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Correlates of E-Government Use in County Governments

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CORRELATES OF E-GOVERNMENT USE IN COUNTY GOVERNMENTS

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Dedicated to my family

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

One hundred and one American counties were selected randomly within predetermined strata and used to study the extent of use of e-government technologies. The study design was cross-sectional and the time period of the study was a single year, 2006. Each website was analyzed to obtain an e-government utilization score. The research objective of this dissertation was twofold: First, to develop an up-to date and comprehensive index of e-government utilization, to be used to evaluate the extent of e-government utilization in county governments. The second objective was to identify the characteristics of those counties that are associated with more extensive utilization of e-government technologies. Counties' use of e-government technology was evaluated using four different levels of utilization; publish, interact, transact, and integrate. This study found that most of the sampled U.S. counties used the web only to publish information and to provide basic unsophisticated services. It was found that counties with larger populations, those in which employees were more professionally oriented toward communicating with citizens, and those that did Information Technology (IT) planning make greater use of e-government technology. This study found that neither population size nor local per capita wealth is an impediment for extensive use of e-government technology. It seems that within every county that utilizes e-government technology well there is a story as to why that has happened. The most important implication of this study is that the story seems to be related to professionalism. To tell the stories as to how e-government utilization emerges especially in local governments, the quantitative analysis of this study needs to be followed by good qualitative research.

CHAPTER 1

INTRODUCTION

The purpose of the study

Information and communication (ICT) technologies have made a considerable contribution to the modernization of public administration at all levels. There is some literature on the adoption and the impact of technology on government service delivery (Kraemer and King, 1977; Griessemer, 1983; Klay, 1988; West, 2005). Yet whether public organizations are keeping pace with the new improvements and utilizing the potential improvements in ICT to serve the citizens is an issue of debate (West, 2000).

Today governments at all levels are using computers and the Internet to inform citizens and interact with others. Governments are using these tools to enable their employees as they do their daily tasks and to enable citizens to interact with their governments. New technology enables citizens to interact with their governments in ways that were not possible before.

E-government is a relatively new term that is used to describe new ways of electronic interaction among governments, citizens, businesses, and others.

E-government has become a very popular way to serve citizens (Norris and Moon, 2005). In fact, today the Internet is the most popular e-government service delivery system (West, 2005). E-government has been defined in different ways. According to the World Bank (2006), e-government refers to the use of information and communications technologies to improve efficiency, effectiveness, transparency and accountability of governments. West (2000) refers to e-government as "the delivery of information and services online through the internet or other digital means". Norris, Fletcher, and Holden (2001) define e-government as “the electronic provision of information and services by governments 24 hours per day, seven days per week."

E-government, sometimes called “digital government,” has become popular with the public. People expect to use the Internet to do business. The use of the Internet has

become prevalent in the business sector. There is a wide spread perception among the public that the Internet has the potential to increase efficiency, reduce costs and increase customer satisfaction. Many countries have decided not to stay behind the information age and to provide their citizens convenient ways for services. For example the European Union set a goal of putting all possible government services online by the year 2005 (Commission of the European Communities, 2002). Today many local governments in the U.S. are following the same trend.

Many authors believe that e-government will eventually alter the ways in which governments work. How the changes will take place is a debated issue but there is little doubt about whether change will occur (West, 2005). As Means and Abramson (2001) noted, the demand for e-government is likely to be very high in spite of the fact that e-government can be costly.

Local governments vary widely in the extent to which they make use of e-government technology. The extent to which local governments in the U.S. make use of e-government technology has not been well documented. Some researchers have used surveys of local government officials to learn about their utilization of e-government technology (Ho, 2002; Norris and Moon, 2005). Surveys of officials are easily administered and can be sent to many local governments. However the accuracy of data obtained is dependent upon the responses of the local officials. This raises the possibility of biased data. They might be biased for the following reasons. First, officials might be very busy with little time to respond. Second, they might tend to exaggerate the degree that their government is up to date in terms of utilizing popular technologies.

A better way to evaluate a government's use of e-government technology is to review its web site. The fullest use of this technique has been done by West (2000; 2004). However, neither West nor others have developed a comprehensive index of technology utilization by governments. Rather than just depending on some survey results, as most of the e-government studies do, this study will examine the actual content of local governments' websites. This is a preferred method since depending on surveys of officials may lead to biased responses.

Recently West (2005) developed an index that summarizes services, interactivity, accessibility, and democratic capacity, however, his index did not include the most

advanced stage of e-government, that is the *integrate stage*. The "integrate" stage enables a user to directly link with other units of the same government as well as with other governments to accomplish tasks such as updating multiple databases simultaneously. As such, it is considered the highest level of online service provision by governments. No index of e-government utilization to date has included the integrate stage. This study develops an index of utilization that includes the presence of integrating in a local government web site.

Lacking a *complete index*, we currently have a vague understanding as to what differentiates the governments that make extensive use of e-government technology from those that do not utilize the same technology as fully. We do not know, for example, to what extent something like the affluence of the local populace affects the degree of e-government utilization.

Another gap in the existing e-government literature is the limited amount of research in technology utilization at the *county* level. Current research has studied nations, states and municipalities, but not counties. Wilkinson and Cappel's (2005) article stands out as an e-government study at the county level. They examined 32 counties' websites in Michigan using an index of utilization. They studied relationships between e-government utilization and income and population. Their e-government index, however, is unsophisticated and does not include the integrate stage mentioned earlier.

Norris and Moon (2005) studied counties as well, but their analysis is limited to survey data (as opposed to real content analysis of counties' web sites). Consequently, their study lacks an index of e-government utilization. Norris and Moon depended solely on survey data from International City/County Management Association and Public Technology Inc. (ICMA/PTI). That survey data only identified one aspect of e-government utilization, specifically transactional capability. This study will fill some of the gaps in our understanding of e-government utilization. In this study, counties are the unit of analysis. A comprehensive index of e-government utilization, derived from close scrutiny of each county's web site is used to grade each county's performance.

The purpose of this dissertation is twofold:

1) To develop a means of effectively summarizing the extent to which a **county government** is making use of e-government technology. This will result in **an index of e-government** utilization.

2) To identify statistically the **characteristics** of those counties that make the most extensive utilization of e-government technologies relative to those counties that utilize the technology to lesser degrees.

This study contributes to the current e-government literature in two ways. It first creates a more up-to date and comprehensive index of e-government utilization. This index is used to rate the extent of e-government utilization in selected county governments. Second, each county's rating is used as the dependent variable to explore the extent to which e-government utilization is related to some demographic, economic, social, and political variables. This study presents a better understanding of factors that are associated with e-government utilization in local governments.

Many scholars argue that e-government is more than putting government services online. They argue that it could portend a fundamental change in the way that governments function.
E-government has the potential to transform the fundamental relationship between government and the public (Pardo, 2000; Fountain, 2001; Means and Abramson, 2001; McGinnis, 2003). Ho (2002) argued that the Internet is a powerful tool for reinventing local governments and that e-government is a new paradigm.

The concept of reform is a very old theme in public administration literature. Some analysts use the term "reform" to emphasize the potential effects of e-government on the way public organizations work and provide services to citizens (Porte, 2005). For example, e-government is expected to make government more transparent and accountable. While e-government has been recognized as a new tool having the potential to change how government does business and provides services to citizens, existing literature is of limited use. In short, "little of it is empirical" (Norris and Moon, 2005). The literature on e-government often reflects high expectations about its possible effects but very little of that literature is based on empirical research. More empirical research about e-government is needed.

Very little is known about the characteristics of governments that utilize e-government technologies extensively relative to those that do not. Studying e-government utilization will help discover some of the characteristics of local governments that are making fuller use of e-government technology. The results may be useful to policy makers and administrators.

As argued by some authors, successful application of e-government has the potential to improve trust in government, which has been declining over the last three decades (Nye, 1997; West, 2005). E-government has the potential to improve efficiency of internal processes as well as to change the relationship of government interactions with both individuals and businesses (Siew and Leng, 2003). Understanding the factors that are related to more extensive utilization of e-government might help policy makers to see how they make fuller use of technology in their own governments.

This study provides an extensive analysis of the content of county web sites. As Norris and Moon (2005) argue, it is important to periodically examine e-government at the grassroots level because of its potential reach, cost, and impacts. This study is timely since, as previously noted, many governments chose 2005 as a target year to provide many government services online. Therefore, it seems an appropriate time to evaluate the extent to which many county governments are utilizing e-government technology and to identify some of the characteristics associated with utilization.

CHAPTER 2

LITERATURE REVIEW

A Brief History of the emergence of E-Government

In the literature the roots of e- government trace to the earliest days of electronic computing. It has been argued that he US government was the main driving force of much of the development of computers and networking, including creating and nurturing the Internet.

The roots of the Internet date back to the development of computer networking through Federally funded projects in the 1960s. The United States Defense Department funded ARPANET (Advanced Research Projects Agency Network), a digital system that made it possible to connect computers in different locations with extensive redundancy. ARPANET become operational in 1969 and was accessible only to ARPA contractors. In 1980 the National Science Foundation (NSF) also began to fund the development of a research network that became linked to the ARPANET. In the early 1990's the introduction of the World Wide Web (WWW) made possible the rapid spread of the Internet. With the creation of the WWW, the Internet could be used by people with little technical knowledge (Relyea and Hogue, 2004).

The creation of the Internet is a product of public administration, not a product of private sector capitalism. The roots of electronic government can be traced back to the use of the first mechanical record processing machines used in managing government records in the late 19th century (King and Kraemer, 1977). Relyea and Hogue (2004) note that the technology that would contribute to the realization of digital government in the United States began with the Federal government's funding of computer research and development after the end of World War II. Similarly the development of the HTML language, which made the WWW possible, was funded by nations of the European Union.

Computers were quickly recognized as a major tool for improving the management and use of information in local governments following their introduction in the 1940s. Many

states and larger local governments began to use computers, mostly for financial management, in the 1950s. By the 1970s, more than half of U.S. cities and counties with populations over 10,000 used computers; in the late 1970s, 75% of local governments with populations over 100,000 used computers (King and Kraemer, 1977).

In the early decades of computing, computers were big, costly and slow by today's standards. Computers were kept in a central location and second and third shifts were often scheduled instead of having an idle computer (King and Kraemer, 1977). The invention of the desktop computers enabled employers to put computers on employee's desks and enabled citizens to put them in their homes. Currently a major concern is to make the Internet available to all citizens.

Today almost all national governments have their web sites online. A 2004 survey by the United Nations (U.N) found that only thirteen nations of its 191 members were not online. European countries have chosen to make all possible government services available online by the year 2005 (European Union Action Plan, 2002). In the U.S. all federal agencies and all states have their own web sites. Internet use is widespread among local governments.

The first nations to adopt the Internet -- the U.S., Britain, Canada and Australia – were the first to develop e-government applications. The first government web pages were basically informational. They provided one-way transmission of information rather than interaction with citizens (Lee et al., 2005). Moon (2002) notes that the idea of e-government followed the private-sector adoption of so-called "e-business" and "e-commerce". As citizens became accustomed to doing business online they started to expect government services online.

King and Kraemer (1977) found that the first use of computing in American local governments was to improve the effectiveness and efficiency of the organizations. The early applications of e-government were also mainly designed to increase the effectiveness and efficiency of government organizations. The primary concern was the need of the organizations, not the needs of citizens. Nowadays, priorities and expectations are more toward providing services that are tailored to fit the needs of citizen-customers. As Morris and Moon (2005) note, governments are now seeking to better serve their constituencies and promote benefits to both government and its citizens.

E-government adoption has been found to be widespread among both developed and developing countries (U.N Report, 2004). Forlano (2004) notes that the drive toward digital government is based on a combination of several factors:

- The desires of citizens and private organizations to use information and communication technology to influence policy makers;
- The availability of the necessary telecommunication infrastructure;
- The promise of information and communication technology to increase government efficiency;
- The need for public sector reform.

Relyea and Hogue (2004) note that several laws and executive orders promote the use of IT in the federal government of the U.S. These laws deal with such topics as improving the efficiency and economy of government operations, ensuring proper management of these technologies, and security and privacy issues. The U.S. Congress passed the E-Government Act in December of 2002 to assist collaboration among federal agencies as well as to secure and improve the federal government's online information (Levack, 2003).

Current Literature on E-government

E-government is defined by the United Nations as the application of information and communication technology (ICT) by a government for the provision of information and basic public services to the people (U.N Report, 2004). According to the Word Bank (2005) e-government refers to the use of information and communications technologies to improve efficiency, effectiveness, transparency and accountability of governments.

In this study no distinction is made between the concept of e-government and e-democracy. Stahl (2005) uses the distinction made by Montesquieu about the division of power to differentiate e-government from e-democracy. Stahl suggests that the term "e-government" should be used to indicate the use of ICT for the purposes of the executive branch of government. He prefers that the term "e-democracy" be used to represent the use of ICT in all other aspects of political processes in democracy. According to his terminology the term e-government should be limited to use of technology by the executive branch while

the term e-democracy should be used to describe the use of these technologies in both the judicial and legislative branches. County governments, however, typically do not distinguish between these branches. In many states county commissioners exercise both legislative and executive authority. Therefore, only the term e-government is used in this study to describe the use of these electronic technologies in governments.

The proponents of e-government maintain that many benefits can result from e-government utilization. Many politicians and practitioners have promised a myriad of benefits, such as radical improvements in policy innovation and efficiency and effectiveness in public service delivery (Gore, 1993). The World Bank (2005) suggests that the use of e-government technologies can help reformers to achieve the following benefits: “less corruption, increased transparency, greater convenience, revenue growth, and/or cost reductions”.

Carter and Belanger (2005) note three main benefits of e-government -- increased government accountability to citizens, greater public access to information, and a more efficient, cost-effective government. Garson (2004) identifies four promises of e-government for the United States. First, Garson says there will be a profound transformation of the way the government does business. Second, new, improved and transformed governmental processes will cut transaction costs, thereby reducing the expense of government. Third, he predicts a future in which a long-term loss of social capital in the United States is reversed through increased electronic networking. Fourth, Garson indicates that these changes will enhance the freedoms that Americans enjoy. Finally, as argued by some authors, a successful application of e-government has the potential to improve trust in government (Garson, 2004; West, 2005), which has been declining over the last three decades (Nye, 1997).

Some researchers are studying the impact of e-government adoption on internal organizational structures and processes and on organizational outputs and outcomes. Here, scholars examine how the adoption and use of e-government affects organizational change (Porte, 2005). Ho (2002) argued that the Internet encourages transformation from the traditional bureaucratic paradigm to an "e-government" paradigm; that is, from standardization and departmentalization to coordinated network building, external collaboration, and customer services.

Correlates of E-government

Nearly all of the research done to date on e-government has been descriptive rather than explanatory. The first researchers who studied e-government sought primarily to discover and describe the extent to which governments were utilizing e-government. Early research on e-government did not deal with the issue of "correlates of e-government". In other words they did not seek to explain the processes of utilization, specifically why some governments are more inclined to utilize e-government technology than others.

The first studies of e-government essentially sought to provide detailed descriptive statistics of e-government utilization. West (2000), for example, analyzed 1813 state and federal government websites and revealed that e-government utilization was far behind what was possible with the technology that was available at that time. In 2000, few governments had adopted privacy policies. Few were able to provide secure transactions; in the same vein, few governments were offering even one online transaction service.

Within the past few years, a handful of scholars have began to study the question of how different factors, both internal and external to government organizations, affect the propensity of government to adopt e-government technology (Norris and Moon, 2005; West, 2005; Wilkinson and Cappel, 2005). Norris and Moon (2005) conducted a longitudinal examination of local government adoption of e-government, website sophistication, the perceived impacts of e-government, and barriers to the adoption and sophistication of e-government. They used data from two nationwide surveys, done in 2000 and 2002, and published by the International City/County Management Association and Public Technology Inc. (ICMA/PTI, 2002). Norris and Moon used this available survey data. They did not go to the cities' and counties' websites and did not directly analyze the contents of them. Their reliance on survey respondents, rather than doing a direct analysis of websites, limited their examination of website sophistication. They used *transactional capability* as a proxy for website sophistication. If a respondent said it was possible to conduct financial transactions in at least one context, the entire website would be judged to be a sophisticated one.

One finding of Norris and Moon was that very few governments offered online transactions. This caused them to judge most local government websites as being relatively unsophisticated in the time period ranging from 2000 to 2002. Norris and Moon were particularly interested in the relationship between some demographic and political variables, e-government adoption, and website sophistication. Five independent variables they

included in their study were *population*, *type of government (*city vs. county*)*, *form of government* (presence of a professional manager), *region*, and *metropolitan status*. Except for *population*, however, they found no statistically significant and consistent relationship between these variables and e-government utilization. Some variables such as metropolitan status were found to have a positive effect on some e-government features and a negative one on some others. *Size* was found to have a positive and consistent relationship with the adoption of online transaction.

Wilkinson and Cappel (2005) were the first to specifically analyze county websites to determine the extent to which county governments provide services to their constituents over the web and to relate that analysis to possible explanatory variables. Examining 32 counties in Michigan, they attempted to find out the effects of two factors (income and population) on e-government utilization. They found that both factors -- economic prosperity and population -- are significant predictors of e-government utilization. Wealthier and more populated counties were utilizing e-government more effectively than poorer or less populous counties.

West studied several aspects of e-government. His work is significant because he developed a way to analyze government websites of states and countries. Basically, he sought for ways to measure the complexity of government websites and e-government performance. West's (2005) book is the most comprehensive study on e-government. It includes most of his previous works on e-government under a coherent theoretical framework. West has addressed e-government utilization. As related to this study, in Chapter 4 he analyzes the factors that influence the "performance" of e-government utilization, which he determines by looking at the number and breadth of online services offered by governments. Here, he adopts *states* as the unit of analysis and, through content analysis of state websites, constructs a personal "index" of e-government utilization, which becomes the dependent variable of this section. As I stated earlier, his index does not include elements of the *integrate* stage, which many regard as the highest stage of e-government utilization. As independent variables, West includes several organizational, fiscal, and political factors, which were all derived from his theoretical approach.

West (2005) used interest group lobbying as an organizational factor and measured it with the number of registered lobbyists in each state. "[T]o tap the degree of training within each state's labor force", education level in each state is measured by the percentage of

population that has a college degree (p. 73). Legislative professionalism was based on the staffing and salary of elected members of state legislatures. The fiscal measure was per capita personal income. It measured the state's financial capacity for undertaking policy innovations. This indicator was designed to investigate the relative impact of wealth and poverty on a state's ability to implement new technology in the public sector. West's measures of political determinants included three different items measuring party competition and citizen demand. For party competition, he relied on the percentage of Democrats in the state's House of Representatives. To measure citizen demand, he looked at the percentage of each state's citizens who say they use the Internet and the percentage of state governments' websites where citizens can communicate and transact online business with public sector agencies.

Briefly, he found that *state wealth* and *legislative professionalism* were keys to the development of online government in the American states. He did not find any association between e-government utilization and increases in state governments' use of privatization or the presence of budget deficits in states.

Internal factors:

Form of Government **(**Council-administrator or council-elected executive)

The form of government has been considered an important determinant of innovation adoption (Svara, 1993; Moon, 2002; Norris and Moon, 2005) The influence of form of government is nicely summarized by Moon (2002) as follows:

> City managers, who are often professional chief administrators, may be more proactive in introducing technological innovations to the public sphere because their professionalism tends to value innovativeness and efficiency more than mayors, who are elected officials and thus tend to hold political values… This is partially because the cooperative nature of the internal process in council-manager governments makes them more receptive to managerial reforms and innovations than mayor-council governments (p. 430).

Professional managers, those with professional training and technical experience, are expected to value innovation more than elected officials, such as mayors, who are more reflective of political values. Therefore, council-manager governments are generally considered to be more likely to adopt new technologies. The empirical findings for IT utilizations, though, are contradictory. For example, Norris and Moon

(2005) find no significant statistical relationship between the adoption of online transactions and form of government.

Strategic Planning for information technology

The concept of strategic planning has received increasing academic attention in the last decade, particularly in the literature of IT (Berry, 1992; Luling, 2001; Moon, 2002). Berry (1992) argues that managers have been moving away from traditional, hierarchically managed agencies toward a management style that emphasizes responsiveness to citizens, excellent quality services, and employee empowerment in the work place. Strategic planning is a feature of this management style. This movement is still ongoing and influential in the efforts of governments at all levels. Providing government information and services to citizens is a central feature. Indeed, the highest stage of e-service delivery -- the portal stage -- is all about reengineering the work processes in a government. As such, there is a crucial link between strategic planning and e-government as well.

The process of putting citizens online doesn't happen overnight. An electronic government must begin with a vision. Moon (2002) notes that early adopters of a website are more likely to have begun their e-government initiatives within the context of locally adopted strategic plans for information technology. In the same vein, strategic planning can be useful to improve governments' e-government performance after the initial creation of a basic website. Ke and Wei (2004, p. 2) observed that in Singapore having a strategic action plan for e-government helped them to tackle the problems that arose after the initiation of online services. Singapore is generally considered to be one of the most extensive users of e-government technology.

External (Environmental) Factors:

Size (population)

Of the external factors, the size of a government is considered one of the primary predictors of innovation (Berry, 1994; Weare et al., 1999; Moon, 2002; Moon and Norris, 2005; Wilkinson and Cappel, 2005). The costs of e-government services, specifically the cost of developing and maintaining a web page, do not vary widely between large and small governments. The revenues of governments, however, are closely associated with size.

Larger governments can distribute the costs of web page development and operation across a larger tax base, whereas smaller governments, with fewer information technology professionals, must pay similar costs from smaller budgets (Bray, 2005). Size is related to organizational complexity. Generally large complex organizations have greater numbers of experts. This kind of complexity can promote innovation. When multidisciplinary specialists work together, their interchange of ideas has resulted in innovation (Berry, 1994).

Region

Geographic location is argued to have an influence on the diffusion of innovations. Berry and Berry (1992), for example, found that new taxes are much more likely to be adopted when neighboring states have previously adopted similar taxes. States are less likely to adopt new taxes, when none of their neighbors have adopted similar taxes. Some studies have demonstrated that this is also the case in the adoption of e-government services and technologies (Berry, 1994; Weare et al., 1999; Norris and Moon, 2005).

Percentage of urban population

Another variable that is theorized to influence e-government adoption and performance is urbanization. Much of the information provided by most local governments deal with services related to the necessities and requirements of urban life, it is expected that urban areas will produce higher demand for e-government services. Urban areas often have many extensive users of the Internet. In the broader context of technology adoption, Dasgupta, Lall, and Wheeler (2001, p.3) argue that “network economies cause internet intensity to grow more quickly in urbanized societies.” In the literature of innovation and e-government, urban population is generally associated with higher levels of innovation and e-government utilization (Weare, Musso and Hale, 1999; Norris and Moon, 2005).

Income

The average wealth of people living in a place is a variable that is consistently found to have a positive relationship with e-government utilization. This finding is hardly surprising. Assuming that democratic governments are shaped by the demands of their constituents, governments of wealthy regions will strive more to offer better online services because their relatively affluent constituents are more likely to demand and afford online services than are relatively poorer people in regions with fewer resources. Existing literature tells us that

socioeconomic factors are closely related to the extent to which citizens use computers and the Internet (Ho, 2002; Siau, 2006). Developing online applications costs money. It requires some amount of infrastructure plus skilled labor. As such, wealthy regions can "afford" online services more easily than poorer regions.

Some authors emphasize that the digital divide is a barrier to e-government applications (Ho, 2002; West 2000; 2004; Holzer and Melitski, 2003; Norris and Moon, 2005). The digital divide is defined as the gaps or inequalities among groups of people in terms of "differential access to the Internet" (Garson 2006, 98). Those who do not have computer and Internet access cannot interact with their governments via web sites. Among many others, West (2005) finds that the overall wealth of population is a key factor to the development of online government in the American states.

Social Capital

Social capital is defined as "features of social organization, such as trust, norms, and networks, that can improve the efficiency of society by facilitating coordinated actions," (Putnam 1993, 167). Interest in "social capital" and its influence on social, political, and economic life has increased in the last two decades among social scientists. Social capital has been used to explain such distinct phenomena as voting participation (Knack 1992), investment and growth (Knack and Keefer 1997), and health (Kawachi et al. 1997). Given the importance of social capital on a wide range of social phenomena, policy makers are advised to consider the effects of their policies on social capital formation (Durlauf and Fafchamps, 2004).

Among the political contributions of "social resources" such as trust is their contribution to the smooth functioning of democratic institutions. An important channel through which social capital improves government is "government accountability". Almond and Verba (1963) long ago argued that "civic cooperation" is essential for democratic stability. In line with this argument, Knack (2002, p. 773) argued that social capital makes governments more responsive to the demands of citizens and thus enhance government accountability. Analyzing governmental performance American states, he finds empirical evidence for social trust's positive impact on government performance. An implication of this finding for e-government performance is, because some of the demand for e-government facilities mostly

comes from people rather than officials, we can expect better e-government services in societies with higher degrees of social capital.

Another important point is that social capital is also linked to greater innovation and flexibility in policy making (Knack, p. 774). Putnam (1993), for example, found that more civic regions of Italy were more successful than other regions in responding to new challenges, crises, or opportunities. Here again we can expect better e-government services in societies with higher degrees of social capital.

Social capital mainly is about the interaction of people in communities. Information technology, especially the Internet, is one of the major means of interacting. Therefore, the use of e-government technologies has the potential to improve social interaction and, hence, social capital (Bretschneider, 2003). Developing e-government access can be a way for governments to stimulate social interaction. On the other hand, in communities where social interaction is high it is expected that greater demands will be put on governments to provide e-government access.

In summary, the independent variables that will be used in the study are: Form of government, strategic plan, total population, region, percentage of urban population, income, and social capital.

Stages of E-Government

The dependent variable in the present research is *county e-government score*. The dependent variable will reflect the extent of use of e-government technology by a county. The underlying conceptual framework for the development of the score is the concept that e-government is developed in stages by a government. Observers have noted that use of e-government develops gradually through stages.

The literature on e-government has dealt extensively with the differences in e-government services. One common way to analyze differences was first to divide e-government services into categories, or “stages”. In the e-government literature, most scholars cite four to five stages - some include e-democracy and some do not. The concept of stages of e-government assumes that lower levels of development have to be implemented in order to move to higher levels of development. This does not mean that every aspect of a lower stage has to be completed before moving to higher-level

applications. The concept of stages does posit that a substantial amount of completion of one level of development is necessary to move successfully to higher levels. The use of the concept of stages of development for e-government is very similar to the use of stages by Allan Schick in his 1996 classic article on “the stages of budget reform”.

Layne and Lee (2001) identify four stages of e-government: cataloguing, transaction, vertical integration, and horizontal integration. They differentiate these four stages in terms of the complexity involved and the levels of integration achieved. The first stage is called “cataloging” because efforts are focused on cataloguing government information and presenting it on the web. The second stage is called the “transaction” stage, in which the focus is on “connecting the internal government system to on-line interfaces and allowing citizens to transact with government electronically” (p. 123). At this stage, e-government efforts consist of putting live database links to on-line interfaces. For example, citizens may renew their licenses and pay fines on-line. Third stage, “vertical integration” refers to integration of services across different levels of government, where connections are established to link local, state and federal governments’ websites to assist citizens. Layne and Lee provide two examples of vertical integration, the first example is how a state’s drivers' license registration system could be linked to a national database of licensed truckers for cross checking. Their second example described how a local business licensing process could be linked to a state’s business licensing system and also to a federal database to obtain an employer identification number.

The fourth stage suggested by Lane and Lee, horizontal integration, is closely related to the third stage. In contrast to the third stage, horizontal integration is defined as integration across different functions and services. Their example is “a business being able to pay its unemployment insurance to one state agency and its state business taxes to another state agency at the same time” (p. 124). Such horizontal integration is now possible since systems in multiple agencies can communicate with each other and work from the same database.

Hiller and Belanger (2001) identified five stages of e-government growth. The first four stages are similar to the descriptions of Layne and Lee (2001). Hiller and Belanger called their fifth stage “participation”. This stage exists when citizens are actually able to participate in the decision making process, such as expressing opinions in online chat groups or surveys. Online voting would be a stage five action.

West (2004) identifies four stages: (1) the billboard stage (2) the partial service delivery stage; (3) the portal stage; and (4) interactive democracy. His differentiation of the stages is not very clear. He sees the first stage as static and argues that officials of government use technology in a manner similar to highway billboards. Like billboards, first stage websites can only display information. At this stage officials can post reports and publications and offer databases for viewing, but the information cannot be manipulated. The interaction is one-way.

West called his second stage the "partial service delivery" stage, wherein users can order and execute some services online and manipulate informational databases to access information in the form they prefer. In this stage online services are few in number, sporadic, and limited in availability to the disabled and non-English speakers.

The third stage is a one-stop government portal with fully executable and integrated online services that offer convenience to visitors. At this stage some sophisticated measures such as data encryption are used to protect privacy and facilitate secure transactions. The entire city or state has one web portal where all agencies can be accessed, where agencies are integrated with one another, and a range of fully executable services are available.

At the fourth stage, government web sites move beyond integrated and fully executable service delivery. Government websites offer options for personalization. Users can personalize Web sites, provide feedback, and make comments. Citizen oversight and participation features would be emphasized. Fourth stage development is only possible where governments have already successfully implemented the third stage improvements.

The United Nations' Division for Public Administration and Development Management has also used the concept of stages to describe the development and use of e-government. The U.N.'s *Web Measure Index 2004* introduces five stages e-government, ascending from the least sophisticated stage to the most the sophisticated one (U.N, 2004).

The five stages are as follows.

Stage I is called "emerging presence" where e-government presents information which is limited and basic. A stage one web page might also include links to other departments such as education, health, or finance. In this stage, most information remains static and allows few options to citizens.

Stage II is called “enhanced presence” where the government provides greater amounts of contemporary and historical information, such as “policies, laws and regulations, reports, newsletters, and downloadable databases”. What differentiates stage one from stage two is the amount of information presented.

Stage III is called “Interactive presence”. The online services of a government become interactive. The user can communicate with the system to do such things as initiating an application for a license or respond to programmed queries. Interaction makes services more convenient to the consumer by tailoring the applications to the customer’s needs. At this stage the interaction is not very complicated and does not include sophisticated online capabilities such as encrypted protection for secure financial transactions.

Stage IV is called “transactional presence” and at this stage the web site allows two-way interactions between the citizen and his/her government. This stage does include sophisticated online capabilities such as encrypted protection for secure financial transactions. It enables such activities as paying taxes; applying for ID cards, birth certificates/passports, and license renewals; and paying for utility bills, motor vehicle licenses, taxes, and fees for services. At the “transactional presence” stage, citizens enjoy the convenience of governmental offices that are *virtually* open online 24/7. It is at this stage that e-government truly begins to benefit citizens by preventing them from making unnecessary trips to conduct business with government.

Stage V is called “networked presence”. It represents the most sophisticated level of e-governance. Its distinguishing feature is the integration of C2G, G2C, C2C, and G2G interactions (Citizen to Government, Government to Citizens, Citizens to Citizens, and Government to Government). This stage can serve to strengthen democracy by encouraging and making possible participatory decision-making and open dialogue. Through such interactive features as web comment forms and online consultation mechanisms, a government can solicit citizen inputs to public policy deliberations in an interactive manner. At this level democratic participatory decision-making is possible. The central focus of the “networked presence” stage is to help empower citizens.

When governments move to the higher stages that include financial transactions or the exchange of sensitive personal information, it becomes a necessity to include comprehensive privacy and security policies. These policies should state citizens’ rights and

assure that the collected data are used for legitimate purposes (Weare et al., 1999; Holzer, 2003; Holden and Millet, 2005). Governments must pay significant attention to issues of security and privacy in service delivery, which may help improve citizens' comfort levels. A survey by the Accenture Corporation (Accenture, 2005) indicates that citizens are positive about e-government; yet they are more concerned about safeguards for privacy and security than they are with rapid implementation of e-technology. In other words they do not want governments to rush in offering new features if those are not secure. The Accenture survey concludes that the United States is fairly advanced in how it deals with privacy and security of personal information. Despite the efforts made, however, US citizens remain cautious about governments' sharing their personal information, including passport, health insurance and medical information.

Each of the above conceptualizations of stages is quite similar to the others. Differences between each of these conceptualizations are very minor. To operationalize the concept of stages, it is necessary to choose a conceptual schema that is clear and easy to apply. The conceptualizations of stages used to operationalize the dependent variable in this study originated with the government of Singapore as described by Siew and Leng (2003). It is a four-stage conceptualization. The four stages are called: publish, interact, transact, and integrate. These stages are described in more detail in the methodology chapter that follows.

Fountain (2001) observed that the original IT initiatives of the National Performance Review (NPR) noted that the federal government was not progressing as quickly as business sector for several reasons- regulatory, legislative and cultural. Further, she noted that the NPR staff believed that the government needs to have a coherent plan for using the available technology and effective leadership to better use technology. Better use of technology requires change in organizational culture as well as the processes and structures of bureaucracy. Therefore, there is a need for empirical knowledge and informed leadership to mitigate the resistance to change in government. This empirical study will contribute to knowledge about obstacles and influencing factors associated with good use of technology.

CHAPTER 3

METHODOLOGY

This study analyzed the utilization of e-government by counties in the United States. Thus, the unit of analysis of this study is counties. There are over three thousand counties in the United States. One hundred and one of these counties were selected randomly within predetermined strata. The study design is cross-sectional and the time period of the study was a single year, 2006. To avoid time inconsistencies, the websites of all counties in the sample were examined in a period of two months (September and October 2006). Analysis of these websites, therefore, was done from a sample done at a single point in time. Each website was analyzed to obtain an e-government utilization score constructed according to the index specified below.

Data Collection

Three sources were used to compile the dataset: (1) the 2000 Census Dataset; (2) The data of The National Center for Charitable Statistics (3) the data collected from websites of the counties. The 2000 Census dataset was used to acquire measurements for the majority of external county characteristics. Data for social capital variable gathered from The National Center for Charitable Statistics (NCFS) dataset. Finally, county websites were examined to compute an e-government score, the dependent variable. The three components of the final dataset are discussed below in more detail.

To increase the reliability of evaluations, two additional persons evaluated some of the websites using the same index. The scores of each of the three raters were compared to ascertain reliability of the rating process. No substantial divergence was evident, only minimal divergence was found and the necessary modifications were made. Therefore, the rating process was considered reliable.

Census Variables

The following variables were collected from the 2000 U.S. Census dataset (U.S. Census Bureau: State and County QuickFacts):

• County population (size)

• Urban population (percentage of urban population)

• Region

• Per capita income of county residents

One limitation of using the Census dataset was that it does not include the data on the form of government. Therefore, the researcher had to rely on the examination of county websites to identify the form of government.

Social Capital Variable

There is no data source that presents a measure of social capital for all American counties. As a proxy for social capital, this study used the number of "non-profit" organizations at the county level. Data for the number of "non-profit" organizations were gathered from The National Center for Charitable Statistics (NCFS) dataset. The Federal Information Processing Standards (FIPS) codes were used to identify the counties from NCFS dataset. FIPS codes are a standardized set of numeric or alphabetic codes issued by the National Institute of Standards and Technology (NIST). They are similar to Zip postal codes. FIPS codes are assigned to ensure uniform identification of geographic entities through all federal government agencies. County codes are found at the website of National Institute of Standards and Technology (http://www.itl.nist.gov/fipspubs/co-codes/states.txt).

The Dependent Variable:

The dependent variable in the present research is *county e-government score*. This score represents the extent of use of e-government technology of a county, which was determined by an evaluation of its website according to the index specified below.

Index of E-government Utilization

In the e-government literature, most researchers cite four to five stages. Siew and Leng (2003) reported that Singapore has identified four levels of service maturity based on the depth of interaction between citizens and government. The four levels of service maturity

identified by Singapore are those used to define the dependent variable, *county e-government score,* in this study. The four levels are as follows.

a) Publish Level: One-way interaction; user receives information but there is no transaction or two-way communication. At this stage communication is essentially nothing more than a virtual bulletin board.

b) Interact Level: Two-way interaction; the user can initiate transactions online but cannot complete them online. For example, a user can download a form to be traditionally mailed but cannot complete the transaction online.

c) Transact Level: Two-way interaction; the user can complete transactions online but only one transaction at a time. Other automatic linkages and actions would not be accomplished.

d) Integrate (portal) Level: Two-way interaction; the user can complete more than one transaction online with only one entry and through a single interface. For example, entry of an address change would be automatically posted to multiple sites.

The *"Publish"* level represents the lowest level of sophistication and functionality. The web site is static and basically displays information in a manner similar to a newspaper, radio or television station. At this stage there is only a one-way information flow. West (2005) calls this the "billboard" stage, as websites resemble highway billboards. At this stage, the online presence of information saves governments time and money and gives citizens the convenience of accessing information easily 24/7 (Reddick, 2004). Because there is no two-way communication at this stage, one cannot get further information other than that which is already available online.

The "Interact" level includes two-way communication between the parties. At this level, citizens can interact with their government via surveys and comment forms. Some interact level websites allow citizens to personalize their connections to the government websites so that the sites automatically recognize them and tailor the information provided to them. Forlano (2004) considers e-mail, message posting, interactive data downloading and document submission under this stage.

The "Transact" level is an advanced level. There is two-way communication between parties and it is possible to conduct real-time transactions with appropriate features included

to allay privacy and security concerns. Transact level transactions include such actions as paying property taxes, obtaining a tax refund, paying a parking ticket, or renewing a driver's license. Forlano (2004) includes the following services under this stage: visa and passport applications, birth and death certificate requests, and making payments for licenses, fines, fees, bills and taxes.

The "Integrate" level is the most sophisticated, most integrated, and most desired level of maturity. This stage offers considerable convenience to citizens and visitors by integrating service delivery programs across government agencies and between levels of government. Often requiring "horizontal" and/or "vertical" linkages, these initiatives provide citizens with an integrated set of services. Moon (2002) nicely distinguished between the two types of integration. Vertical integration refers to the integration of similar functionalities among different levels of government. Horizontal integration refers to systems integration across different functions. Some examples of both horizontal and vertical integration are found in child welfare, in service programs for the aged, in economic development, and in facilitating general compliance such as in getting business permits (Pardo, 2000; West, 2004).

As indicated, Singapore's four-stage model is used with minor modifications. No modification is made to Singapore's definitions for the first three stages – Publish, Interact, and Transact. Singapore's fourth stage, The "Integrate (Portal)" stage, is extended to include some e-democracy features. Originally Singapore's fourth stage included business-type service-related actions. We have included e-democracy oriented measures that relate to citizens' ability to comment on, and influence, decision-making. The e-government utilization index for this study is comprised of the following four levels.

1. Publish Level: One-way interaction. 1 Point for each feature

    a) Office phone number or email address other than Webmaster
    b) Online database
    c) Publications or forms
    d) Audio clips or video clips
    e) User can select relevant categories of information
    f) Other examples of one-way information (2 points max)

2. Interact Level: Two-way interaction. 1 Point for each feature

    a) Search capability
    b) Comment/feedback form
    c) Auto email (email subscriptions)
    d) Multiple languages or disabled access

e) Chat room/ video conferencing
f) Interactive GIS applications

3. Transact Level: Two-way interaction. 1 Point for each feature

    a) Presence of security/ privacy policy
    b) Payment of utility bills
    c) Payment of taxes/ fines
    d) Purchase of licenses
    e) Apply for birth and death certificates
    f) Employment applications

4. Integrate (Portal) Level: Two-way interaction that involves vertical or horizontal integration or seems likely to inform government decision-making. 1 Point for each feature

    a) Address update where one entry updates multiple databases
    b) Business permitting/licensing with portal features
    c) Active solicitation of citizen input regarding pending decisions such as a decision about a pending land use change
    d) Active solicitation of citizen input regarding the performance of government
    e) Other highly significant interaction likely to affect decision making
    f) Other evident portal capabilities such as integration of non profits or contract providers websites

Independent Variables:

The current research concentrates on two clusters of independent variables for each county: internal county government characteristics and external environmental factors of counties. In all, there are seven independent variables.

Internal Agency Characteristics:

1. *Form of government*: Counties can have either of two types of managers: council administrators or council-elected executive (rarely both). Some counties use the traditional commission form where there is no single executive. For this study the primary concern is whether the county has a professional administrator. It is expected that professional administrators will actively attend meetings and read the publications of their profession. Their professional training and interactions should make them more aware of e-government developments. It is also possible that failure to develop e-government technology in their

governments could cause a loss of prestige among their professional peers. A county's form of government score will equal 2 if it has a *professional administrator* (i.e. county administrator), 1 if it has an elected executive, 0 otherwise. The primary source of information for this variable will be each county's own website.

2. *Planning for Information Technology*: Some governments adopt plans for the use of information technology in general. Others might have a more specific plan, which deals specifically with e-government. Counties with a strategic plan on specifically on e-government will be given a score of 2; those with only a general IT plan will be given a score of 1; those without will be given a score of 0. Information for this variable will be primarily obtained from each county website.

3. *Distinguished Budget Presentation Award*: County governments can choose to submit their budget documents and processes to the Government Finance Officers Association of the United States and Canada (GFOA). These budget documents and processes undergo peer review to determine whether a government is worthy of receiving a Distinguished Budget Presentation Award. It is likely that the governments that submit themselves to this process employ persons who are actively engaged in professional networks. Such involvement is an indicator of a professionally oriented staff in a government. It is expected that governments whose employees are actively engaged in professional networks are more likely to learn about e-government technology. It is also likely the professionals who are actively engaged with other professionals are subjected to peer pressures to utilize modern technology in their own governments.

Environmental Factors:

3. *County (size) Population*: County population is the number of persons residing in a county. Data for county population was gathered from the latest census dataset (2000 U.S. Census).

4. *Urban population*: This was measured as the percentage of urban population in a county. Data for urban population came from the 2000 U.S. Census as well.

5. *Wealth*: The average wealth in a county was calculated as the mean per capita income of county residents. Data for mean per capita income came from the 2000 U.S. Census.

6. *Region*: Each county was assigned a label depending upon the geographical region of the United States within which it is located. The regional definitions used in this study are those used by the National Association of County officials (NACO, 2000) in its survey of e-government done in the year 2000. There are four regions: northeast, midwest, south and west.

7. *Social capital*: Traditionally, social capital has been measured along two dimensions: membership in social organizations and social trust (Putnam 2001). There is no comprehensive data on the latter dimension at the county level. In addition there is no data that measures membership in social organizations at the county level. As a proxy for "membership in social organizations", hence for social capital, this study used the number of "non-profit" organizations at the county level. The *National Center for Charitable Statistics* provides data on the number of "non-profit" organizations in each county. These data have already been used in some studies as an ingredient of the social capital index (Swaminathan and Findeis 2004). Saxton and Benson (2005) found a strong positive relationship between social capital and membership in nonprofit organizations. This study, therefore, used membership in nonprofit organizations as an indicator of social capital. This study is most concerned about social networking in the community. Where there is larger number of nonprofit organizations relative to the total population of the community, then more networking among the organizations is likely to occur. Instead of using the total number of nonprofit organizations in the county, that number is adjusted for population size. The variable used is "the number of nonprofit organizations *per capita*".

STATISTICAL ANALYSIS

This research utilized multivariate regression analysis (MRA). This technique was used in the present research to investigate the relationships between the e-government score (the DV) and two sets of independent variables (IVs) – internal characteristics of county governments and external socioeconomic characteristics of the counties. MRA was used for the following purposes:

1. Describing the relationship between the dependent variable (e-government score) and two types of independent variables (internal county characteristics and external socioeconomic characteristics).

2. Determining the influence of each independent variable in statistically explaining the extent of utilization of e-government technologies of a county (as measured by the e-government score).

It was expected that performing this statistical analysis would result in a better understanding of the mechanisms of adoption of e-government features by counties. The resulting understanding of statistical relationships contributes to our theoretical understanding of the utilization of e-government.

Understanding what organizational and environmental factors contribute to or hinder the use of e-government is necessary to frame better strategies for the implementation of e-government. If e-government can be improved, it is hoped that the quality of government will be improved.

Hypotheses:

To test the effects of the independent variables on the dependent variable, the following hypotheses were formulated. These are first listed for brevity and then discussed in more detail below.

H1: Greater presence of professionalism is positively associated with e-government score.
H2: Evidence of planning for information technology is positively associated with e-government score.
H3: County total population is positively associated with e-government score.
H4: Percentage of urban population is positively associated with e-government score.
H5: Mean per capita income of county residents is positively associated with e-government score.
H6: The geographic region of a county affects its e-government score.
H7: Social capital is positively associated with e-government score.

Hypothesis 1*: County governments with greater presence of professionalism are more likely to have higher e-government scores*. Counties where professional employees are present employ people whose responsibilities include keeping abreast of new technologies. Many professions require members to undergo annual training to keep abreast of new developments. For many professionals, it is a matter of pride to keep up with new technologies. Utilizing new technology is a way of demonstrating to elected officials that the professionals are performing in a worthy manner. Utilizing new technology is also a way of enhancing peer approval within professional circles. Two categories of professional employees are county administrators and senior financial managers. Professionalism is measured in two ways: first, by the presence of the council-manager form of government and, second, by receipt of the Distinguished Budget Presentation Award. The council-manager form of government in a county is positively associated with its e-government score.

Hypothesis One has two sub-hypotheses:

H1a. *The council-manager form of government in a county is positively associated with its e-government score*.

H1b. *Receipt of the Distinguished Budget Presentation Award is positively associated with its e-government score*

Hypothesis 2: *Evidence of planning for information technology is positively associated with e-government score*. Some governments have formal plans for technology and some of them have plans specifically for e-government. E-government applications can be complex and costly. Where it is evident plans have been developed, it is likely that IT specialists have interacted with others to make better use of technology. It is from such interactions that ideas for e-government applications are more likely to emerge. Whether or not county governments have developed such plans will be ascertained from their websites.

Hypothesis 3: *County total population is positively associated with e-government score*. Larger governments are expected to have larger budgets that they can use for information technology/e-government services. Larger governments also need to serve larger populations, which are inherently more complex with more diverse service needs. E-government technology allows for greater tailoring of service delivery. Data for county population will come from the latest Census dataset (2000 U.S. Census).

Hypothesis 4: *Percentage of urban population is positively associated with e-government score*. The literature shows that urban populations are likely to be more educated, computer literate and connected to the Internet. Furthermore, urban populations tend to be more diverse and have greater varieties of needs for government services. As mentioned above e-government technology allows for greater tailoring of service delivery. County urban population will be obtained from Census dataset.

Hypothesis 5: *Mean per capita income of county residents is positively associated with e-government score.* Affluent citizens are more likely to have computers and use them to access the Internet. It is likely that they put more demand on governments to provide services and obtain information electronically. Consequently, it is expected that in counties where incomes are higher, more demands will be made by citizens to provide e-government services. Data for mean per capita income came from the 2000 U.S. Census dataset.

Hypothesis 6: *The geographic region of a county affects its e-government score.* The central idea of this hypothesis is that governments do not exist in isolation and that they are affected by what neighboring governments do. Unfortunately the study does not have an access to information regarding the extent of technology use by neighboring cities or counties. The region hypothesis is about spill over effects. It is therefore expected that the scores of counties would vary if there is a shared sub-national regional effect. Counties were identified according to which of the four sub-national regions they are in – Northeast, South, Midwest, and West.

Hypothesis 7: *Social capital is positively associated with e-government score.* Social capital is mainly about social interaction through inter-organizational and inter-personal networking. It is expected that, where social interaction is high, greater demands will be put on governments to provide e-government services. On the other hand, when county governments do such things as providing online forums, sharing information and posting electronic bulletin boards, they are acting to strengthen social capita. Social capital will be measured by the number of nonprofit organizations relative to the size of population in the county. The data for this variable was collected for the year 2002 by The National Center for Charitable Statistics (NCCS, 2006).

Table 3. 1: Levels of Measurement, Coding, and Hypotheses for the Variables

Variable	Level of Measurement & Attributes	Hypotheses
Form of government (the presence of council-manager)	Dichotomy: 0 = No 1 = Yes	H1a: The council-manager form of government in a county is positively associated with the e-government score
Award (Receipt of the Distinguished Budget Presentation Award)	Dichotomy: 0 = No 1 = Yes	H1b: Receipt of the Distinguished Budget Presentation Award is positively associated with its e-government score
Information technology	Dichotomy: 0 = No 1 = Yes	H2: Evidence of planning for information technology is positively associated with e-government score
Population	Interval: Measured in number of residents a county	H3: County total population is positively associated with e-government score
Urban Population	Interval: 0% - 100%	H4: Percentage of urban population is positively associated with e-government score
Mean per capita income of county residents	Interval: Measured in U.S. Dollars	H5: Mean per capita income of county residents is positively associated with the e-government score
Geographic Region	Nominal: 1 = Northeast 2 = Midwest 3 = South 4 = West	H6: The geographic region of a county affects its e-government score
Social capital	Interval: Measured in numbers of non-profit organizations per ten thousand of citizens	H7: Social capital is positively associated with e-government score

Conclusion

A better understanding of the characteristics of governments that utilize e-government technologies extensively is the objective of this study. It is hoped that this understanding will be of use to policy makers and administrators who seek to better serve their citizens. I also hope that this study will result in better theoretical understanding of the contexts in which e-government technologies are put to use.

This study is built upon the assumption that e-government technologies can and should be used to improve the quality of life of citizens. Currently it is not known why some governments make a fuller use of e-government technology than do others. We do not know

the extent to which things such as the wealth of citizens, their social networking activities, or the presence of professionals in a government influence the utilization of technologies. If the absence of wealth in a county is an impediment to utilization of e-government technology then perhaps the policy makers at higher levels might provide financial support to poorer governments. If we find that e-government utilization is highly correlated with social capital, that suggests that e-government utilization faces greater obstacles where social capital is low. Similarly, if professionalism is highly correlated to e-government utilization, governments with lesser professionalism might face more obstacles to utilization. In short, understanding the factors that are related to more extensive utilization of e-government might help policy makers to see how they could make fuller use of technology in their own governments.

CHAPTER 4

EMPIRICAL ANALYSIS

4.1 Descriptive Analysis

This chapter includes preliminary statistical analysis of the dependent variable (DV), e-government score, and all independent variables (IVs) included in the research. The purpose of the preliminary statistical analyses is to describe variables used in the study by providing information on each variable. These variables include all the dichotomous variables, the categorical variable (geographic region), and three continuous variables (county population, per capita income, and social capital). The data for the continuous variables were obtained from the Census Bureau.

The preliminary analysis includes an analysis of the variables for missing values and an assessment of possible violations of the regression analysis. To meet the normality assumption continuous variables should have skewness and kurtosis within expected values of -2.0 and 2.0. Skewness and kurtosis indicate how much a distribution varies from a normal distribution (Gujarati, 2003; Garson, 1998).

The dataset used in this study has no missing values. In this preliminary analysis, first, the distribution of each individual variable will be presented. Then, for continuous variables the histograms were visually examined and skewness and kurtosis values were tested. When the normality assumption was violated, skewness and kurtosis were not within the acceptable limits of -2.0 and 2.0, to make the distribution more symmetrically normal, a logarithmic transformation was performed.

Another criterion considered was the split between dichotomous variables. In the literature on methodology, some authors suggest deleting dichotomous variables with the split of 90-10, or more from the regression analysis (Garson, 1998).

Dependent Variable (DV): E-Government Score

Table 4.1 displays varying frequencies of e-government services that were included in the e-government index used in this study. The findings are in line with the theoretical categorization of e-government services that were outlined in chapter two. On average,

publish-level services were offered by 47 percent of counties, interact-level services by 26 percent, transact-level services by 15 percent, and integrate-level services by 3 percent.

Table 4. 1: Frequencies of E-government Services in Counties

Level	Feature	# of counties with feature	level average
Publish	Phone	96	47.3%
	Email	78	
	Forms	73	
	Publications	53	
	Database	48	
	Categorization	20	
	VideoClip	11	
	AudioClip	3	
Interact	Search	59	26.1%
	GIS Application	41	
	Comment	29	
	Auto Email	16	
	Foreign Language	10	
	Chatroom	3	
Transact	Tax Payment	34	15.4%
	Privacy Policy	26	
	Security Policy	19	
	Employment Application	16	
	Birth Certificate	11	
	Death Certificate	11	
	License Purchase	10	
	Utility Payment	7	
	Fine Payment	6	
Integrate	Business Permitting Linked	6	3.4%
	Citizen Input Decisions	6	
	Business Licensing Linked	3	
	Citizen Input Performance	2	
	Multiple Address Update	0	

The dependent variable of this research, E-government score, approximates an interval scale. The values for the E-government score were computed for 101 counties. The maximum possible score is 28. The distribution of data looks approximately normal. The visual examination of the histogram and the normal probability plot indicate some departures from normality. There is a small positive skew (.749) and a slightly raised peak (kurtosis = .660). Nevertheless, these values for skewness and kurtosis are well within expected values (-2.0 and 2.0) and thus they do not allow us to reject the normality assumption.

Table 4. 2: E-government Score Statistics

Statistics	Value
Mean	6.8614
Median	6.0000
St. Deviation	4.51892
Skewness	.749
Kurtosis	.660
n = 101	

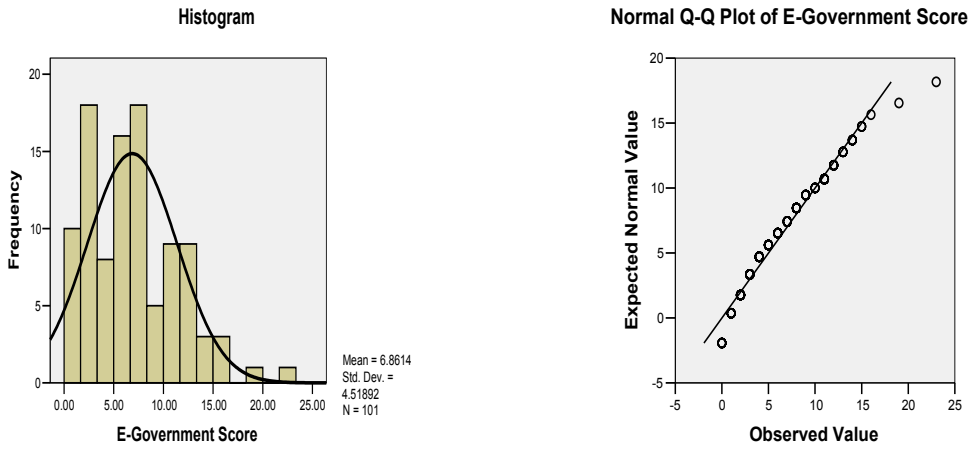

Figure 4. 1: E-government Score Histogram and Normal Probability Plot

Louisville (KY) and Anne Arundel (MD) received the highest e-government scores, 23 and 19 respectively. On the opposite end were Ballard (KY), Otter Tail (MN), Callaway (MO), Custer (MT), and Knox (TX), all with e-government scores of 0. Finally, the fact that the mean of e-government scores was lower than 7 out of 28 indicates that most counties are still in the very early stages of e-government utilization.

The highest scorer, Louisville (KY), provides e-government services at all levels but interestingly it does not provide online forms, GIS applications or address updating at the integrate level. The second highest scorer, Anne Arundel (MD), provides e-government services at all levels but it does not provide for any chatrooms, fine payments, license purchases, linked business permitting, or address updating at the integrate level.

Most of the counties provide publish level services such as: phone numbers (97%), email (78 %), forms (73 %). Some of them provide interactive features such as: search (59%), comment form (49), GIS application (41). On the other hand, the majority of the counties do not provide services at the integrate level, such as multiple address update (0 %) and business permit linked (3 %). These results show that most of the county governments in the United States have done well in putting information online and in being able to digitally interact with their citizens. On the other hand, a majority of the counties are not providing much transact level services. Integrate level services are very rarely provided to citizens by their counties. This pattern of usage may reflect what counties think is most important, or it may reflect inertia in their willingness to adopt electronic services, especially at the portal level where coordination between agencies is vital.

INTERNAL GOVERNMENT CHARACTERISTICS

Form of Government

In the literature on public ICT and e-government, form of government is often considered to be an essential factor in adoption and effective use of new technologies, such as e-government (Svara, 1993; Norris and Moon, 2005). In the council-manager form, the governing body, the council, hires a professionally trained manager to oversee the delivery of public services. Professional managers are expected to be more proactive in introducing and managing technological innovations. Figure 4.2 indicates that about 43 percent of the counties in our sample are counties with professional managers.

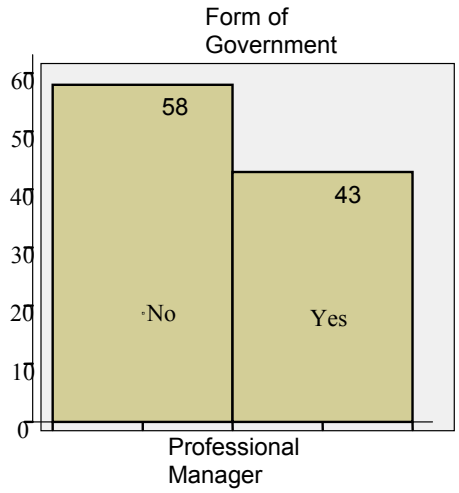

Figure 4. 2: Frequencies of Form of Government

Distinguished Budget Presentation Award

A county government that receives a Distinguished Budget Presentation Award from the Government Finance Officers Association is very likely to employ professionally oriented staff members. In this study, receipt of this award is used as a surrogate for a measure of professionalism in each government. Figure 4.3 shows that about 23 percent of the counties received the award.

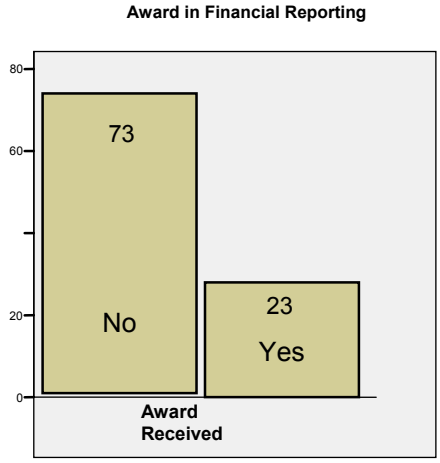

Figure 4. 3: Frequencies of Award in Financial Reporting

Planning for Information Technology

Having a plan for information technology or having e-government strategic plan is an indicator that the government probably employs a trained professional IT staff, which is expected to be a vital factor for adoption and effective use of new technologies. Figure 4.4 shows that only about 6 percent of the counties had an IT plan. Although it has been recommended that variables be dropped where fewer than ten percent of a sample exhibit a characteristic (Garson, 1998) this variable is retained in the analysis. The reason is that the presence of an IT plan is generally considered to be an important factor in the success of e-government utilization. This low rate of having IT plans might be an indicator of the overall absence of high level technology utilization found in this study.

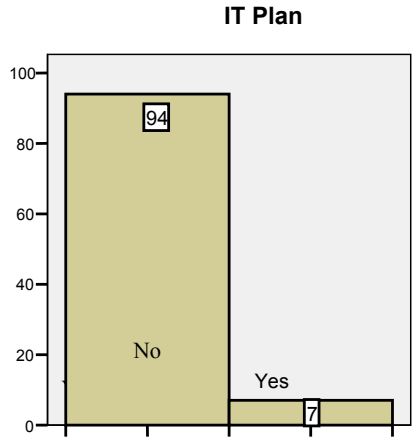

Figure 4. 4: Frequencies of IT plan

EXTERNAL ENVIRONMENTAL FACTORS

County Population

The literature on e-government mostly shows that the size of a government is considered one of the primary predictors of adoption of information technology. The cost of creating and maintaining a government website is very modest relative to the costs of other government activities. While big counties are likely to have more income and to employ more experts on their workforce, the potential for a small county to employ many experts is much lower.

The population in the sample ranges from 1,393 to 1,068,978. The majority of counties in the United States are small, with populations between 5,000 and 50,000. To avoid getting a sample in which a majority would be small, stratified random sampling was utilized. Eight different size categories were employed. The population ranges for each of these eight categories are shown in figure 4.5. Thirteen counties were sampled in each of the eight categories. Data availability caused the rejection of three counties in midsize categories. Figure 4.5 presents the frequencies for each category.

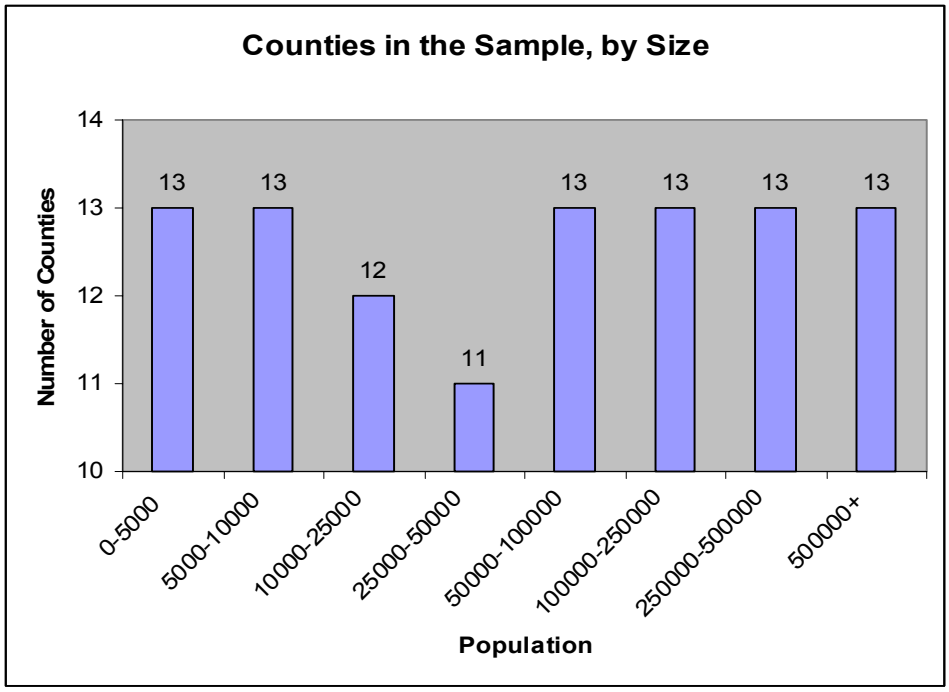

Figure 4. 5: Frequencies of Counties by Size

Visual examination of the histogram (Figure 4.6) and normal probability plot (Figure 4.7) reveals that the normality assumption for the county population variable is violated as intended. Table 4.2 demonstrates that skewness is within the acceptable limits (1.74392458) but there is positive kurtosis (2.20427753). To make the distribution more symmetrically normal, a logarithmic transformation (natural log) was performed.

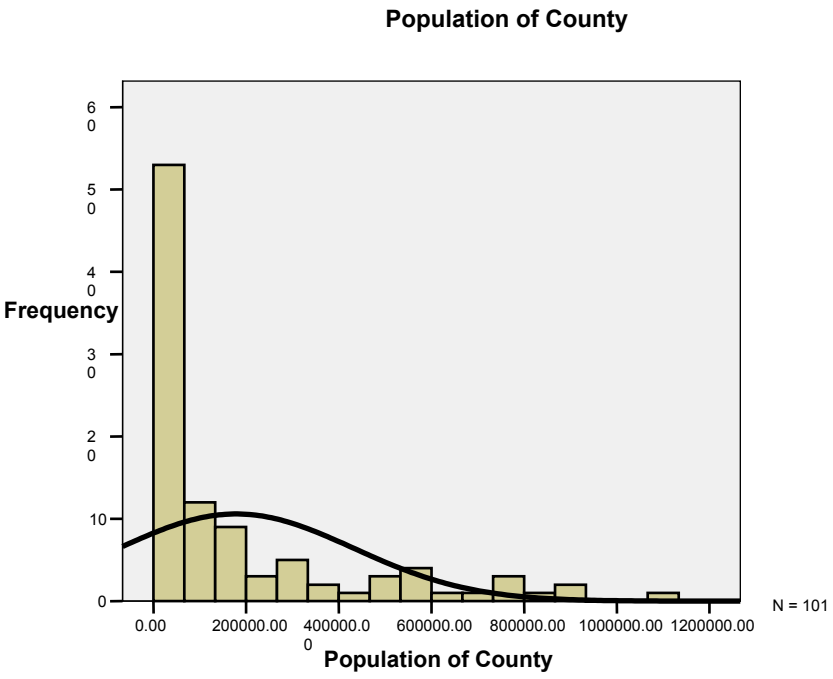

Figure 4. 6: Histogram of Population

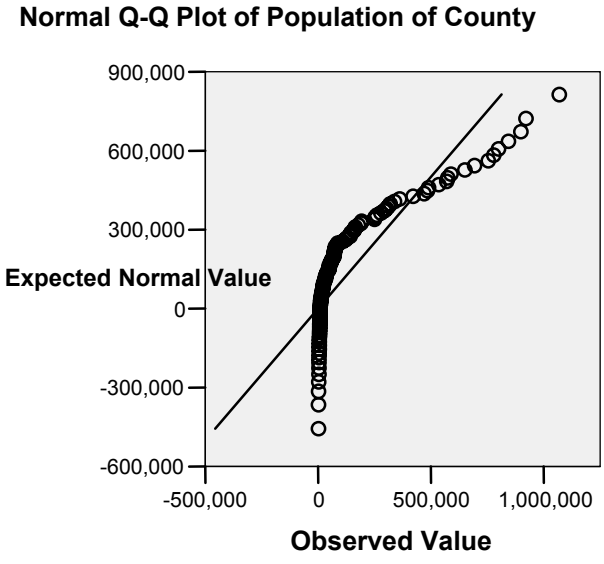

Figure 4. 7: Normal Q-Q Plot of Population

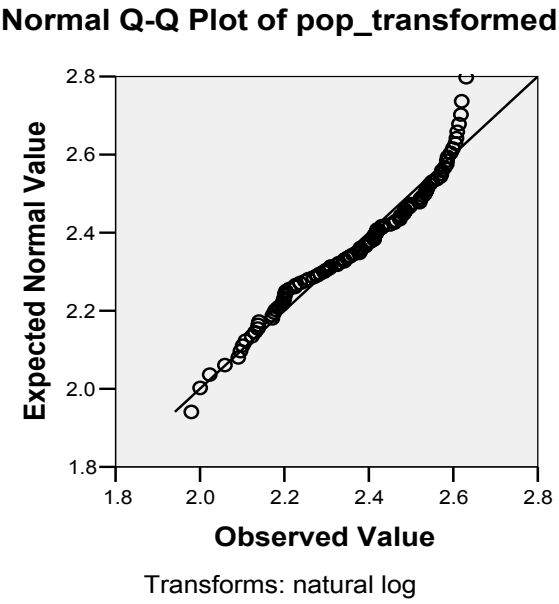

Figure 4. 8: Normal Q-Q Plot of Transformed Population

After the logarithmic transformation, visual examination of the normal probability plot (Figure 4.8) and the histogram (Figure 4.9) show that the data distribution approximates normal.

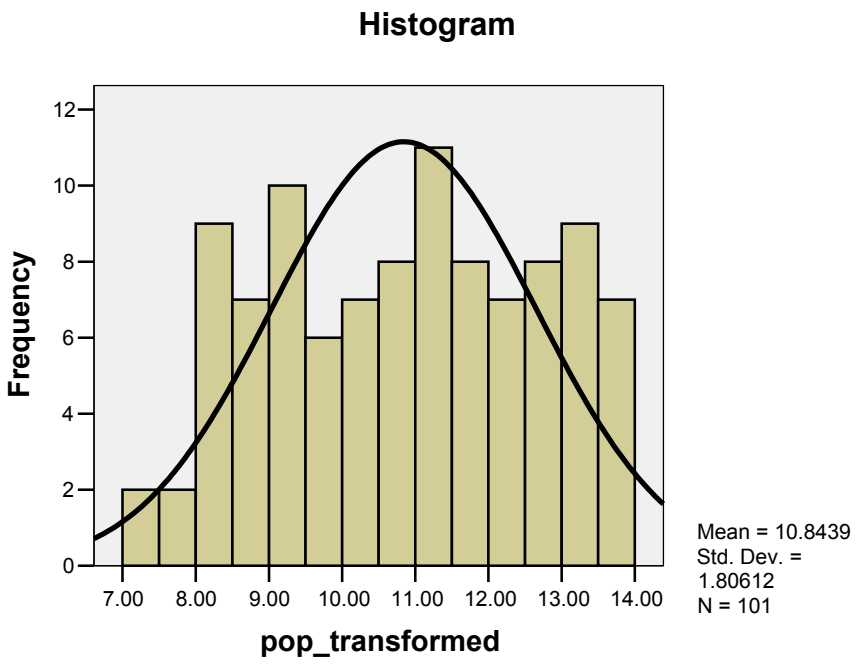

Figure 4. 9: Histogram of Transformed Population

After the logarithmic transformation was performed, data distribution substantially improved. Table 4.3 demonstrates that skewness and kurtosis for transformed population are both within the acceptable limits, respectively (-0.255) (-0.305).

Table 4. 3: County Population Descriptive Statistics

Statistics	Transformed	Untransformed
Central Tendency		
Mean	2.6634	178629.2079
Median	3.0000	57159
Dispersion		
St. Deviation	0.80346	253715.8827
Range	3.00	1067585
Distribution		
Skewness	-0.255	1.74392458
Kurtosis	-0.305	2.20427753
N = 101		

Income

In the e-government literature, wealth and per capita income of residents (a surrogate for education), are considered as strong predictors of e-government utilization. The mean for the income variable is $19,315. Per capita income (PCI) of residents ranges from $ 9,558 to $ 36,964.

Visual examination of the histogram (Figure 4.10) and normal probability plot (Figure 4.11) reveals that the normality assumption for the income PCI () variable is violated. Table 4.3 demonstrates that skewness is within the acceptable limits (1.331) but there is positive kurtosis (2.821). To make the distribution more symmetrically normal, a logarithmic transformation (natural log) was performed.

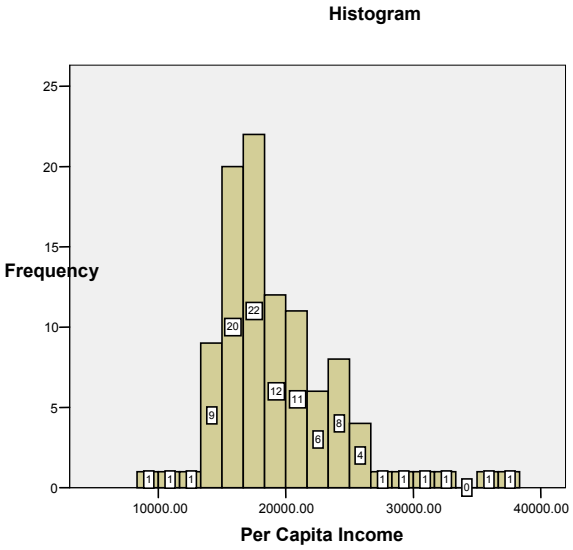

Figure 4. 10: Histogram of Per Capita Income

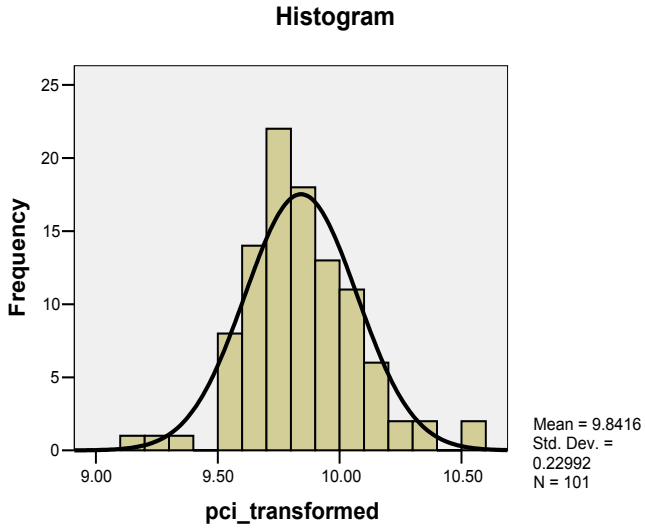

Figure 4. 11: Histogram of Transformed Per Capita Income

After the logarithmic transformation was performed, data distribution substantially improved. Table 4.4 demonstrates that skewness and kurtosis are both within the acceptable limits, respectively(.367) (1.113).

Table 4. 4: PCI Descriptive Statistics

Statistics	Transformed	Untransformed
Central Tendency		
Mean	9.8416	19314.8119
Median	9.8057	18137.0000
Dispersion		
St. Deviation	.22992	4744.27564
Range	1.35	27406.00
Distribution		
Skewness	.367	1.331
Kurtosis	1.113	2.821
N = 101		

Region

Geographic location has been considered to have some influence on the diffusion of innovations (Berry and Berry, 1992). Some studies have demonstrated statistically significant relationships between geographic region and adoption of e-government services and technologies (Norris and Moon, 2005). The geographic region (categorical variable), consisting of four categories, was recoded into three dichotomous dummy variables. No stratification by geographic region was done in the study. The distribution of the counties by geographic region is as follows.

Table 4. 5: Descriptive Statistics of Region

Region: Northeast

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	93	92.1	92.1	92.1
	yes	8	7.9	7.9	100.0
	Total	101	100.0	100.0	

Region: Midwest

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	70	69.3	69.3	69.3
	yes	31	30.7	30.7	100.0
	Total	101	100.0	100.0	

Region: South

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	52	51.5	51.5	51.5
	yes	49	48.5	48.5	100.0
	Total	101	100.0	100.0	

Region: West

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	88	87.1	87.1	87.1
	yes	13	12.9	12.9	100.0
	Total	101	100.0	100.0	

Social Capital

The visual examination of the histogram indicates some departures from normality for the social capital variable, but skewness and kurtosis, which indicate how much a distribution varies from a normal distribution, are well within expected values (-2.0 and 2.0). There is a small positive skew (1.235) and a slightly raised peak (kurtosis = 1.110).

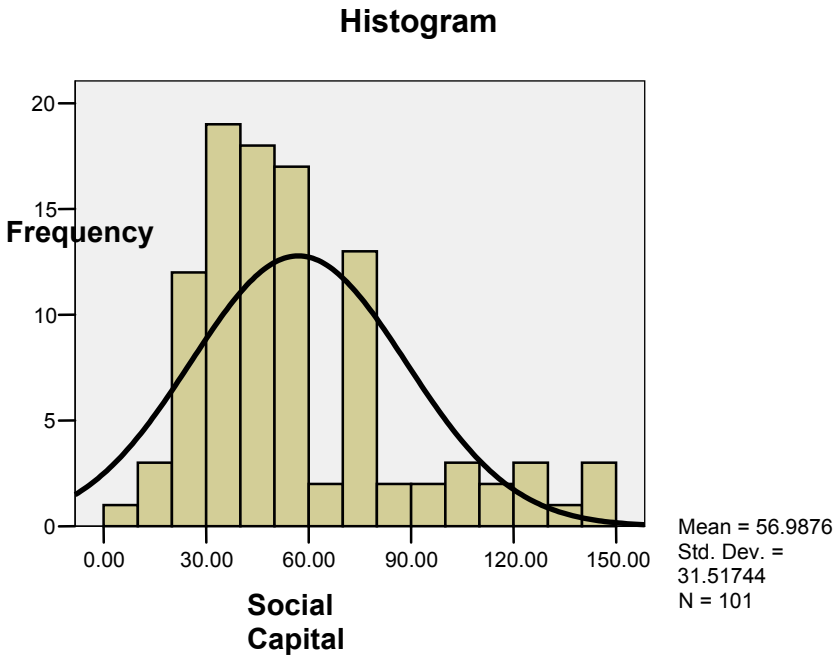

Figure 4. 4: Histogram of Social Capital

4.2 Preliminary Bivariate Analysis

Bivariate analysis provides some preliminary information. First, it shows whether the observed direction of relationship between the dependent variable, e-government score and each of the independent variables is consistent with the hypothesized direction. Bivariate analysis also shows the strength and the significance of relationship between two variables, but it ignores the effect of other variables included in the study.

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. More importantly, examining bivariate correlations allows us detect multicollinearity between the independent variables.

Table4.2. 1: Pair-Wise Correlations between all variables

	E-Government Score	Award in Financial Reporting	Form of Government	IT Plan	Population of County	Per Capita Income	Urban Population	s capital	Region: Northeast	Region: midwest	Region: south
E-Government Score	1										
Award in Financial Reporting	0.541*										
Form of Government	0.445*	0.451*									
IT Plan	0.373*	0.266*	0.159*								
Population of County	0.641*	0.498*	0.327*	0.175							
Per Capita Income	0.453*	0.375*	0.486*	0.278*	0.443*						
Urban Population	0.567*	0.317*	0.353*	0.144	**0.800***	0.435*					
Soc. Capital	-0.284*	-0.281*	-0.293*	-0.075	-0.339*	-0.121	-0.248*				
Region: Northeast	0.017	-0.182	-0.030	0.064	0.180	0.387*	0.196**	0.227**			
Region: midwest	-0.065	-0.028	-0.052	-0.182	-0.176	-0.116	-0.155	-0.188	-0.195**		
Region: south	0.056	0.063	0.166	0.047	0.000	-0.100	0.120	0.063	-0.285*	-0.646*	
Region: west	-0.008	0.092	-0.152	0.128	0.097	-0.003	-0.123	-0.018	-0.113	-0.256*	-0.373*

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 4.2.1 shows the correlations between the independent variables and the dependent variable, e-government score and the correlations among the independent variables. Looking at the correlations among the independent variables, we see that the population of county and urban population variables are highly correlated. This is a strong indication of multicolliniarity between these independent variables. Therefore, urban population was dropped from the dataset.

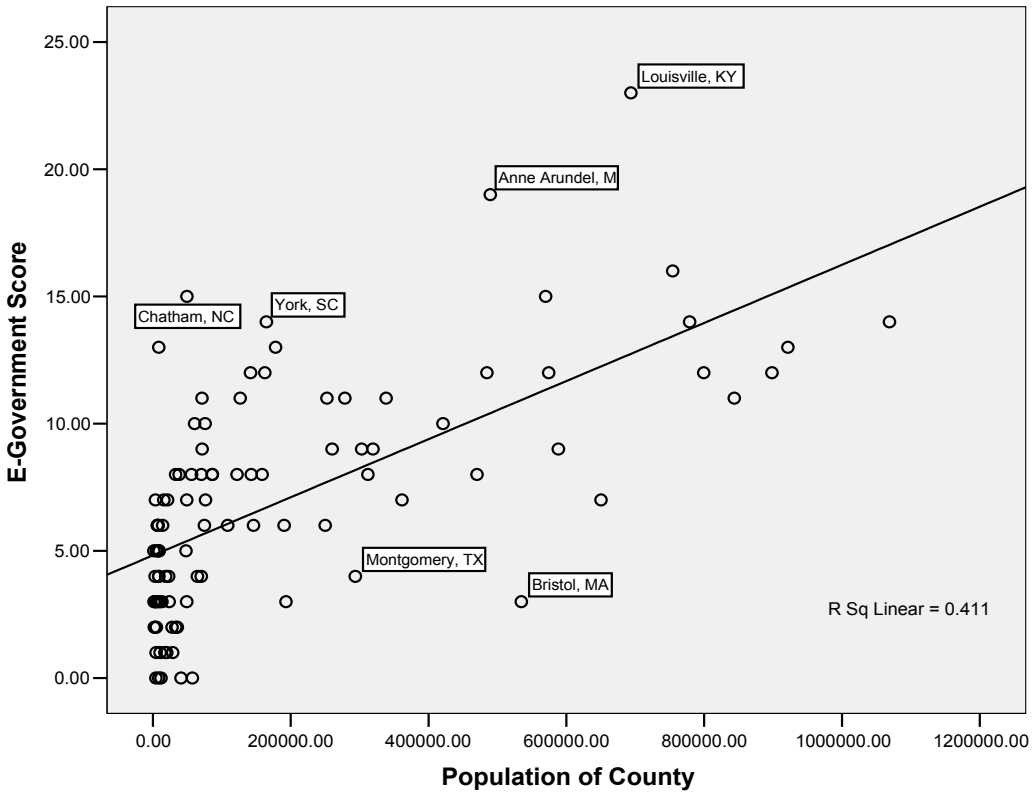

Figure 4.2. 1: Correlation of E-government Score and County Population

The bivariate correlation between e-government score and county population gives us some preliminary findings. It is evident that there is a statistical relationship. The existence of outliers, counties whose scores depart considerably from the fit line, indicate that some small counties actively provide e-government features greater than do some other counties with much larger populations. The larger outliers like Louisville of Kentucky (23) and Anne

Arundel of Maryland (19), and much smaller outliers like Chatham of North Carolina (15) and York of South Carolina, received higher scores than their populations alone would lead one to expect. These outlier results suggest that large populations are not necessary for higher levels of e-government utilization. Therefore, based on this preliminary analysis we can state that low population (size) is not an impediment of e-government utilization.

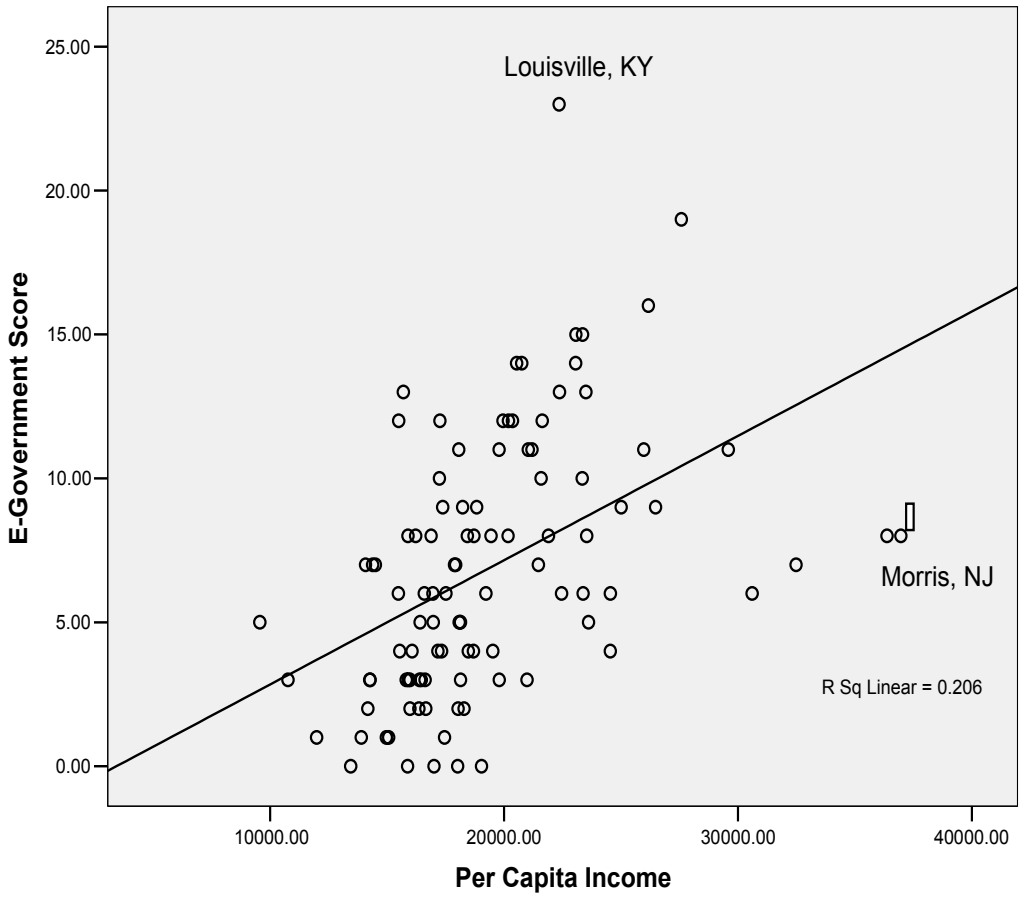

Figure 4.2. 2: Correlation of E-government Score and wealth (per capita income)

There seems to be a trend between wealth and e-government utilization, but the outliers tell a different story. Louisville of Kentucky and Anne Arundel of Maryland, as demonstrated by Figure 4.2.2, scored high in e-government score, respectively 23 and 19, relative to their citizens' wealth, respectively $22,352 and $27,578. York of South Carolina (14) scored relatively high in e-government score, relative to it is low income ($20,536). Morris of New Jersey received a low e-government score (8) relative to it is citizens' high level of income ($ 36,964).

4.3. Multivariate Statistical Analysis

This section of the chapter presents a discussion of the results of multiple regression analysis (MRA). Multiple regression analysis is used to see if it is possible to statistically explain an outcome with multiple independent variables. The use of multiple regression analysis allows the use of multiple independent variables and provides for statistical control in the estimation of the unique effect of each independent variable on the result of the analysis (Tate, 1998).

The influence between the dependent variable, e-government score, and each of above mentioned independent variables is analyzed in a multivariate context. Bivariate analyses do not provide conclusive evidence for relationships because they do not take into account the influence of other (control) variables, which might result in biases in bivariate analyses. Multivariate analysis allows us to estimate the influence of an independent variable on a dependent variable in the presence of other independent variables. Because the dependent variable (e-government score) has a sufficiently long range of continuous values (0 to 23), an ordinary least squares (OLS) model is used in this multivariate regression analysis.

Multivariate regression assumptions include the assumption that for every independent variable combination, independent variables are exactly known and residuals are normally and independently distributed with a mean of zero (Tate, 1998). Multivariate regression assumptions also include assumptions of normality, linearity, and homoscedasticity. Homoscedasticity was evaluated by using the histogram and the residuals scatterplot. The

normality of residuals was tested by examining the histogram (Figure 4.3.1) and normal probability plot of residuals' distribution (Figure 4.3.2).

The results of the visual examination suggested that the assumption of normality of residuals was met. The assumptions of linearity and homoscedasticity were tested by visual examination of the residuals scatterplot (Figure 4.3.3).

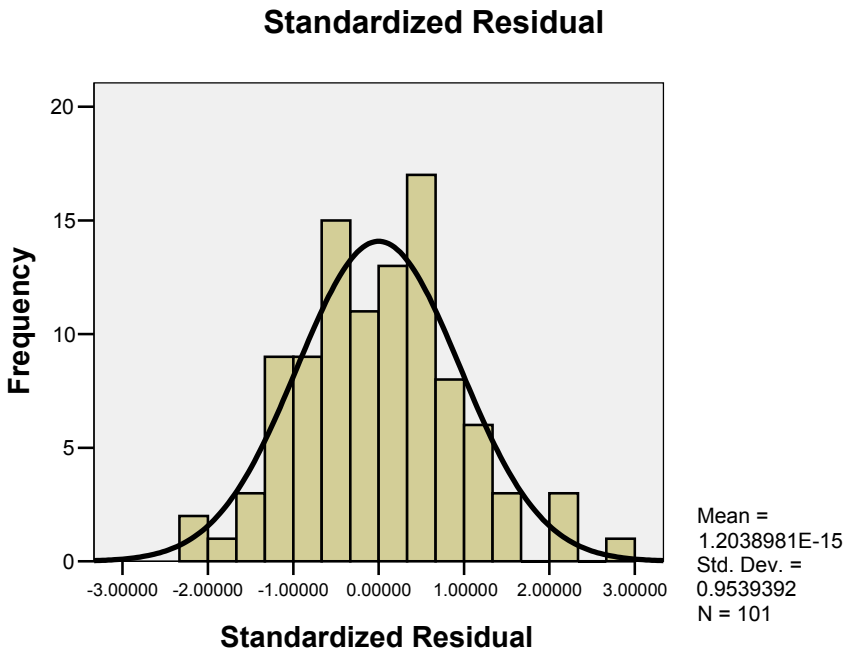

Figure 4.3. 1: E-Government Score Standardized Residuals Histogram

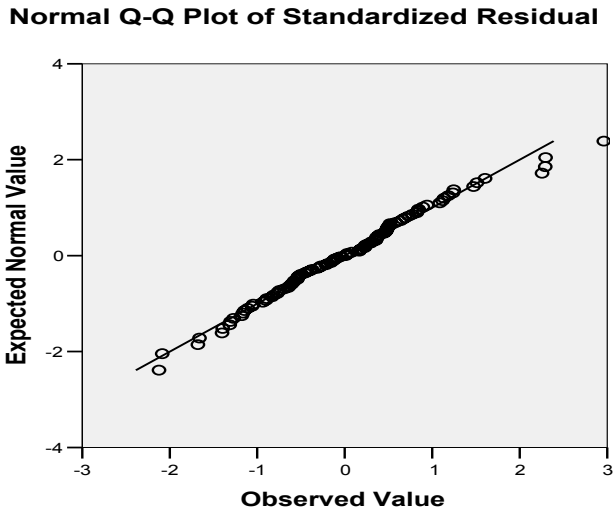

Figure 4.3. 2: E-Government Score Standardized Residuals Normal Probability Plot

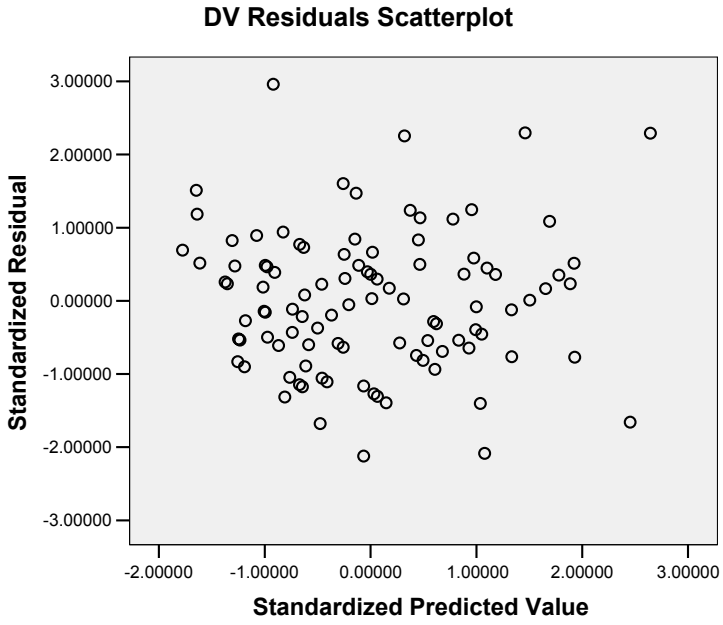

Figure 4.3. 3: DV Residuals Scatterplot

Table 4.3.1 contains the summary of the full multiple regression model that includes the complete set of independent variables, which were retained in the dataset after the preliminary analyses. The F-test was performed to test the null hypothesis Ho: R2=0, which is equal to the null hypothesis that all independent variables' regression coefficients are equal to zero. The results of F-test suggest that the regression model results in significantly better prediction of the dependent variable than would be expected by chance ($F_{9, 91} = 13.23$, $p<.001$). The overall strength of the relationship between the dependent variable, e-government score, and all of the independent variables is measured by adjusted R2, an approximate unbiased estimate of the coefficient determination. We used adjusted R2 rather than R2 because the usual estimate of R2 is positively biased (Tate, 1998).

The full model (Table 4.3.1) statistically explains approximately 52 percent of the variance in the e-government score (adj R2 =.522). As seen in the full model table, two independent variables make no significant contribution to the prediction of the dependent variable, e-government score. Therefore, the decision was made to delete the region and wealth variables, which do not contribute to the prediction power of the model.

When a correlation between independent variables equals or exceeds .70, there is a strong indication of multicolliniarity between these independent variables. Therefore, the urban population variable was removed from the model, after the preliminary analysis, because of the high correlation between county population and urban population variables (.80).

Table 4.3. 1: Full OLS Analysis of E-government Utilization in American Counties, 2006

Variables	Coefficient	Standard Er.	Standardized Coefficient	P>|t|
Constant	0.892	18.501		0.247
Award	1.280	0.947	0.127	0.143
Form of Gov.	1.095	0.808	0.12	0.360
IT Plan	4.029	1.320	0.228	0.016
pci_transformed	0.000	2.031	0.117	0.658
pop_transformed	0.000	0.314	0.467	0.000
Social Capital	-0.006	0.016	-0.042	0.069
Region: Northeast	2.233	1.479	0.229	0.211
Region: South	1.626	0.830	0.181	0.796
Region: West	0.784	1.067	0.058	0.426

N 101

F (9,91) 13.23

Prob > F 0.000

Adjusted R^2
0.522

*** Correlation is significant at the 0.01 level (2-tailed).
** Correlation is significant at the 0.05 level (2-tailed).
* Correlation is significant at the 0.10 level (2-tailed).

Five variables were included in the final regression analysis (Table 4.3.2). Although their relative importance in predicting e-government score is low, two of these variables, form of government and social capital, were included in the final regression analysis. This was done because of their important hypothesized relevance for determining the scope of county initiatives.

Table 4.3. 2:Final OLS Analysis of E-government Utilization in American Counties

Variables	Coefficient	Standard Er.	Standardized Coefficient	P>|t|
Constant	-11.368	3.142		0.000
Award	1.793**	0.861	0.179	0.040
Form of Gov.	1.091	0.732	0.120	0.140
IT	3.107**	1.278	0.175	0.017
Pop_transformed	1.444***	0.258	0.577	0.000
Social Capital	0.024*	0.013	0.170	0.056

N 100

F (5,95) 23.374

Prob > F 0.000

Adjusted R^2 0.528

*** Correlation is significant at the 0.01 level (2-tailed).
** Correlation is significant at the 0.05 level (2-tailed).
* Correlation is significant at the 0.06 level (2-tailed).

Given the small size of the sample, I accepted a less rigid rule for statistical significance of coefficients than the traditional 95 percent statistical significance. Social capital was not

significant at the 95 percent (.05) level, but was significant at the 94 percent level (.06). This level of assurance can be considered satisfactory given the limited number of observations in our sample.

The adjusted R^2 of the final model (.528) reduces to .512 in the absence of the social capital variable. This indicates that the presence of the social capital variable in our model enhances --albeit slightly -- the overall explanatory power of the model. The decision to include social capital in the final model was made to encourage further research. I have not encountered any research in e-government literature that included a social capital variable in their analysis. It is a variable that seems worthy of further refinement and inclusion.

Table 4.3.2. displays the results of OLS analysis of e-government utilization in 101 American counties. All independent variables except form of government and wealth (per capita income) turned out to have positive and statistically significant impacts on e-government utilization in American counties. Of the dichotomous variables, county governments that have received an award in financial reporting had on average 1.79 points higher e-government scores than those that did not receive this award, when all other variables are held constant. This finding supported hypothesis one (b). Similarly, the e-government scores of counties with an information technology plan were on average 3.11 points higher than those without. Thus, hypothesis two is also supported.

As for the continuous variables, there is a statistically significant, albeit substantively weak, relationship between social capital and e-government scores of a county. All other variables kept constant, one unit increase in the social capital (number of non-governmental organizations per 10,000 people) in a county results in, on average, an increase by 0.024 points in the e-government score of that county, which provides marginal support to Hypothesis 7. Finally, Hypothesis 3 was also supported by the statistical analysis. A unit increase in the transformed value of the population of a county increases the e-government score of that score by an average of 1.44 points. However, because the transformed values of populations are natural logs of populations of counties, they do not directly provide us substantive impacts of changes in the real population. I calculated the predicted e-government scores of counties at different real population values by re-transforming these transformed population scores back to their original values. Table 4.3.3 displays the predicted e-government scores of counties with different population sizes. As seen in the table, the predicted e-government score of a county increases when the population of this

county increases. For example, all other variables held constant at values detailed below, whereas a county with a population of 10,000 had a predicted e-government score of 3.3, a county with a pop of 100,000 had a predicted e-government score of 6.62.

Table4.3. 3: The predicted e-government scores of counties with different population sizes

Population	E-GOV'
1000	0
5000	2.3
10000	3.3
25000	4.63
50000	5.62
100000	6.62
250000	7.95
500000	8.94
1000000	9.96

* When calculating e-government scores, I assumed that the county did not have an IT plan, or a financial award, or a professional administrator. I also assumed the mean social capital value (57) for each county.

County size has the strongest effect on the e-government utilization, as measured by e-government score ($\beta = .577$, $p<.001$).

Confirmation and Rejection of Hypotheses

Hypothesis 1*: County governments with greater presence of professionalism are more likely to have higher e-government scores*. Counties where professional employees are present employ people whose responsibilities include keeping abreast of new technologies. Two categories of professional employees are county administrators and senior financial managers. Professionalism is measured in two ways: first, by the presence of council-manager form of government and, second, by receipt of the Distinguished Budget Presentation Award.

Hypothesis One has two sub-hypotheses:

H1a. *The council-manager form of government in a county is positively associated with its e-government score.* Form of government was included in the final subset of the most important predictors of the dependent variable, e-government score (Table 4.3.2). Form

of government was not a significant independent predictor of e-government score. Receipt of the Distinguished Budget Presentation Award seems to be a superior indicator of professionalism.

H1b. *Receipt of the Distinguished Budget Presentation Award is positively associated with its e-government score.* The budget award variable, consistent with the hypothesis, has a significant positive effect on the e-government score ($\beta = .179$, $p<.05$). This indicator of professionalism produced a significant positive effect on predicting e-government score.

Hypothesis 2: *Evidence of planning for information technology is positively associated with e-government score*. Some governments have formal plans for technology and some of them have plans specifically for e-government. E-government applications can be complex and costly. Where it is evident plans have been developed, it is likely that IT specialists have interacted with others to make better use of technology. It is from such interactions that ideas for e-government applications are more likely to emerge. The Information Technology variable, consistent with the hypothesis, has a significant positive effect on the e-government score ($\beta = .175$, $p<.05$).

Hypothesis 3: *County total population is positively associated with e-government score*. Larger governments are expected to have larger budgets that they can use for information technology/e-government services. Larger governments also need to serve larger populations, which are inherently more complex with more diverse service needs. E-government technology allows for greater tailoring of service delivery. The transformed population of a county has the strongest effect on e-government initiatives, as measured by the e-government score ($\beta = .577$, $p<.001$).

Hypothesis 4: *Percentage of urban population is positively associated with e-government score*. The literature shows that urban populations are likely to be more educated, computer literate and connected to the Internet. Furthermore, urban populations tend to be more diverse and have greater varieties of needs for government services. As mentioned above e-government technology allows for greater tailoring of service delivery. Urban population variable had a very high correlation with total county population and was, therefore, removed from the final model to avoid multicolliniarity problems.

Hypothesis 5: *Mean per capita income of county residents is positively associated with e-government score.* Affluent citizens are more likely to have computers and use them to access to the Internet. It is likely that they put more demand on governments to provide services and information electronically. Consequently, it was expected that counties in counties where incomes are higher, more demands will come from citizens to provide e-government services. Contrary to expectations, wealth (mean per capita income) did not make a significant contribution to prediction of e-government scores.

Hypothesis 6: *The geographic region of a county affects its e-government score.* The central idea of this hypothesis is that governments do not exist in isolation and that they are affected by what neighboring governments do. Unfortunately the study does not have access to information regarding the extent of technology use by neighboring cities or counties. Four sub-national regional categories were used. The region variable did not make a significant contribution to prediction of e-government scores and it was, therefore, removed from the final model.

Hypothesis 7: *Social capital is positively associated with e-government score.* Social capital is mainly about social interaction through inter-organizational and inter-personal networking. It is expected that, where social interaction is high, greater demands will be put on governments to provide e-government services. On the other hand, when county governments do such things as providing online forums, sharing information and posting electronic bulletin boards, they are acting to strengthen social capital. Given the importance of social capital on a wide range of social phenomena, the researcher put this social capital variable into the final model. Social capital variable, measured by number of nonprofit organizations relative to the size of population in the county, although it did not add much by itself, positively contributed to the model as hypothesized ($\beta = .170$, $p<.06$) though very marginally. Data availability forced the researcher to use number of nonprofit organizations relative to the size of population as a proxy to social capital. We believe that a better measure of social capital might produce better results. For example, a measure based on membership in clubs or professional associations related to technology (e.g. user groups or CIO forums) would produce better results.

CHAPTER 5

CONCLUSION

The research objectives of this dissertation were twofold: The first objective was to develop an up-to date and comprehensive index of e-government utilization, to be used to evaluate the extent of e-government utilization in selected county governments. The second objective was to identify the characteristics of those counties that make the most extensive utilization of e-government technologies relative to counties that utilize the technology to lesser degrees.

Some researchers have noted that e-government has become a very popular way to serve citizens (Norris and Moon, 2005) and today the Internet is the most popular e-government service delivery system (West, 2005). Furthermore, the demand for e-government is expected to be high (Means and Abramson, 2001). One of the findings of this study also confirms this interest at county level governments. About 90 % of the randomly selected counties had some kind of website to provide information and services to their citizens.

Even though about 90 % of the sampled counties had websites, relatively few utilized the available technology effectively. This conclusion is evidenced by the fact the mean utilization score is very low, about 7 out of a possible score of 28. Many of the possible e-government features have not been adopted in most counties. Counties' use of e-government technology was evaluated using four different levels of utilization; publish, interact, transact and integrate. This study found that 47.3% of counties used the web only to publish information and not to provide higher level uses. Future research needs to focus on why counties are not using higher level of utilization. It is important for researchers to learn what the obstacles of the utilization are. The findings of this study help to understand the obstacles.

One of the claimed obstacles was the costs of e-government technology. In the bivariate analysis, mean per capita income indicated that greater utilization occurs where greater wealth exists. That association did not hold in multiple regression analysis. Higher per capita income was highly correlated with both county population and both measures of professionalism. In multivariate analysis, per capita income did not have significant independent explanatory effect. A review of the scattergram relating wealth to e-government scores indicated that some poor counties made a more extensive use of e-government technology. The existence of these outliers indicates that wealth alone is not an insurmountable obstacle. In those relatively poor

counties something is happening to cause these counties to make fuller use of e-government technology.

Geographic region is a frequently used variable in policy studies. Hypothesis 6 of this study was that "*The geographic region of a county affects its e-government score*". The result of multiple regression analysis indicated that the region variable had no significant relationship to e-government utilization. Consequently, there is no reason to believe the location of a county within the nation has anything to do with its use of e-government technology.

What we expected was that counties, where there is extensive interaction among not for profit organizations, would make a fuller use of e-government technology. We expected that where there is more extensive social networking, that there would be greater demand for electronic networking. What this study found was a very weak relationship. It seems that counties do not have to have extensive social networking present to make good use of e-government technology, but the existence of social networking might make it a bit easier for counties to make better use of e-government technology.

Most of the studies of e-government have found that population size is related to e-government utilization. Hypothesis 3 of this study indicated that there would be a positive association. That hypothesis was confirmed. Multivariate analysis revealed clearly that there is a positive association. This study found that counties with larger populations make greater use of e-government technology. However, correlation is not the same thing as causation. The scattergram (Figure 4.2.1) showing county e-government scores by population shows several outliers. Some counties with small populations scored relatively high e-government scores. That is an important indicator that small size does not prevent counties from making extensive use of e-government technology. Good e-government utilization is less likely to happen in small counties, but it can happen.

In summary, this study indicates that neither size nor wealth of a government is an impediment for extensive use of e-government. There are positive bivariate statistical associations for both wealth and population size in the sampled counties, but only population size had independent explanatory effect in the multivariate analysis. What is most important is that the scattergrams showed that there are outlier counties for both wealth and population size. Some relatively poor counties and some relatively small counties are making fuller use of e-

government technology than would be predicted on the basis of the statistical associations alone.

The statistical findings of this study related to professionalism give clues about why these outlier counties might exist. Hypothesis 1a stated that “county governments with greater presence of professionalism are more likely to have higher e-government scores”. The first measure of professionalism used in the study was the presence of the council manager form of government. Hypothesis 1a. stated that “ council form of government in a county is positively associated with its e-government score”. Bivariate analysis found that the council manager form is strongly related to the e-government score, but it is also strongly correlated with receiving the distinguished budget award, income, population and having an IT plan. Multivariate analysis indicated, however, that council manager form has no significant independent predictive effect on e-government utilization.

The other measure of professionalism was the receipt of the Distinguished Budget Presentation Award. Hypothesis 1b stated that “ receipt of the Distinguished Budget Presentation Award is positively associated with its e-government score”. Bivariate analysis found that receipt of the Distinguished Budget Presentation Award is strongly related to the e-government score. It is also strongly correlated with population, form of government, income and having an IT plan. Multivariate analysis indicated that, even when controlling for other variables, receipt of the award has significant predictive effect on e-government utilization. The professionalism hypothesis was confirmed.

To receive the Distinguished Budget Presentation Award a government must demonstrate that it has designed a budget document that serves as an effective communication device with the public. To receive this award, a government’s employees must actively seek it. They have to go through an extensive peer review process, one in which the reviewers have to agree that the government’s budget is an effective communicative device. To receive this award, a county must have one or more staff members who are striving to communicate effectively with the public.

Is it likely that a county would strive to use e-government technology well if it did not have some elected officials or staff members who want to communicate effectively with the public? It is conceivable that a county might make use of e-government of technology solely to gain a reputation among peer governments. It seems more likely, though, that e-government utilization

occurs most where elected officials or staff members want to communicate better with the public.

Within every county that utilizes e-government technology well there is a story as to why that has happened. Someone made it happen. The most important finding of this study is that the story seems to be related to professionalism. In each government where e-government technology is used extensively, one or more persons have surely taken initiative to promote e-government utilization. The budget award finding suggests that advocates for e-government use are more likely to be present where some financial professionals are actively seeking to communicate well with the public. In small governments, these might be the same persons. The advocates of e-government utilization might be the same individuals who have sought to develop budgets that communicate well. In larger governments, though, they are probably separate individuals. To tell the stories as to how e-government utilization emerges, the quantitative analysis of this dissertation needs to be followed by good qualitative research.

This study has revealed that some counties like Morris County of New Jersey, which are relatively wealthy and have large populations, are not making extensive use of e-government technology. On the other hand, small counties like Chatham of North Carolina and York of South Carolina are making good use of e-government technology. It may be that the most important requisite for e-government utilization is to have someone present in the government who will actively advocate it. Such advocates might be called champions of e-government technology.

Future studies

Further quantitative studies on e-government utilization are needed. A primary limitation of this study is that it was conducted with a single sample selected from one category of local governments in one country. Studies such as this should be replicated in other types of governments within the U.S. and other countries. There is also a need for better data. There will be a continuous need to update and refine e-government utilization indexes as technology changes. In the future it might be possible to get better measures of web utilization. Perhaps the U.S. Census Bureau could include questions on computer ownership and web use for future researchers. It can be expected that in communities where local citizens are more likely to use computers and have internet access that they would put more pressures on their local

governments to provide e-government services. Unfortunately no good measures of local web utilization exist. It is hoped that such data will become available in the future.

This study points strongly to the need for qualitative research into e-government utilization. In each government that does it well, or does it poorly, there is a story to be uncovered. This study, which utilized solely quantitative methodology, has yielded results that clearly point out a need for case studies. These case studies should focus on outlier counties. The counties, especially, which make fuller use of e-government technology in spite of their relatively small size, or lack of wealth, should be examined. On the other hand some counties, in spite of wealth and large population, did not score highly in e-government use. Case studies of these outlier counties will help us better understand the barriers to e-government utilization.

Most importantly case studies are needed to uncover information about the advocates of e-government utilization. Who are these advocates and what motivates them to promote the technology? The statistical findings indicate that the advocates are likely to be professionals. Professional norms and expectations of public service, as well as professional desires for peer recognition, might be motivating factors. The result of the study also suggests that elected officials can be the advocates. In little Refugio County, Texas, the website strongly suggests that the elected county tax assessor was an advocate. To what degree was the desire to serve the public a motivating factor for her?

What barriers confront advocates of e-government technology? This study suggests that neither population size nor wealth are major barriers where locals desire to make e-government happen. But are there other barriers we have not uncovered? The answers to questions such as these can best be explored through sound qualitative research. Without answers to these questions efforts to promote e-government utilization will be impaired. This dissertation concludes with a recommendation that extensive qualitative studies of e-government utilization be done.

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BIOGRAPHICAL SKETCH

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