nation have equal opportunity to interact with their peers, learning from each other and emulating other jurisdictions' innovations.

Regional diffusion model, on the other hand, assumes that jurisdictions are influenced primarily by those jurisdictions that are geographically proximate (Berry & Berry, 1999). The models are primarily applied to test diffusion of innovations on the state level. According to Berry and Berry, there are two major types of regional diffusion models: neighbor models and fixed-region models. According to the neighbor models, states are influenced primarily by those states with which they share a border. Fixed-region models assume that the nation is divided into multiple regions and states are affected by the policies of other states within the same regions.

Berry & Berry (1990) and Berry (1994) conclude that national interaction model is not suitable for predicting the patterns of policy adoption because regional effect is too important to ignore. They further argued that, in their conventional form, national interaction and regional diffusion models are deficient and do not offer a realistic explanation of innovation diffusion. The authors offer an alternative model, by combining regional diffusion model

with internal determinant model, which takes into consideration internal, political, economic, and social characteristics of states at the time of policy adoption.

Danziger and Dutton (1977a; 1977b) have tested for regional effect with regard to adoption of computer innovations on the local level and found it to be significant. Despite the fact that later research seems to confirm that geographic regional play a significant effect on innovation adoption, including ICT innovation, there might be a possibility that this is not the case with adopting e-government innovations. The main reason for this could be the "deterritorialization" effect of e-government (Donk & Snellen, 1998). Donk and Snellen argue that active utilization of ICTs, such as the Internet, causes the state to lose its territorial basis, which results in deterritorialization, a phenomenon characterized by the erosion of jurisdictional boundaries among government agencies. Deterritorialization diminishes most of the geographic barriers. As a result, jurisdictions have equal chances of learning about each other's practices regardless of their proximity to each other. Tying the deterritorialization to the diffusion of innovation theory, one may argue that national interaction model might better explain adoption of e-government among municipalities.

Agnew, Brown, & Herr (1976) offered another explanation why regional diffusion models might be inaccurate in explaining pattern of innovation adoptions. According to the authors, geographic distance is not always the strongest influence in limiting the flow of information. Some innovations on the local level seem to leap over many municipalities to more distant but larger municipalities. The authors characterized this "leap-frogging" as a hierarchy effect in the flow of information on innovations in which larger municipalities are earlier adopters and smaller municipalities are later adopters. The size of municipality, according to the authors, may also be correlated with the need for innovation, which, in turn,

makes larger municipalities early adopters. Though deterritorialization and hierarchy effects have never been linked to each other in the literature, it may be possible that they can complement each other in explaining adoption of innovations of the national level. Thus, it is likely that deterritorialization occurs unequally among municipalities. Since deterritorialization capability of the municipality is directly related to the level of ICT adoption, municipalities that adopt ICTs at a higher rate are likely to deterritorialize earlier. Since utilizing ICTs always requires additional resources, training and hiring professional staff, it is most likely that there are larger municipalities who can start doing that at earlier stages.

Neither Agnew, Brown, & Herr (1976), nor Donk and Snellen (1998), in their discussion of hierarchy effect and deterritorialization, make any reference to social or political subcultures of jurisdictions (or regions where these jurisdictions are located), which might affect views on the function of government as well as the way the government operates. However, in the U.S., these subcultures can play a substantial role when it comes to an innovation such as e-government. Thus, Daniel Elazar (1994) argues that in the U.S. political landscape consists of three major political subcultures: individualistic, moralistic, and traditionalistic. These subcultures exist side by side, sometimes overlapping one another. For the most part, the subcultures reflect the patterns of migration of people of different origins and backgrounds across the continental U.S. As the result of these migrations, the subcultures have territorial basis and are tied to specific regions of the country. Elazar distinguishes three major regions – New England, the Middle States, and the South – where a certain political culture or a mix of cultures dominates. In the South, for example, traditionalistic political culture prevails. If one is to accept Elazar's classification, one can expect the rate

and the scope of adoption of e-government initiatives (like any other government initiatives) in a municipality to be influenced by the political subculture of the region where this municipality is located. For example, municipalities where moralistic subculture dominates, would be more likely to adopt e-government initiatives than municipalities with traditionalistic subculture. Undoubtedly, deterritorialization and the hierarchy effects with regard to e-government initiatives, are becoming increasingly tangible, however, it is unlikely that at this point they would surpass the regional effects.

The results of a research conducted by the Pew Internet & American Life Project (Spooner, 2003) implicitly support the statement about regional variations of municipal e-government initiatives. The results of the study show that the purposes for which residents of different regions go online vary. The study primarily focuses on such population characteristics that affect the use of the Internet as education and income; some consideration is also given to race, age, and gender of the Internet users. Though the study does not specifically examine accessing government services online by residents of different regions, the results of the study related to other online activities leave enough room to make a conclusion that such differences would likely exist.

It is beyond the scope of the present research to formulate and test hypotheses on how exactly different forms of social or political subculture or sociodemographic characteristics of the regions might affect the scope and quality of municipal e-government initiatives within these regions. The present research simply formulates the hypothesis that *some* difference exist between the municipalities from different geographic regions that are likely to be attributed to internal municipal agencies' characteristics and external environmental factors

of the municipalities, without looking into the direction and the magnitude of these differences.

The geographic region is operationalized as:

- Northeast (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, New Jersey, New York, Pennsylvania)
- North Central (Illinois, Indiana, Michigan, Ohio, Wisconsin, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota)
- South (Delaware, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia, District of Columbia, Alabama, Kentucky, Mississippi, Tennessee, Arkansas, Louisiana, Oklahoma, Texas)
- West (Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming, Alaska, California, Hawaii, Oregon, Washington).

The following hypothesis is tested with regard to the geographic region variable:

H_{21}: The geographic region of a municipality affects its e-government score.

VARIABLES NOT CONSIDERED IN THE PRESENT RESEARCH

This study considers the variables outlined above to be the most important in identifying determinants in adoption of e-government initiatives on municipal level. It should be noted, however, that this list is not exhaustive. There are a number of both internal organizational and external environmental variables that are considered to be beyond the scope of this study.

With regard to organizational variables, it has been argued that a group of variables related to organizational structure and culture might have a role in the propensity of organizations to innovate. Such organizational factors as diversity, formalization of task

structure, centralization, and staff participation in decision making have been identified as determinants of innovation (Wilson, 1966, Sapolsky, 1967; Mohr, 1969; Corwin, 1972; Yin, Heald, Vogel, Fleischauer, & Vladeck, 1976; Danziger & Dutton, 1977a; Danziger & Dutton, 1977b; Damanpour, 1991; Damanpour, 1992). Organizational diversity defined as the number of different tasks, specialists, technologies, incentives, and rewards within the organization encourages new ideas but hinders their adoption. Formalization relates to rigidity of organizational roles and hinders innovativeness. Centralization involves narrow hierarchical channels of authority. It has been correlated with low innovativeness. However, it has been argued that more centralized organizations may be more effective at facilitating adoption. There is a possibility, according to the literature, that staff involvement with decision making process may lead to higher innovativeness. However empirical findings have been contradictory.

Another group of organizational variables that affect innovativeness has been linked to the organizational staff that is directly involved with innovation. Besides level of professionalism, the effect of which on innovation is explored in this study, other characteristics of innovators are considered the literature. Thus it is argued that innovators are usually well educated and use their experience to seek innovative solutions. They are also younger, of higher social status, and of higher income, and they may travel more widely (Yin, Heald, Vogel, Fleischauer, & Vladeck, 1976; Rogers, 2003).

As for the external environmental variables that will not be considered in this study, most important variables include age and gender of municipality residents, as well as the rates of retired and disabled municipality residents.

A series of research has appeared recently that focuses on differences of representatives of various sociodemographic groups regarding their access to the Internet as well as their overall online activities, including using e-government services. Pew Internet & American Life Project reports (Lenhart et al., 2003; Madden & Rainie, 2003; Fox, 2004) and the U.S. Department of Commerce 2002 report "A nation online: How Americans are expanding their use of the Internet" have demonstrated that computer and Internet use are strongly associated with age. Despite the fact that the percent of Americans age 65 or older has increased by 47 percent between 2000 and 2004, older Americans are less likely to be both Internet and computer users. In 2004, only 22 percent of older Americans, or about 8 million, use the Internet. By contrast, 58 percent of Americans age 50-64, 75 percent of 30-49 year-olds, and 77 percent of 18-29 year-olds go online (Fox, 2004).

A research by the Pew Internet & American Life Project (Madden & Rainie, 2003) has demonstrated that, while in 2002 men were still more likely to access e-government information online, the gender gap in this sphere is closing. The U.S. Department of Commerce (2002) report produced similar findings with regard to gender gap in access to the Internet.

According to another report by the Pew Internet & American Life Project (Lenhart et al, 2003) titled "The ever-shifting Internet population: A new look at Internet access and the digital divide," retired and disabled Americans are less likely to have Internet access and less likely to believe that they will ever go online.

Innovation literature indicates that such variables as stable rates of population turnover, and community norms that are characterized by levels of liberalism or conservatism are also

likely to influence the rate and scope of innovation adoption and also may be considered to look at the proliferation of e-government initiatives.

DIGITAL DIVIDE: THE LINK BETWEEN E-GOVERNMENT AND INNOVATION

The two dimensions of e-government that involve external stakeholders – online service delivery and using the Internet to facilitate citizens' participation – have the potential to improve the work of government by enabling citizens and businesses to access government services at any convenient time and by reducing the social and economic costs of citizen participation. On the other hand, it has been argued that these dimensions might create a division between those who have access to computers with Internet access and those who don't. Computer literacy would also play an increasingly important role. People who do not have Internet access, have slow Internet connections, or simply are less familiar with computers would be excluded or may feel intimidated by the technology and would not take advantage of the convenience of online services or withdraw from participation. Based on the research by West (2003b), the average reading level of American adults is 8th grade whereas he has found that governmental websites average about 11th grade in readability and two-thirds were at 12th grade level.

The gap in opportunities to benefit from ICT between the "information rich" and "information poor" is at the center of the digital divide. There is even a potential for e-government to diminish services to the disadvantaged. As public administration authors such as Fountain (2001a) acknowledge, once an agency has established an active Internet presence, it may be more difficult for it to justify providing in-person services, even though many citizens still lack Internet access. Rocheleau (2003) points out that employees of

public agencies that provide online services may face a conflict allocating their workload when they have to face the decision whether they should give priority to in-person or phone requests or to lower transaction cost electronic requests.

The National Telecommunications & Information Administration (NTIA) and Economics and Statistics Administration have conducted extensive research on the digital divide and have published four comprehensive reports on the issue (NTIA, 1995; NTIA, 1998; NTIA, 1999; NTIA, 2000). The digital divide was also a focus of the Hart-Teeter 2003 report on e-government, which summarizes the findings of the study Hart-Teeter conducted on behalf of Council of Excellence in Government. Reports from both organizations consider digital divide to be a serious problem. The statistics show an improvement of access by all groups in society, but with the width of the gap between information rich and information poor diminishing only for some groups (such as gender) while widening for others (racial divide for some ethnic categories). In spite of higher levels of connectivity, the problem of digital divide persists. Thus, according to NTIA (2000), urban high-income households ($75,000 and higher) are more than twenty times more likely to have access to the Internet than low-income rural households, and more than nine times as likely to have a computer at home.

Despite the fact that their costs have considerably decreased, for many people hardware, software, and fees associated with maintaining Internet access are still prohibitively expensive. One of the most popular solution offered to address this issue is to provide people who cannot afford private Internet access with opportunity to get online at no or minimal cost via community access centers (CAC) or Internet kiosks that can be installed in public places, such libraries, shopping malls, transportation terminals, employment centers, etc. (Edmiston, 2003; NTIA, 2000). However, a CAC approach can only provide fragmented and temporary

solution. Thomas and Wyatt (2000) point out that after a person has started taking advantage of online government services by accessing the Internet through a CAC, this practice may stop when the CAC ceases to function or the person moves to a new place with no CAC in proximity. But a more important reason of why CAC approach alone will likely be ineffective is because the digital divide has much deeper roots than simple lack of online access – roots that extend to computer literacy, information competency, and political efficacy.

Education and literacy are factors that affect the digital divide in a way equally important to technical access (Norris, 2001; Warschauer, 2003). Advanced reading, writing, and analytical skills are important for being able to use the Internet effectively (Warschauer, 2003). Besides, complexity and volume of online government information requires people who access this information to be able to search for the information or services they need as well as to evaluate the results of their search (Fountain, 2001a). The data from research demonstrate that education, socioeconomic status, and the use of the Internet are positively correlated with each other. People of lower socioeconomic status who cannot afford Internet access tend also to be less literate. Merely providing them with access would get them online but would not guarantee they would reap all the benefits of e-government. Thus, the digital divide provides an additional reason in favor of access of socially (i.e. digitally) disadvantaged groups to education (Warschauer, 2003), including lifelong education.

Ethnic diversity is also associated with digital divide. Most of the government websites provide majority of their information and services in English (Norris, 2001; Warschauer, 2003). On the other hand, municipal government are dealing with increasing number of incidents when they have to provide services to a sizeable proportions of residents who do

not speak English as the first language. In such cases, having non-English versions of government websites might be a way to go towards eliminating this form of digital divide.

None of the literature has pointed out directly on a link between digital divide and innovation research. Nevertheless such a link exists. Based on research results in the spheres of e-government, ICT, and innovation, it is fascinating, how similar socioeconomic characteristics are for municipalities that score low on innovation and high on digital divide, if one is looking at the environmental factors' variables.

CHAPTER THREE: RESEARCH METHODOLOGY

This chapter addresses the issue of research design and methodology. The chapter contains description of how the sample for the present research was compiled. It describes data sources for the dependent and independent variables. The chapter concludes with a brief description of dependent and independent variables, their levels of measurement, and the research hypotheses.

RESEARCH DESIGN

The main research goal of the present study is to determine which internal characteristics of municipal agencies and which external factors of municipalities across the U.S. affect the quality and the scope of adoption of e-government initiatives. To achieve this goal, an integrated dataset was developed. Three sources were used to compile the dataset: (1) the 2004 ICMA E-government Survey; (2) the 2000 Census Dataset; (3) the data collected from web portals of a sub-sample of municipalities that participated in the 2004 ICMA E-government Survey. The ICMA portion of the dataset was primarily the source for internal agency characteristics variables. The 2000 Census dataset was used to obtain measurements for the majority of external municipality characteristics. Finally, municipal web portals were examined to compute an e-government score, the dependent variable. The three components of the final dataset are discussed below in more detail.

THE ICMA 2004 E-GOVERNMENT SURVEY VARIABLES

The basis of the integrated dataset for the present research is the 2004 ICMA E-government Survey. The survey was developed by the International City/County Management Association with the goal of assessing e-government initiatives of municipal

and county governments. The survey was administered in spring of 2004. The 2004 ICMA E-government Survey is the third survey of local e-government initiatives administered by the ICMA. The first survey was conducted by the ICMA in 2000 in collaboration with Public Technology, Inc. The second survey was conducted in 2002 by ICMA independently. The 2004 survey is five pages long. It consists of five sections exploring the following aspects of e-government: (1) customer service and management, (2) online procurement, (3) geographic information systems, (4) intranet, and (5) financing. Most of the questions included into the survey are multiple-choice. The questions that are not multiple-choice ask about the rates at which certain e-government services are used and an operating budget for information technology. The survey contains one open-ended question. The survey was mailed to 7,944 local governments, including 7,095 municipalities and 849 counties. The respondents also had an option of completing the survey online. ICMA surveys traditionally have high response rates. Overall, 42.9 percent of municipalities and 47.5 percent of counties have responded to the 2004 survey.

The dataset with the responses to the ICMA 2004 E-government Survey was obtained from the ICMA in a spreadsheet format. All data input and data cleaning were done by the ICMA. The ICMA handled all the issues associated with reliability and validity of the survey. The ICMA has a well-established reputation of conducting high-quality nationwide research. This organization is recognized for its adherence to highest level of professionalism and quality of its research products. Therefore, it is assumed that the ICMA has used appropriate procedures to ensure reliability and validity of the data. The dataset obtained from ICMA also included the following additional information for the responding jurisdictions:

- Jurisdiction name, state name, main phone number,
- Population code
- 2000 U.S. Census population figure
- 2000 U.S. Census metro status
- 2000 U.S. Census geographic division and geographic region,
- Municipal form of government
- State number and county number
- National Institute of Standards and Technology Federal Information Processing Standards (FIPS) place codes

Prior to integrating additional variables within the ICMA dataset, the dataset was modified to fit the purpose of the present research. Since the focus of the present research is municipal governments, all responses obtained from the county governments were deleted from the dataset. This reduced the total number of cases to 3,007.

The ICMA received responses from municipalities of different sizes, located in different geographic regions, and with various forms of government. Table 3.1 summarizes the major categories of responding municipalities and response rates associated with municipalities that belong to each category.

The ICMA dataset was further modified by deleting municipalities with forms of government other than mayor-council and council-manager. Finally, the decision was made to reduce the total number of cases in the dataset to a number between 200 and 250. This was achieved by selecting a random sample of 251 jurisdictions. Table 3.2 contains the information on the categories and response rates for the modified ICMA dataset that is used for the present research.

Table 3.1: 2004 ICMA Survey Respondent Categories and Response Rates

Category	# responded	% of sample
Total	3,007	
Municipality size		
Over 1,000,000	5	.2%
500,000-1,000,000	7	.2%
250,000-499,999	16	.5%
100,000-249,999	106	3.5%
50,000-99,999	219	7.3%
25,000-49,999	360	12.0%
10,000-24,999	752	25.0%
5,000-9,999	765	25.4%
2,500-4,999	777	25.8%
Geographic region		
Northeast	679	22.6%
North-Central	931	31.0%
South	843	28.0%
West	554	18.4%
Form of government		
Mayor-council	1039	34.6%
Council-manager	1760	58.5%
Commission	57	1.9%
Town meeting	132	4.4%
Representative town meeting	19	.6%

The following variables from the ICMA dataset are used in the present research:

- Outside funding for e-government initiatives of the municipality
- Having a separate budget for e-government initiatives
- Form of government
- Conducting citizen surveys to determine residents' and businesses' preference for online services
- Reengineering of business processes
- Collaboration among municipality departments
- Staff resistance to change

- Privacy-related problems
- Security-related problems
- Developing e-government services in-house
- Support from elected officials
- Having an intranet

Table 3.2: Modified Dataset Respondent Categories of and their Response Rates

Category	Frequency	Percentage
Total	251	
Municipality size		
Over 500,000	2	.8%
250,000-499,999	1	.4%
100,000-249,999	13	5.2%
50,000-99,999	24	9.6%
25,000-49,999	39	15.5%
10,000-24,999	60	23.9%
5,000-9,999	60	23.9%
2,500-4,999	52	20.7%
Geographic region		
Northeast	22	8.8%
North-Central	81	32.3%
South	82	32.7%
West	66	26.3%
Form of government		
Mayor-council	85	33.9%
Council-manager	166	66.1%

Table 3.3 contains the description of the levels of measurement for the ICMA variables, their categories, and hypotheses associated with them.

Table 3.3: Levels of Measurement, Coding, and Hypotheses for the ICMA Variables

Variable	Level of Measurement & Attributes	Hypotheses
Outside funding for e-government initiatives	Dichotomy: 0 = No 1 = Yes	H_1: Outside funding for e-government initiatives of a municipal agency is positively associated with its e-government score
Separate budget for e-government initiatives	Dichotomy: 0 = No 1 = Yes	H_2: Having a separate budget for e-government initiatives is positively associated with its e-government score
Form of government	Dichotomy: 1 = Mayor-council 2 = Council-mgr.	H_3: The council-manager form of government in a municipality is positively associated with the e-government score
Conducting citizen surveys	Dichotomy: 0 = No 1 = Yes	H_4: Conducting citizen surveys by municipalities to determine what online services residents and businesses want is positively associated with the e-government score
Reengineering of business processes	Dichotomy: 0 = No 1 = Yes	H_5: Implementing e-government initiatives that have resulted in reengineering of business processes is positively associated with the e-government score
Collaboration among municipality departments	Dichotomy: 0 = No 1 = Yes	H_6: Lack of collaboration among municipality departments is negatively associated with the e-government score
Staff resistance to change	Dichotomy: 0 = No 1 = Yes	H_7: Staff resistance to change is negatively associated with the e-government score
Privacy-related problems	Dichotomy: 0 = No 1 = Yes	H_8: Having privacy-related problems is negatively associated with the e-government score
Security-related problems	Dichotomy: 0 = No 1 = Yes	H_9: Having security-related problems is negatively associated with the e-government score
Developing e-government services in-house	Dichotomy: 0 = No 1 = Yes	H_{10}: Developing e-government services in-house is positively associated with e-government score
Lack of support from elected officials	Dichotomy: 0 = No 1 = Yes	H_{11}: Lack of support from elected officials in municipality is negatively associated with the e-government score
Having an intranet	Dichotomy: 0 = No 1 = Yes	H_{12}: Having an intranet is positively associated with the e-government score
Geographic Region*	Nominal: 1 = Northeast 2 = North Central 3 = South 4 = West	H_{21}: The geographic region of a municipality affects its e-government score

* ICMA uses two classifications for the geographic region, its own classification and classification developed by the Census Bureau. All these classifications are included into the ICMA dataset. This research adopts the Census Bureau classification. Thus, the original source of the "Geographical Region" variable is 2000 Census dataset. However, since this variable was already included in the ICMA dataset, this dataset is listed as the source for this variable.

CENSUS VARIABLES

After completing modifications of the ICMA dataset, the following variables were added to it from the 2000 U.S. Census dataset:

- Municipality size (population)
- Percentage of urban population
- Percentage of residents of 25 years and over with B.A. and higher degree
- Mean per capita income of municipality residents
- Percentage of municipality residents below poverty level
- Percentage of nonwhite municipality residents
- Percentage of non-English-speaking households in the municipality
- Percentage of unemployed residents with no disability

The FIPS codes were used to match the ICMA data with the Census data. FIPS are standardized codes issued by the National Institute of Standards and Technology (NIST). FIPS are assigned for geographic entities to avoid unnecessary duplication and incompatibility in the collection, processing and dissemination of data. FIPS codes are used both with ICMA and Census datasets to identify municipalities.

Comparing the modified dataset for the present research with the complete ICMA dataset provided useful information about how accurately the modified sample represents the ICMA respondents. However, it revealed little about how representative the modified sample is of the U.S. municipalities. Unfortunately, the data, relevant to the present research, on the universe of municipalities are not available. The 2002 U.S. Census of Governments dataset (U.S. Census Bureau, n.d.), which contains most of the information of interest to this study, provides the best estimate of municipalities' population parameters. This dataset includes

data on 19,429 municipalities, which comprise 79.3 percent of the U.S. population of municipalities. This dataset was used as the basis for establishing representativeness and generalizabilty of the modified ICMA sample. The dataset was downloaded from the 2002 U.S. Census of Governments web site. It was further modified to include only the data on cities and towns. All municipalities with the population under 2,500 were also excluded from the dataset. This reduced the number of municipalities in the dataset to 5,153, which turned out to be not dramatically different from the ICMA dataset (3,007). The major limitation of using the 2002 Census of Governments dataset was that it does not include the data on the form of government. Thus, it was impossible to delete municipalities with the form of government other than mayor-council or council-management, which was done for the ICMA dataset. However, based on the ICMA data (Table 3.1), it was assumed that the percentage of these municipalities would likely be low.

Table 3.4 compares the 2002 Census of Governments and the modified ICMA datasets. Based on the data reported in Table 3.4, the dataset for the present research overall is representative of the universe of municipalities (as it is approximated by 2002 Census of Governments dataset). The municipalities with population range from 25,000 to 250,000 and over 500,000 are slightly overrepresented in the sample, while municipalities with population ranges from 250,000 to 500,000 and 2,500 to 5,000 are slightly underrepresented, but these discrepancies are not significant enough to substantially affect the representativeness of the sample for the present research. Similarly, the Northeast and the West regions are slightly overrepresented in the sample for the present research, while the South region is slightly underrepresented; however these discrepancies are also low.

Table 3.4: Distributions of Municipalities in the 2002 Census of Governments and Modified ICMA Datasets

Category	2002 Census of Governments	Modified ICMA
Total	5,153	251
Municipality size		
Over 500,000	.5%	.8%
250,000-499,999	.7%	.4%
100,000-249,999	3.2%	5.2%
50,000-99,999	6.8%	9.6%
25,000-49,999	11.4%	15.5%
10,000-24,999	23.5%	23.9%
5,000-9,999	24.6%	23.9%
2,500-4,999	29.2%	20.7%
Geographic region		
Northeast	5.8	8.8%
North-Central	32.4	32.3%
South	41.2	32.7%
West	20.6	26.3%

Table 3.5 contains the description of the levels of measurement for the 2000 Census variables, their coding, and associated hypotheses.

DEPENDENT VARIABLE: E-GOVERNMENT SCORE

The last step in completing the dataset was to visit the web portals of jurisdictions that comprise the modified ICMA dataset and to rate their e-government scores (the dependent variable). The following components were measured to determine the e-government score for each municipality's web portal:

Table 3.5: Levels of Measurement, Coding, and Hypotheses for the Census Variables

Variable	Level of Measurement & Attributes	Hypothesis
Municipality size	Interval: 2,528 - 1,188,580	H_{13}: Municipality size is positively associated with the e-government score
Percentage of urban population	Interval: 0% - 100%	H_{14}: Percentage of urban population is positively associated with the e-government score
Percentage of residents of 25 years and over with B.A. and higher degree	Interval: 0% - 100%	H_{15}: Percentage of municipal residents with B.A. and higher degree is positively associated with the e-government score
Mean per capita income of municipality residents	Interval: Measured in U.S. Dollars	H_{16}: Mean per capita income of municipality residents is positively associated with the e-government score
Percentage of municipality residents below poverty level	Interval: 0% - 100%	H_{17}: Percentage of municipality residents below poverty level is negatively associated with the e-government score
Percentage of nonwhite municipality residents	Interval: 0% - 100%	H_{18}: Percentage of nonwhite municipality residents is negatively associated with the e-government score
Percentage of non-English-speaking households in the municipality	Interval: 0% - 100%	H_{19}: Percentage of non-English-speaking (linguistically isolated) households in the municipality is negatively associated with the e-government score
Percentage of unemployed residents with no disability	Interval: 0% - 100%	H_{20}: Unemployment rate in the municipality is negatively associated with the e-government score

Web Portal Content

- Contact information for elected officials:
    - Name
    - Email address
    - Phone number
- Contact information for public servants
    - Name
    - Email address
    - Phone number

    - Office address
    - Office hours
- Availability of office hours for the departments' personnel
- On-line access to public documents
- Time-sensitive information
    - Job vacancies
    - Public meetings and community events
- Content items
    - Agency mission statement
    - Minutes of public meetings
    - Access to budget information and publications
- Multimedia materials
    - Audio/video files of public meetings

Web Portal Usability

- Appropriate length of municipality web pages (two or more screen lengths)
- Availability of a Sitemap (hyperlinked outline of the web portal)
- Availability of the "search" option

Online Services

- Number of services provided through the web portal
- Availability of on-line form to submit a service request or to provide a feedback regarding types and quality of services

Digital Divide

- Presence of a foreign-language version of the web portal

Citizen Participation

- Availability of online forums or chat rooms to discuss specific local issues
- Offering current information about municipal governance through an online newsletter or e-mail listserv.
- Information on bids and solicitation of the requests for proposals
- Conducting online polls or surveys about specific issues in municipality and allowing citizens to view the results of these polls and surveys
- Availability of interactive on-line GIS

Restricted Areas

- Availability of restricted areas that require usernames and passwords to complete online transaction using a credit card or a digital signature
- Availability of the option of submitting personal information that requires a username and password

Privacy Policies

- Availability of privacy policies that describe what information on the users is collected
- Whether the privacy policy addresses the use or sale of data collected on the website by outside or third party organizations

E-government score is an approximation to an interval-level variable. To determine the total e-government score for each municipality, a four-level rating system was designed (Table 3.6). All information and services provided through municipal web portals were divided into two major categories. The first category rates the services that are intended only to provide certain information to the citizen users without giving them an option to interact or

complete transactions with government through web portal, such as listing contact information for public personnel and elected officials or putting the agendas of city council meetings. This "information" category was further divided into two subcategories, static information and dynamic information. The static information subcategory includes information that does not require frequent updates, such as contact information. The services that fall under this subcategory received the score of "1." In contrast, the dynamic information subcategory includes information that has to be frequently updated, such a community events, council meetings agenda, etc. The services from the dynamic subcategory received the score of "2."

Similarly, the services of the "transaction" category were divided into two parts, non-secure and secure transactions. Non-secure transactions included those interaction with government that do not require restricted areas, such a using an on-line form to provide a feedback or place a request, or subscribing to an electronic listserv. These transactions received the score of "3." Secure transactions subcategory included the on-line interactions with government that involve encryption of information transmitted through the Internet and require registration to obtain a user name and password. These interactions usually involve financial transactions and require users to submit sensitive personal and/or credit card information. These transactions received the score of "4." The total number of services from the "transaction" category was computed. Each service scored one point, with the maximum score being ten, even in cases when the actual number of services exceeds this number.

In addition, determining the total e-government score involved rating some components of the web portal that are not directly related to the provision of specific services but measure

the overall usability of the web portal, such as appropriate page length or presence of a foreign-language version of the portal. These components have received the rating of "1."

A separate category was also created for a type of interactive on-line services that do not require a direct response from or interaction with the government, such as service requests or financial transactions, but using which would substantially contribute to one's understanding of the community issues. Based on the literature that discusses the use of e-government to increase citizen participation, one can assume that these services are likely to be used by citizens who take interest in the issues of the local community, are likely to be involved into the governance process, or are considering such involvement. These services include: (1) posting video or audio files of public meetings for those who cannot be participate in person, (2) placing online an interactive geographic information system (GIS) that allows citizens to perform queries, and (3) posting online information about the bids or soliciting requests for proposals. Services in this category have received the rating of "3." The service categories and their corresponding ratings are listed in the Table 3.6.

To locate web addresses for municipal portals, the *Google* search engine was used. If the search through *Google* produced no results, an attempt was made to locate web address through the web portal of the state in which the municipality was located, since most state portals have links to the portals of local governments. For the purpose of the present research, only the portals that were owned and maintained by municipalities directly or through contracting out were considered. This approach excluded Chamber of Commerce web sites as well as cases where the space was designated on state web portals for local governments to provide some basic information, such as names and contact information for elected officials and key personnel or the address of the town hall. It should be noted that

respondents to the ICMA survey provided information on whether their municipality has a web portal. However, in some cases when the respondents indicated that the municipality has a portal, the alleged portal was either impossible to locate it or it turned out be the Chamber of Commerce web site that had some limited information on municipal government or a "directory" entry on the state web portal. Since these cases were not considered, the number of municipalities that have web portals in the sample for the present research is lower than the number of municipalities that claimed having portals, according to the ICMA dataset.

E-government score was computed for 251 municipalities. According to the methodology of e-government score computation, the maximum possible score is 58 (Table 3.5). For the sample, the score ranged between zero and 57. The score of zero was given to municipalities when (1) they had no web portals; (2) the web address for their portal was incorrect and no updated address was provided; (3) their web portal was under construction. The reliability of the components used to compute e-government score was evaluated using Cronbach's alpha. The Cronbach's alpha score for the aggregate scale to e-government score was .898 indicating a reasonable level of reliability.

This chapter described research design, methodology, and sample. The next chapter offers univariate statistical analysis of the variables.

Table 3.6: Categories of the E-government Variable and Corresponding Scores

Category	Score
Information	
Static	
• Contact information for elected officials:	
o Name	1
o Email address	1
o Phone number	1
• Contact information for public servants	
o Name	1
o Email address	1
o Phone number	1
o Office address	1
• Availability of office hours for the departments' personnel	1
• On-line access to public documents	
• Agency mission statement	1
• Access to budget information and publications	1
Dynamic	
• Job vacancies	2
• Public meetings and community events	2
• Audio/video files of public meetings	2
Transaction	
Non-secure	
• Availability of on-line form to submit a service request or to provide a feedback regarding types and quality of services	3
• Availability of online forums or chat rooms to discuss specific local issues	3
• Offering current information about municipal governance through an online newsletter or e-mail listserv	3
• Conducting online polls or surveys about specific issues	3
Secure	
• Availability of restricted areas that require usernames and passwords to complete online transaction using a credit card or a digital signature	4
• Availability of the option of submitting personal information that require a username and password	4
Total number of services	Max. 10
Web Portal Usability	
• Appropriate length of municipality web pages	1
• The availability of a Sitemap	1
• The availability of the "search" option	1
Interactive services related to citizen participation	
• Audio/video files of public meetings	3
• Information on bids and solicitation of the requests for proposals	3
• Availability of interactive on-line GIS	3
Maximum Possible Score	**58**

CHAPTER FOUR: UNIVARIATE STATISTICAL ANALYSIS

This chapter includes the univariate statistical analysis of the dependent variable (DV) and all independent variables (IVs) included in the research. The major goal of the univariate statistical analysis is to understand the individual variables in the sample better and to assess if the sample for the present research seems to differ from known distributions in the universe of all municipalities, which is important to determine how representative this sample is of this universe. For this purpose, the distribution of the variables for the random sample of the ICMA municipalities is compared with the complete ICMA sample. These variables include all the dichotomous variables, the categorical variable (geographic region), and one continuous variable (municipality size). For the continuous variables, the data for which were obtained from the Census Bureau, the means are obtained and compared to the means of these variables on the national level that were also computed from the Census dataset. Another goal of the univariate analysis is to screen the variables for missing values and to see if the variables meet the necessary assumptions to be included into the bivariate and the multivariate correlation/regression analyses to determine their affect on the DV, the e-government score.

First, the data were screened for missing values. None of the values are missing for the DV and the internal agency characteristics IVs. For all IVs that are considered environmental factors, eight values are missing. The values for these IVs were obtained from the Census Bureau. The 2000 Census dataset did not include data for eight municipalities that are part of the dataset for the present research. However, these missing cases comprise less than five percent of the entire dataset, which, according to Tabachnick & Fidell (2001), does not constitute a significant problem. Thus, the cases with missing data for environmental

factors' variables are retained in the dataset. Having an intranet was another variable with he missing data. However, the number of missing cases for this variable also did not exceed five percent; therefore no actions were taken.

Most of the variables included into the present research are continuous or dichotomous. The exception is the geographic region, which is categorical. To be included into the correlation/regression analyses, continuous variables should meet the assumption of normality. In the course of univariate analysis, the normality assumption is tested by evaluating the values of skewness and kurtosis and by examining histograms and probability plots of these variables. Tabachnick & Fidell (2001) and Garson (n.d., ¶ 22, 23) indicate that values of skewness and kurtosis should be within the 2 to -2 range when the data are normally distributed. This criterion was used to evaluate the values skewness and kurtosis. Visual examination of histogram and normal probability plots provided additional information about the data distribution for continuous and categorical variables. Dichotomous variables, on the other hand, are not normally distributed. For these variables, a different selection process should be applied to determine whether or not they can be included into the correlation/regression analyses. Literature on methodology (Rummel, 1970; Hutcheson & Sofroniou, 1999; Tabachnik & Fidel, 2001), suggests deleting dichotomous variables with the split 90-10, or more, from the correlation/regression analyses because the correlation coefficients between these and others variables are truncated and scores for cases in the smaller category are more influential than scores in the category with the majority of cases. This criterion was applied to screen data distribution for the dichotomous variables. Variables with data distribution approaching 90-10 ratio were deleted from the dataset.

The geographic region, which is categorical variable, consisting of four categories, was recoded into three dichotomous dummy variables. To screen the dummy variables, the same procedures were applied as to screening all other dichotomous variables.

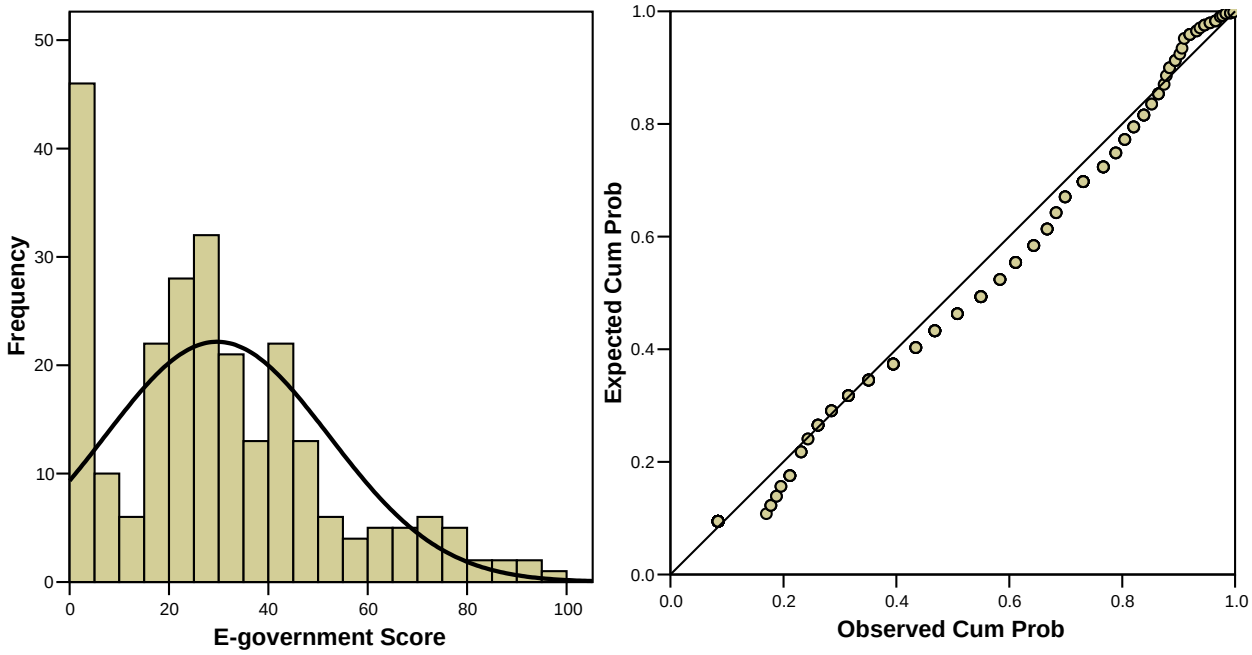
DV: E-GOVERNMENT SCORE

The e-government score is the DV in the present research. The e-government variable approximates an interval scale. The values for this variable were computed for 251 municipalities. According to the methodology of e-government score computation presented in Chapter 3, the maximum possible score is 58 (Table 3.5). For presentational purposes and to make reading of the data more intuitive, the 58-point scale was transformed into a 100-point scale. Table 4.1 and Figure 4.1 offer the results of the statistical analysis of the rescaled e-government score. The distribution of data looks approximately normal. The histogram and the normal probability plot indicate certain departures from normality, but skewness and kurtosis are well within expected values. There is a small positive skew (.68) and a slightly raised peak (kurtosis = .13). The measures of central tendency are aligned closely enough to suggest normality. The mean is 29.69 and the median is 27.59.

Table 4.1: E-government Score Statistics

Statistics	Value
Mean	29.69
Median	27.59
St. Deviation	22.59
Skewness	.68
Kurtosis	.13
n = 251	

Figure 4.1: E-government Score Histogram and Normal Probability Plot



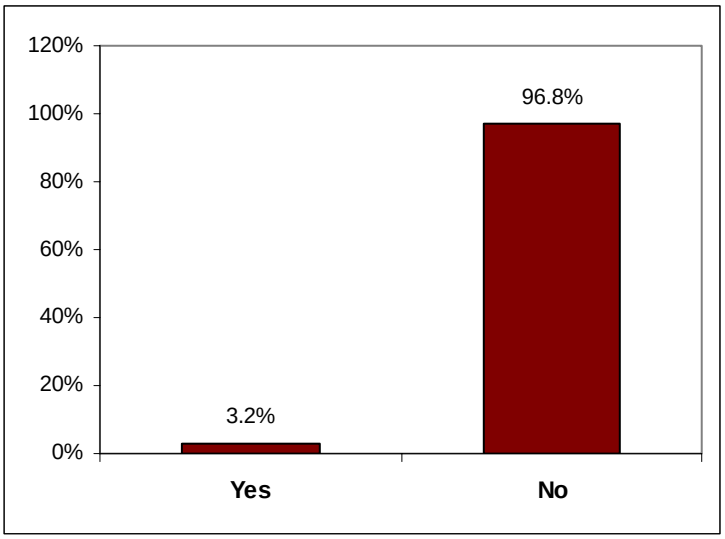
IVS: INTERNAL AGENCY CHARACTERISTICS

Outside Funding for E-government Initiatives

In the literature, outside funding that usually comes in the form of state or federal grants is often regarded as "slack resources" considered to be one of the top predictors for the success of e-government and ICT initiatives, as well as innovations in general. Based on the sub-sample of responses to the ICMA Survey, only about 3 percent of municipalities have received funding for their e-government initiatives from either federal- or state-level governments in form of grants (Figure 4.2), which is consistent with the complete ICMA sample (about four percent). This clearly means that for the most part local governments are on their own when it comes to funding e-government initiatives. Taking into consideration high start-up costs of equipment and personnel training, as well as unfavorable economic conditions in many municipalities, one can expect many municipalities, especially small ones, to have difficulties launching and maintaining e-government. Alternatively, this could

mean that municipalities are not aware of grant opportunities for e-government initiatives or, for some reason, are not taking advantage of them.

Figure 4.2: Outside Funding for the E-government Initiatives



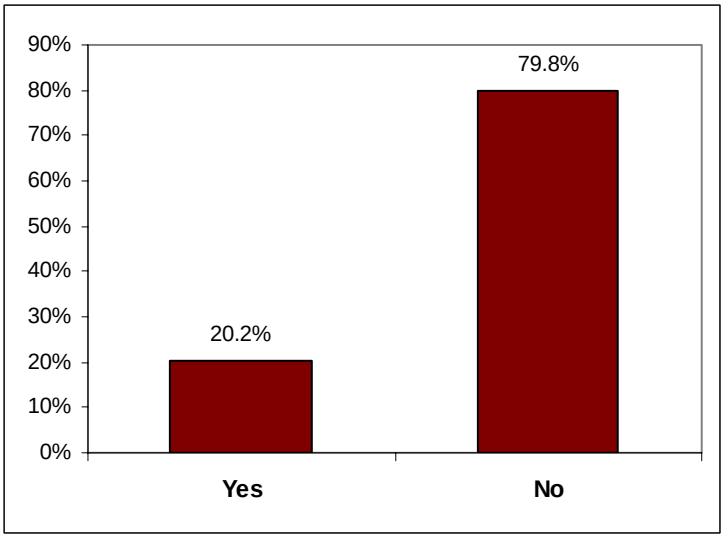
For the outside funding, the split between the categories exceeds 90-10 ratio, which violates the criterion of normality required to include this variable into the further correlation/regression analyses. Therefore, it was decided to delete this variable from further analyses.

Having a Separate E-government Budget

Having a separate budget for e-government initiatives, or innovations in general, is considered by the literature as another indicator of having "slack resources" and may therefore play an important role in predicting the overall success of these initiatives. Figure 4.3 illustrates that a little over 20 percent of the respondents included in the sub-sample for the present research, have indicated that they have a separate budget for their e-government initiatives (this number is 18 percent for the complete ICMA sample), which means that, for the most part, the funding for these initiatives has to be assembled from various, perhaps

unrelated, articles of the budget. This could make e-government funding piecemeal, inconsistent, and unstructured, ultimately affecting the overall quality of municipal e-government. The split between the categories of the variable is approximately 20-80, which satisfies the condition for including this variable into further analyses.

Figure 4.3: Separate E-government Budget

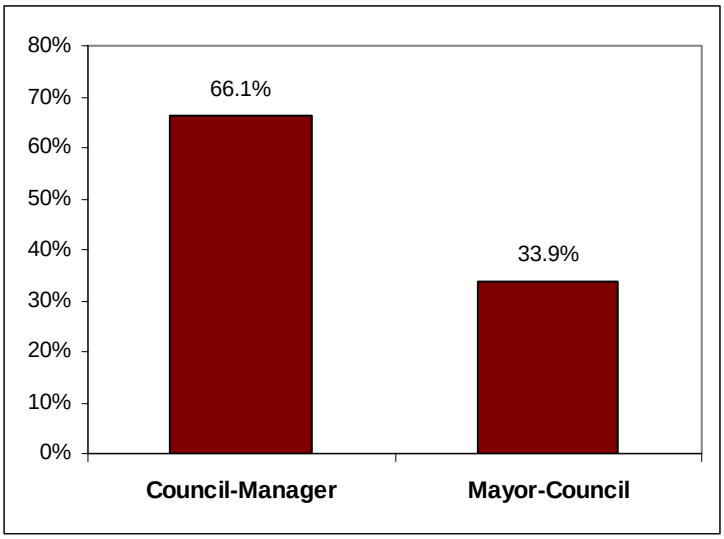


Form of Government

In the literature on public ICT and e-government innovation, form of government is often considered to play an important role. Most of the authors argue that municipalities with the council-manager form of government tend to focus more on internal efficiency than municipalities with the mayor-council form and, as a result, tend to be more successful implementers of innovations, such as e-government. Figure 4.4 demonstrates that about 66 percent of the respondent municipalities from the sub-sample (61 percent in the complete ICMA sample) are municipalities with the council-management form of government. This proportional distribution of municipalities by the form of government is similar to the one of

the complete ICMA sample. The 34-66 split between the categories is well within acceptable limits for this variable to be included into the correlation/regression analyses.

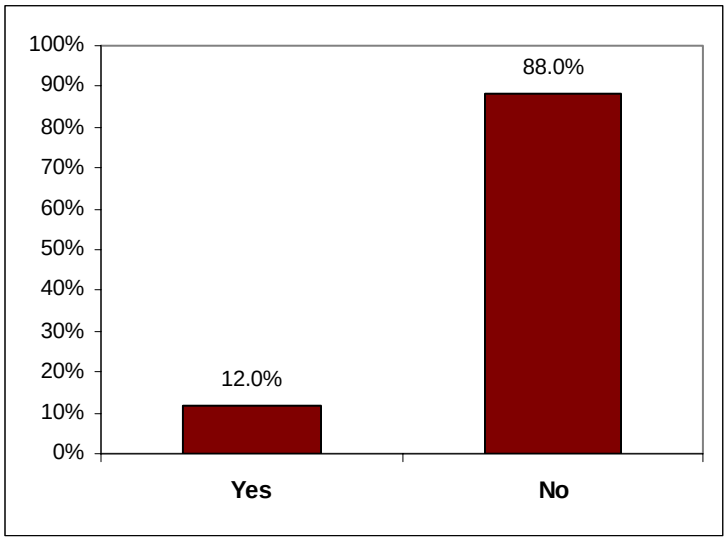
Figure 4.4: Form of Government



Conducting Citizen Surveys

The e-government literature often emphasizes that conducting citizen surveys to determine the citizens' demand for on-line services is an important prerequisite for the successful local e-government. However, in the sub-sample of the ICMA respondents, only 12 percent of municipalities have conducted such surveys (Figure 4.5). This number is somewhat higher than the number of municipalities in the complete ICMA sample (nine percent). This is certainly a low number. The practice of implementing local e-government initiatives without prior investigation of the demand for the on-line services, may lead to a situation where municipal government spends resources to offer services or information that citizens never use. For this variable, the split between categories is approximately 12-88, so the decision is made to keep this variable and include it in further analyses.

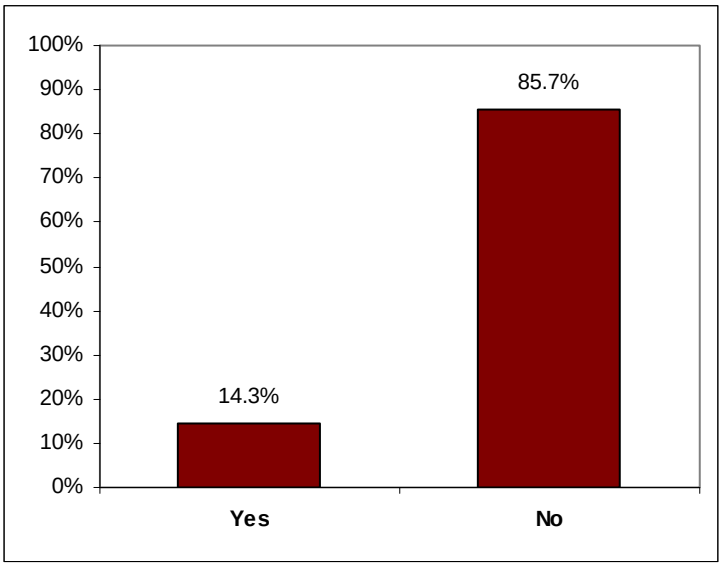
Figure 4.5: Conducting Citizen Surveys



Reengineering of Business Processes

The ICT and e-government literature repeatedly emphasize that to be truly successful innovations associated with implementing e-government or ICT should inevitably lead to reengineering of business processes rather than automating the existing ones. For just about 14 percent of the respondents in the sub-sample, implementing e-government initiatives has resulted in reengineering of business processes (Figure 4.6), which means that they are likely to have moved beyond mere automation of existing processes to re-evaluating these processes and as the role played by various departments and personnel in the course of moving some of their services online. In the complete ICMA sample, the number of respondents that indicated that e-government initiatives have resulted in reengineering their business processes is about 16 percent. The 60-40 split between categories indicates that this variable can be included into further analyses.

Figure 4.6: Reengineering of Business Processes

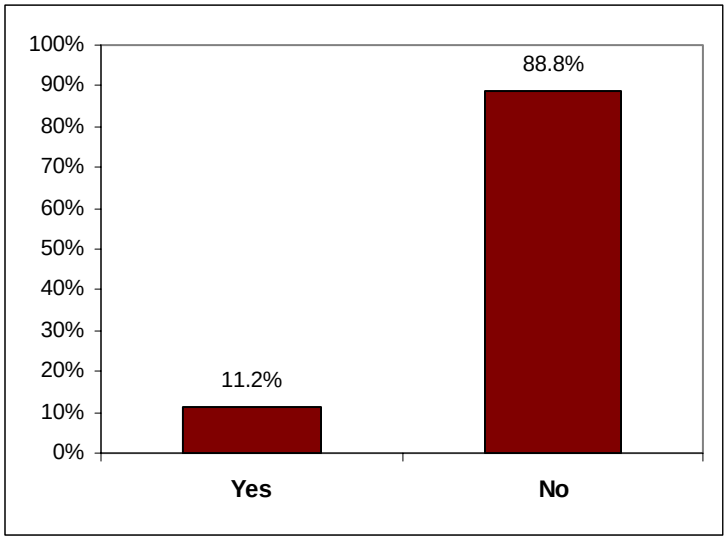


Lack of Collaboration between Departments

The four variables that are discussed next: lack of collaboration between departments, staff resistance to change, privacy- and security-related issues, and lack of support from elected officials are generally considered to be barriers to e-government. E-government initiatives often require smooth exchange and integration of information owned by different departments, which is often inconsistent with the bureaucratic "traditions" of information ownership, which discourage information sharing, treating the information as a valuable asset that can be used to secure scarce funding. This traditional approach is also characterized by the stowepiped structure of government agencies and departments which affects the process of information sharing, often leads to a lack of collaboration between organizational units and, as a result, is universally considered a serious impediment to successful implementation of innovations associated with e-government and ICT in general. According to the ICMA sub-sample, only about 11 percent of municipalities are facing this problem (Figure 4.7). This number is about 13 percent in the complete ICMA sample. This is an encouraging

result. However, the split between the categories of this variable is dangerously close to 90-10 ratio, which is likely to affect the accuracy of the statistical analysis associated with the effect this variable has on the overall e-government score. For this reason, it was decided to exclude this variable from further analyses.

Figure 4.7: Lack of Inter-Departmental Collaboration

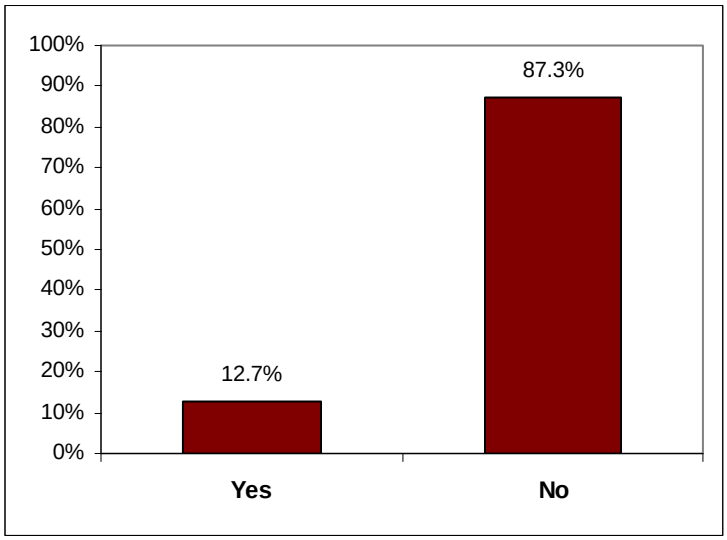


Staff Resistance to Change

Staff resistance to change is another powerful barrier to the success of e-government innovation. According to the respondents, relatively low percentages of municipalities claim to have experienced staff resistance in the process of implementing their e-government (Figure 4.8). Only about 12 percent of respondent municipalities in the sub-sample (11 percent in the complete ICMA sample) claim that their personnel resist changes associated with moving services on-line. Some might consider this low number to be in slight contradiction to the literature on innovation and IT implementation in public sector, according to which the public sector does not offer enough incentives for public employees to learn new skills associated with e-government technology and does not punish those who

resist doing so. The split between the categories of this variable is approaching the 90-10 ratio. However, since the actual split is approximately 13-87, the decision is made to keep this variable and include it into further analyses.

Figure 4.8: Staff Resistance to Change



Problems with Privacy and Security

Protecting privacy of the users of the on-line government services and ensuring security of on-line transactions between citizens and government is considered in the e-government literature to be fundamental for the success of e-government. Failing to do so may lead to vulnerability of sensitive personal information and ultimately result in the loss of trust in e-government. The majority of respondents indicated that their municipalities do not have serious problems with either privacy or security of their e-government initiatives (Figure 4.9 and Figure 4.10). Ensuring security of transactions seems to be a bigger challenge for municipalities than keeping personal information private. Thus, almost 30 percent in the sub-sample (23 percent in the complete ICMA sample) indicated that their jurisdictions are facing security-related issues when it comes to e-government initiatives, while less than 20

percent (15 percent in the complete sample) indicated privacy to be a problem. For both variables, the data split between the categories (18-88 for the privacy problems; 30-70 for the security problems) allow inclusion of these variables into further analyses.

Figure 4.9: Privacy-Related Problems

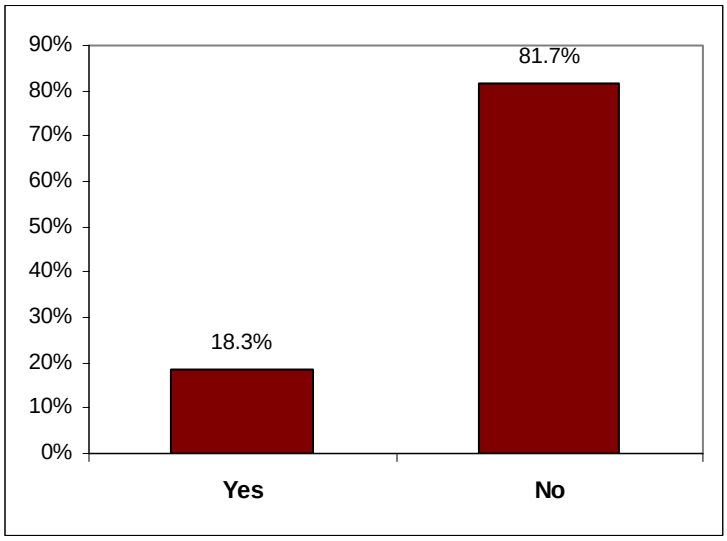
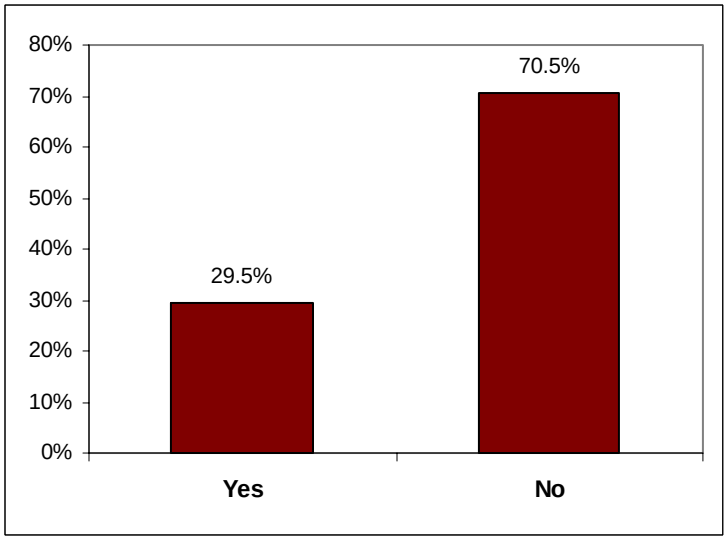


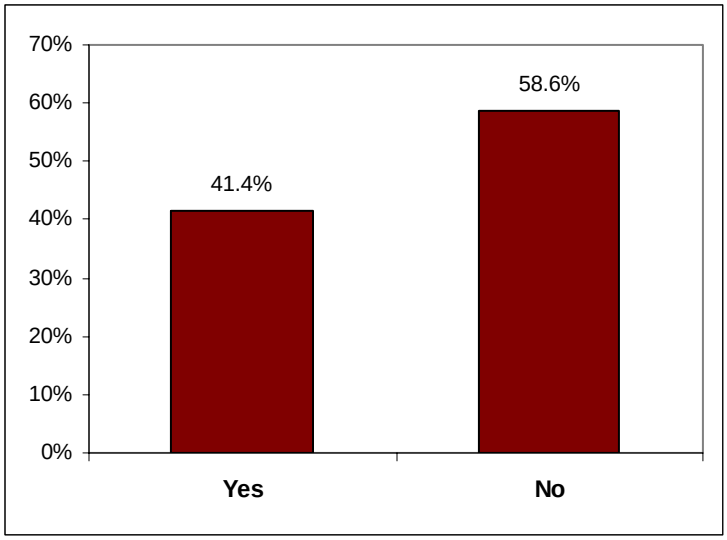
Figure 4.10: Security-Related Problems



Developing E-government Services in-House

Developing e-government services in-house is an indicator of employing a highly trained and professional staff, which in the literature is universally considered as a prerequisite for success of ICT and e-government innovation. Based on the ICMA sub-sample, the majority of municipalities do not develop their e-government services in-house (Figure 4.11). In the sub-sample, about 41 percent do so, while in the complete ICMA sample, this number is about 44 percent. While this practice might cause a problem of keeping municipal portals up-to-date, outsourcing the development of e-government services can save government agencies time and resources necessary for acquiring expertise in this area. Based on the 41-59 split between the categories of this variable, it is included into further analyses.

Figure 4.11: Developing E-government Services In-house

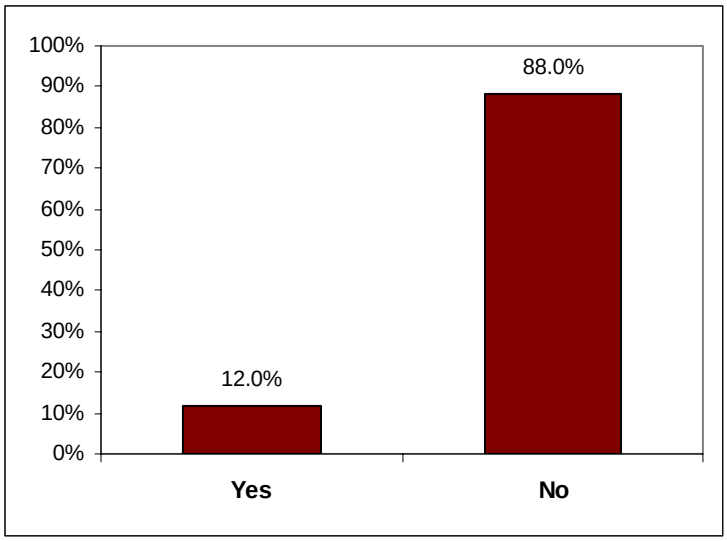


Lack Support from Elected Officials

A surprisingly low number of municipalities have indicated that their e-government efforts lack support from elected officials. Figure 4.12 demonstrates that only 12 percent indicated the absence of such support in the sub-sample (11 percent in the complete sample).

This is an encouraging result, since in the e-government literature the importance of such is support continuously emphasized. Support from elected officials is primarily associated with allocation of resources to fund e-government initiatives. It is therefore reasonable to expect that low levels of such support in municipalities would negatively affect the overall scope and quality of municipal e-government. A note should be made about the split between the categories of the variable approaching the 90-10 ratio. The decision is made to keep the variable for further analysis, since the actual split is 12-88.

Figure 4.12: Lack of Support from Elected Officials

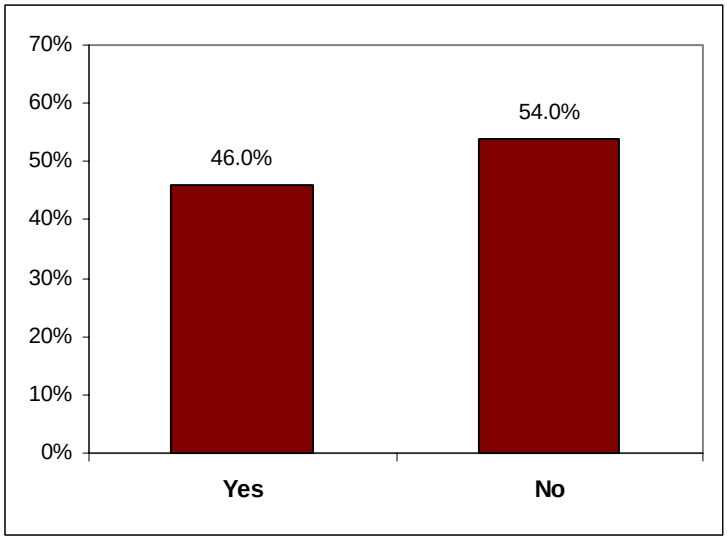


Having an Intranet

The last variable related to internal agency characteristics of municipal government agencies considered in the present research is having an intranet. Having an intranet is associated with adopting a networked approach within an organization, which, along with interdepartmental collaboration, may significantly increase efficiency of government operations. While the majority of the sub-sample of the respondents to the ICMA Survey indicated that their municipal agency does not have an intranet, the gap between those who

have an intranet and those who do not is less than ten percent (Figure 4.13). In the complete ICMA sample, the number of municipalities with an intranet is about 40 percent. The split between the categories of the variable is approximately 46-54, which satisfies the condition of including this variable into further analyses.

Figure 4.13: Having an Intranet



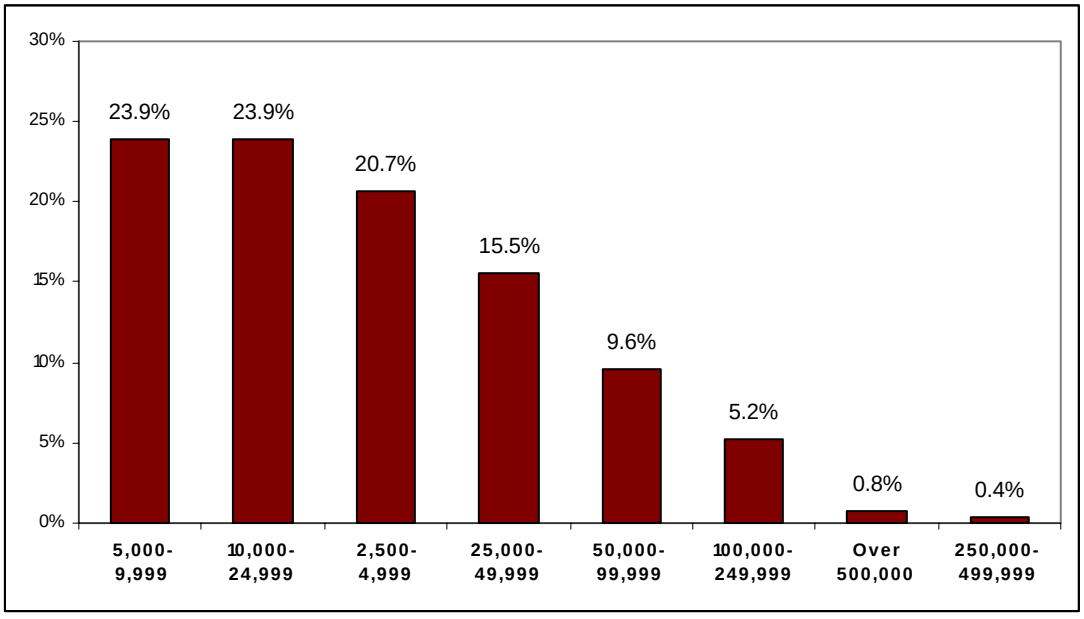
IVs: External Environmental Factors

Municipality Size

For the present research, municipality size is measured in terms of population. In the literature, population size is associated with economies of scale and, in a way, determines a demand for innovation. Thus, larger municipalities are likely to have higher rates of residents with the Internet access and therefore higher demand for e-government services. The mean of the municipality size variable in the sub-sample (33,488) is close to the mean of this variable in the complete ICMA sample (32,295) and to the mean of the 2002 Census of Governments sub-sample (29,085). Consistent with the complete ICMA sample, municipalities in the sub-sample for the present research vary substantially in their

population, ranging from 2,528 to 1,188,580. The majority of sample consists of medium-size municipalities with population between 5,000 and 25,000; these municipalities comprise almost fifty percent of all municipalities in the sample (Figure 4.14). Visual examination of the histogram and normal probability plot (Figure 4.15) reveals the fact that the normality assumption for the municipality size variable is severely violated. Table 4.2 demonstrates that there is a strong positive skew (9.99) and even stronger positive kurtosis (122.37). To make the distribution more symmetrically normal, a logarithmic transformation was performed.

Figure 4.14: Municipalities in the Sample, by Size



The transformation has resulted in significant improvement of data distribution. Visual inspection of the histogram and the normal probability plot (Figure 4.16) showed that data distribution for the transformed variable closely approximates normal. The measures of central tendency are more closely aligned than those in the untransformed distribution. The mean is 4.16 and the median 4.09. The dispersion statistics also indicate a more tightly

concentrated distribution of scores. The standard deviation is .50, which indicates a modest variation of scores around the mean. The range of scores is 2.67. The skewness (.63) and kurtosis (.13) have also improved substantially.

Figure 4.15: Municipality Size Histogram and Normal Probability Plot

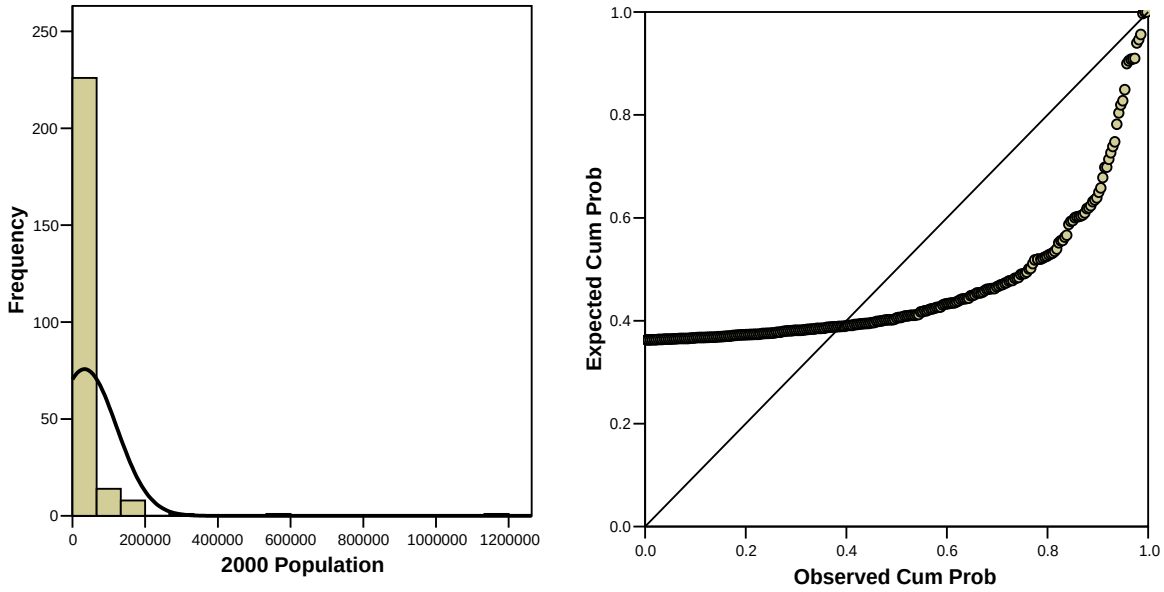


Figure 4.16: Municipality Size (Transformed) Histogram and Normal Probability Plot

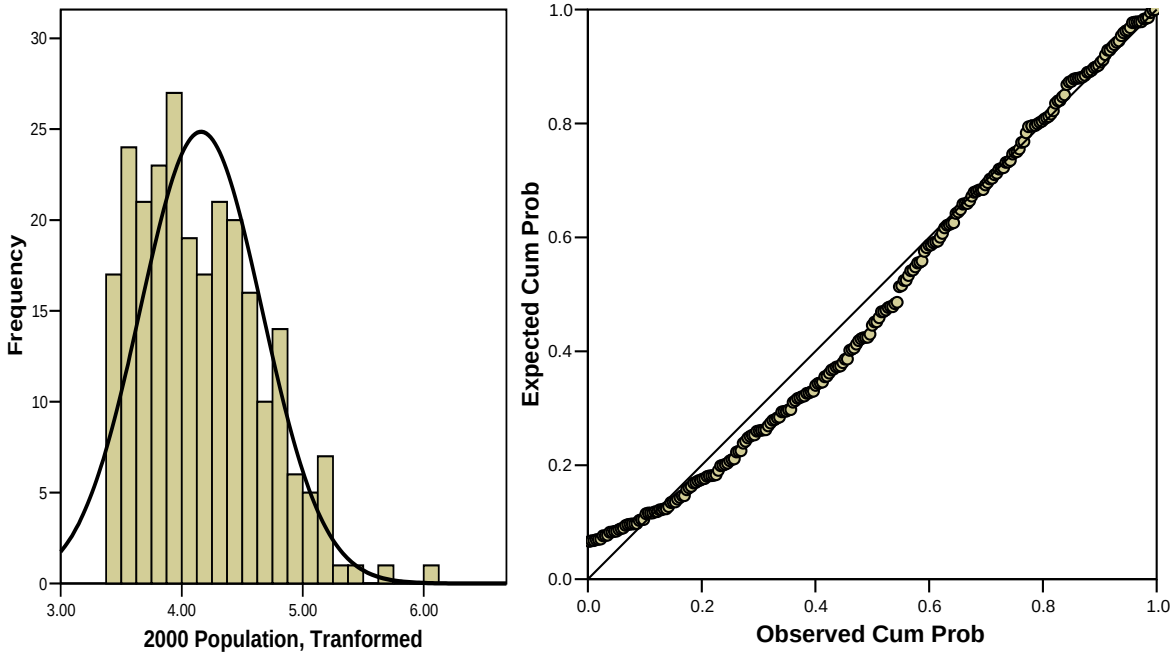


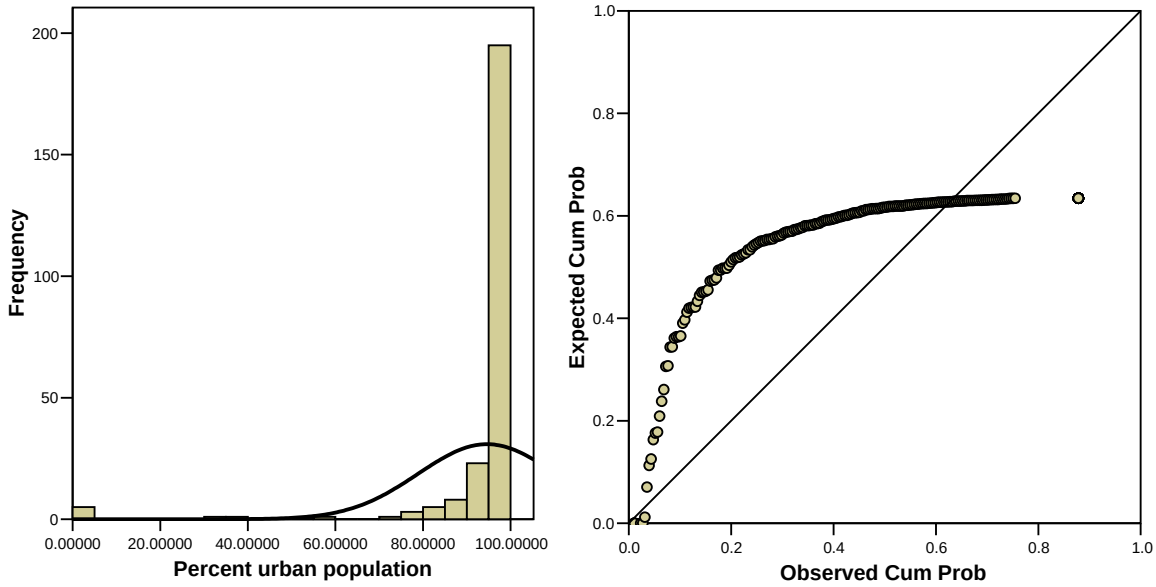
Table 4.2: Municipality Size Descriptive Statistics

Statistics	Untransformed	Transformed
Central Tendency		
Mean	33,487.65	4.16
Median	12,366.00	4.09
Dispersion		
St. Deviation	88,164.51	.50
Range	1,186,052	2.67
Distribution		
Skewness	9.99	.63
Kurtosis	122.37	.13
n = 243		

Percentage of Urban Population

According to the literature, urban population is likely to be more educated, computer-literate and connected to the Internet. All these factors determine the demand for e-government services. Therefore, it more urbanized municipalities would likely to be ahead of rural areas in terms of e-government. The mean for this variable in the sub-sample (94.61) is somewhat higher than the nation's mean (79.01). Table 4.3 and Figure 4.17 demonstrate that the normality assumption for the percentage of urban population variable is severely violated. The distribution is negatively skewed (-5.06) and very highly peaked (kurtosis = 26.70).

Figure 4.17: Percentage of Urban Population Histogram and Normal Probability Plot

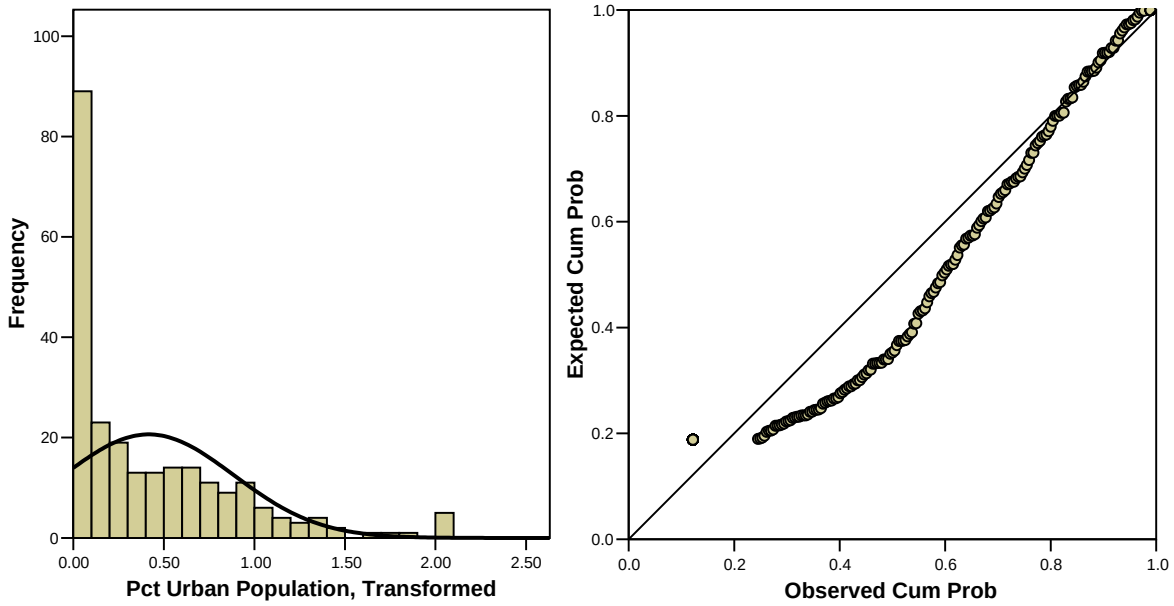


To address the issue, the percentage of urban population was reflected and logarithmically transformed. However the transformation did not result in making the distribution more symmetric (Figure 4.18). The transformed data are positively skewed (1.37) and slightly peaked (kurtosis = 1.65). The measures of central tendency are aligned relatively closely. Standard deviation (.47) does not indicate substantial variation of scores around the mean (Table 4.3). Nevertheless, despite the fact that the measures of descriptive statistics are within expected values, the histogram and the probability plot show that the data for the transformed percentage of urban population variable do not look normally distributed. The histogram does not approximate the normal probability curve, and the slope of the probability plot does not approximate a 45-degree line. The conclusion is therefore made that the logarithmic transformation was not sufficient to make the data meet the normality assumption. Based on this conclusion, the variable is removed from further analyses.

Table 4.3: Percentage of Urban Population Descriptive Statistics

Statistics	Untransformed	Transformed
Central Tendency		
Mean	94.61	.42
Median	99.27	.24
Dispersion		
St. Deviation	15.70	.47
Range	100	2
Distribution		
Skewness	-5.06	1.37
Kurtosis	26.70	1.65
n = 243		

Figure 4.18: Percentage of Urban Population (Transformed) Histogram and Normal Probability Plot

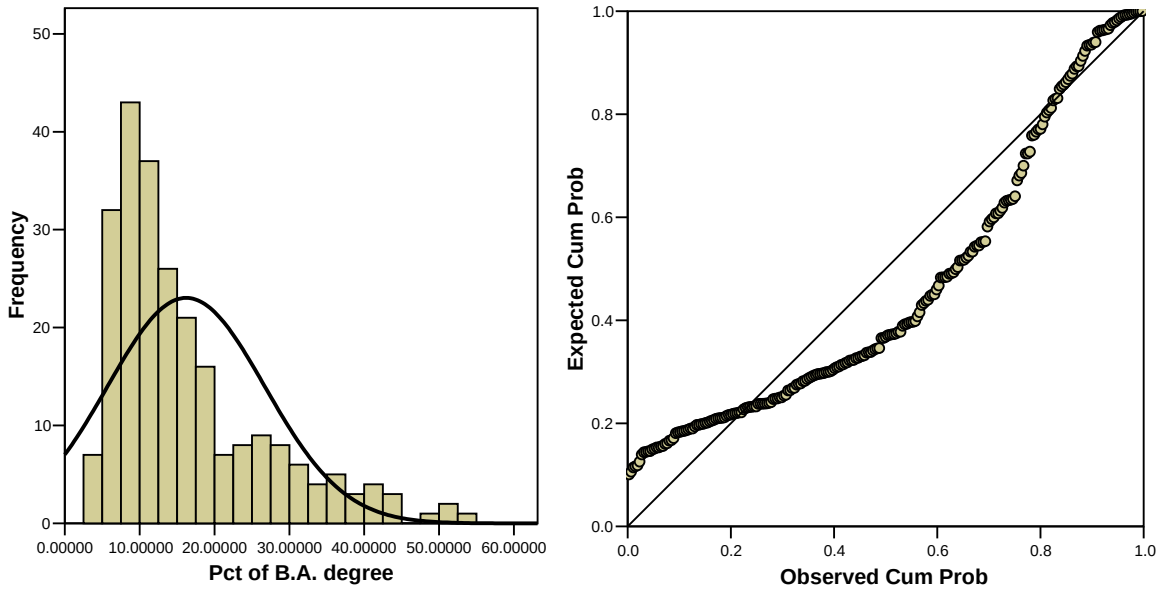


Percentage of Municipal Residents with B.A. and Higher Degree

E-government literature has been consistently confirming that people with higher levels of education are more likely to use the Internet and access government websites more often. The mean for this variable in the sub-sample (16.21) is close to the nation's mean (15.80). The measures of central tendency and dispersion, as well as the values of skewness (1.35)

and kurtosis (1.38) for the percentage of municipal residents with B.A. and higher degree, presented in Table 4.4, suggest that the assumption of normality has been reasonably met. Nevertheless, visual inspection of the histogram and especially probability plot show that the distribution of data in this variable does not look normal (Figure 4.19). The histogram reveals visible positive skew, while the slope of the normal probability plot does not approximate a 45-degree line. Therefore, this variable was logarithmically transformed to improve data distribution.

Figure 4.19: Percentage of Residents with B.A. and Higher Degree Histogram and Normal Probability Plot

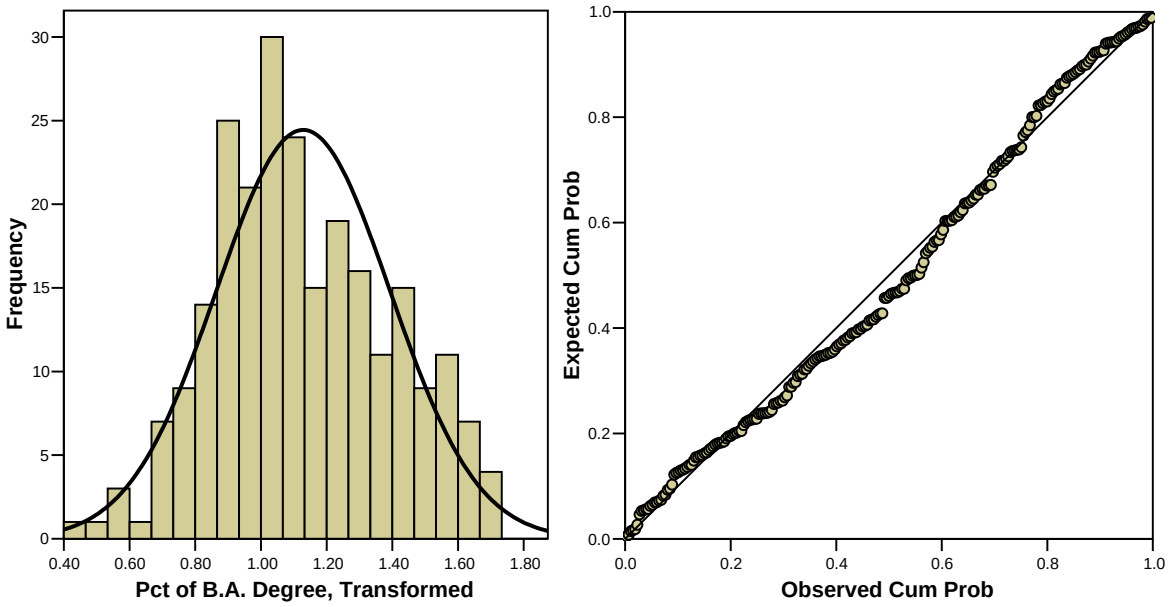


Visually, data distribution for the transformed variable looks substantially improved, closely approximating normal probability curve and a 45-degree slope (Figure 4.20). After the transformation, the standard deviation (.26) and the range (1.29) values are much lower as well. The data are less skewed (.15); the value of kurtosis (-.48) indicate a slightly flattened peak. The transformed variable may be included into further analyses.

Table 4.4: Percentage of Residents with B.A. and Higher Degree Descriptive Statistics

Statistics	Untransformed	Transformed
Central Tendency		
Mean	16.21	1.12
Median	12.66	1.10
Dispersion		
St. Deviation	10.52	.26
Range	50.80	1.29
Distribution		
Skewness	1.35	.15
Kurtosis	1.38	-.48
n = 243		

Figure 4.20: Percentage of Residents with B.A. and Higher Degree (Transformed) Histogram and Normal Probability Plot



Mean per Capita Income

In the e-government literature, income, similar to education, is considered as a strong predictor for using the Internet and on-line government services. The sub-sample mean for this variable (22,034) is very close the nation's mean (21,587). Visual inspection of the histogram and the normal probability plot of data distribution for the mean per capita income

variable (Figure 4.21) revealed violation of the normality assumption. Table 4.5 demonstrates that the values of skewness (2.88) and kurtosis (11.36) are high. Standard deviation (10,435.67) is also substantial. Based on the data screening results, the variable was logarithmically transformed.

Figure 4.21: Mean per Capita Income Histogram and Normal Probability Plot

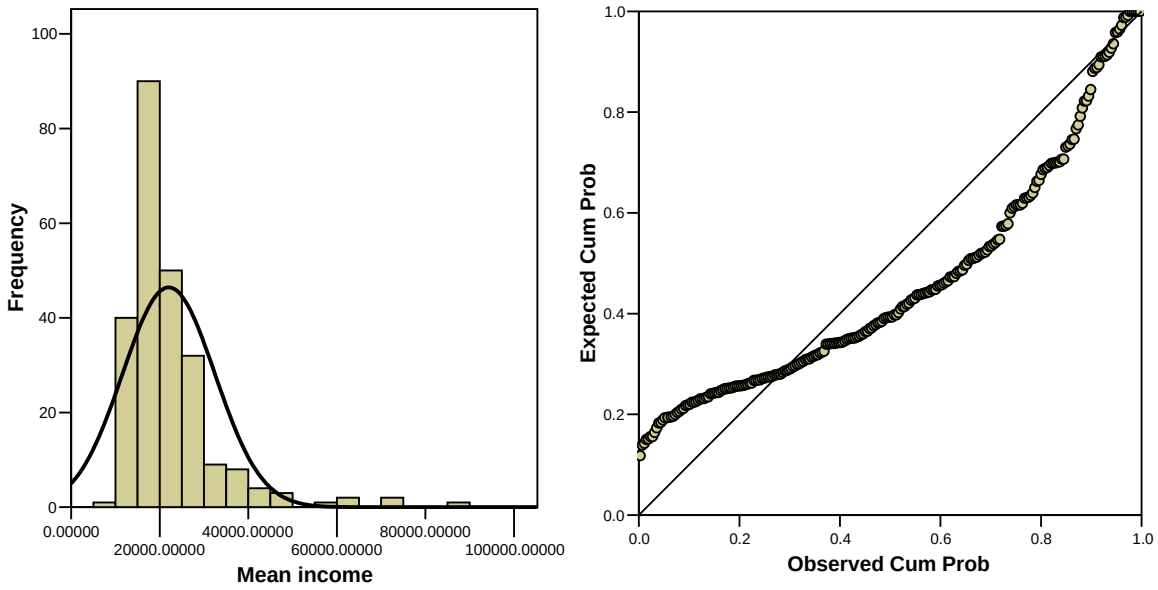
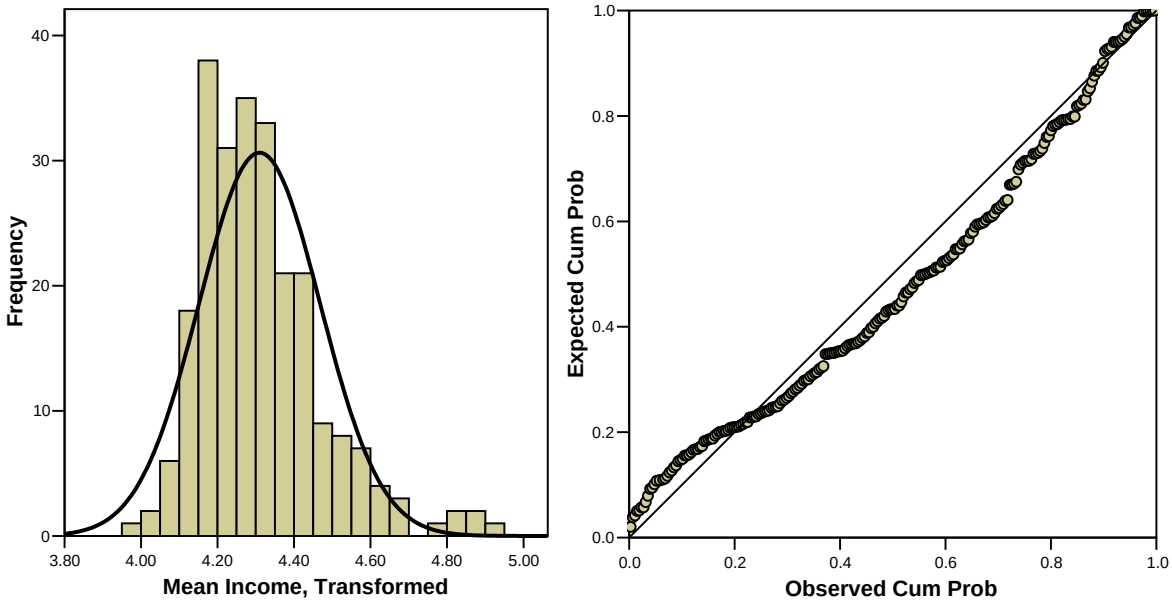


Table 4.5: Mean per Capita Income Descriptive Statistics

Statistics	Untransformed	Transformed
Central Tendency		
Mean	22,033.75	4.31
Median	19,207.00	4.28
Dispersion		
St. Deviation	10,435.67	.16
Range	76,300	.95
Distribution		
Skewness	2.88	1.09
Kurtosis	11.36	1.82
n = 243		

The transformation resulted in substantial improvement of data distribution. Visually, data distribution approximates normal (Figure 4.22). The skewness (1.09) and kurtosis (1.82) values are within the acceptable range; the measures of central tendency and dispersion presented in Table 4.5 also suggest that the normality assumption is met.

Figure 4.22: Mean per Capita Income (Transformed) Histogram and Normal Probability Plot



Percentage of Residents below the Poverty Level

This variable is another indicator of the income level of municipality residents. Though a little lower, the sub-sample mean for this variable (11.73) is close to the nation's (12.05). Inspection of the histogram and the normal probability plot for the percentage of residents below the poverty level variable suggests certain violation of the normality assumption. Visually, the data look positively skewed on the histogram, while the slope of the probability plot does not exactly approximate a 45-degree line (Figure 4.23). However, the descriptive statistics values presented in Table 4.6 do not demonstrate violation of the normality

assumption. The mean (11.73) and the median (9.96) are closely aligned; the standard deviation (7.63) is not high; and skewness (1.00) and kurtosis (.87) are within the acceptable range. Based on the descriptive statistics values, it was decided that the data meet the normality assumption and no transformation is necessary.

Figure 4.23: Percentage of Residents below Poverty Level Histogram and Normal Probability Plot

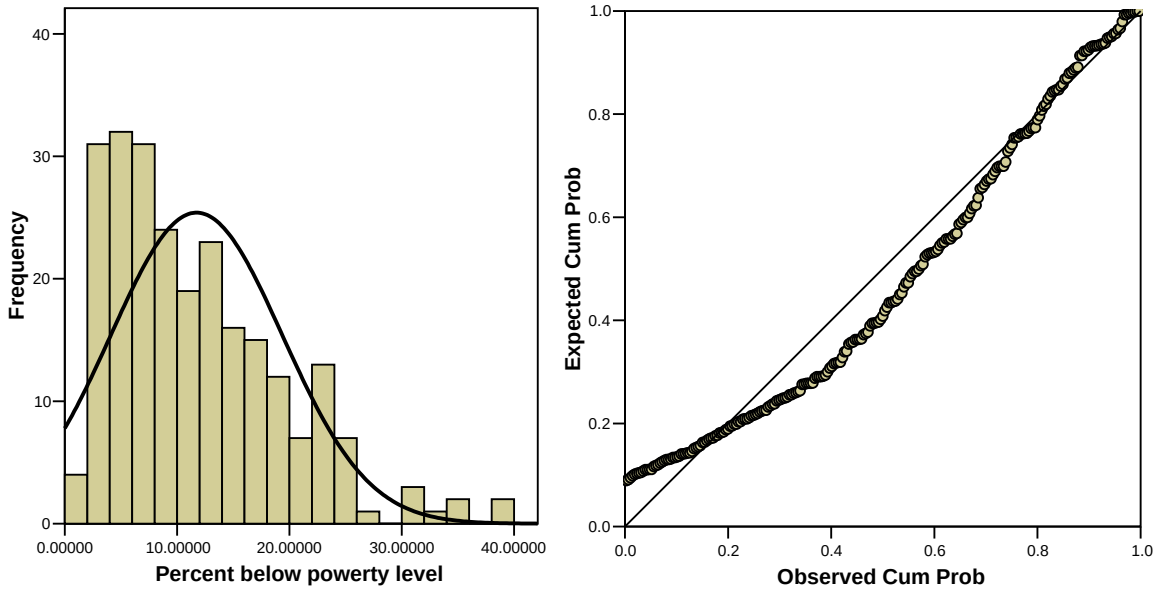


Table 4.6: Percentage of Residents below the Poverty Level Descriptive Statistics

Statistics	Values
Central Tendency	
Mean	11.73
Median	9.96
Dispersion	
St. Deviation	7.63
Range	38.10
Distribution	
Skewness	1.00
Kurtosis	.87
n = 243	

Percentage of Nonwhite Residents

Almost universally, ethnic diversity is believed to have a negative effect on e-government and ICT initiatives in the literature on e-government, especially when digital divide is discussed. For the present research, ethnic diversity is operationalized as the percentage of nonwhite residents and the percentage of non-English-speaking households. For the percentage of nonwhite residents, the sub-sample mean (16.94) is somewhat lower than the nation's mean (22.31). The histogram and the normal probability plot for the percentage of nonwhite residents variable (Figure 4.24) suggest violation of the normality assumption. Table 4.7 demonstrates that the distribution is positively skewed (1.55) within acceptable range, but the kurtosis value (2.13) is too high, which confirms the violation of normality. Logarithmic transformation is applied to address the issue.

Figure 4.24: Percentage of Nonwhite Residents Histogram and Normal Probability Plot

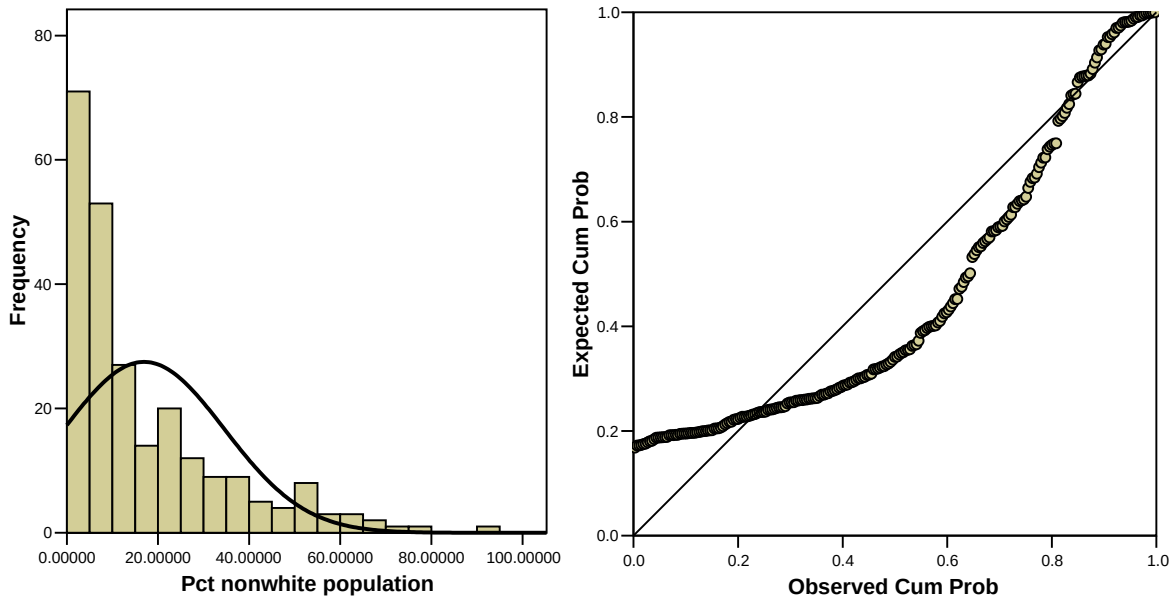
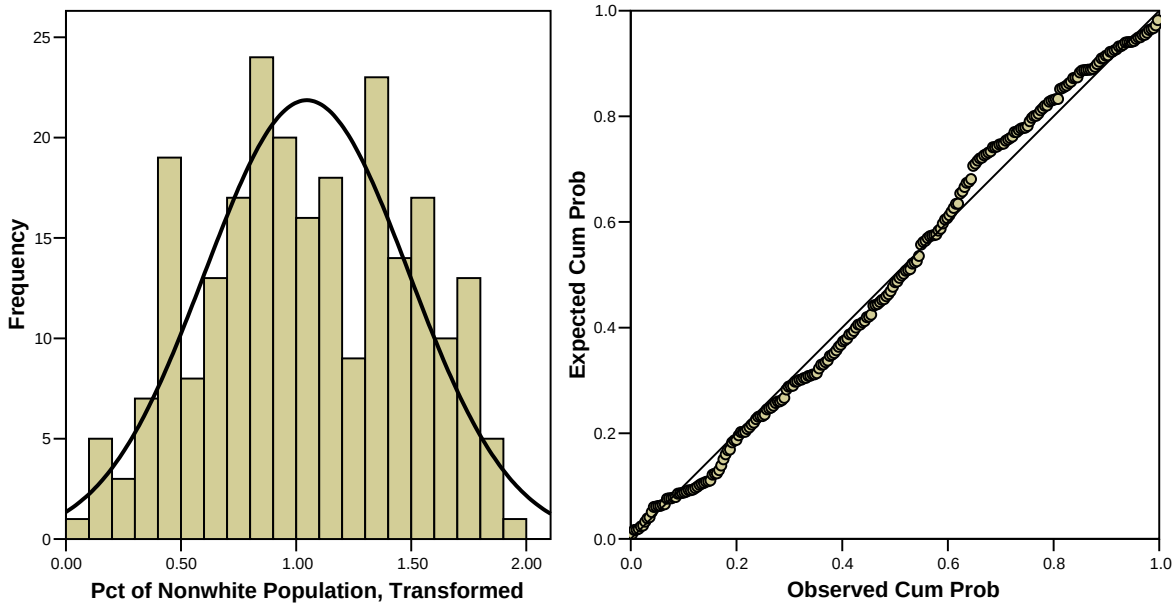


Table 4.7: Percentage of Nonwhite Residents Descriptive Statistics

Statistics	Untransformed	Transformed
Central Tendency		
Mean	16.94	1.04
Median	9.74	1.03
Dispersion		
St. Deviation	17.63	.44
Range	93.75	1.98
Distribution		
Skewness	1.55	-.05
Kurtosis	2.13	-.85
n = 243		

The histogram and the probability plot of the transformed data (Figure 4.25) reveal substantial improvement of the data distribution. The measures of central tendency are closely aligned: the mean is 1.04 and the median is 1.03. The standard deviation is .44. There is a very low negative skew (-.05), and value of kurtosis (-.85) indicates small flattening of the distribution. Based on the examination of the histogram and the probability plot and the values of descriptive statistics, a conclusion was made that the data distribution for the transformed percentage of nonwhite population variable approximates normal.

Figure 4.25: Percentage of Nonwhite Residents (Transformed) Histogram and Normal Probability Plot



Percentage of Non-English-Speaking Households

For the percentage of non-English-speaking households, the sub-sample mean (2.92) is noticeably higher than the nation's mean (1.55). The visual examination of the histogram and the normal probability plot (Figure 4.26) revealed violation of the normality assumption. The distribution is positively skewed (2.45) and highly peaked (6.84). Logarithmic transformation was applied to the data to address the deviation of normality issue.

Figure 4.26: Percentage of Non-English-Speaking Households Histogram and Normal Probability Plot

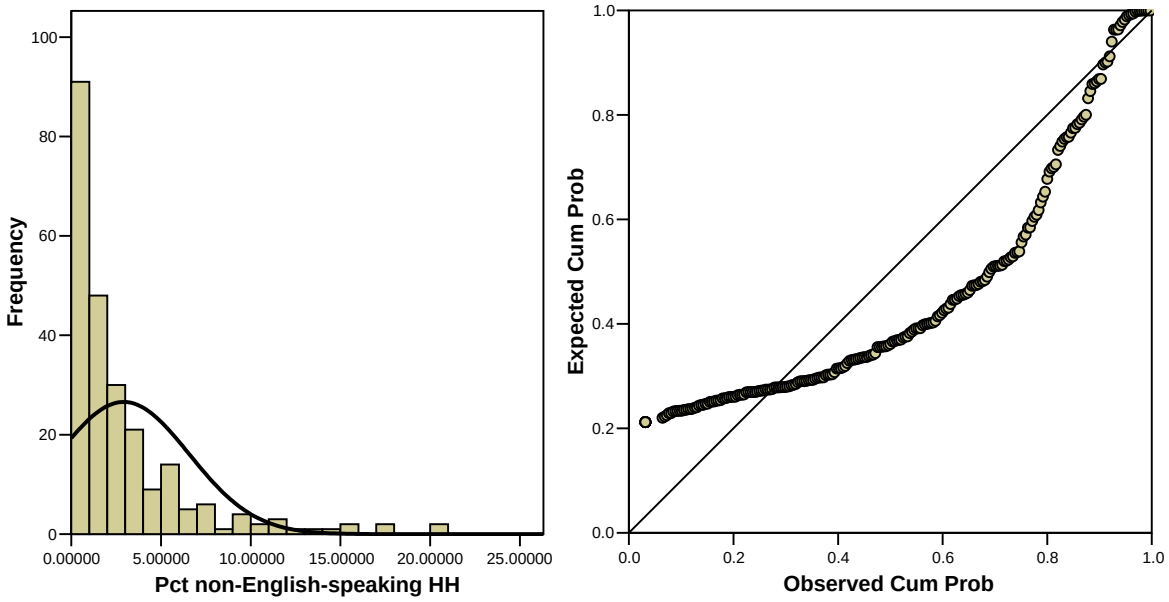
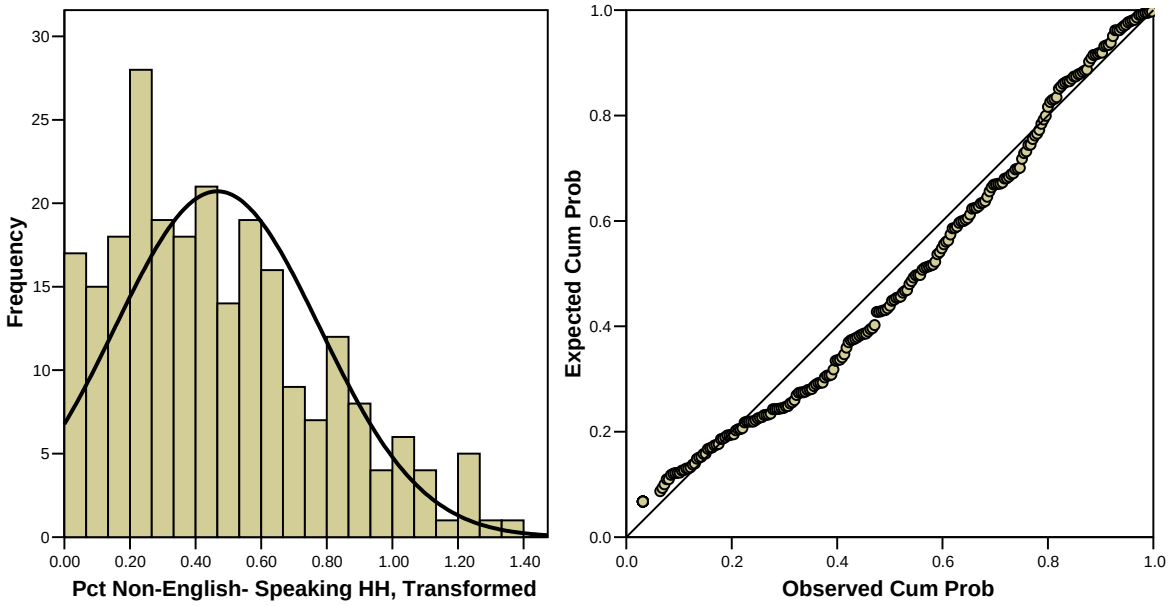


Table 4.8: Percentage of Non-English-Speaking Households Descriptive Statistics

Statistics	Untransformed	Transformed
Central Tendency		
Mean	2.92	.47
Median	1.62	.42
Dispersion		
St. Deviation	3.64	.31
Range	20.99	1.34
Distribution		
Skewness	2.45	.65
Kurtosis	6.84	-.15
n = 243		

The transformation substantially improved data distribution for the variable. Though there is a slight visible positive skew on the histogram, and a visible deviation from a 45-degree slope on the normal probability plot (Figure 4.27), the descriptive statistic values allow reaching the conclusion that, overall, the data are normally distributed. Thus, the mean (.47) and the median (.42) are very closely aligned; the standard deviation is small; the values of skewness (.65) and kurtosis (-.15) do not exceed the expected range (Table 4.8).

Figure 4.27: Percentage of Non-English-Speaking Households (Transformed) Histogram and Normal Probability Plot



Unemployment Rate

According to the e-government literature, unemployed residents are likely to use computers and the Internet less often, creating a lower demand for e-government. Though somewhat lower, sub-sample mean for the unemployment rate (9.62) is close to the nation's mean (10.44). No data transformation was performed for this variable. Visual examination of the histogram and the normal probability plot (Figure 4.28) revealed that the data distribution closely approximates normal. The mean (9.62) and median (9.47) are very closely aligned; the standard deviation (2.42) is small; skewness (.35) and kurtosis (.52) are well within expected values (Table 4.9).

Figure 4.28: Unemployment Rate: Histogram and Normal Probability Plot

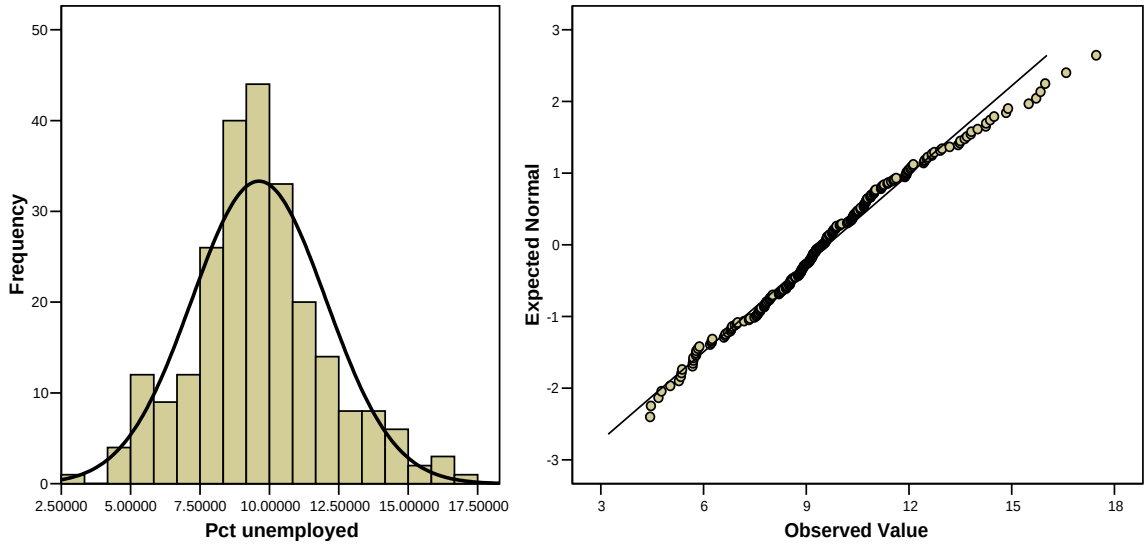


Table 4.9: Unemployment Rate Descriptive Statistics

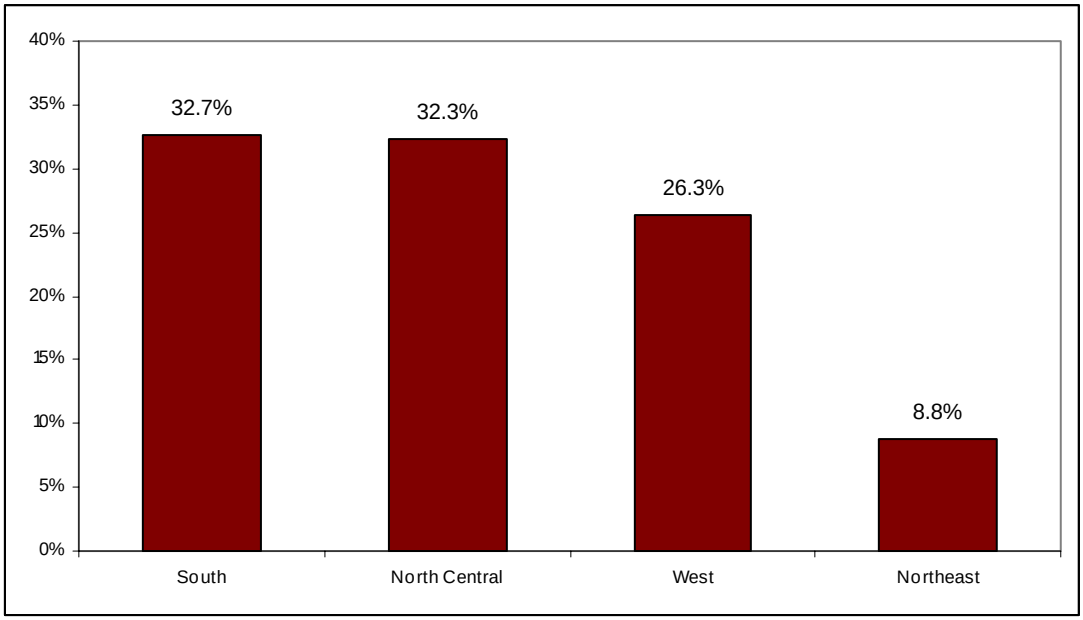
Statistics	Value
Central Tendency	
Mean	9.62
Median	9.47
Dispersion	
St. Deviation	2.42
Range	14.50
Distribution	
Skewness	.35
Kurtosis	.52
n = 243	

Geographic Region

In the literature on innovation, the regional effect is given an important role in a jurisdictional propensity to innovate. The present research uses the geographic region classification developed by the Census Bureau. Based on this classification, the U.S. is divided into four regions. The region names and the percentage of respondents from each region included in the sample for the present research are presented in Figure 4.29. The highest number of municipalities in the sub-sample is from the South and the North Central

region. The municipalities from each of these two regions comprise one-third of the total number of municipalities. In contrast, municipalities from the Northeast region make only about nine percent of the total number of municipalities. Municipalities from the West region comprise 26 percent of the sub-sample. Overall, the data distribution in the sub-sample for the present research is not substantially different from the distribution in the complete ICMA sample.

Figure 4.29: Geographic Region



To be included into the correlation/regression analyses, the geographic region was recoded into a set of dummy variables. Three dummy variables were created to represent the geographic region, "North Central," "South," and "West." The "Northeastern" category was left out to prevent perfect multicollinearity (see Garson, n.d., ¶ 12). The split between the categories for each dummy variable do not exceed 90-10 ratio (Figure 4.30; Figure 4.31; Figure 4.32), which satisfies the criterion of including these variables into further analyses.

Figure 4.30: North Central Region

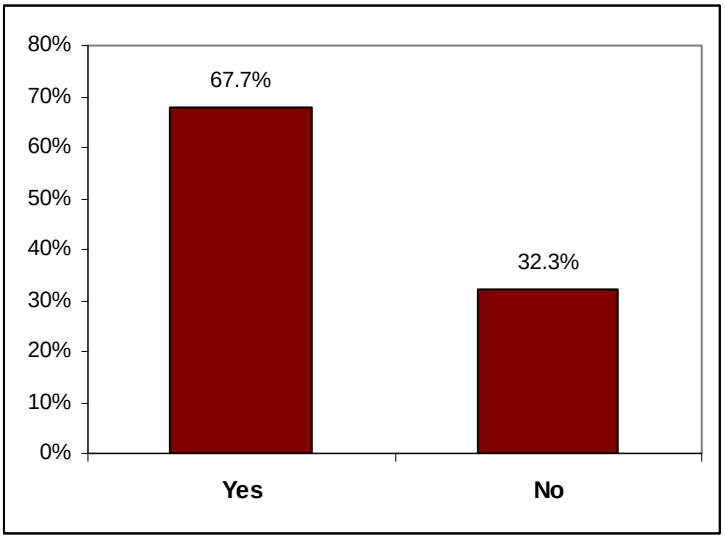


Figure 4.31: South Region

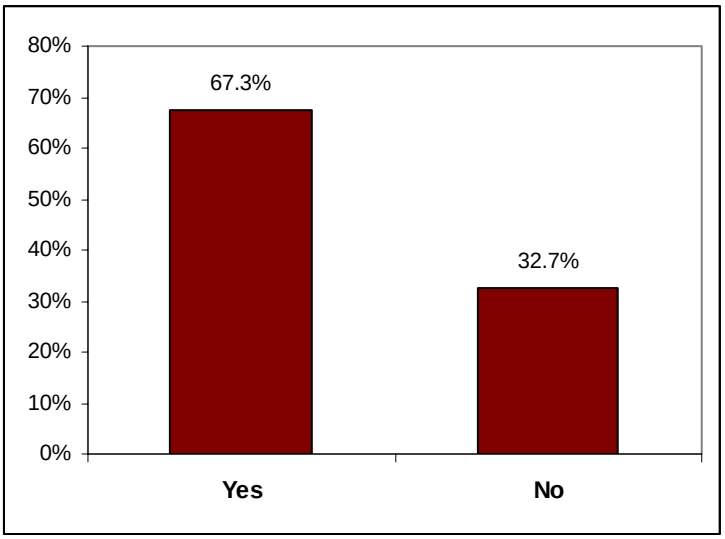
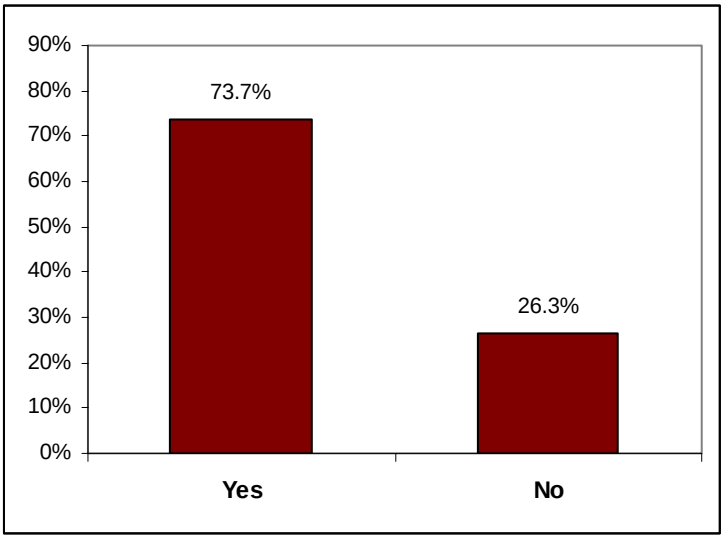


Figure 4.32: West Region



CONCLUSION

This chapter discussed the results of univariate statistical analysis of the dependent and the independent variables included in the present research. Overall, the data distributions for the variables included into the dataset for the present research are not substantially different from the known distributions in the universe of municipalities – the complete ICMA and the Census datasets. For the dichotomous and the categorical ICMA variables, the split between the categories in the sub-sample for the present research approximates the split in the complete ICMA dataset. Similarly, the mean and overall data distribution for the municipality size, the continuous variable the data for which were also obtained from the ICMA dataset, in the sub-sample approximates those of the complete ICMA sample. The continuous variables, the data for which were obtained from the Census Bureau dataset, are also not significantly different, based on the comparisons of means for the sub-sample data with the nation's mean. The exception is the percent of urban population variable (which was deleted for the reason of not meeting the normality assumption) and the ethnic diversity

variables (the percentage of nonwhite residents and the percentage of non-English-speaking households). For the non-English-speaking households, the discrepancy between the sub-sample and the nation's means was very small in absolute numbers. However because the total percentage of such households is low, even small differences might seem substantial.

Missing values do not constitute a significant problem for the sample dataset. All variables were tested to determine whether they satisfy the criteria of being included into the correlation/regression analyses. As the result of these tests, two dichotomous IVs – the outside funding for e-government initiatives and the lack of inter-departmental collaboration – were omitted from the research. All continuous variables that did not satisfy the criteria of normality for being included into the correlation/regression analyses were logarithmically transformed. For all continuous variables, except one (the percentage of urban population), logarithmic transformation resulted in substantial improvement of data distribution, and meeting the criteria of inclusion into the correlation/regression analysis. The percentage of urban population variable was deleted from the further analyses.

The list of the IVs that were logarithmically transformed appears below:

- Municipality size
- Percentage of municipal residents with B.A. and higher degree
- Mean per capita income
- Percentage of nonwhite residents
- Percentage of non-English-speaking households

For the correlation/regression analyses performed in the following chapters, logs of these variables rather than the original variables are used.

CHAPTER FIVE: BIVARIATE STATISTICAL ANALYSIS

This chapter explores bivariate correlations between the DV (the e-government score) and two groups of IVs, the internal characteristics of municipal government agencies and the external environmental factors of municipalities. Correlations among the IVs are also examined. Several goals are accomplished by studying bivariate correlations. Correlation analysis shows whether the direction of relationship between the DV and each of the IVs is consistent with the hypothesized. It also demonstrates the strength and the significance of relationship between two variables, ignoring the effect of other variables in the dataset. Visual screening of the bivariate correlation scatterplot provides information regarding the linearity of the bivariate relationship among continuous variables or between continuous and dichotomous variables. Finally, examining bivariate correlations allows detecting multicollinearity between the IVs.

All bivariate relationships are tested using Pearsonian correlation. This technique measures the degree of linear relationship between two variables. Pearsonian correlation is used to measure the relationship between two continuous variables or between continuous and dichotomous variables (Cohen, Cohen, West, & Aiken, 2003). In the later case, point-biserial correlation coefficient is computed.

To explore bivariate relationships between the DV and dichotomous IVs measuring internal agency characteristics, an independent *t*-test was performed in addition to Pearsonian correlation. The purpose of the test was to determine whether there was a significant difference in e-government scores between the municipalities with a mayor-council and with a council-manager form of government, and to determine whether e-government scores of municipalities that provided positive responses to the questions measuring internal agency

characteristics were significantly different from the scores of the municipalities that provided negative responses. The *t*-test is an interval statistic that is used to test the hypothesis that two groups have different means (O'Sullivan & Rassel, 1999). Each group is considered a separate sample, and the *t*-test is a two-sample test. Bivariate scatterplots were requested and examined between the DV and the interval IVs that measure external environmental factors of municipalities to explore visually the direction of these relationships.

The discussion of the bivariate relationships is structured as follows: the first part of the chapter focuses on the relationships between the DV and IVs; the multicollinear relationships between IVs are discussed in the second part. The discussion begins with outlining confirmatory findings; then unexpected and null findings are discussed. Table 5.1 presents the correlations among all variables included into the present research.

Table 5.1: Bivariate Correlations

	E-gov Score	Egov Budget	Form of Govt	Citizen Surveys	Reeng.	Staff resist. to change	Privacy probl.	Security probl.	Develop in-house	Lack of supp. from elect. officials	Intranet	Municip. size	% unempl.	% of B.A. degree	Mean income	% below poverty level	% nonwhite	% non-English-speaking	North Central	South
Egov Budget	.147*																			
Form of Govt	.347**	.115																		
Citizen Surveys	.325**	.280**	.133*																	
Reeng.	.237**	.202**	.101	.346**																
Staff resist. to change	.079	-.046	.097	.119	.014															
Privacy probl.	-.102	.003	.078	.048	.071	.128*														
Security probl.	-.084	-.008	.001	.031	.035	.067	.462**													
Develop in-house	.228**	-.039	.072	.020	.233**	.042	.166**	-.012												
Lack of supp. from elect. officials	-.125*	.012	-.074	-.058	-.081	.080	.111	.031	-.036											
Intranet	.338**	.113	.238**	.191**	.259**	.081	-.110	-.112	.189**	-.128*										
Municip. size	.627**	.124	.295**	.225**	.264**	.070	-.007	-.053	.269**	-.107	.457**									
% unempl.	.182**	.010	.244**	.014	.056	-.046	-.127*	-.025	-.022	-.123	.149*	.239**								
% of B.A. degree	.457**	.108	.193**	.250**	.123	.097	-.083	-.070	.166**	.005	.194**	.307**	.217**							
Mean income	.341**	.114	.128*	.184**	.136*	.102	-.106	-.050	.097	.038	.121	.168**	.200**	.848**						
% below poverty level	-.150*	-.080	.009	-.171**	-.128*	-.048	-.007	-.009	-.155*	-.066	-.070	-.051	.254**	-.519**	-.671**					
% nonwhite	.236**	.035	.204**	.007	.102	.061	-.035	.005	.012	-.060	.202**	.358**	.358**	-.135*	-.253**	.468**				
% non-English-speaking	.259**	.077	.293**	.030	.135*	.050	.030	.017	.053	-.049	.207**	.323**	.434**	-.031	-.089	.205**	.529**			
North Central	-.089	-.012	-.352**	.018	.034	-.085	-.041	-.054	.042	-.018	-.082	-.152*	-.291**	-.002	.068	-.219**	-.426**	-.360**		
South	.035	.067	.122	-.067	-.043	.039	-.110	-.041	.000	-.021	.119	.075	.081	-.017	-.087	.234**	.358**	.085	-.481**	
West	.104	-.008	.198**	.042	.065	.043	.045	.090	-.025	-.053	.000	.148*	.303**	-.007	.006	.002	.199**	.334**	-.412**	-.416**

*Statistically significant at $p \leq .05$; **Statistically significant at $p \leq .01$

CORRELATIONS BETWEEN THE DV AND THE IVS

Confirmatory Findings

This section describes bivariate correlations between the DV and the IVs that are statistically significant and have the same direction as predicted.

The following correlations fall under this category:

- E-government - (log of) municipality size
- E-government - (log of) percentage of residents with B.A. and higher degree
- E-government - form of government
- E-government - (log of) mean income of municipality residents
- E-government - having an intranet
- E-government - conducting citizen surveys
- E-government - reengineering
- E-government - developing e-government services in-house
- E-government - having a separate e-government budget
- E-government - (log of) percentage of unemployed residents
- E-government - percentage of residents below poverty level
- E-government - having a separate e-government budget
- E-government - lack of support from elected officials

The correlations are discussed below, starting with the correlations between the DV and the internal agency characteristics IVs. The strongest correlations are discussed first.

E-government Score - Form of Government

H_3: The council-manager form of government in a municipality is positively associated with the e-government score.

The strongest correlation between the DV (the e-government score) and the internal agency characteristics IVs is with the form of government (r = .347; $p \leq .01$). Table 5.2 illustrates that municipalities with council-manager form of government tend to have higher e-government scores. This is consistent with the hypothesized relationships between the two variables. The results of independent t-test indicate that the mean e-government scores of municipalities with mayor-council and council-manager forms of government are significantly different (t = -5.847; $p < .001$).

Table 5.2: E-government - Form of Government Correlation

Form of Government	Mean	Median	Minimum	Maximum	Independent t-test
Mayor-council	18.74	20.69	0	71	t = -5.847***
Council-manager	35.29	32.76	0	98	

*Statistically significant at $p \leq .05$, **Statistically significant at $p \leq .01$, ***Statistically significant at $p \leq .001$

E-government Score - Having an Intranet

H_{12}: Having an intranet is positively associated with the e-government score.

The next correlation in strength between the e-government score and the internal agency characteristics variables is with the intranet variable which is significantly correlated with the e-government score (r = .338; $p \leq .01$). The nature of the relationship between the two variables is consistent with the predicted one, with municipalities having an intranet scoring higher on e-government (Table 5.3). The results of the independent t-test show a significant

difference in e-government scores between municipalities with and without intranets (t = -5.528; p<.001).

Table 5.3: E-government - Intranet Correlation

Intranet	Mean	Median	Minimum	Maximum	Independent *t*-test
Yes	38.31	36.21	0	98	t = -5.528***
No	23.03	22.41	0	83	

*Statistically significant at p≤.05, **Statistically significant at p≤.01, ***Statistically significant at p≤.001

E-government Score - Conducting Citizen Surveys

H_4: Conducting citizen surveys by municipalities to determine what online services residents and businesses want is positively associated with the e-government score.

There is a significant positive correlation (r = .325; p≤.01) between the e-government score of a municipality and the citizen surveys variable. As anticipated, the municipalities that conduct citizen surveys to determine the demand for e-government services tend to have higher e-government score (Table 5.4). The results of the independent *t*-test show a significant difference in mean e-government scores between municipalities that have conducted e-government surveys and municipalities that have not (t = -5.325; p<.001).

Table 5.4: E-government - Citizen Surveys Correlation

Citizen Surveys	Mean	Median	Minimum	Maximum	Independent *t*-test
Yes	49.41	43.10	0	98	t = -5.325***
No	26.85	25.86	0	91	

*Statistically significant at p≤.05, **Statistically significant at p≤.01, ***Statistically significant at p≤.001

E-government Score - Reengineering

H_5: Implementing e-government initiatives that have resulted in reengineering of business processes is positively associated with the e-government score.

The reengineering is another internal agency characteristic variable that is significantly correlated with the e-government score (r = .237; $p \leq .01$). Though the correlation is weak, the direction of relationship between the two variables is consistent with the hypothesized, with municipalities in which e-government has led to reengineering of the business processes scoring higher on their e-government initiatives (Table 5.5). The results of the independent *t*-test show a significant difference in mean e-government scores between municipalities in which e-government has been associated with reengineering of business processes and municipalities in which it has not (t = -3.857; $p < .001$).

Table 5.5: E-government - Reengineering

Reengineering	Mean	Median	Minimum	Maximum	Independent *t*-test
Yes	42.77	41.38	0	90	t = -3.857***
No	27.50	25.86	0	98	

*Statistically significant at $p \leq .05$, **Statistically significant at $p \leq .01$, ***Statistically significant at $p \leq .001$

E-government Score - Developing E-government Services in-house

H_{10}: Developing e-government services in-house is positively associated with e-government score.

The e-government score is significantly correlated with the developing e-government services in-house (r = .228; $p \leq .01$), although this correlation is weak. According to the direction of the relationship, the municipalities that develop their e-government services in-house tend to score higher on their e-government initiatives (Table 5.6), which is consistent with the predicted relationship. The results of the independent *t*-test show a significant difference in mean e-government scores between municipalities in which develop e-

government services in-house and municipalities which outsource development of e-government services (t = -3.691; p<.001).

Table 5.6: E-government - Developing E-government Services in-house Correlation

In-house Services	Mean	Median	Minimum	Maximum	Independent *t*-test
Yes	35.79	32.76	0	91	t = -3.691***
No	25.37	22.41	0	98	

*Statistically significant at $p \leq .05$, **Statistically significant at $p \leq .01$, ***Statistically significant at $p \leq .001$

E-government Score - Having a Separate Budget for E-government Initiatives

H_2: Having a separate budget for e-government initiatives is positively associated with its e-government score.

There is a weak, yet significant, bivariate correlation between the e-government score and the separate budget for e-government variable (r = .147; $p \leq .05$). The direction of the relationship is consistent with the predicted, with government agencies that have a separate e-government budget scoring higher on e-government (Table 5.7). The results of the independent *t*-test show a significant difference in mean e-government scores between municipalities which have a separate budget for e-government initiatives and municipalities that do not (t = -2.235; $p \leq .05$).

Table 5.7: E-government - Separate E-government Budget Correlation

E-government Budget	Mean	Median	Minimum	Maximum	Independent *t*-test
Yes	37.44	32.76	0	98	t = -2.235*
No	29.29	27.59	0	91	

*Statistically significant at $p \leq .05$, **Statistically significant at $p \leq .01$, ***Statistically significant at $p \leq .001$

E-government Score - Lack of Support from Elected Officials

H_{11}: Lack of support from elected officials in municipality is negatively associated with the e-government score.

The weakest bivariate correlation between the e-government score and the variables measuring internal agency characteristics is with the separate budget for e-government variable (r = -.125; $p \leq .05$). As predicted, the municipalities that mentioned the lack of support tend to get lower e-government scores (Table 5.8). The results of the independent *t*-test show a significant difference in mean e-government scores between municipalities in which e-government initiatives receive support from elected officials and in which they do not (t = 1.996; $p \leq .05$).

Table 5.8: E-government - Lack of Support Correlation

Lack of Support	Mean	Median	Minimum	Maximum	Independent *t*-test
Yes	22.01	23.28	0	57	t = 1.996*
No	30.78	27.59	0	98	

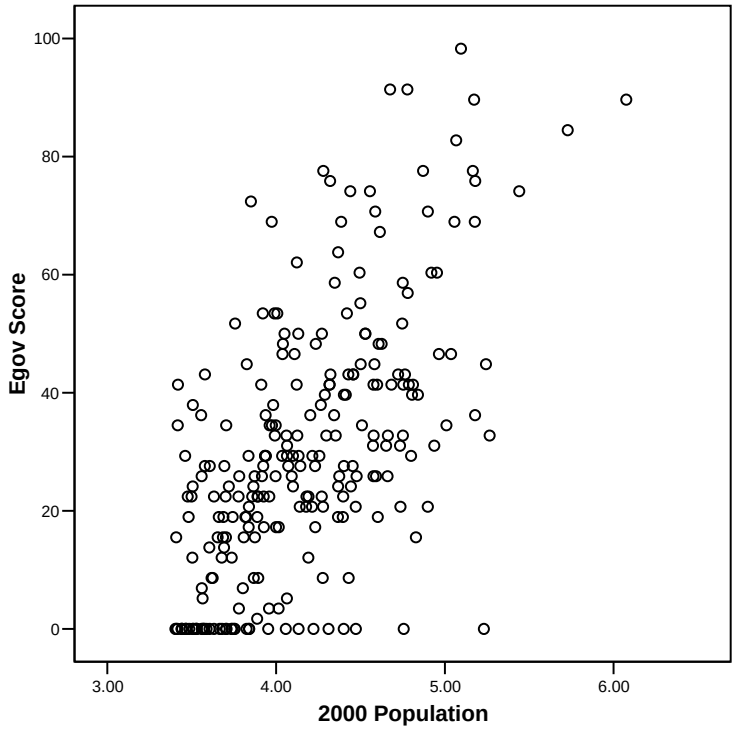
*Statistically significant at $p \leq .05$, **Statistically significant at $p \leq .01$, ***Statistically significant at $p \leq .001$

E-government Score - Municipality Size

H_{13}: Municipality size is positively associated with the e-government score.

With regard to the environmental factors, the e-government score is the most strongly correlated with the (log of) municipality size (r = .627; $p \leq .01$). Consistently with hypothesized, the direction of the relationship is positive. The scatterplot (Figure 5.1) confirms the positive nature of the relationship between the e-government score and the (log of) municipality size; it also shows that this relationship satisfies the linearity assumption.

Figure 5.1: E-government - Municipality Size Scatterplot

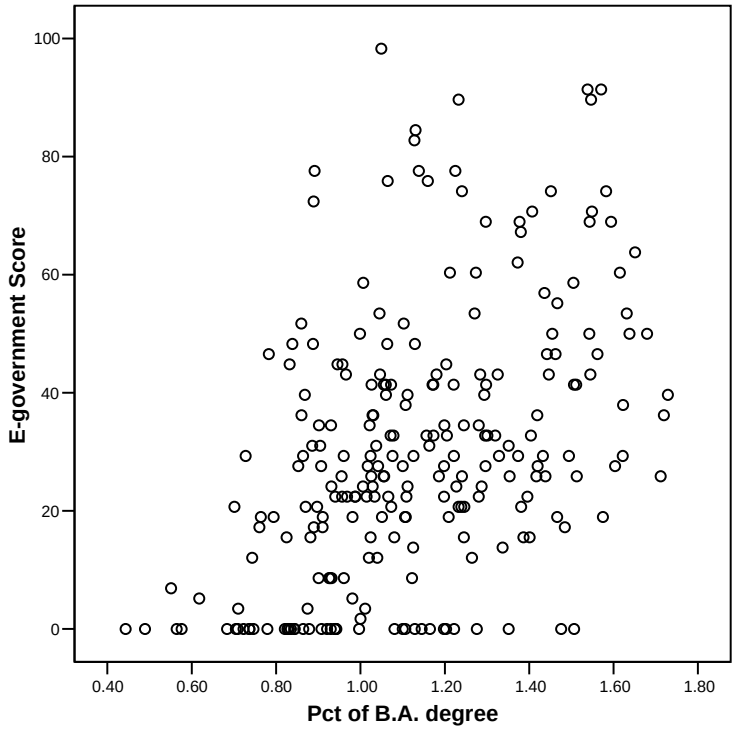


E-government Score - Percentage of Residents with B.A. and Higher Degree

H_{15}: Percentage of municipal residents with B.A. and higher degree is positively associated with the e-government score.

The (log of) percentage of residents with B.A. and higher degree is also positively correlated with the e-government score (r = .457; $p \leq .01$), which is consistent with the hypothesized relationship between the two variables. Figure 5.2 shows the positive and linear character of the relationship.

Figure 5.2: E-government - Percentage B.A. Degree and Higher Scatterplot

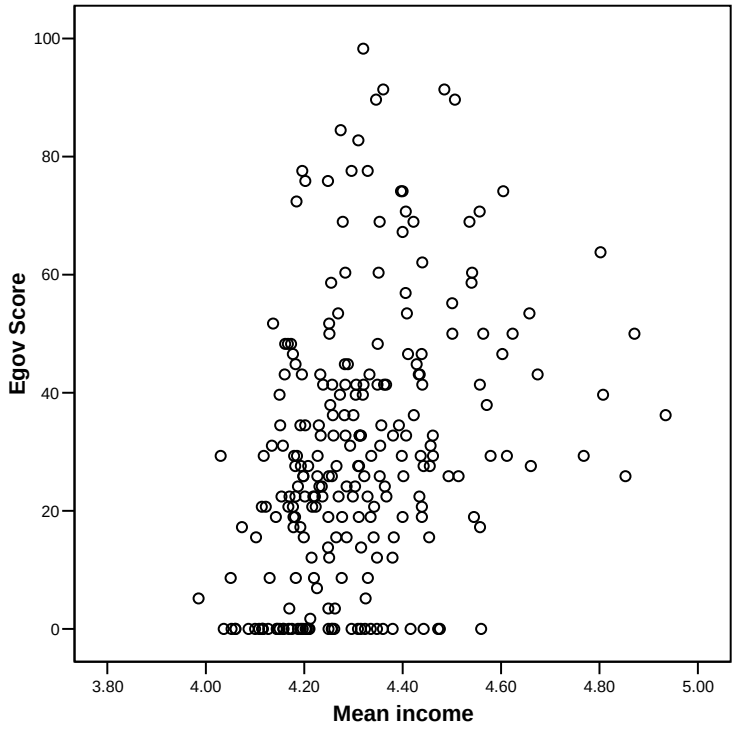


E-government Score - Mean per Capita Income

H_{16}: Mean per capita income of municipality residents is positively associated with the e-government score.

Significant relationship exists between the e-government score and the (log of) mean per capita income (r = .341; $p \leq .01$). The positive direction of the relationship is consistent with the hypothesized. Based on the scatterplot (Figure 5.3), although the relationship between the two variables is visibly less linear than for other correlations, it is still possible to conclude that linearity assumption is met.

Figure 5.3: E-government - Mean per Capita Income Scatterplot

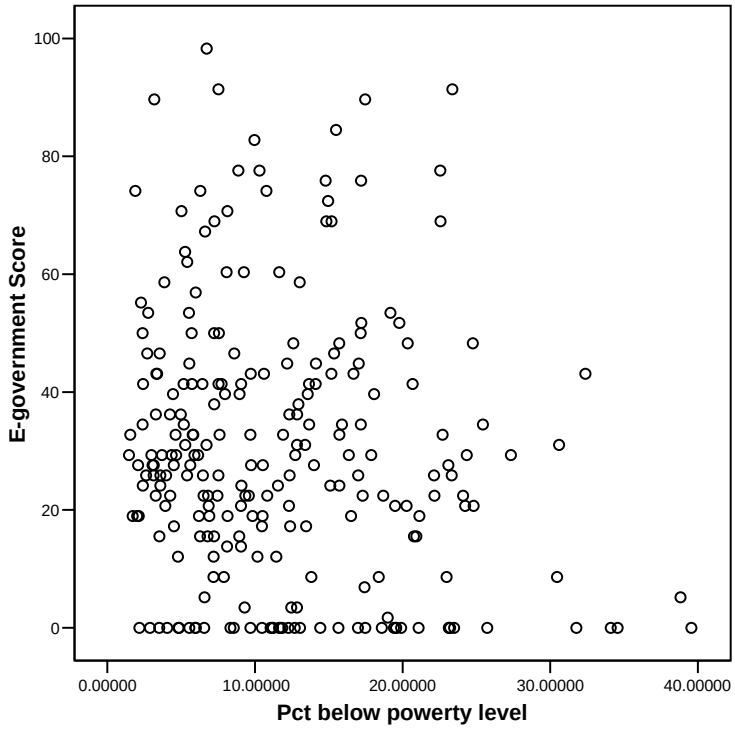


E-government Score - Percentage below Poverty Level

H_{17}: Percentage of municipality residents below poverty level is negatively associated with the e-government score.

There is a weak and negative correlation between the e-government and the percentage of residents between the poverty level variables (r = -.150; $p \leq .05$). As predicted, the municipalities with higher rates of residents below poverty level tend to have lower scores on e-government. The scatterplot (Figure 5.4) demonstrate the weakness of correlation and the negative character of relationships.

Figure 5.4: E-government - Percentage below Poverty Level Scatterplot



Unexpected Findings: Ethnic Diversity Variables and Unemployment Rate

Unexpected findings include bivariate relationships that are statistically significant, but for which relationships between the DV and the IVs are opposite from what was predicted. This category includes the following correlations:

- E-government - (log of) percentage of non-English-speaking households
- E-government - (log of) percentage of nonwhite residents
- E-government - unemployment rate

The first two variables serve as proxies for the ethnic diversity construct. It was hypothesized that each variable is negatively correlated with the e-government score. In the sample for the present research, however, there is a significant, although weak, positive

correlation between each of the ethnic diversity variables and the e-government score (Table 5.1):

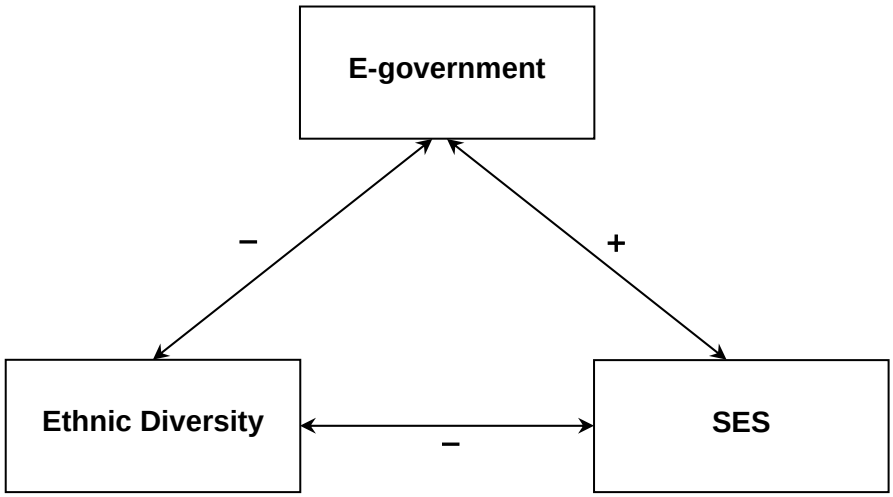
- E-government - (log of) percentage of non-English-speaking households: r = .259; $p \leq .01$
- E-government - (log of) percentage of nonwhite residents: r = .236; $p \leq .01$

The hypotheses regarding negative association between the ethnic diversity variables and the e-government score were based on the previous research on innovation, ICT, and e-government (see Chapter 2). According the literature, ethnic diversity is strongly associated with digital divide. Based on the digital divide framework, representatives of ethnic groups who tend to be less educated and less wealthy have lower access to ICTs and the Internet. Based on this framework, municipalities that have higher concentration of ethnically diverse residents are likely to have lower e-government scores because of the lower demand for the on-line government services from these residents.

It is not exactly clear why the e-government score and the ethnic diversity variables are positively correlated in the sample. To check for possible problems with ethnic diversity variables in this sample, it was decided to examine some other relationships described in the literature between these and other variables in the sample. For this purpose, the socioeconomic status (SES) variables, that are also part of the sample, were chosen. The literature on innovation, ICT, and e-government consistently points out the negative nature of relationships between the SES and the ethnic diversity variables, while indicating that SES is positively correlated with the propensity to adopt e-government, new ICT, and innovations in general. Digital divide literature considers SES to be the second component of the digital divide construct, in addition to ethnic diversity, contributing to differential access by various

population groups to innovations, such as e-government. Based on the digital divide literature, the ethic diversity is negatively correlated both with the e-government score and the SES. On the other hand, high SES is positively correlated with e-government score (Figure 5.5). To examine if the hypothesized relationships between the ethnic diversity and the SES variables would hold for this sample, bivariate correlations between the ethnic diversity variables and the variables that measure education and income of municipality residents (and are components of the SES construct) were examined (Table 5.1). For the present research, education is operationalized as the percentage of residents with B.A. and higher degree, while income is operationalized as the mean income in municipality and the percentage of residents below poverty level.

Figure 5.5: Hypothesized Relationships between E-government, SES, and Ethnic Diversity



First, the correlations between the ethnic diversity variables and the (log of) percentage of residents with B.A. and higher degree were examined. The (log of) percentage of residents with B.A. and higher degree is negatively correlated with the (log of) percentage of nonwhite

residents (r = -.135; $p \leq .05$) and has no correlation with the (log of) percentage of non-English-speaking households (r = -.031; $p \leq .635$). The significant negative correlation between the (log of) percentage of residents with B.A. and higher degree and the (log of) percentage of non-English-speaking households is consistent with the literature findings, however it is rather weak.

Examining correlations between the ethnic diversity variables and the (log of) mean income demonstrated that the (log of) mean income is negatively correlated with the (log of) percentage of nonwhite residents (r = -.253; $p \leq .01$) and has no relationship with the (log of) percentage of non-English-speaking households (r = -.089; $p \leq .166$). Again, the negative significant correlation between the (log of) mean income and the (log of) percentage of nonwhite residents is consistent with the literature findings.

Finally, the percentage of residents below poverty level is positively correlated with the (log of) percentage of nonwhite residents (r = .468; $p \leq .01$) and the (log of) percentage of non-English-speaking households (r = .205; $p \leq .01$). The relationships between variables in both correlations are also consistent with the predicted in the literature.

Thus, overall (except for the null correlations), the results of examining the correlations between the ethnic diversity and the SES variables in this sample indicate the support for the digital divide literature hypotheses about the negative nature of these relationships. The correlations between the SES variables and the e-government score, which are also consistent with the digital divide literature. It therefore remains unclear why the ethnic diversity variables are positively correlated to the e-government score, while being negatively correlated with the SES variables. It may be possible that there is an intervening variable, such as municipality size, that accounts for the unexpected relationship between the ethnic

diversity variables and the e-government score. To test this assumption, partial correlation analysis was performed between the e-government score, the ethnic diversity variables, controlling for municipality size. The results of this analysis appear in Table 5.9.

Table 5.9: Partial Correlations between the E-government and the Ethnic Diversity Variables, Controlling for Municipality Size

	E-government Score	% nonwhite population	% non-English-speaking HH
E-government Score			
% nonwhite population	.013		
% non-English-speaking HH	.075	.467*	

*Statistically significant at p≤.01

The correlations results outlined in Table 5.9, when the municipality size is controlled are somewhat different from the original results (Table 5.1) when no such control was introduced. Contrary to what was expected, statistically controlling for municipality size made correlation between the e-government score and both of the ethnic diversity variables non-significant, suggesting no relationship.

Thus, contrary to the hypothesized negative relationships between the e-government and the ethnical diversity variables which was formulated on the basis of literature review, there are relatively weak, but significant, positive correlations between these variables and the e-government score (without statistically controlling for the municipality size variable), which disappears when such a control is introduced. On the other hand, the relationships between the ethnic diversity and the SES variables are either non-significant or, when significant, are consistent with the hypothesized.

Based on the literature, digital divide, which to a substantial degree determines differential access by various socioeconomic groups to municipal e-government services, is affected by two major characteristics: ethnic diversity and socioeconomic status of the

population (such as education and income). Other demographic characteristics, such as gender or age, also have an effect on the digital divide, but their effect is less significant, or tends to vanish altogether. After examining correlations between the e-government, the ethnic diversity, and the SES variables in the sample, it may be possible to conclude that, while ethnic diversity is likely to be associated with lower levels of SES, it is not likely to be associated with a decreased demand for e-government services. In this case, the ethnic component of digital divide theory, according to which ethnically diverse population groups have lesser access to ICT and the Internet, may not hold for the municipalities in the sample. Alternatively, the SES component of the digital divide, based on which population groups of lower SES have lower rates of access to the ICT and the Internet, remains true for the municipalities in the sample. The possible reasons for such relationships between the variable remain unclear.

With regard to unexpected direction of the unemployment rate effect on the DV ($r = .182$; $p<.01$), there are two possible explanations for the opposite direction of the effect. The first one has to do with whether or not unemployment rate should be considered as a variable that, along with the ethnic diversity and the SES variables, is a characteristic of the digital divide construct. Some might argue that the unemployment rate should be made a component of the SES, since, traditionally, unemployment is positively associated with lower levels of education and income. Originally, it was planned to adopt this approach for the present research. However, later it was decided to keep the unemployment rate as a separate variable for both logical and statistical reasons. From the logical standpoint, the latest economic tendencies have demonstrated that unemployment may no longer be necessarily affecting primarily population with lower income and education. Thus, many of the downsizing

victims during the latest economic recession were middle managers and professionals with relatively high levels of education and training. It is therefore likely that the usage of the Internet, including e-government services, by this group increased as they started looking for new jobs, registering at the centers for unemployment, applying for unemployment benefits, and using other government services related to assistance with unemployment. It is very likely those if these services were available on-line, this stratum of unemployed population would take advantage of the e-government alternative, as its members could clearly afford computers and Internet access and had sufficient education and skills to be able to use e-government services. The statistical reason for not including the unemployment rate into the SES construct is that though it was significantly correlated with other SES variables (Table 5.1), these correlations are not as strong as correlations among the other SES variables and the direction of some of these correlations is the opposite of what is suggested by the digital divide.

The other possible reason for the unexpected direction of the relationship between the DV and unemployment rate is that the unemployment data were somewhat out-of-date. The data for all Census variables were collected in 2000, and while the time that has passed since the collection of data was not long enough for other variables to change substantially, it may not have been the case with the unemployment rate, which is directly affected by economic situation and, on the municipal level, can change significantly faster than, for example, ethnic diversity.

Null Findings

Table 5.10 lists the IVs, bivariate correlations of which with the dependent variable, the e-government score, are not significant. The hypotheses associated with the direction of predicted affects of the IVs on the e-government score are also listed in the table.

Table 5.10: Non-Significant Correlations

Variables	Hypotheses
Staff resistance to change	*H_7: Staff resistance to change is negatively associated with the e-government score*
Privacy-related problems	*H_8: Having privacy-related problems is negatively associated with the e-government score*
Security-related problems	*H_9: Having security-related problems is negatively associated with the e-government score*
North Central Region South Region West Region	*H_{21}: The geographic region of a municipality affects its e-government score*

Based on the literature, all these variables were found to have an important effect on adoption of such innovations as ICT and e-government by agencies in both the private and especially the public sector (see Chapter 2 for detailed discussion). Failing to form bivariate correlations with the e-government in this sample does necessarily not mean that the variables will remain uncorrelated with the e-government score, while simultaneously controlling for other IVs in the dataset. The relationships between the variables listed in the Table 5.10 are revisited in the chapter of multivariate analysis.

MULTICOLLINEARITY

According to Tabachnick & Fidell (2001), when a bivariate correlation between IVs equals or exceeds .70, there is a multicollinearity problem with a correlation matrix. Examining correlations between the IVs (Table 5.1) revealed the correlation of .848 between the (log of) mean income and the (log of) percentage of residents with B.A. degree or higher,

which clearly indicates a multicollinearity problem. Moreover, the correlation between the (log of) mean income level and the percentage of residents below poverty level (-.671) is also very close to the multicollinearity threshold. Multicollinearity between these variables is not unexpected. All three variables (the (log of) percentage of residents with B.A. and higher degree, the (log of) mean income, and the percentage of residents below poverty level) are component of the SES construct (see Chapter 2). The direction of the relationships between these variables and the DV as well as among themselves in the sample is consistent with the literature. Thus, the e-government score is positively correlated with both (log of) mean income (r = .341; $p \leq .01$) and the (log of) percentage of residents with B.A. degree and higher (r = .457; $p \leq .01$), while the relationship between the e-government score and the percentage of residents below poverty level is negative (r = -.150; $p \leq .05$). Consequently, it is not surprising that the number of residents with higher levels of education (B.A. degree and higher) in a municipality is positively correlated with the higher mean income in this municipality on the one hand, while municipalities with higher percentages of residents below poverty level tend to have lower rates of educated residents and lower mean per capita income.

Tabachnick & Fidell (2001), Garson, (n.d.) indicate that multicollinearity in the correlation/regression analyses causes both logical and statistical problems. From the logical perspective, it is not a good idea to include redundant variables in the analysis. From the statistical perspective, multicollinearity causes inflation of the regression coefficients, which makes it difficult to assess the relative importance of the independent variables using beta weights. To deal with the multicollinearity issue in this sample, it was decided to combine the (log of) percentage of residents with B.A. and higher degree, the (log of) mean income,

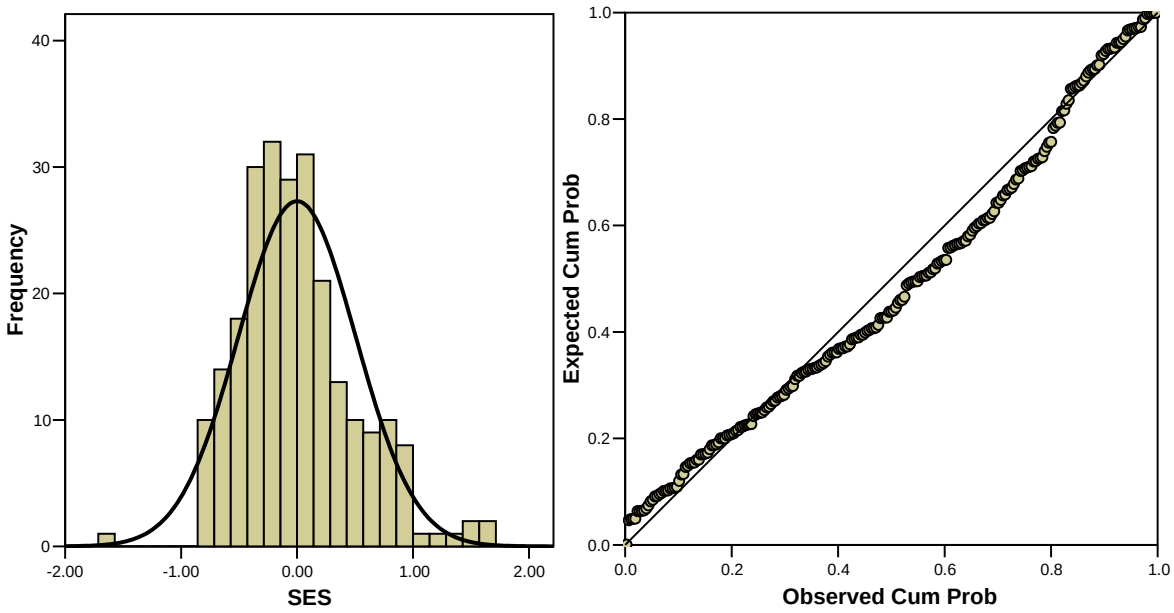
and the percentage of residents below poverty level variables into a composite socioeconomic status (SES) index. This was accomplished by converting the measures for each variable into its *z* score. The *z* scores were then averaged to produce an overall SES index for each municipality. Though this procedure resulted in the limitation of not being able to measure the unique effect of each of the SES variables on the e-government score, for the purposes of the present research, this approach is considered to be preferable in dealing with the multicollinearity problem than deleting two of the multicollinear SES variables.

Before testing the relationship between the e-government score and the new SES variable, a hypothesis was formulated with regard to the direction of the relationship. According to the hypotheses presented in Chapter 2 (section "Socioeconomic Status of Municipality Residents"), high socioeconomic status of a municipality residents was expected to be positively associated with the e-government score. Therefore, the hypothesis for the SES itself is formulated as follows:

H_{22}: Socioeconomic status of municipality residents is positively associated with the e-government score.

Prior to running correlation analysis between the SES and the e-government score variables, the SES was screened for normality. The results of the screening indicate that the data distribution for the SES approximates normal (Figure 5.6). The histogram does not reveal any substantial skew, and the slope of the normal probability plot approximates a 45-degree line. Values of the descriptive statistics (Table 5.11) also suggest that the normality assumption for the SES variable has been met. Measures of central tendency (mean = .00; median = -.79) are closely aligned; the standard deviation is low (.51); the values of skewness (.65) and kurtosis (.91) are well within the expected range.

Figure 5.6: SES Histogram and Normal Probability Plot

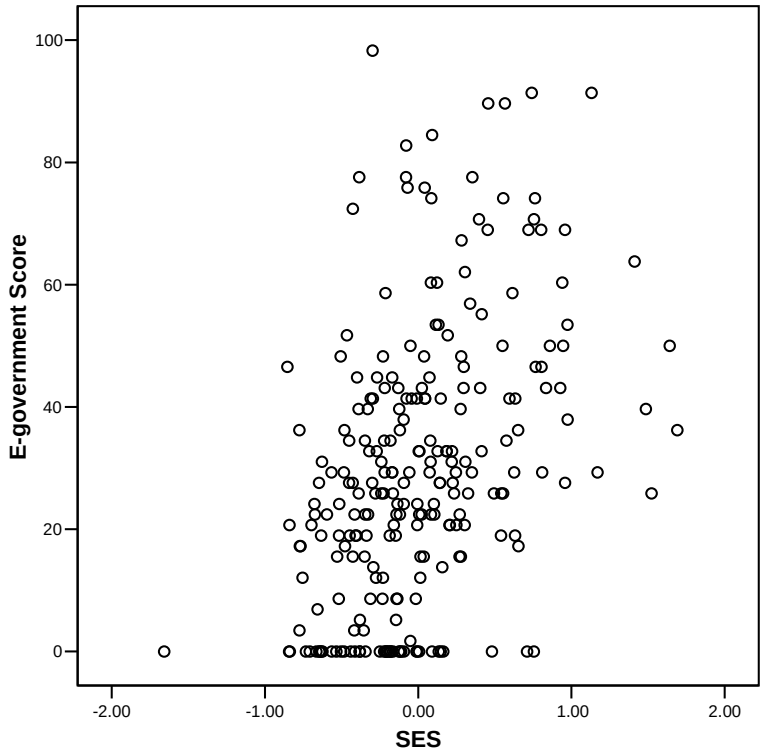


There is a positive moderate correlation between the SES and the e-government score (r = .426; $p \leq .01$). The positive linear relationship between the e-government and the SES is reflected by the scatterplot on Figure 5.7. The direction of the relationship is consistent with the hypothesized, with the municipalities that have higher rates of residents of upper SES getting higher scores on e-government.

Table 5.11: SES Descriptive Statistics

Statistics	Values
Central Tendency	
Mean	.00
Median	-.79
Dispersion	
St. Deviation	.51
Range	3.35
Distribution	
Skewness	.65
Kurtosis	.91
n = 243	

Figure 5.7: E-government - SES Scatterplot



CONCLUSION

Summary of Empirical Findings

This chapter contained a discussion of the results of bivariate correlation analysis between the variables. The correlation analysis was performed between the DV (the e-government score) and all the IVs. To explore bivariate relationships between the DV and dichotomous IVs, the independent *t*-test was performed. The correlations among IVs were also examined for multicollinearity. For most of the IVs, the direction of the relationship with the DV was consistent with the hypothesized. The exceptions were the correlation between the e-government score and the ethnic diversity variables (the (log of) percentage of non-English-speaking households and the (log of) percentage of nonwhite residents) and between the e-government score and the unemployment rate, which, contrary to the

hypothesized, turned out to be positive. The hypothesized negative relationships between the e-government on the one hand and the ethnic diversity variables and the unemployment rate were based primarily on the digital divide framework, according to which ethnically diverse population groups as well as unemployed residents tend to have lower rates of access to ICT, the Internet, and – as a result – to e-government services. According to the digital divide framework, the major determinants of ethnically diverse and unemployed population having less access to ICT and the Internet are lower levels of income and education of their representatives. However, in the sample for the present research, municipalities with higher rates of ethnically diverse population, while getting lower scores on the SES variables that measure income and education, tend to have higher scores on e-government. The reasons for the direction of these relationships are not entirely clear. An assumption was made that there might be an intervening variable, municipality size, which accounts for this. However, after the partial correlation analysis was performed between the e-government score and the ethnic diversity variables, controlling for municipality size, the hypothesized relationships lost their significance altogether.

With regard to unexpected direction of the unemployment rate effect on the DV two possible explanations were offered. According to the first one, unemployment may not be an accurate characteristic of digital divide, since a lot of downsizing victims during the latest economic recession were educated people with relatively high incomes who could afford computers and Internet access even after they became unemployed, at least for some time. Moreover, these people would likely to use the technology actively to looking for new jobs, and obtain government information related to unemployment benefits on-line, if such an alternative existed.

The other possible reason for the unexpected direction of the relationship between the DV and unemployment rate is that the unemployment rate data, which were collected in 2000, got somewhat out-of-date.

Bivariate correlations between the e-government score and several IVs were not significant, resulting in null findings. The IVs that did not form significant correlations with the DV are staff resistance to change, privacy-related problems, security-related problems, and the geographic region dummies. It is possible that these correlations become significant during multivariate analyses, when the effects of other variables are accounted for.

High bivariate correlations between the IVs that form socioeconomic construct raised the issue of multicollinearity. This issue was addressed by creating a composite SES index by transforming socioeconomic status variables into *z* scores and averaging the scores. A new hypothesis was formulated which predicted a positive effect of the SES index on the e-government score. The newly created SES variable was screened for normality. The screening revealed that the data distribution for this variable satisfies the normality assumption. The bivariate correlation analysis between the SES index and other variables in the dataset indicated that the index is positively correlated with the DV and is not correlated with any IV at a level that would indicate a multicollinearity problem.

Theoretical Relevance of Bivariate Relationships

Overall, the bivariate statistical analysis results demonstrated that applying the integrated approach that combines methodologies from three theoretical frameworks, e-government, ICT, and innovation theory, to determine the factors affecting the quality and the scope of local e-government initiatives was justified. At its present stage, implementing e-government can be considered an innovation to a similar degree as implementation of ICT in

the public sector in the 1970s. The hypothesized direction and strength of the relationship between the quality and the scope of municipal e-government initiatives and most of the IVs may be predicted either by using one of the theoretical frameworks (innovation, ICT, or generic e-government) or by combining two or all three frameworks (see Chapter 2). As one would expect, the variables mentioned as important predictors by all three frameworks (such as municipality size and the SES variables) had the strongest significant bivariate correlations with the e-government score. The variables that are primarily discussed in both e-government and ICT literature (such as form of government and reengineering) had slightly weaker, but also significant, correlations with the e-government score. Finally, the variables that most often are emphasized in the e-government literature, (such as conducting citizen surveys to determine the demand for e-government or having an intranet) had approximately the same level of significance that the e-government/ICT variables.

At the same time, the bivariate data analysis for the present research demonstrated that some relationships, predicted by the literature on adoption of innovation and ICT, may not necessarily stand when the DV is municipal e-government. Thus such an important predictor of generic innovations as geographic region was not significant when the effects of other variables were not considered. With regard to the ethnic diversity variables, the direction of their relationship with the DV for the present research turned out to be the opposite of the predicted.

A possible explanation for these results is a unique character of e-government innovation on the municipal level, which cannot be explained by some of the "conventional" predictors that can explain generic or ICT innovation. Another possibility is that, developing at fast pace, municipal e-government has advanced to more sophisticated stages, at which some of

the IVs have lost their effect. Thus, with regards to geographic region, it may be possible that a once futuristic effect of deterritorialization in adopting local municipal e-government initiatives discussed in Chapter 2 finally is becoming a reality. As for the digital divide associated with ethnic diversity, the data in the present research demonstrate that although the ethnic diversity variables are (consistently with the literature) positively correlated with lower socioeconomic status, they may not negatively affect the demand for municipal e-government. This may happen due to the fact that, when it comes to e-government, ethnic minorities may be so far below the radar of being considered as potential customers for e-government services that their number in a municipality has no effects on the way municipal agencies consider adopting e-government initiatives. Alternatively, the absence of negative relationship between ethnic diversity and e-government may mean that lower socioeconomic status and linguistic isolation associated with ethnic diversity do not inhibit the use of e-government services. Clearly, additional research is necessary to confirm direction of relationships between the scope and quality of municipal e-government initiatives at the present stages of their development, on the one hand, and the geographic region or the ethnic diversity variables, on the other hand.

The next chapter includes discussion of the results of multivariate analysis.

CHAPTER SIX: MULITIVARIATE STATISTICAL ANALYSIS

This chapter includes a discussion of the results of the multiple regression analysis (MRA). This technique was used in the present research to investigate the relationships between the DV (the e-government score) and two sets of IVs – internal characteristics of municipal public agencies and external environmental factors of municipalities. MRA is used to address several types of research and practical questions (see Huberty & Hussein, 2001; Tabachnick & Fidell, 2001; Cohen, Cohen, West, & Aiken, 2003). In the present research, it is used for the following purposes:

1. Describing the relationship between the DV (e-government score) and two sets of IVs (internal municipal agency characteristics and external environmental factors).
2. Determining the effect of individual IVs in explaining the rate and the scope of adoption of municipal e-government initiatives (as measured by the e-government score).
3. Comparing two sets IVs – internal agency characteristics and environmental municipality factors – in their power to predict the rate and the scope of adoption of municipal e-government initiatives.

Performing these steps would presumably result in a better understanding of the mechanisms of adoption of e-government initiatives on the municipal level, which, in turn, has important policy and theoretical implications, outlined in Chapter 1 of this dissertation.

Thus, on the municipal agency level, understanding what organizational factors contribute to or hinder the rate and the scope of e-government adoption can help municipal agencies to adapt their organizational processes, and perhaps even organizational structure to

make the delivery of e-government services more efficient. Being aware of the effects various sociodemographic characteristics of municipality residents have on the demand for municipal e-government services can help local governments to decide which online services they should be providing to satisfy this demand. Though this method is perhaps less precise in determining the demand for e-government services for a particular municipality than conducting citizen surveys, it is certainly less expensive and may be preferable for municipalities with limited financial resources.

With regard to programs and policies to support and facilitate local e-government initiatives designed and provided by state or federal governments, knowing what impact a certain combination of agency and municipality characteristics is likely to have on the success of a particular local e-government initiative for which a policy or program is designed, can be valuable in terms of designing these support policies or programs to be more targeted and effective. For the same reasons, in the process of making a decision to provide a support, such as a grant, for a specific local e-government initiative, a grant-awarding agency would likely want to know which group of variables – internal agency characteristics or external municipality factors – is likely to have a stronger effect on the outcome of such a support in a specific municipality. This consideration would be based on a practical reasoning: in the course of trying to estimate the affect of various agency and municipality characteristics on a program or policy outcome, it is not always possible to have an access to a vide range of variables. For example, on a municipal level, most of the sociodemographic data are freely available from the Census Bureau and are easily accessible. These data are also likely to be less biased. The data on internal agency characteristics, on the other hand, may be more difficult and expensive to obtain. However, even when such

data are available, they are usually provided by a person who works for the municipal agency, such as the chief information officer, and might contain a certain amount of bias. Thus, when describing limitations of the ICMA datasets, Northrop (2003) indicated that the respondents to the survey may not be perfectly knowledgeable about what information and services are present on the municipal web portal. As a result the respondents might underestimate the e-government features and services due to not being totally up-to-date, or, alternatively, they might overestimate these features and services, believing they are available, should be available, or were planned to become available by the time the response was provided.

THE MRA MODELS: RELATIONSHIP BETWEEN THE DV AND IVS

The goal of the first MRA test is to describe the relationship between the e-government score (DV) and the linear composite of agency and municipality variables (IVs). It has been argued that the IVs for the present research, described in earlier chapters, are treated as predictors for the e-government score. However, it should be noted that in MRA demonstration of causality is not a statistical, but a logical, implicit, and frequently speculative notion.

Full and Reduced MRA Models

Table 6.1 contains the summary of the full multiple regression model which includes the complete set of IVs that were retained in the dataset after univariate and bivariate analyses in previous chapters. The *F*-test performed to determine whether the coefficient of multiple determination (R^2) for the population from which the sample is drawn is zero (Tabachnick & Fidell, 2001). The results of this test indicate that the regression model results in

significantly better prediction of the DV than would be expected by chance ($F_{18, 194} = 13.693$, $p<.001$). Two values of the multiple correlation coefficient, raw (R^2) and adjusted (R^2_{adj}), showing goodness-of-fit for the regression model, which indicates the percent of the variance in the DV explained jointly by the IVs, are reported. These coefficients can also be interpreted as the proportion reduction of error in estimating the DV when knowing the IVs (Garson, n.d.). In choosing which of the multiple correlation coefficients to report, Hutcheson & Sofroniou (1999), Huberty & Hussein (2001), and Huberty (2003) strongly recommend using the value of R^2_{adj} , which approximates the mean R^2 over repeated samples for which the linear composite weights are those derived from the original sample. According to the authors, unadjusted R^2 contains a "build-in" positive bias and tends to increase as the number of IVs increases, even if these IVs have no influence on the DV; R^2_{adj} , on the other hand, takes into account the number of IVs entered into the model and does not necessarily increase as more IVs are added.

The full model can explain about 52 percent of the variance in the e-government score (R^2_{adj} =.519). However the result of examination of part correlations (*sr*), which show the unique effect of the IVs on the DV, has indicated that some IVs contribute very little to the prediction of the DV. A decision was therefore made to perform additional analyses with the goal of improving the goodness-of-fit for the model. These analyses involved estimating the importance of each IV and deleting those that are least important in order to increase the prediction power of the model.

Table 6.1: MRA Full Model Summary

Variable	*β*	*sr*	Statistics
Intercept			
E-government budget	.000	.000	$R^2 = .560$
Form of government	.149**	.131	$R^2_{adj} = .519$
Citizen surveys	.166**	.145	
Reengineering	.003	.002	$F_{18\,,\,194} = 13.693$, $p<.001$
Staff resistance to change	-.004	-.003	
Privacy problems	-.145*	-.117	
Security problems	.036	.031	
Developing e-government in-house	.079	.072	
Lack of support from elect. officials	-.042	-.041	
Having an intranet	-.001	-.001	
Municipality size	.456***	.333	
% unemployed	-.172*	-.122	
% nonwhite residents	.015	.010	
% non-English-speaking HH	.101	.075	
SES	.291***	.230	
North Central	.184*	.084	
South	.125	.052	
West	.135	.060	

*Statistically significant at $p \leq .05$, **Statistically significant at $p \leq .01$, ***Statistically significant at $p \leq .001$

Deleting predictors to improve the goodness-of-fit for the model is a standard practice in MRA (Huberty & Hussein, 2001; Tabachnick & Fidell, 2001; Garson, n.d.). One of the MRA goals is to identify the combination of fewest IVs that result in the best DV prediction for the available dataset. This can be done by looking at the part correlations. However, part correlation shows the change in R^2 associated with the deletion of an IV. As discussed above, for the present research R^2_{adj} is used as an indicator of goodness-of-fit for the model. In this case, the combination of fewest IVs that would predict the most of the variability in the DV can be achieved by deleting the IVs that do not make a substantial contribution to the explaining the variability in the DV. In doing so, two major rules should be followed. The first rule, discussed by Huberty & Hussein (2001) and Tabachnick & Fidell (2001), suggests that the deletion of variables has to be governed by theoretical and logical, along with

statistical, considerations. Huberty & Hussein (2001) recommend that before deleting any of the IVs, the researcher decides if there is a subset of the IVs that should be retained in the dataset "no matter what." The decisions about which variables to include in such a subset should be based on the researcher's expectation, previous research, subjective judgment, or a combination of these. Tabachnick and Fidell (2001) recommend that in the process of deleting the IVs such factors as reliability of the variables and the cost of their measurement should be also taken into consideration. In the present research, a combination of theoretical and statistical reasoning is applied to make decisions about which variables to delete. To follow this rule, based on the previous research and the assumptions outlined in Chapter 2, a subset of the variables is identified which, on the theoretical grounds, are considered to be the most influential predictors of municipal e-government score. Table 6.2 lists the variables that are included into the subset (listed in the order of their hypothesized importance):

Table 6.2: Hypothesized Most Important E-government Predictors

Agency Characteristics	Environmental factors
Form of government	Municipality size
Conducting citizen surveys (strategic planning proxy)	Socioeconomic status
Having a separate e-government budget	Geographic region dummies
Lack of support from elected officials	

Due to the their high hypothesized relevance for determining the scope of municipal initiatives, the seven variables listed in Table 6.2 would be forced into the analysis, even if their relative importance in predicting e-government score, characterized by change in R^2_{adj} associated with their deletion, is low.

The next rule in identifying the best subset of e-government score predictors is to determine which of the predictor variables contribute most to the prediction accuracy of the DV and which contribute little. To accomplish this, Huberty and Hussein (2001) suggest

doing *p* MRAs, each with *p*–1 predictors. The predictor which when deleted is associated with the largest drop of the R^2_{adj} value should be considered the most important predictor. This approach was used in the next step to identify the best subset of e-government score predictors. Table 6.3 reports the results for determining predictors' relative importance after running 18 separate MRAs. The table lists R^2_{adj} associated with deletion of each variable. Each variable is assigned a rank based on the change of R^2_{adj} associated with its deletion. Higher ranks are associated with larger drops of the R^2_{adj} value. Two subsets of variables were assigned equal ranks because the deletion of each of these variables is associated with the same change in R^2_{adj}. Deletion of some of the IVs resulted in an increase of R^2_{adj}. According to Huberty and Hussein (2001), this implies that each of these IVs made a questionable contribution to predictive accuracy of the DV.

It is assumed that reliability of variable measurement does not constitute a problem for this dataset. The ICMA survey that provided measurements for the agency variables consisted of very straightforward dichotomous-type questions requiring respondents to answer "yes" or "no" or to indicate presence or absence of a particular agency characteristic. It is also assumed that the respondents had sufficient knowledge of municipal e-government initiatives in their agencies to be able to provide a reliable and unbiased response. Similarly, it is assumed that reliability criteria are met for the Census variables as well. Therefore, unless a variable was included into the forced-in subset of the important predictors, the change in the R^2_{adj} value associated with its deletion was the only criterion governing its permanent removal from the MRA model. As shown in Table 6.3, none of the variables the deletion of which resulted in an increase of R^2_{adj} were part of the forced-in subset.

Table 6.3: Results for Determining IVs' Relative Importance, Full Model

Predictor deleted	R^2_{adj}	Rank
None	.519	
Municipality size	.400	1
SES	.464	2
Citizen surveys	.503	3
Form of government	.503	3
% unemployed	.505	4
Privacy problems	.506	5
Having e-government budget	.511	6
North Central	.514	7
% non-English-speaking HH	.515	8
Developing e-government in-house	.516	9
West	.517	10
South	.518	11
Lack of support from elect. officials	.519	12
Security problems	.520	13
Reengineering	.521	14
Staff resistance to change	.521	14
% nonwhite residents	.521	14
Having an intranet	.523	15

The results of the analysis for determining relative importance of IVs demonstrated that for the following IVs, their deletion resulted in increase of the R^2_{adj} value:

- Security problems
- Reengineering
- Staff resistance to change
- (Log of) percent of nonwhite residents
- Having an intranet

The increase of the R^2_{adj} associated with the deletion of these variables was an indicator that the variables made a questionable contribution to the predicting power of the MRA model. It was further tested whether removal of these variables from the MRA would improve the prediction accuracy of the regression model. Table 6.4 provides summary of the

MRA for the reduced model that does not include the five removed variables. As a part of multicollinearity diagnostic procedure, tolerance and variance inflation factor (VIF) values are also reported in Table 6.4.

Table 6.4 demonstrated that, as expected, the prediction accuracy of the reduced model has improved in comparison to the full model (R^2_{adj} = .531). The overall significance of model has also improved ($F_{13\ ,\ 201}$ = 19.651, p<.001). To determine relative importance of the IVs in the reduced model, the procedure of doing p MRAs, each with p–1 predictors, suggested by Huberty and Hussein (2001) was repeated. In the course of this procedure 13 MRAs were performed. The results of the procedure, summarized in Table 6.5, demonstrated that no deletion of individual IV resulted in an increase of the R^2_{adj} value. This means that the reduced model, summarized in Table 6.4, provides the best DV prediction for the available dataset with each IV contributing to the explaining some variability in the DV.

Table 6.4: MRA Reduced Model Summary

Variable	***β***	***sr***	**Tolerance**	***VIF***	**Statistics**
Intercept					
E-government budget	-.003	-.003	.897	1.115	R^2 = .560
Form of government	.149**	.132	.778	1.285	R^2_{adj} = .531
Citizen surveys	.167**	.153	.835	1.197	
Privacy problems	-.124*	-.117	.897	1.115	$F_{13\ ,\ 201}$ = 19.651, p<.001
Developing e-government in-house	.077	.071	.862	1.160	
Lack of support from elect. officials	-.048	-.046	.946	1.157	
Municipality size	.457***	.377	.680	1.471	
% unemployed	-.173**	-.124	.516	1.938	
% non-English-speaking HH	.107	.086	.653	1.531	
SES	.291***	.234	.650	1.538	
North Central	.201*	.096	.226	4.420	
South	.150	.071	.222	4.507	
West	.160	.077	.230	4.339	

*Statistically significant at p≤.05, **Statistically significant at p≤.01, ***Statistically significant at p≤.001

Table 6.5: Results for Determining IVs' Relative Importance, Reduced Model

Predictor deleted	R^2_{adj}	Rank
None	.531	
Municipality size	.383	1
SES	.475	2
Citizen surveys	.513	3
Form of government	.515	4
% unemployed	.517	5
Having e-government budget	.517	5
Privacy problems	.519	6
North Central	.524	7
% non-English-speaking HH	.526	8
West	.527	9
Developing e-government in-house	.528	10
South	.528	10
Lack of support from elect. officials	.531	11

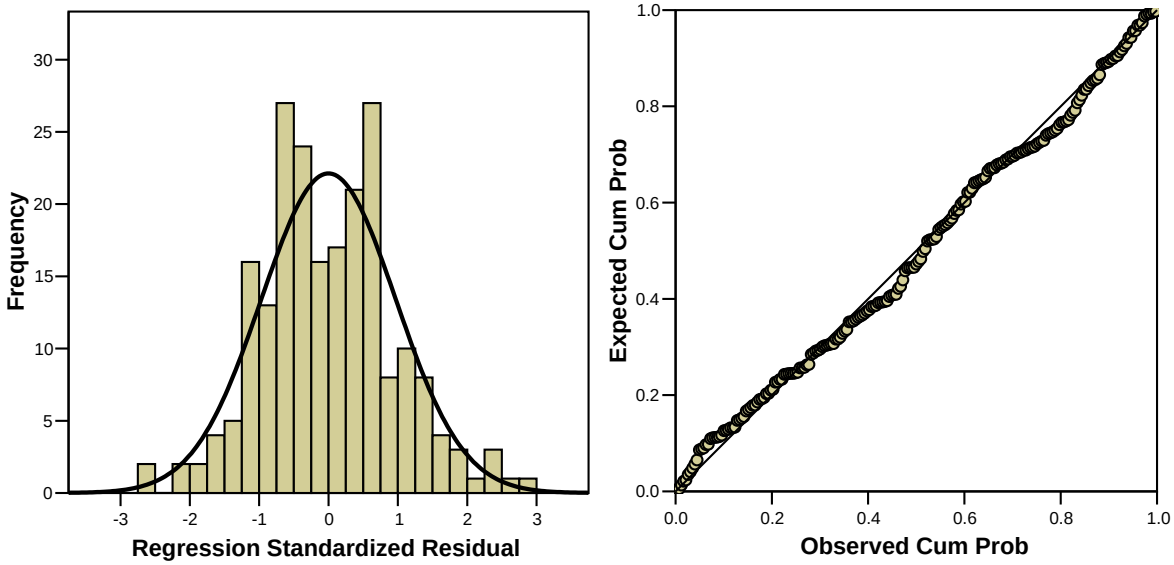
TESTING THE MRA ASSUMPTIONS

Normality, Linearity, and Homoscedasticity

To test the MRA assumptions of normality, linearity, and homoscedasticity between predicted values of the DV (e-government score) and errors of prediction in the reduced model, the histogram and normal probability plot of residuals' distribution as well as the residuals scatterplot were examined. The assumptions of this analysis are (1) that the residuals are normally distributed about the predicted DV scores; (2) that residuals have a straight-line relationship with predicted DV scores; and (3) that the variance of the residuals about predicted DV scores is the same for all predicted scores (Tabachnick & Fidell, 2001).

To test the normality of residuals, the histogram and normal probability plot of residuals' distribution were examined (Figure 6.1). The results of examination suggested that the assumption of normality of residuals was met. The distribution of residuals approximates normal, and the slope of the probability plot approximates a 45-degree line.

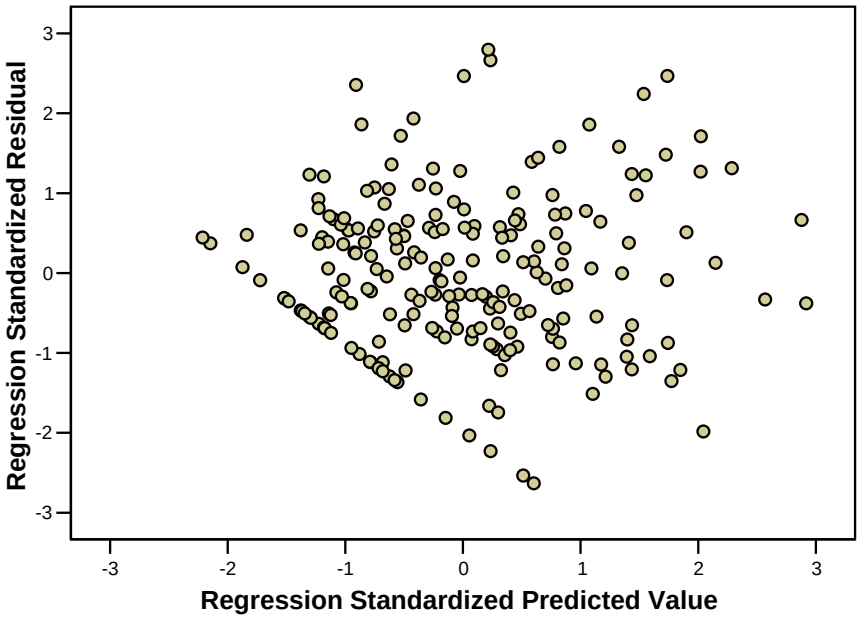
Figure 6.1: DV Residuals Histogram and Normal Probability Plot



The assumptions of linearity and homoscedasticity were tested by examining the residuals scatterplot (Figure 6.2). Residuals scatterplot indicates that there was an insignificant violation of homoscedasticity assumption, suggesting a slight increase in the standard deviation of errors for larger predicted values of the DV. However, the heteroscedasticity is not serious enough to weaken the results of the MRA in any substantial way. Therefore, no further transformation of data was performed.

Meeting the assumptions of normality, linearity, and homoscedasticity in the regression model provided justification for the conclusion that in the dataset for the present research the two sets of the IVs (internal agency characteristics and external environmental factors of municipalities) in the reduced model can collectively predict about 53 percent of variability in the e-government score (R^2_{adj} =.531).

Figure 6.2: DV Residuals Scatterplot



Multicollinearity

To check for intercorrelation of IVs, a test for multivariate multicollinearity was performed. In MRA, multicollinearity occurs when an IV is highly correlated with one or more other IVs in the model (Hutcheson & Sofroniou, 1999; Tabachnick & Fidell, 2001; Cohen, Cohen, West, Aiken, 2003; Garson, n.d.). With high multicollinearity, the regression equation can be formulated, but the parameters may be unreliable and therefore can change dramatically as the result of minor changes in the dataset (Hutcheson & Sofroniou, 1999; Garson, n.d.). When the goal of MRA is limited to prediction of the DV, multicollinearity does not present a problem, and no remedial actions are required (Hutcheson & Sofroniou, 1999; Cohen, Cohen, West, Aiken, 2003; Garson, n.d.). However, if the goal is to explain the strength of relationships between individual predictor variables and the response variable, high multicollinearity poses a problem for the correct interpretation of the beta weights.

In the context of the present research, reliable estimates of the beta weights are analyzed to establish a relative importance of individual IVs in producing an effect on the DV, as well as to establish the direction of this effect. It is also important to be able to verify that the significance of contribution in predicting the DV associated with each IV was reliably determined by the model (Table 6.4).

To test for multivariate multicollinearity, tolerance and VIF statistics were examined (Table 6.4). In the literature on methodology (Hutcheson & Sofroniou 1999; Garson, n.d.) the tolerance values of .20 or less and VIF values of five or more are indicative of a multicollinearity problem. As reported in Table 6.4, both tolerance and VIF statistics are within expected values, indicating no multicollinearity problem.

EFFECTS OF INDIVIDUAL IVS: THEORETICAL AND PRACTICAL IMPLICATIONS

With all the tested MRA assumptions being met, it is possible with a relatively high degree of reliability to determine the magnitude and significance of the effects of individual IVs based on their beta weights (Table 6.4).

Not all variables in the reduced model have a significant effect on the scope and quality of e-government initiatives. Most of the patterns regarding the strength, direction, and significance of the relationships between the DV and individual IVs identified during the analysis of bivariate relationships persisted in the multivariate analysis. Thus, external environmental factors seem to have a somewhat stronger and more significant effect on the DV, repeating the bivariate relationship pattern. This seems to be an important finding, especially from the practical perspective, since the external variables are not as costly to obtain as the internal ones and generally may be more reliable. Also, the multivariate effect of the variables that are considered as important predictors by all three frameworks on which

the current research is based (innovation, ICT and e-government) were the strongest and the most significant predictors for e-government score in the MRA model. For all significant effects, the direction of the relationships between an IV and the DV is consistent with hypothesized.

The discussion of the MRA model (Table 6.4) is structured as follows: first significant and then non-significant findings are discussed.

Significant Findings

Municipality Size

H_{13}: Municipality size is positively associated with the e-government score.

The literature on e-government, ICT and innovation, considers municipality size as one of the strongest predictors of adopting new technology and innovations in general. The present research has also emphasized the important role of municipality size in predicting municipal e-government score (Chapter 2). The (log of) municipality size variable was included into the forced-in subset of the most important predictors of e-government score (Table 6.2). The (log of) municipality size (measured by population) has the strongest effect on the quality and scope of local e-government initiatives, as measured by the e-government score ($\beta = .457$, $p<.001$). The direction of the relationship is also consistent with the predicted: larger municipalities tend to score higher on e-government.

SES Index

H_{22}: Socioeconomic status of municipality residents is positively associated with the e-government score.

The SES index (which combines the (log of) mean income of municipality residents, the (log of) percentage of residents with B.A. and higher degree, and the percentage of residents below the poverty level) is the next variable that was predicted to have a strong effect on the e-government score. This variable was also made a part of the forced-in subset of the most important predictors. According to the MRA results and consistent wit the hypothesis, SES has a significant positive effect on the e-government score (β = .291, p<.001).

Geographic Region

H_{21}: The geographic region of a municipality affects its e-government score.

In Chapter 2 of this dissertation, it was hypothesized that, despite of "deterritorialization" associated with implementing e-government, according to which e-government innovations might leap over nearby municipalities to more distant ones, current municipal e-government initiatives are likely to be affected by regional economic, political, and cultural characteristics. The importance of the geographic region for predicting e-government score was discussed in Chapter 2. The variable was also included into the forced-in subset.

The regression model revealed some interesting and somewhat unexpected effects of regional dummy variables on the e-government score. According to the model, the North Central region had a significant positive effect on the DV (β = .201, p≤.05). Based on the significance of the intercept (p<.001), the Northeast region – the reference category for the region dummies – also significantly affected the e-government score. The strongest positive effect by the North Central region, comparative to other regions, is in a slight contradiction to the previous research on regional effects on the Internet use. Thus, according to a Pew Internet & American Life Project Report (Spooner, 2003), population of states that are part of

the North Central region has one of the lowest rates of Internet access. The North Central region, as defined by the Census Bureau, corresponds to the Industrial Midwest, Upper Midwest, and part of the Lower Midwest regions in the Pew Report. According to the report Internet usage in the Industrial Midwest region is characterized by a low growth rate (one percent between 2001 and 2002). Many of the Internet users in this region are novices who are fairly reserved when asked whether the Internet has improved their life. Similarly, residents of the Upper Midwest and the Lower Midwest regions do not tend to credit the Internet with making improvements in their lives. In the Pew Report, residents of the Midwest regions are more likely to use the Internet for fun and recreational purposes rather than a business or research purposes. The significant effect on the DV of Northeast region (which corresponds to the New England and a part of the Mid-Atlantic regions in the Pew Report) is more consistent with the Pew Project's findings, according to which the residents of the Mid-Atlantic and particularly the New England regions tend to be wealthier, more educated and to use the Internet to find the answer to a question or conduct an on-line transaction.

Unemployment Rate

H_{20}: Unemployment rate in the municipality is negatively associated with the e-government score.

According to recent research on the use of ICT and the Internet, unemployment rate is negatively related to the use of computers and the Internet (U.S. Department of Commerce, 2002). Unlike the results of bivariate analysis, the MRA results tend to support these

findings. There is a significant negative relationship between unemployment rate in the municipality and its e-government score (β = -.173, $p \leq .01$).

Conducting Citizen Surveys

H_4: Conducting citizen surveys by municipalities to determine what online services residents and businesses want is positively associated with the e-government score.

In the present research, the practice of conducting citizen surveys serves as the proxy for strategic planning. The importance of strategic planning is repeatedly discussed in the literature on e-government, ICT, and innovation. An essential component of strategic planning relevant to the present research is related to determining the demand for e-government services from the municipal government agency's customers and to develop on-line services that would allow meeting this demand in the most effective and efficient way. The theoretical importance of this variable for the current research was emphasized by including it into the forced-in subset of predictors. Based on the MRA results, conducting citizen surveys is the strongest agency characteristic affecting the e-government score (β = .167, $p \leq .01$). The direction of relationships between this variable and the DV is consistent with the hypothesized.

Form of Government

H_3: The council-manager form of government in a municipality is positively associated with the e-government score.

Form of government has also been considered an important predictor for the e-government score and was included into the forced-in set of IVs. The hypothesized

relationship between the e-government score and the municipal form of government was based, in part, on the argument by Kim (2003), according to which managers of the municipalities with the council-manager form of government are more likely to focus on internal efficiency of government agencies' operations because their reappointment by the council is related to their ability to operate within limited budgets. Consistently with the hypothesis, municipalities with council manager form of government had significantly higher e-government scores (β = .149, $p \leq .01$).

Privacy Problems

H_8: Having privacy-related problems is negatively associated with the e-government score.

Though ensuring adequate levels of privacy is considered important for the successful functions of electronic government both by the e-government literature and in the present research, the privacy variable was not included into the forced-in subset of predictors for the MRA analysis. The primary reason for not including this variable was that the privacy issues related to e-government become important when e-government initiatives reach more advanced levels, such a conducting on-line transactions with citizen that require submitting sensitive personal information. Many municipalities in the sample for the present research have not yet reached this level of e-government. As predicted, municipalities that acknowledged having privacy-related problems with their e-government initiatives tend to get lower e-government scores (β = -.124, $p \leq .05$). It is worth noting that the bivariate relationship between the DV and the form of government was not significant.

Non-Significant Findings

Individually, all other variables in the reduced model did not make significant contributions to the prediction of the DV. However, as reported in Table 6.5, they contributed to explaining a portion of variability in the DV and their deletion was associated with the reduction in R^2_{adj}.

Two of the variables, lack of support from elected officials and e-government budget, that did not contributed significantly individually were included into the forced-in predictors set, which means that, based on the previous research and their hypothesized importance for predicting the DV in the present research, they were expected to produce a substantial effect.

With regards to the e-government budget, a possible explanation of why this variable did not produce a significant effect on the DV may be that the funds appropriated for e-government initiatives may not be budgeted as a separate item, but rather are embedded into the budget of the department that has overall responsibility for administering e-government initiative, such as the IT or the City Management department. Alternatively, the funds for e-government initiatives may be spread among several departments. In a hypothetical situation when a municipality is trying to involve its citizens in community planning process by developing an interactive on-line GIS that displays locations of potential constructions sites for the purpose of generating citizens' feedback, the funds for this project may be allocated to several different departments. For example, acquisition of GPS units for geocoding construction sites may be budgeted to the Planning Department. Separate the funds may be budgeted to the GIS Department for creating an interactive on-line map of the municipality. And yet additional funds can be appropriated to the IT department for the purchasing the necessary equipment, such as a server or computer hardware. Under these hypothetical

circumstances, despite the fact that all described appropriations might be quite significant and would be related to a single e-government initiative they would be appear in the budget document separately, as parts of the individual departments' budgets.

It is less clear why the lack of support from elected officials was not significant. It might have happened for statistical – rather than theoretical or logical – reasons. The univariate analysis of the lack of support variable (Chapter 4) revealed the split of 88-12 between the dichotomous categories. This split approaches dangerously close the 90-10 threshold, which, according to the methodological literature, may cause a problem for correlation/regression analysis due to correlation coefficients being truncated and the scores for the cases in the smaller category being more influential than the scores in the category with the majority of cases (see the discussion in Chapter 4).

With respect to developing e-government in-house, the possible explanation for the variable non-significance is that outsourcing the development and the administration of municipal web portals to third parties does not necessarily mean the inferior quality of on-line services. In fact, one might expect the quality of the outsourced web portals to be rather high if the municipality has enough resources to hire highly professional commercial web administrator.

The relationship between the DV and the ethnic diversity variable, the (log of) percent of non-English-speaking households, that appeared to be inconsistent with the hypothesized during the bivariate analysis (Chapter 5), remained inconsistent in the course of the MRA. A possible explanation is that, while ethnic diversity may determine the access to various ICTs and the Internet, it may not have any effect on the demand for municipal e-government services.

Finally, the effect of two geographic regions, West and South, on the DV was found to be insignificant, which somewhat contradicts the earlier research on the regional effect on the Internet use. Thus, according to the Pew Internet & American Life Project Report (Spooner, 2003), mentioned above, in the regions, defined by the Pew Projects, that roughly approximate the West region, as defined by the Census Bureau, Internet users tend to be less educated and less wealthy, while more ethnically diverse. They use the Internet for job search and getting the news more often than residents of other regions. They also indicate that the Internet positively affects their lives. On the other hand, Internet users of the regions defined by the Pew Project that roughly coincide with the South region of the Census Bureau tend to use the Internet more for fun activities and getting news and health information, as well as staying in touch with family and friends. Internet users of the southern part of the South region (Florida, Georgia, South Carolina, and North Carolina) are characterized by a high degree of racial and ethnic diversity. They are less likely to shop on-line or look up information about hobbies than the users in other regions. One might expect that this diversity between the regions in the use of the Internet would have an affect on the demand for e-government services.

Although the findings about the regional effects in the present research are in some contradictions with the findings of the Pew Project, one has to keep in mind that the focus of the Pew Project was the use of the Internet in general rather than for the purpose of interacting with local government. For this reason, in comparing the findings, one has to be aware of the limitations associated with limited comparability of the results.

COMPARING INTERNAL AND EXTERNAL IVS

The purpose of the last MRA test is to compare two sets of IVs – internal agency characteristics and external environmental factors – in their accuracy to predict the DV. As mentioned earlier in this chapter, internal agency characteristics are generally more expensive to collect and could be more biased due to respondents not having access to the most up-to-date information. It also takes longer to collect data on internal variables. All these limitations can have a substantial hindering effect on the process of successful and efficient design of programs and policies affecting municipal e-government. In this situation, knowing which group of potential predictor variables is better in determining the scope and quality of municipal e-government initiatives can save some time and resources of collecting the data that might not necessarily substantially improve prediction.

To compare the two sets of IVs, the following steps were performed. First, MRAs with two full models, one containing only internal IVs and the other containing only external IVs, were performed. After that, the variables that did not contributed to the increase in the R^2_{adj} were deleted from each model. This procedure resulted in generating two reduced models (one with internal IVs and one with external IVs). The values of R^2_{adj} for the two models were compared to determine which set of IVs was better in predicting the DV. Finally, a test for the significance of the differences between two "correlated correlations" described by Tabachnick and Fidell (2001) was performed to determine whether the difference between the sets of variables in predicting the DV was in fact significant. Detailed descriptions of each procedure outlined above and its results appear below.

Before describing the procedures and their results it is important to mention that the test for multicollinearity between the IVs was not performed for this analysis. The reason for not

testing for the presence of multicollinearity is that the goal of the analysis in this section is limited to prediction of the DV rather than explaining the strength of relationships between individual IVs and the DV. Therefore, though the size and the significance of beta weights associated with individual IVs are reported, they have no affect on the outcomes of the analysis and are not discussed.

Internal IVs: the Full and the Reduced Models

The full model for the internal IVs is summarized in Table 6.6. Overall, the model is significant ($F_{10, 208} = 10.174$, $p<.001$). The full model containing only internal IVs explains about 30 percent of the variability in the DV ($R^2_{adj} = .296$), which is substantially less than the full or reduced models containing combinations of the internal and external IVs.

The next step was to determine which variables did not contribute to the prediction of the DV and delete these variables to improve prediction power of the model. This was accomplishes by rating each IVs based on the change in R^2_{adj} associated with its deletion. Table 6.7 reports the results of this step.

Table 6.6: Internal IVs, Full Model Summary

Variable	*β*	*sr*	Statistics
Intercept			
E-government budget	.032	.030	$R^2 = .328$
Form of government	.249***	.237	$R^2_{adj} = .296$
Citizen surveys	.262***	.236	
Reengineering	.032	.028	$F_{10, 208} = 10.174$, $p<.001$
Staff resistance to change	.024	.023	
Privacy problems	-.196**	-.164	
Security problems	.047	.041	
Developing e-government in-house	.205***	.193	
Lack of support from elect. officials	-.071	-.070	
Having an intranet	.168**	.152	

*Statistically significant at $p\leq.05$, **Statistically significant at $p\leq.01$, ***Statistically significant at $p\leq.001$

Table 6.7: Results for Determining Internal IVs' Relative Importance

Predictor deleted	R^2_{adj}	Rank
None	.296	
Citizen surveys	.237	1
Form of government	.241	2
Developing e-government in-house	.261	3
Privacy problems	.272	4
Having an intranet	.275	5
E-government budget	.280	6
Lack of support from elect. officials	.294	7
Security problems	.298	8
Reengineering	.299	9
Staff resistance to change	.299	9

Deletion of three variables – security problems, reengineering, and staff resistance to change – has resulted in an R^2_{adj} increase, justifying removal of these variables from the model. Since none of these variables was included into the forced-in subset of the most important IVs (Table 6.2), it was decided to proceed with the removal of all three variables.

The removal of the three IVs resulted in the reduced model of internal IVs, summarized in Table 6.8. The goodness-of-fit of the reduced model has improved somewhat (R^2_{adj} = .303). The model remained significant ($F_{7, 211}$ = 14.538, p<.001).

Table 6.8: Internal IVs, Reduced Model Summary

Variable	β	*sr*	Statistics
Intercept			
E-government budget	.032	.031	R^2 = .325
Form of government	.249***	.239	R^2_{adj} = .303
Citizen surveys	.276***	.259	
Privacy problems	-.168**	-.162	$F_{7, 211}$ = 14.538, p<.001
Developing e-government in-house	.205***	.199	
Lack of support from elect. officials	-.074	-.073	
Having an intranet	.172**	.159	

*Statistically significant at $p \leq .05$, **Statistically significant at $p \leq .01$, ***Statistically significant at $p \leq .001$

External IVs: the Full and the Reduced Models

The steps described in the previous section on the internal IVs were performed for the subset of the external IVs. First, the full model containing only internal IVs was generated (Table 6.9). This full model had a substantially better goodness-of-fit than either the full or the reduced model containing only internal IVs (Tables 6.6; Table 6.8). The model is cable of explaining almost 50 percent of the variability in the DV (R^2_{adj} = .480). The model is also significant ($F_{8, 234}$ = 28.960, p<.001).

Table 6.9: External IVs, Full Model Summary

Variable	*β*	*sr*	Statistics
Intercept			
Municipality size	.526***	.463	R^2 = .498
% unemployed	-.176**	-.134	R^2_{adj} = .480
% nonwhite residents	.013	.010	
% non-English-speaking HH	.133*	.102	$F_{8, 234}$ = 28.960, p<.001
SES	.356***	.298	
North Central	.191	.088	
South	.148	.064	
West	.185	.084	

*Statistically significant at $p \leq .05$, **Statistically significant at $p \leq .01$, ***Statistically significant at $p \leq .001$

The results of the analysis for determining relative importance of the external IVs are presented in Table 6.10. Based on these results, deletion of only one external IV, the (log of) percentage of nonwhite residents, has caused an increase of R^2_{adj}. This variable was not included into the forced-in subset of important predictors, and therefore it was decided to proceed with its removal from the model.

Table 6.10: Results for Determining External IVs' Relative Importance

Predictor deleted	R^2_{adj}	Rank
None	.480	
Municipality size	.262	1
SES	.391	2
% unemployed	.464	3
% non-English-speaking HH	.472	4
North Central	.474	5
West	.475	6
South	.478	7
% nonwhite residents	.482	8

After the (log of) percentage of nonwhite residents was removed, the reduced model of external IVs was generated (Table 6.11). As expected, the prediction power of the model increased (R^2_{adj} = .482). The overall model remained significant ($F_{7, 235}$ = 33.226, p<.001).

Table 6.11: External IVs, Reduced Model Summary

Variable	β	*sr*	Statistics
Intercept			
Municipality size	.529***	.480	R^2 = .497
% unemployed	-.174**	-.134	R^2_{adj} = .482
% non-English-speaking HH	.137*	.112	
SES	.354***	.299	$F_{7, 235}$ = 33.226, p<.001
North Central	.194	.090	
South	.155	.071	
West	.190	.088	

*Statistically significant at $p \leq .05$, **Statistically significant at $p \leq .01$, ***Statistically significant at $p \leq .001$

The results of MRA analysis performed to compare two models, with only internal and only external sets of IVs, revealed that the reduced MRA model which included the subset of only external IVs (R^2_{adj} = .482) can explain more variability in the DV than the reduced model which included the subset of only internal IVs (R^2_{adj} = .303). The final step of the analysis to compare two sets of IVs included carrying out a procedure to find out whether the difference between the set of internal and external IVs in predicting the DV was in fact

significant. Tabachnick and Fidell (2001) refer to this procedure as the test of significance of the difference between two correlated correlations. Tabachnick and Fidell (2001:146) provide formulas to compute the difference between the two sets of IVs.

To compute the difference between the two sets, first it was necessary to compute the predicted DV scores from the set of internal IVs (set *A*) and the predicted DV scores from the set of external IVs (set *B*). Then, the procedure required obtaining the following correlations: (1) the correlation between the measured scores of the DV and the scores of the DV predicted by the set of internal IVs (r_{ya}); (2) the correlation between the measured scores of the DV and the scores of the DV predicted by the set of external IV (r_{yb}); (3) the correlation between the scores of the DV as predicted by the internal IVs and the scores of the DV as predicted by external IVs.

The test of significance of the difference between two correlated correlations is the *z* test between r_{ya} and r_{yb}:

$$\overline{Z^*} = \left(z_{ya} - z_{yb}\right)\sqrt{\frac{N-3}{2-2\overline{s_{ya,yb}}}},$$

where *N* is the sample size,

$$z_{ya} = (1/2)\ln\left(\frac{1+r_{ya}}{1-r_{ya}}\right) \qquad \text{and} \qquad z_{yb} = (1/2)\ln\left(\frac{1+r_{yb}}{1-r_{yb}}\right)$$

and

$$\overline{s_{ya,yb}} = \frac{\left[\left(r_{ab}\right)\left(1-2\bar{r}^2\right)\right] - \left[(1/2)\left(\bar{r}^2\right)\left(1-2\bar{r}^2-r_{ab}^2\right)\right]}{\left(1-\bar{r}^2\right)^2}$$

where $\bar{r} = (1/2)\left(r_{ya} + r_{yb}\right)$.

Table 6.12 presents correlations between the measured e-government score and e-government scores predicted from the internal agency characteristics and external

environmental factors. The correlation between the measured e-government score and the e-government score as predicted from the internal agency characteristics is .570 (r_{ya} = .570). The correlation between the measured e-government score and the e-government score as predicted from external environmental factors is .705 (r_{yb} = .705). The correlation between e-government score as predicted by internal agency characteristics and e-government score as predicted from environmental factors is .553 (r_{ab} = .553). The sample size (N) is 251.

Table 6.12: Correlations between the Measured and the Predicted E-government Scores

	Measured e-gov score	E-gov score predicted from internal agency characteristics
E-gov score predicted from internal agency characteristics	.570*	
E-gov score predicted from external environmental factors	.705*	.553*

*Statistically significant at $p \leq .01$

$$\bar{r} = (1/2)(.570 + .705) = .638$$

$$\overline{s_{ya,yb}} = \frac{\left[(.553)\left(1 - 2(.638)^2\right)\right] - \left[(1/2)(.638^2)\left(1 - 2(.638^2) - .553^2\right)\right]}{\left(1 - .638^2\right)^2} = .36181$$

$$z_{ya} = (1/2)\ln\left(\frac{1 + .570}{1 - .570}\right) = .64752$$

$$z_{yb} = (1/2)\ln\left(\frac{1 + .705}{1 - .705}\right) = .87717$$

$$\overline{Z^*} = (.64752 - .87717)\sqrt{\frac{251 - 3}{2 - 2(.36105)}} = -3.20112$$

The results of the test demonstrated that $\overline{Z^*}$ is outside the critical values of ±1.96 for a two-tailed test. This means that the e-government score can be significantly better predicted by the set of the external IVs than by the set of internal IVs.

CONCLUSION

This chapter discussed the results of applying MRA to investigate the relationships between the e-government score (DV) and the two sets of IVs – internal agency characteristics and external environmental factors. In the course of using MRA, three research goals were met. First, after performing MRA with all IVs retained in the dataset after univariate and bivariate analysis (the full model), the set of internal agency characteristics and external factors that explained the most variability in the DV was determined (the reduced model). To accomplish this, at first, the set of forced-in IVs that had high theoretical relevance in explaining the DV was identified. Next, after determining the change in R^2_{adj} associated with deletion of each of the IVs, the variables that did not substantially contributed to the prediction power of the MRA model were deleted. This resulted in generating the reduced model that was able to provide the best prediction of the DV for the dataset. The reduced model had more explanatory power than the full model. The MRA assumptions of normality, linearity, homoscedasticity, and multicollinearity were tested for the reduced model. The results of these tests demonstrated that the data in the reduced model satisfy all the MRA assumptions.

The second goal of MRA was to determine the strength of the effects of individual IVs on the DV. For this purpose, the reduced model was used. Significant and non-significant multivariate relationships between the DV and the IVs were discussed along with theoretical and practical implications of the findings.

The final goal of the MRA was to compare two sets of IVs – internal agency characteristics and external factors of municipalities – in their accuracy to predict the DV. The theoretical and practical relevance of this analysis was discussed in this and earlier chapters. The results of this analysis demonstrated that external environmental factors' set is a significantly better predictor of the quality and the scope of local e-government initiatives, as measured by the e-government score.

CHAPTER SEVEN: CONCLUSIONS

The research objective of this dissertation was to determine which internal characteristics of municipal government agencies and which environmental factors of the U.S. municipalities affect the quality and the scope of adoption of their e-government initiatives, as measured by a municipal e-government score. Recent research has demonstrated that municipal e-government initiatives develop at a rapid pace and begin to affect profoundly such dimensions of municipal political and administrative reality as democratic processes, citizen participation, and governance. Therefore, facilitating these initiatives by municipal as well as by state- and federal-level governments through programs and policies seems like a logical step. However, recent research has also demonstrated that there are wide discrepancies among municipalities with regard to the scope and the quality of e-government initiatives as well as with regard to the demand for municipal e-government services. These discrepancies seem to be affected both by the organizational characteristics of municipal agencies and by sociodemographic traits of municipalities. For example, in the e-government literature, having an intranet is often associated with providing more sophisticated e-government services, while increased demand for e-government is frequently attributed to municipality size and higher socioeconomic status of municipality residents. Identifying internal agency characteristics and environmental factors that play the most significant role in shaping the demand for and the supply of e-government services can be important to understanding the mechanisms of adopting municipal e-government initiatives and in developing diversified approaches towards facilitation of these initiatives, based on municipality characteristics.

To accomplish the research objective of the dissertation, an integrated approach was developed. The approach combined theoretical methodologies drawn from three frameworks: e-government, ICT, and innovation theory. These frameworks are believed to complement each other in their ability to explain different aspects of municipal e-government initiatives. Linking the three frameworks is justified by earlier research. Findings in the area of the ICT adoption have been consistently used to explain the adoption of e-government. The very concept of e-government is associated with the use of various ICTs to facilitate provision of government products and services. However, in the e-government literature, it has been consistently pointed out that e-government is a considerably broader concept than ICT and, in addition to improving efficiency and effectiveness of service delivery and to restructuring organizational processes, which is also attributed to ICT, e-government contains the potential to facilitate democratic processes and governance by enabling more direct citizen involvement. Innovation theory has been applied to explain the adoption of ICT in the private and the public sectors, which justifies applying the theory to explain the adoption of e-government. In fact, recently some research has begun to apply certain components of innovation theory to explain state and municipal e-government initiatives using some of the variables traditionally associated with innovation adoption. However, three major drawbacks are present in the present research. First, the research adopts primarily a normative approach by emphasizing what local e-government should be, often without comparing this e-government ideal to the actual situation in municipal e-government. Second, when the relationships between the actual state of local e-government initiatives and socioeconomic characteristics of the municipalities that adopt them are studied, the research is limited to municipalities within a single state, without expanding to a regional or the national level,

which creates a generalizability problem and prevents determining regional effects that might influence adoption and the scope of e-government initiatives by municipal governments. Finally, the research that studies municipal e-government initiatives beyond the limits of a single state focuses primarily on web portals of large municipalities, ignoring small ones.

The present research attempted to address these drawbacks by developing an approach that integrates innovation theory, ICT, and e-government frameworks. To test this approach, an aggregated dataset was developed that combined data from the 2004 E-Government Survey conducted by the International City/County Management Association with 2000 U.S. Census data on respondent municipalities. The dataset was further supplemented by the data obtained directly from the municipalities' web portals.

In the present research, the dependent variable is the municipal e-government score. This variable measures the scope and the quality of municipal e-government initiatives. The e-government score for municipalities in the sample was computed by accessing municipal web portals and rating the following seven web portal components:

1. Content of the web portal
2. Usability and user-friendliness of the web portal
3. Number and types of e-government services provided through the web portal
4. The way digital divide is addressed
5. Mechanisms for citizen participation
6. Having and handling restricted areas
7. Having privacy policies

These components were chosen based on previous research by Huang & Chao (2001), Holzer & Melitski (2003), and West (2003b) that focused on evaluating e-government

websites. The detailed description of e-government score components is presented in Chapter 3.

Following the innovation theory approach, the research concentrates on two clusters IVs: internal municipal agency characteristics and environmental factors of municipalities. Internal agency characteristics were treated as indicators of supply of e-government services, while external environmental factors were believed to indicate the demand for such services.

Contextual background for the research, which outlined the status of local e-government initiatives and included a discussion of policy and theoretical relevance of the research, was presented in Chapter 1 of the dissertation. This chapter also contained the research statement and identified the DV and all IVs and presented the research hypotheses.

Chapter 2 contained a comprehensive literature review. It provided theoretical justification for integrating the innovation, the ICT, and the e-government frameworks to explain the effects of internal agency characteristics and external environmental factors on the scope and the quality of municipal e-government initiatives, as measured by e-government score. Operational definitions of the DV and all IVs were also given in this chapter. Additionally, the chapter discussed the relevance of each IV for predicting the DV based on the previous research in the areas of innovation, ICT, and e-government.

Chapter 3 addressed the issues of research design and methodology. The chapter described the steps that were taken to compile the research sample. It also described three data sources for the dependent and independent variables: the 2004 ICMA E-government Survey dataset, the 2000 Census dataset, and the web portals of municipalities that responded to the 2004 ICMA Survey. Finally, the chapter discussed levels of measurement for the DV and all the IVs in the sample.

Data screening of individual variables was performed in Chapter 4. The primary purpose of the screening was to understand individual variables in the sample better and to assess if the distribution of data in the sample for the present research looks different from known distributions in the universe of municipalities, in order to determine its representativeness of the sample. To accomplish this, the data on the variables in the sample were compared to the data on the same variables from the complete ICMA dataset and from the Census Bureau national datasets that include data on the universe of the U.S. municipalities. Another purpose of the univariate data analysis was to screen the variables for missing values and to verify that the variables meet the necessary assumptions to be included into further bivariate and multivariate correlation/regression analyses. As the result of the screening, one continuous and two dichotomous IVs the data for which did not satisfy the assumptions for being included into correlation/regression analyses, even after transformation, were omitted from further research. Five continuous variables the data for which violated the assumption of normality were logarithmically transformed, which resulted in substantial improvement of the data and made it possible to use these variables in further analyses.

Chapter 5 examined bivariate correlations between the DV and IVs as well as among the IVs. The bivariate correlations among the IVs were examined for the presence of multicollinearity. To explore bivariate relationships between the DV and the dichotomous IVs, independent *t*-tests were performed to test whether the e-government score means of the groups formed by dichotomous IVs are significantly different.

In most cases, the directions of bivariate relationships between the DV and the IVs were consistent with the hypothesized. The results of the testing for multicollinearity demonstrated that the variables that measured socioeconomic status of municipality residents

were highly collinear. The bivariate multicollinearity issue in the dataset was addressed by creating a composite SES index by transforming socioeconomic status variables into *z* scores and averaging the scores. The chapter concluded with the discussion of the theoretical implications of bivariate analysis results.

Multivariate relationships between the DV and the IVs in the sample were explored by using MRA. The results of the multivariate analyses were presented in Chapter 6. MRA was used to accomplish three goals: (1) describe the relationship between the DV and two sets of IVs (internal municipal agency characteristics and external environmental factors); (2) determine the effects of individual IVs in explaining the rate and the scope of adoption of e-government initiatives; and (3) compare two sets of IVs – internal agency characteristics and environmental municipality factors – in their power to predict the rate and the scope of adoption of e-government initiatives. The chapter contained a detailed discussion of the several MRA models generated to accomplish the three goals and the theoretical implications of the findings.

The findings obtained in the course of accomplishing the key research objective of this dissertation demonstrated that the two sets of IVs – internal agency characteristics and external environmental factors of municipalities – together explain about 53% of variability in the DV in the sample. The IVs that measure external characteristics of municipalities tend to have a stronger effect on the DV. The following sections of the chapter contain a detailed discussion of the effect of internal agency characteristics and external environmental factors on the e-government score.

INTERNAL AGENCY CHARACTERISTICS

The bivariate and multivariate analyses of the data in the sample indicated that the variables measuring internal agency characteristics were weaker predictors of municipal e-government (as measured by the e-government score) than sociodemographic factors of municipalities. When the determinants of organizational innovation are discussed in the literature on generic innovation, with organization being the unit of analysis, Mohr's (1969:63) argument that the propensity of organizations to adopt innovation is "directly related to the motivation to innovate, inversely related to the strength of obstacles to innovation, and directly related to the availability of resources for overcoming such obstacles" has been repeatedly tested and confirmed. The literature on organizational innovation in public sector, associated with implementing ICT or e-government initiatives, expands the list determinants by mentioning the importance of having professional technical staff and management, which, according to Fountain (2001b), should be proficient both in the "bureaucratic game" and the "network game." The present research made an attempt to test whether these determinants of organizational innovations, outlined by the generic, the ICT, and the e-government innovation literature, affect the rate and the scope of e-government initiatives for the data in the sample. In the present research, motivation to innovate (i.e. adopt e-government initiatives) was measured by the form of government (with council-manager governments, hypothetically, being more motivated) and conducting citizen surveys. Obstacles to innovation were measured by lack of collaboration among departments, staff resistance to change, having privacy- and security-related problems, and lack of support from elected officials. Outside funding, having a separate innovation (i.e. e-government) budget, and an ability to reengineer organizational processes to accommodate changes associated with e-government implementation measured availability of resources for

overcoming such the obstacles. Finally, having professional staff and the management e-government proficiency were measured by the following variables: developing e-government services in-house and having an intranet. Some of the internal agency characteristics variables mentioned above were deleted from the research after their screening revealed that the data distribution for them did not satisfy the assumption for correlation/regression analyses (see Chapter 4).

As discussed earlier, the internal agency IVs that are considered as important innovation predictors by the literature on all three integrated frameworks had the strongest effect on the DV, both when the effects of other IVs are ignored and controlled. Thus, bivariate and multivariate analyses indicated that the form of government has a strong significant effect on the e-government score. It was hypothesized that municipalities with council-manager form of government would likely to have higher e-government scores. This hypothesis was based on the argument, according to which managers of the council-manager municipalities tend to focus on internal efficiency of government agencies' operations because their reappointment by the council is related to their ability to operate successfully within the budget limits (Kim, 2003). Consistently with this argument, in the sample for the present research, municipalities with the council-manager form of government had significantly higher e-government scores than the mayor-council municipalities.

Some the variables, however, that had high significant bivariate correlations with the e-government score, were no longer important predictors of the dependent variable when the effect of other variables were taken into consideration during multivariate analyses. The variables that fell under this category included those that measured obstacles to innovation, the availability of resources for overcoming such obstacles, and availability of professional

staff/management. Moreover, contributions of some of these variables to predictive accuracy of the DV in the multiple regression analysis were questionable enough for these variables to be removed from the full model (see Chapter 6). Only the variables that made up the group that measured organizational motivation to innovate (the form of government and conducting citizen surveys) remained important and significant predictors of the DV when the effects of other variables were ignored and when they were taken into account. These results suggest that the motivational component of municipal agencies to implement e-government initiatives is the strongest factor affecting the quality and scope of these initiatives and possibly allows dealing effectively with such impediments as limited resources, shortage of technical staff and others. This possibility is logically feasible: with the motivation to implement e-government initiatives within a municipal government agency being low, all the impediments mentioned above are likely to produce more debilitating effect for this agency in the course of implementing these initiatives than when government agencies are highly motivated in their efforts to succeed with e-government.

In the final reduced MRA model, the IV measuring whether municipalities have conducted citizen surveys to determine the demand for e-government services was the strongest agency predictor of the e-government score. This variable was introduced into the research as the proxy for strategic planning, which, according to the literature on e-government, ICT, and generic innovation, is an important determinant of innovation adoption. One of the goals of strategic planning is to determine the needs of the organization's customers and to develop strategies to meet those needs in the most efficient way. For a municipal government agency that provides e-government services, strategic planning, among other things, would mean determining the demand for e-government

services among its residents. One of the most effective mechanisms of achieving this goal is to conduct citizen surveys. The results of bivariate and multivariate analyses revealed that, as hypothesized, the municipalities which have conducted citizen surveys to determine the demand for e-government services had significantly higher e-government scores.

Having privacy problems associated with implementing e-government initiatives was the third internal agency characteristic that had a significant effect on the e-government score in the sample. It is essential to provide adequate privacy in the course of providing e-government services. Municipal government has to protect confidentiality of the personal data of the citizens who access web portals of municipal agencies and has to have clear privacy policies that indicate what personal information is collected and how it is handled. In the literature on e-government privacy problems associated with providing on-line services are characterized as highly detrimental for the e-government success. It is therefore was hypothesized that facing privacy-related problems in an effort to implement e-government initiatives is negatively associated with the scope and the quality of e-government initiatives, as measured by the e-government score. The results of bivariate and multivariate analyses for the present research supported this hypothesis.

ENVIRONMENTAL FACTORS OF MUNICIPALITIES

If internal agency variables characterize the supply side of e-government services provision, environmental factors of municipalities provide an indication of the demand for such services. Accepting the notion that the demand determines the supply, the fact that the environmental factors are stronger and more significant predictors of the quality and scope of e-government initiatives (see Chapter 6) is consistent with core premises of the microeconomic theory. If this is in fact true, then, for the students and practitioners of e-

government, this could mean that a significant proportion of municipal e-government initiatives can be explained and predicted based on the environmental municipality variables alone that are generally more accessible, less expensive to collect, and more reliable than the internal agency variables. The major problem with these variables, however, is that they are not always up-to-date. Thus, if the Census Bureau datasets are used as sources for environmental variables, as it was the case in the present research, one has to acknowledge that many of these datasets are updated once every ten years, which could arguably introduce certain inaccuracies into the sociodemographic data if such factors as high migration rates and rapidly changing economic conditions affecting those variables are taken into consideration. This problem can be to a certain degree resolved by using estimates of sociodemographic parameters of interest instead of the actual data.

That said, in the sample for the present research, the (log of) municipality size and the SES variables (transformed into the SES index for the MRA) were among the strongest predictors of the DV. These findings are consistent with the literature. Municipality size and residents' socioeconomic status are proven to be strong and significant predictors of the generic innovation, as well the scope and success of the ICT and the e-government initiatives. In the innovation literature, municipality size is sometimes directly attributed to the demand, or the "need" for innovation (Agnew, Brown, & Herr, 1978). This demand emerges when the economies of scale associated with innovation adoption become significant to require adoption of an innovation. As hypothesized, the e-government score and the municipality size are positively correlated. Municipality residents' SES is considered as a strong predictor of the municipality's propensity to adopt all kinds of innovations, including ICTs and e-government. The literature has demonstrated that the attitudes toward

various types of ICT are substantially more favorable among higher socioeconomic strata. As a consequence, the demand for e-government services is likely to be higher in municipalities that have higher rates of residents belonging to high SES who tend to be more educated and are more familiar with computers and the Internet.

Bivariate analysis has also indicated the ethnic diversity IVs and the percent of unemployed residents (unemployment rate) to be significantly correlated with the DV. However, the directions of these correlation were opposite from the predicted. It was hypothesized that ethnic diversity variables, that included percentage of nonwhite residents and percentage of non-English-speaking households, are negatively associated with the e-government score. However, in the course of bivariate analysis, the direction of these relationships was positive. The possible reasons for the unexpected direction of these relationships are not entirely clear (for detailed discussion, see Chapter 5). The results of multivariate analysis demonstrated that when the effects of other IVs were taken into account, the ethnic diversity variables were no longer significant predictors of the DV.

With regard to unemployment rate, it was hypothesized that it is negatively related to the e-government score. The bivariate analysis, however, demonstrated that, similar to the ethnic diversity variables and contrary to the hypothesized direction of the relationship, the unemployment rate and the e-government score were positively correlated. In the MRA models, the effect of the unemployment rate remained significant, however the direction of the relationships changed to negative, which was consistent with the direction that was predicted and discussed in the literature on the generic, the ICT, and the e-government innovation.

Possible reasons for the vanishing effect of the ethnic diversity and the reversed effect of the unemployment rate in the course of bivariate and multivariate analyses are that the digital divide construct, to which these variables are attributed by the literature on ICT and especially e-government, may not properly explain the usage of *municipal* e-government services, which may be somehow different from the e-government on the state and the national level, as well as from the ICT and generic innovations. For the unemployment rate, the reversal of relationship with the DV may mean that this variable is not a digital divide characteristic. Under current economic conditions, unemployment rate is not likely to be as highly correlated with lower education, socioeconomic status, or ethnic diversity as this used to be at the time of earlier studies.

Alternatively, the unexpected direction of relationships between the ethnic diversity variables and the unemployment rate on the one hand, and the e-government score on the other, may be attributed to the fact that the data that were collected for these variables during 2000 Census have become somewhat outdated and did not accurately reflect the present rates of ethnic diversity and unemployment. Additional research exploring the relationships between municipal e-government and the variables that are traditionally attributed to the digital divide could shed more light on the nature of these relationships.

CONCLUDING STATEMENT

The present research attempted to take a step towards developing an approach that can be applied to study municipal e-government initiatives. In the course of the dissertation, e-government initiatives of municipalities of different sizes across the nation were compared by measuring institutional characteristics of municipal agencies and sociodemographic characteristics of municipalities, which are likely to affect the quality and the scope of

municipal e-government initiatives. The major theoretical relevance of the present research is that it combined components of three theoretical frameworks – innovation, ICT, and e-government – to explain adoption of municipal e-government initiatives. From the practical standpoint, the research is relevant for two reasons. First, the research was focused on municipalities of different sizes and from different regions, which contributed to the generalizability of its findings. Second, it allowed determining which predictors of municipal e-government initiatives are likely to have stronger and more significant influence on the scope and the quality of these initiatives. Though the findings of the present research can be used for both theoretical and practical purposes, the present research should be treated as a preliminary attempt to examine municipal e-government initiatives on a national level. Additional research in this area is necessary to shed more light on the subject and to answer the questions that remained unanswered by the present research, such as the possible reasons for changing relationships between e-government score and variables measuring ethnic diversity and unemployment. The future research also needs to expand the list of IVs by looking at the variables that were not considered in this dissertation. On the agency level, these variables may include organizational diversity, formalization of task structure, centralization, and staff participation in decision making. On the municipal level, such variables as age and gender of municipality residents, as well as the rates of retired and disabled municipality residents may be considered.

REFERENCES

Agnew, J., L.A. Brown, & J.P. Herr (1978). The community innovation process: A conceptualization and empirical analysis. *Urban Affairs Quarterly*, 14(1): 3-30.

Arterton, F.C. (1987). *Teledemocracy: Can technology protect democracy?* Newbury Park, CA: SAGE Publications, Inc.

Atkinson, R.D. & Ulevich, J. (2000). "Digital government: The next step to reengineering the federal government." Washington, DC: Progressive Policy Institute. Online Available at http://www.dlcppi.org. Accessed August 17, 2002.

Baker, P.M.A. (1997). *Local-government Internet sites as public policy innovations*. Ph.D. Thesis. George Mason University.

Baldridge, V.J. & R. A. Burnham (1975). Organizational innovation: Individual, organizational, and environmental impacts. *Administrative Science Quarterly*, 20(2): 165-176.

Baumgartner, F.R. & B.D. Jones (1993). *Agendas and instability in American politics*. Chicago, IL: The University of Chicago Press.

Beaumaster, S. (2002). *Local government IT implementation issues: A challenge for public administration.* Proceedings of the 35th Hawaii International Conference on System Sciences.

Bell, P., P. Reddy, & L. Rainie (2004). *Rural areas and the Internet: Rural Americans' Internet use has grown, but they continue to lag behind others*. Pew Internet & American Life Project Report. Retrieved May 30, 2004, from http://www.pewinternet.org.

Benbya, H., G. Passiante, & N.A. Belbaly (2004). Corporate portal: A tool for knowledge management synchronization. *International Journal of Information Management*, 24: 201-220.

Berry, F.S. & W.D. Berry (1999). "Innovation and diffusion models in policy research." In P.A. Sabatier (Ed.). *Theories of the policy process* (pp. 169-200). Boulder, CO: Westview Press.

Berry, F.S. (1994a). "Innovation in public management: The adoption of strategic planning." In *Public Administration Review*, 54(4): 322-330.

Berry, F.S. (1994b). "Sizing up state and policy innovation research." In *Policy Studies Journal*, 22(3): 442-457.

Berry, F.S. (1994c). "The politics of tax increases in the states." In *American Journal of Political Science*, 38 (3): 855-859.

Berry, F.S., W.D. Berry & S.K. Foster (1998). The determinants of success in implementing an expert system in state government. *Public Administration Review*, 58(4): 293-305

Bozeman, B & S. Bretschneider (1986). Public management information systems: Theory and prescription. *Public Administration Review*, 46(Special Issue), 475-487.

Brudney, J.L. & S.C. Selden (1995). The adoption of innovation by smaller local governments: The case of computer technology. *American Review of Public Administration*, 25(1): 71-86.

Caldow, J. (1999). "The quest for electronic government: A defining vision." Report. Institute for Electronic Government, IBM Corporation.

Carroll, J.D. (1995). The rhetoric of reform and political reality in the National Performance Review. *Public Administration Review*, 55(3): 302-312.

Chidurala, M., P. Kaminskas, S. Pathak, A. Sridhar, & S. Tsfati (2001). "E-government best practices: An implementation manual." College Park, MD: University of Maryland.

CNET News.com (2001, April 25). "Putting citizens online, not in line." Retrieved June 1, 2004, from http://news.com.com/2009-1023-256384.html?legacy=cnet.

Cohen, J., P. Cohen, S.G. West, & L.S. Aiken (2003). *Applied multiple regression/correlation analysis for behavioral sciences* (3rd ed.). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Crossing Boundaries Political Advisory Committee (2003). *Finding our Digital Voice: Governing in the Information Age*. The Crossing Boundaries Final Report and Recommendations. Centre for Collaborative Government.

Daft, R.L. & S.W. Becker (1978). *The innovative organization: Innovation adoption in school organizations*. New York, NY: Elsevier.

Damanpour, F. (1991). Organizational innovation: A meta-analysis of effects of determinants and moderators. *The Academy of Management Journal*, 34(3): 555-590.

Damanpour, F. (1992). Organizational size and innovation. *Organizational Studies*, 13(3): 375-402.

Danziger, J.N. & W.H. Dutton. (1977a). Computers as an innovation in American local governments. *Communication of the ACM*, 20(12): 945-956.

Danziger, J.N. & W.H. Dutton. (1977b). Technological innovation in local government: The case of computers. *Policy and Politics*, 6: 27-49.

Dawes, S. (2002). "The Future of E-Government." Article based on testimony presented to the New York City Council Select Committee on Information Technology in

Government's hearing, "An Examination of New York City's E-Government Initiatives." Albany, NY: Center for Technology in Government, University at Albany/SUNY.

Dawes, S.S., P.A. Bloniarz, & K.L. Kelly (1999). Some Assembly Required: Building a Digital Government for the 21st Century. Center for Technology in Government, University at Albany, SUNY.

Detlor, B. & K. Finn (2002). Towards a framework for government portal design: The government, citizen and portal perspectives. In A. Gronlund (Ed.) *Electronic Government: Design, Applications and Management* (pp. 99-119). Hershey, PA: Idea Group Publishing.

Detlor, B. (2000). The corporate portal as information infrastructure: Toward a framework for portal design. *International Journal of Information Management*, 20: 91-101.

DiMaggio, P., E. Hargittai, W.R. Neuman, & J.P. Robinson (2001). Social implications of the Internet. *Annual Review of Sociology*, 27: 207-336.

Edmiston, K.D. (2003). State and local e-government: Prospects and challenges. *American Review of Public Administration*, 33(1): 20-45.

Federal Communication Commission. *Broadband. High speed Internet access*. Retrieved May 25, 2004, from http://www.fcc.gov/cgb/broadband.html.

Fountain, J.E. (2001a). *Building the virtual state: Information technology and institutional change*. Washington, DC: Brookings Institution Press.

Fountain, J.E. (2001b). The virtual state: Transforming American Government? *National Civil Review*, 90(3): 241-251.

Fountain, J.E. (2002b). Toward a theory of federal bureaucracy for the twenty-first century. In E.C. Kamarck, and J.S. Nye, Jr (Eds). *Governance.com: Democracy in the information age*. Washington, D.C.: Brookings Institution Press. 117-140.

Fountain, J.E. (2003a). *Electronic Government and Electronic Civics*. Working Paper Number: RWP03-001. Cambridge, MA: National Center for Digital Government, Harvard University.

Fountain, J.E. (2003b). *Information, institutions and governance: Advancing a basic social science research program for digital government*. Working Paper Number: RWP03-004, Submitted: 01/09/2003. Cambridge, MA: National Center for Digital Government, Harvard University.

Fox, S. (2004). *Older Americans and the Internet*. Pew Internet & American Life Project Report. Retrieved May 29, 2004 from http://www.pewinternet.org.

Gant, D.B. & J.P. Gant (2002). *State Web Portals: Delivering and Financing E-Service. The PricewaterhouseCoopers Endowment for The Business of Government*. Retrieved May 1, 2004, from http://www.businessofgovernment.org.

Garson, G.D. (n.d.). *Testing assumptions*. Retrieved September 24, 2004, from http://www2.chass.ncsu.edu/garson/pa765/assumpt.htm.

Garson, G.D. (2004). The promise of digital government. In A. Pavlichev & G.D. Garson (Eds.) *Digital government: Principles and best practices* (pp. 2-15). Hershey, PA: Idea Group Publishing.

General Accounting Office (1994). *Executive Guide: Improving Mission Performance through Strategic Information Management and Technology*. GAO/AIMD-94-115. Washington, D.C.

General Accounting Office (2000). *Electronic government: Federal initiatives are evolving but they face significant challenges*. Testimony before the Subcommittee on Government Management, Information and Technology, Committee on Government Reform, House of Representatives. GAO/T-AIMD/GGD-00-179. Washington, D.C.

General Accounting Office (2002a). *Information technology: OMB leadership critical to making needed enterprise architecture and e-government progress*. Testimony before the Subcommittee on Technology and Procurement Policy, Committee on Government Reform, House of Representatives. GAO-02-389T. Washington, D.C.

General Accounting Office (2002b). *Electronic government: Selection and implementation of the Office of Management and Budget's 24 initiatives*. Report to the Committee on Governmental Affairs, U.S. Senate. GAO-03-229. Washington, D.C

General Services Administration, Office of Governmentwide Policy. *Performance-based management, eight steps to develop and use information technology performance measures effectively.* Retrieved on April 7, 2004, from http://www.gsa.gov/irms/ka/mkm/pathways/title.htm.

Gray, V. (1973). Innovation in the states: A diffusion study. *The American Political Science Review*, 67(4): 1174-1185.

Hart-Teeter (2003). *The new e-government equation: Ease, engagement, privacy and protection*. Report prepared for the Council for Excellence in Government. Retrieved August 25, 2003, from http://www.excelgov.org.

Harvard Technology Group on Network-Enabled Services and Government (2001). Eight Imperatives for Leaders in a Networked World. Imperative #1: Focus on How IT Can Reshape Work and Public Sector Strategies. Cambridge, MA John F. Kennedy Shool of Government.

Holzer, M. & Melitski, J. (2003). A comparative e-government analysis of New Jersey's 10 largerst municipalities. *National Center for Public Productivity, Graduate Department of Public Administration*. Newark, NJ: Rutgers University.

Horrigan, J. & L. Rainie (2002). *The broadband difference: How online Americans' behavior changes with high-speed Internet connections at home*. Pew Internet & American Life Project Report. Retrieved May 25, 2004, from http://www.pewinternet.org/.

Huang, C.J. & M.H. Chao (2001). Managing WWW in public administration: Uses and misuses. *Government Information Quarterly*, 18: 357-373.

Huberty, C.J. (2003). Multiple correlation versus multiple regression. *Educational and Psychological Measurement*, 63(2): 271-278.

Huberty, C.J. & M.H. Hussein (2001). Multiple regression analysis and multiple correlation studies. In E.I. Farmer & J.W. Rojewski (Eds.) *Research pathways: Writing professional papers, theses, and dissertations in workforce education* (pp. 325-348). Lanham, NY: University Press of America, Inc.

Hutcheson, G.D. & Sofroniou, N. (1999). *The multivariate social scientist*. Thousand Oaks, CA: SAGE Publications Inc.

IBM e-government strategy and solutions team (2001). Creating an infrastructure for e-government: enabling government innovation.

International City/County Management Association (2002). *Electronic Government 2002*. Survey Results. Retrieved March 3, 2004, from http://www2.icma.org/upload/bc/attach/{613FEECD-7345-40DF-971E-00E2E327A5AF}egov2002web.pdf.

Kakabadze, A., N.K. Kakabadze, & A. Kouzmin (2003). Reinventing the democratic governance project through information technology? A growing agenda for debate. *Public Administration Review*, 63(1): 44-60.

Kellogg, W.A. (1999). Community-based organizations and neighborhood environmental problem solving: A framework for adoption of information technologies. *Journal of Environmental Planning and Management*, 42(4): 445-469.

Kettl, D.F. The transformation of governance: Globalization, devolution, and the role of government. *Public Administration Review*, 60(6): 488-497.

Kettl., D.F. (2002). *The transformation of governance*. John Hopkins University Press.

Kim, H.J. & S. Bretschneider (2004). *Local Government Information Technology Capacity: An Exploratory Theory*. Proceedings of the 37th Hawaii International Conference on System Sciences.

Kim, S. & Layne, K. (2001). "Making the connection: E-government and public administration education." *Journal of Public Administration Education 7(4)*: 229-240.

Kim, Y.M. (2003). Do council-manager and mayor-council types of city governments manage information systems differently? An empirical test. *International Journal of Public Administration*, 26(2): 119-134.

Kingston, R., S. Carver, A. Evans, & I. Turton (2000). Web-based participation geographical information systems: An aid to local environmental decision-making. *Computer, Environment and Urban Systems*, 24, pp. 109-125.

Klein, H.K. (1999). Tocqueville in cyberspace: Using the Internet for citizen associations. *The Information Society*, 15: 213-220.

Kling, R. (1996). "The centrality of organizations in the computerization of society." In R. Kling. (Ed.), *Computerization and Controversy: Value conflicts and social choices* (pp. 108-132). San Diego, CA: Academic Press.

Kling, R; Allen J.P. (1996). "Can computer science solve organizational problems? The case for organizational informatics." In R. Kling. (Ed.), *Computerization and Controversy: Value conflicts and social choices* (pp. 261-276). San Diego, CA: Academic Press.

Kraemer, K. & J. L. King (2003). "Information technology and administrative reform: Will the time after e-government be different?" Paper prepared for the Heinrich Reinermann Schrift fest, Post Graduate School of Administration. University of California, Irvine, CA: Center for Research on Information Technology and Organizations.

Kraemer, K.L., & J. Dedrick (1996). "Computing and public organizations. Center for Research on Information Technology and Organizations". University of California, Irvine.

Landsbergen, D & G. Wolken (2001). Realizing the promise: Government information systems and the fourth generation of information technology. *Public Administration Review*, 61(2): 206-220.

Lane, K. & J. Lee (2001) Developing fully functional e-government: A four stage model. *Government information quarterly*, 18: 122-136.

Larsen, E. & L. Rainie (2002a). *Digital town hall: How local officials use the Internet and the civic benefits they cite from dealing with constituents online*. Washington, D.C.: Pew Internet & American Life Project.

Larsen, E. & L. Rainie (2002b). *The rise of the e-citizen: How people use government agencies' Web sites*. Retrieved June 2, 2004, from http://www.pewinternet.org/reports/toc.asp?Report=57.

LaVigne, M., S. Simon, S. Dawes, T. Pardo, & D. Berlin (2001). *Untangle the web: Delivering municipal services through the Internet*. Albany, NY: Center for Technology in Government, University at Albany, SUNY.

Lenhart, A., J. Horrigan & D. Fallows (2004). "Content Creation Online." Pew Internet & American Life Project Report. Washington, D.C.: Pew Internet & American Life Project.

Lenhart, A., J. Horrigan, L. Rainie, K. Allen, A. Boyce, M. Madden, & E. O'Grady (2003). "The ever-shifting Internet population: A new look at Internet access and the digital divide." Pew Internet & American Life Project Report. Washington, D.C.: Pew Internet & American Life Project.

Lippmann, W. (1963). The task of the public. In C. Rossiter & J. Lare (Eds.) *The essential Lippmann: A political philosophy of liberal democracy* (pp. 106-114). New York, NY: Random House.

London, R. (1995). *Innovation in local government: Identifying factors contributing to innovative efforts from six comparative case studies*. Doctoral Dissertation. Washington State University.

London, S. (1994). Electronic democracy: A literature survey. Retrieved May 4, 2004, from http://www.scottlondon.com/reports/ed.html.

London, S. (1995). Teledemocracy vs. deliberative democracy: A comparative look at two models of public talk. *Journal of Interpersonal Computing and Technology*, 3(2): 33-55.

Madden, M. & L. Rainie (2003). *America's online pursuits: The changing picture of who's online and what they do*. Pew Internet & American Life Project Report. Retrieved May 25, 2004, from http://www.pewinternet.org.

Mander, J. (1978). *Four Arguments for the Elimination of Television*. New York, NY: William Morrow and Company, Inc.

Margetts, H. (1999). *Information technology in government: Britain and America*. New York, NY: Routledge.

McComas, K.A. (2001). Public meetings about local waste management problems: Comapring participants to nonparticipants. *Enviromental Management*, 27(1): 135-147.

Moe, R.C. (1994). The "reinventing government" exercise: Misinterpreting the problem, misjudging the consequences. *Public Administration Review*, (54)2: 111-122.

Mohr, L.B. (1969). Determinants of innovation in organizations. *The American Political Science Review*, 63(1): 111-126.

Moon, M.J. & S. Bretschneider (2002). Does the perception of red tape constrain IT innovativeness in organizations?: Unexpected results from a simultaneous equation model and implications. *Journal of Public Administration Research and Theory*.

Moon, M.J. (2002). "The evolution of e-government among municipalities: Rhetoric or reality?" In *Public Administration Review,* 62(4): 424-433.

Musso, J., W. Chrisopher, & M. Hale (2000). Designing web technologies for local governance reform: Good management or good democracy? *Political Communication*, 17(1): 1-19.

National Electronic Commerce Coordinating Council (2000a). "Critical business issues in the transformation to electronic government." A White Paper. NECCC Annual Conference, Las Vegas, NV. December 13-15. Online. Available at www.ec3.org/ Downloads/2000/Critical_Business_Issues_Paper.pdf. Accessed on May 17, 2004.

National Electronic Committee Coordinating Council (2000b). "E-government strategic planning." A White Paper. NECCC Annual Conference, Las Vegas, NV. December 13-15. Retrieved May 15, 2004, from www.ec3.org/Downloads/2000/Planning_Document.pdf.

National Electronic Committee Coordinating Council (2000c). *The enterprise portal: Organizational issues and related concerns data-sharing*. A White Paper. Retrieved May 15, 2004, from www.ec3.org/Downloads/2000/Enterprise_Portal.pdf.

National Telecommunications & Information Administration and Economics and Statistics Administration, U.S. Department of Commerce. (1995, July). *Falling through the net: A survey of the "have nots" in rural and urban America.* Retrieved October 14, 2003, from http://www.ntia.doc.gov/.

National Telecommunications & Information Administration and Economics and Statistics Administration, U.S. Department of Commerce. (1998, July). *Falling through the net II: New data on the digital divide.* Retrieved October 14, 2003, from http://www.ntia.doc.gov.

National Telecommunications & Information Administration and Economics and Statistics Administration, U.S. Department of Commerce. (1999, November). *Falling through the net: Defining the digital divide.* Retrieved October 14, 2003, from http://www.ntia.doc.gov.

National Telecommunications & Information Administration and Economics and Statistics Administration, U.S. Department of Commerce. (2000, October). *Falling through the net: Toward digital inclusion.* Retrieved October 14, 2003, from http://www.ntia.doc.gov.

Nielsen, J. (1999). *The top ten* new *mistakes of web design.* Retrieved April 28, 2004, from http://www.useit.com/alertbox/990530.html.

Norris, P. (2001). Digital divide: Civic engagement, information poverty, and the Internet worldwide. Cambridge, MA: Cambridge University Press.

Northrop, A. (2003). *E-government: The URBIS cities revisited*. Irvine, CA: Center for Research on Information Technology and Organizations.

Office of Management and Budget (2002a). "E-government strategy: Simplified delivery of services to citizens." Retrieved August 14, 2002, from http://www.whitehouse.gov/omb/inforeg/egovstrategy.pdf.

Office of Management and Budget (2002b). "The President's management agenda." Retrieved August 17, 2002, from http://www.whitehouse.gov/omb/budintegration/pma_index.html.

Office of Management and Budget (2003a). "Analytical Perspectives, Budget of the United States Government, Fiscal Year 2004." Retrieved March 21, 2004, from http://www.whitehouse.gov/omb/budget/fy2004/pdf/spec.pdf.

Office of Management and Budget (2003b). "E-government strategy: Implementing the president's agenda for e-government." Retrieved March 21, 2004, from http://www.whitehouse.gov.

Olsen, M. (1968). *The logic of collective action*. New York, NY: Schocken.

Organisation for Economic Cooperation and Development (2003). *The e-government imperative*. Paris, France: OECD.

O'Sullivan, E. & G.R. Rassel (1999). *Research methods for public administrators* (3rd ed.). New York, NY: Addison Wesley Longman, Inc.

Perry, J.L. & K.L. Kraemer (1979). *Technological innovation in American local governments*. New York, NY: Pergamon Press.

Relyea, H.C. (2002). E-gov: Introduction and overview. *Government Information Quarterly*, 19 (2002): 9-35.

Riley, C.G. (2003). The changing role of citizen in the e-governance & e-democracy equation. Commonwealth Centre for e-Governance.

Riley, T.B. (2003a). *E-governance to e-democracy: Examining the evolution*. Prepared under the auspices of the Commonwealth Secretariat and Co-sponsored by Government Telecommunications and Informatics Services, Public Works and Government Services Canada.

Riley, T.B. (2003b). *E-government vs. e-governance: Examining the differences in changing public sector climate*. Prepared under the auspices of the Commonwealth Secretariat and Co-sponsored by Government Telecommunications and Informatics Services, Public Works and Government Services Canada.

Riley, T.B. (2003c) *The information society: The role of information in the emerging global e-government, e-governance and e-democracy environments.* Prepared under the auspices

of the Commonwealth Secretariat and Co-sponsored by Government Telecommunications and Informatics Services, Public Works and Government Services Canada.

Rocheleau, B. (2003). Politics, accountability, and governmental information systems. In G.D. Garson (Ed.) *Public information technology: Policy and management issues*. Hershey, PA: Idea Group Publishing, pp. 20-52.

Rogers, E.M. (2003). *Diffusion of innovations* (5th ed.). New York, NY: Free Press.

Rosenbloom, D.H. (1993). Editorial: Have and administrative Rx? Don't forget the politics! *Public Administrative Review*, 53(6): 503-507.

Rosenbloom, D.H. and O'Leary, R. (1997). *Public administration and law* (2nd ed.). New York, NY: Marcel Dekker.

Rosner, M.M. (1968). Economic determinants of organizational innovation. *Administrative Science Quarterly*, 12(4): 614-625.

Rosner, M.M. (1968). Economic determinants of organizational innovation. *Administrative Science Quarterly*, 12(4): 614-625.

Rummel, R.J. (1970). *Applied factor analysis*. Evanston: Northwestern University Press.

Savage, R. (1978). Policy innovativeness as a trait of American states. *The Journal of Politics*, 40(1): 212-224.

Schedler, K. & M.C. Scharf (2001). Exploring the interrelations between electronic government and the New Public Management: A managerial framework for electronic government. Proceedings of the IEEE Conference, Zurich, October 2001.

Seneviratne, S.J. (1999). Information technology and organizational change in the pubic sector. In D. G. Garson (Ed.), *Information technology and computer applications in public administration* (pp. 41-61). Hershey, PA: Idea Group Publishing.

Spooner, T. (2003). *Internet use by region in the United States: Regional variations in Internet use mirror differences in educational and income levels*. Pew Internet & American Life Project Report. Retrieved August 24, 2004, from http://www.pewinternet.org.

Spicer, M. (2004). Public administration, the history of ideas, and the reinventing government movement. *Public Administration Review*, 64(3): 353-362.

Stair, R.M. & G.W. Reynolds (1998). *Principles of information systems: A managerial approach*. (3rd ed.). Cambridge, MA: Course Technology.

Stevens, J.M., A.G. Cahill, & E.S. Overman (1990). The transfer of information technology in state governments. *Computer, Environment, and Urban Systems*, 14: 11-23.

Stowers, G.N.L. (1999). Becoming cyberactive: State and local governments on the World Wide Web. *Government Information Quarterly*, 16(2): 111-127.

Streib, G.D. & K.G. Willoughby (2002). Local government becoming e-government: Getting the sizzle, avoiding the fizzle. In H.G. Frederickson and J. Nalbandian (Eds.) *The future of local government administration*. Washington, D.C.: ICMA.

Tabachnick, B.G. & L.S. Fidell (2001). *Using multivariate statistics* (4th ed.). Needham Heights, MA: Allyn & Bacon.

Tat-Kei Ho, A. (2002). Reinventing local governments and the e-government initiative. *Public Administration Review*, 62(4): 434-444.

Thomas, G. & S. Wyatt (2000). Access is not the only problem: Using and controlling the Internet. In S. Wyatt, F. Henwood, N. Miller, and P. Senker (Eds.) *Technology and in/equality: Questioning the information society*. London, Great Britain: Routledge.

Tocqueville, A. (1937). *Democracy in America*. Vol. One. New York, NY: Vintage Books.

Tocqueville, A. (1945). *Democracy in America*. Vol. Two. New York, NY: Vintage Books.

U.S. Census Bureau (n.d.). *Federal, state, and local governments: 2002 Census of governments*. Retrieved October 19, 2004 from http://www.census.gov/govs/www/cog2002.html.

U.S. Department of Commerce (2002). *A nation online: How Americans are expanding their use of the Internet*. Washington, D.C.: Economics and Statistics Administration, National Telecommunications and Information Administration.

UCLA Center for Communication Policy (2003). *Surveying the digital future.* The UCLA Internet Report. Retrieved May 25, 2004, from http://www.ccp.ucla.edu.

Walker, J.L. (1969). The diffusion of innovations among the American States. *The American Political Science Review*, 63(3): 880-899.

Warschauer, M. (2003). *Technology and social inclusion: Rethinking the digital divide*. Cambridge, MA: MIT Press.

Weare, C., J. Musso, & M.L. Hale (1999). Electronic democracy and the diffusion of municipal web pages in California. *Administration & Society*, 31(1): 3-27.

West, D. (2003a). *State and federal e-government in the United States, 2003.* Retrieved November 25, 2003 from http://www.insidepolitics.org/egovt03us.pdf.

West, D.M. (2003b). *Urban e-government, 2003*. Providence, RI: Brown University, Center for Public Policy.

Wilhelm, A.G. (2000). *Democracy in the digital age: Challenges to political life in cyberspace*. New York, NY: Routledge.

Wilson, J.Q. (1989). *Bureaucracy: What government agencies do and why they do it.* Basic Books, Inc.

Yin, R. K., K. A. Heald, M. E. Vogel, P. D. Fleischauer, & B. C. Vladeck (1976). *A review of case studies of technological innovations in state and local services*. Santa Monica, CA: Rand.

Zweers, K. & Planqué, K. (2001). Electronic government. From an organization based perspective toward a client oriented approach. In J.E.J Prince (Ed.), *Designing e-government: On the crossroads of technological innovation and institutional change*. The Hague, the Netherlands: Kluwer Law International.

APPENDIX A:
2004 ICMA E-GOVERNMENT SURVEY

International City/County Management Association
ICMA
icma.org

Complete this survey online!
http://icma.org/egov

Electronic Government 2004

April 2004

The International City/County Management Association (ICMA) is conducting this survey to assess local government activity in the area of Electronic Government (e-government) and to provide information that will be helpful to local governments in their e-government initiatives. The results of this survey will be published in various ICMA publications. Please assure the success of this project by completing the survey and returning it to ICMA by **May 21, 2004**.

Thank you for your participation.

Robert J. O'Neill, Jr.
Executive Director, ICMA

CUSTOMER SERVICES AND MANAGEMENT

For the purposes of this survey, the local government **web site** is the official web site. **This does not include web sites produced by the Chamber of Commerce.**

1. Does your local government have Internet connectivity? ☐ Yes ☐ No

1A. If you have Internet connectivity, please identify the method. *(Check only one.)*
- ☐ a. Dial-up
- ☐ b. DSL
- ☐ c. Cable
- ☐ d. High bandwidth
- ☐ e. Other *(Please specify.)*_____

2. Does your local government have a web site? ☐ Yes ☐ No

2A. If "No," do you plan to create a web site in the next year? ☐ Yes ☐ No

2B. If your local government does not plan to create a web site in the next year, please explain why.

_____
_____

2C. If your local government has a web site, which department has overall responsibility for the day-to-day management of your local government's web site? *(Check only one.)*

- ☐ a. City/county manager/CAO
- ☐ b. IT department
- ☐ c. Finance department
- ☐ d. PIO/Communications office
- ☐ e. Library
- ☐ f. Mayor's office
- ☐ g. Business development office
- ☐ h. Clerk
- ☐ i. Web management team representatives from different departments
- ☐ j. Consultants
- ☐ k. Planning/economic development dept.
- ☐ l. Volunteers
- ☐ m. Other *(Please describe.)* _____

For purposes of this survey, **e-government** is the use of the Internet to deliver services and information.

3. Does your local government have a separate information technology department that is responsible for all information technology needs, including e-government? ☐ Yes ☐ No

3A. If "Yes," how many FTEs are in that department?
☐ a. 1-5 ☐ b. 6-10 ☐ c. 11-20 ☐ d. 21-50 ☐ e. More than 50

4. What is your total *operating* budget for information technology for the *current fiscal year*? $_____

5. Has your local government conducted a citizen survey to determine what online services residents and businesses want?
☐ Yes ☐ No

5A. If "yes," which are the top three most requested online services identified by survey respondents? *(Check only three. If more than three are checked, none of the answers will be used.)*

- ☐ a. Online service requests (e.g., requesting pothole repair)
- ☐ b. Online financial transactions (e.g., online payment of taxes)
- ☐ c. Online registration for community events (e.g., park/rec activities, adult education)
- ☐ d. Online complaints (e.g., reporting graphitti, missed trash pickup)
- ☐ e. Council meeting minutes
- ☐ f. Budget document
- ☐ g. Police reports
- ☐ h. Newsletters e-mailed to residents
- ☐ i. Employment info./applications
- ☐ j. Permits/licenses
- ☐ k. Other (*Please describe.*) _____
- ☐ l. Other (*Please describe.*) _____

6. Please provide the following information about e-government on your local government web site. *(Place a check in the box under the relevant columns.)*

Service	Is currently offered	% of residents/ businesses using	Is NOT currently offered	We plan to offer the service →	We do not plan to offer the service
a. Online **payment** of taxes	☐	%	☐	☐	☐
b. Online **payment** of utility bills	☐	%	☐	☐	☐
c. Online **payment** of fines/fees	☐	%	☐	☐	☐
d. Online **completion and submission** of permit applications	☐	%	☐	☐	☐
e. Online **completion and submission** of business license applications/renewals	☐	%	☐	☐	☐
f. Online **requests** for local government records	☐	%	☐	☐	☐
g. Online **delivery** of local governments records to the requestor.	☐	%	☐	☐	☐
h. Online **requests for services**, such as pothole repair	☐	%	☐	☐	☐
i. Online **registration** for use of recreational facilities/activities, such as classes and picnic areas	☐	%	☐	☐	☐
j. Online voter **registration**	☐	%	☐	☐	☐

Service	Is currently offered	% of residents/ businesses using	Is NOT currently offered	We plan to offer the service	We do not plan to offer the service
k. Online property **registration**, such as animal, bicycle registration	☐	%	☐	☐	☐
l. Forms that can be **downloaded** for manual completion (e.g., voter registration, building permits, etc.)	☐	%	☐	☐	☐
m. Online **communication** with individual elected and appointed officials	☐	%	☐	☐	☐
n. GIS mapping/data	☐	%	☐	☐	☐
o. Employment info. /applications	☐	%	☐	☐	☐
p. Council agendas/minutes	☐	%	☐	☐	☐
q. Codes/ordinances	☐	%	☐	☐	☐
r. Electronic newsletter sent to residents/businesses	☐	%	☐	☐	☐
s. Streaming video	☐	%	☐	☐	☐
t. Other (*Please describe.*)_____	☐	%	☐	☐	☐

7. If your local government offers any of the web-based online services listed above, is there also a paper option and payment by mail or in person for the majority of these services? ☐ Yes ☐ No

8. Which if any of the following barriers to E-government initiatives has your local government encountered? (*Check all applicable.*)

☐ a. Lack of technology/web staff
☐ b. Lack of technology/web expertise
☐ c. Lack of information about E-govt applications
☐ d. Lack of support from elected officials
☐ e. Issues relating to convenience fees for online transactions
☐ f. Lack of collaboration among departments
☐ g. Difficulty justifying return on investment
☐ h. Staff resistance to change
☐ i. Issues regarding privacy
☐ j. Issues regarding security
☐ k. Lack of financial resources
☐ l. Need to upgrade technology (PCs, networks, etc.)
☐ m. Resident resistance to change
☐ n. Lack of resident/business interest/demand
☐ o. Web site does not accept payment by credit card
☐ p. Bandwidth issues
☐ q. Other (*Please specify.*)_____

9. How has E-government changed your local government? (*Check all applicable.*)

☐ a. Has reduced the number of staff
☐ b. Has changed the role of staff
☐ c. Has reduced time demands on staff
☐ d. Has increased demands on staff
☐ e. Has increased non-tax-based revenues from fees, advertising
☐ f. Has increased citizen contact with elected and appointed officials
☐ g. Business processes are being re-engineered
☐ h. Business processes are more efficient
☐ i. Has reduced administrative costs
☐ j. Has improved local gov't communication with the public
☐ k. Has improved customer service
☐ l. Other (*Please specify.*) _____

10. If you currently provide e-government services, how are they developed? *(Check all applicable.)*

☐ a. Developed in-house by local government staff
☐ b. Developed by consultants and local government staff
☐ c. Outsourced to Application Service Providers
☐ d. Programs are purchased from IT vendors and integrated into our databases.
☐ e. Other *(Please specify.)*_____

11. How does your local government provide the following*? (Check all applicable.)*

	In-house by local government staff	Currently outsources
a. Web site hosting	☐	☐
b. Web site design	☐	☐
c. Web site operations and management	☐	☐
d. Integration of Web site with local government databases	☐	☐

11A. Do you use a Web Content Management System? ☐ Yes ☐ No

11B. *If "no,"* do you plan to introduce a Content Management System that enables non-technical staff to manage and maintain your Web site? ☐ Yes ☐ No

12. Does your local government have a policy or procedure on any of the following? *(Check all applicable.)*

	Yes	No
a. Web site privacy	☐	☐
b. Web site options for visually impaired users	☐	☐
c. Web site security	☐	☐
d. Web site language translation capability	☐	☐
e. Paid advertising on the web site	☐	☐
f. Links to businesses that request a link	☐	☐

ONLINE PROCUREMENT

13. Please indicate by checking the boxes below which procurement activities you complete online.

Service	Review product offerings online		Make purchases online	
	Yes	No	Yes	No
a. Property and/or liability insurance	☐	☐	☐	☐
b. Equipment	☐	☐	☐	☐
c. Office supplies	☐	☐	☐	☐

GEOGRAPHIC INFORMATION SYSTEMS (GIS)

14. Does your jurisdiction utilize GIS programs that create maps and display data spatially to help you to analyze information?
☐ Yes ☐ No

14A. If "yes," will you rely more on GIS technology to assist in emergency preparedness as a result of recent terrorism-related threat in the U.S.? ☐ Yes ☐ No ☐ Not Sure

14B. Does your local government **provide GIS data online** to residents/businesses? ☐ Yes ☐ No
14C. If "Yes," does your local government **charge a fee** to residents/businesses for GIS data? ☐ Yes ☐ No

15. Which department manages the GIS function? *(Please check the department that has primary responsibility.)*

☐ a. Information technology
☐ b. Engineering
☐ c. Planning
☐ d. Other *(Please identify.)*_____

INTRANET

16. Does your local government have an Intranet (a web server accessible only to local governments employees, sometimes called a "portal")? ☐ Yes ☐ No

16A. If *"yes,"* how is the Intranet managed? ☐ in house ☐ by a service provider
16B. If *"yes,"* how do you use/plan to use the intranet? *(Please check all below.)*

	Currently use		If you do not currently use an intranet, do you plan to use one in the future?	
	Yes	No	Yes	No
a. Provide news & information	☐	☐	☐	☐
b. Publish documents & manuals online to reduce printing costs	☐	☐	☐	☐
c. Post job openings for internal recruitments	☐	☐	☐	☐
d. Provide employee benefit forms	☐	☐	☐	☐
e. Provide online report generation	☐	☐	☐	☐
f. Provide online procurement tools	☐	☐	☐	☐
g. Enable project teams to collaborate	☐	☐	☐	☐
h. Enable inter-/intra-agency data and information sharing	☐	☐	☐	☐
i. For financial reporting	☐	☐	☐	☐
j. Expand telecommuting staff access to information and data	☐	☐	☐	☐

	Currently use		If you do not currently use an intranet, do you plan to use one in the future?	
k. Provide online training	☐	☐	☐	☐
l. GIS	☐	☐	☐	☐
m. Timesheets	☐	☐	☐	☐
n. Online help desk	☐	☐	☐	☐
o. Other *(Please describe.)* _____	☐	☐	☐	☐

FINANCING

17. Please check the box beside the option below that best describes the e-government budget process in your local government
- ☐ a. There is **no separate** budget item for e-government.
- ☐ b. There is a separate budget item for e-government, and each department develops and submits its own e-government budget
- ☐ c. There is a separate budget item for e-government, and the Information Technology (or equivalent) department develops and submits the e-government budget for the local government.

18. If you have a separate budget item for e-government, how much do you plan to budget for e-government for the coming next fiscal year?
- ☐ a. Under $5,000
- ☐ b. $5,000-$9,999
- ☐ c. $10,000-$24,999
- ☐ d. $25,000-$49,999
- ☐ e. $50,000-$99,999
- ☐ f. $100,000 or over

19. Regardless of whether your local government budgets separately for e-government, as you plan for e-government, where do you obtain your cost estimates? *(Check all applicable.)*
- ☐ a. Our cost information was obtained primarily from IT solution vendors
- ☐ b. Our cost information was obtained primarily from other cities/counties who have implemented similar e-government services.
- ☐ c. We estimated most of the costs for e-government
- ☐ d. Other *(Please specify.)*_____

20. How are your current e-government efforts funded? *(Check all applicable.)*
- ☐ a. Federal or state grants
- ☐ b. Transaction fees from services provided
- ☐ c. General revenues
- ☐ d. Risk-sharing (a private sector firm provides the application and receives a percent of the revenue)
- ☐ e. Municipal bond financing
- ☐ f. Cable fees
- ☐ g. Utility funds/revenues
- ☐ h. Enterprise fund
- ☐ i. Website advertising
- ☐ j. Other *(Please specify.)*_____