A Three Dimensional Assessment of U.S. County e-Government

Aroon Manoharan

Abstract
The research determines the status of counties’ e-government in three dimensions and the factors influencing their success, based on a combination of a county e-government survey and a content analysis of their websites. Despite the technological growth among county governments, the existing studies have little information dealing specifically with local county governments’ use of e-government technology. This research synthesizes the various existing models of e-government to develop a conceptual framework of three distinct e-government dimensions—e-information, e-transaction, and e-participation. The dimension of e-information refers to the provision of relevant and sufficient information through effective communication, thus leading to an informed citizenry; e-transaction involves efficient and effective transactions that result from an integrated citizenry; and e-participation refers to the promotion of an electronic democracy that involves a participatory citizenry. The study produces some significant findings and provides directions for future research in county e-government.

Keywords
counties, websites, information, transaction, participation

Introduction
Citizen’s increasing expectations for high-quality service has motivated governments to improve their information technology (IT) usage for the provision of communication and services to parallel interactions between service providers and clients in the commercial market. Apart from improving the relationship between governments and its citizens, e-government also has the potential to revolutionize the functioning of government’s internal processes (Siew and Leng 2003; Macueve 2008). In addition to increasing productivity, e-government provides the possibility for greater transparency, more accountability to constituents, greater information accessibility, and improved cost-efficiency (Shim and Eom 2008; Carter and Bélanger 2005). Previous studies on e-government have taken an evolutionary approach that frames growth in stages beginning with the creation of the website, to the integration of services, and incorporation of all segments of the population (Layne and Lee 2001; Moon 2002; United Nations Department of Economic and Social Affairs [UNDESA] 2005; Reddick

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2004; Carter and Bélanger 2005). Lee (2010) highlights the importance of this stage development model because of the inability of e-government to be fully implemented in a single step. This research brings together such models that explain this growth in order to develop a framework that incorporates three dimensions of e-government: e-information, e-transaction, and e-participation. The research determines the factors influencing the success of e-government in these three dimensions among U.S. county governments, based on a combination of a county e-government survey and a content analysis of their official websites. The following section introduces and discusses the three dimensions.

E-information is the dimension of e-government that provides substantive online information on public programs, public offices, public officials, government structures, and so on, through effective communication channels. By providing sufficient, relevant, and updated information, the goal of e-government in this dimension is to attain an informed citizenry. Initially, governments focus their efforts on establishing websites with minimum features and mostly non-transactional information such as e-mail addresses, telephone numbers, newsletters, and annual reports. This initial presence is then enhanced with appropriate search tools, sitemaps, and government forms to help citizen users familiarize themselves with the online services (UNDESA 2005). However, these features are still unidirectional. Gradually, the website becomes more interactive, offering downloadable forms, and applications. Therefore, with government information readily available and public processes adequately explained, government transparency and accountability are significantly enhanced (Carter and Bélanger 2005).

E-transaction is the dimension of e-government that provides secure online transactional services, leading to substantial savings in time and money on behalf of the citizen users. The goal of e-government with regard to this dimension is to attain efficient and effective transactions online through a direct channel between providers and customers and reduce the need for middle agents. As transactions increase, the website becomes bidirectional, allowing citizen users to pay taxes, renew licenses, apply for ID cards or birth certificates, and even bid for contracts online. This dimension also entails the integration of websites of various other government offices into a single portal. The website becomes integrated vertically with the city, state, and federal levels; after which it integrates horizontally with other websites at a similar level. This finally leads to a state of one-stop government in which all public agencies are interconnected and the citizen can access services from any public agency at a single location (Layne and Lee 2001). The dimension of e-participation promotes online citizen participation and e-democracy, through features such as online bulletin boards, citizen blogs, e-petitions, online surveys, and policy forums. The adoption of information and communication technologies by governments holds promise beyond the cost-saving potential of previous reform initiatives; it also promises a democratizing effect by providing opportunities for citizens to participate in the decision-making process (Carrizales 2008) and broadens political participation by connecting citizens with their elected representatives. Thus, the adoption of e-government has multiple promises such as transforming citizen interaction and public service delivery, as represented by these dimensions. Accordingly, this research examines the determinants of e-government in the above three dimensions among U.S. county governments.

The examination of e-government at the local level is pertinent, owing to its closeness to citizens and its direct provision of numerous public services (Benton 2005; Norris and Moon 2005), as well as the potential to beneficially affect success on the national stage (Sarikas and Weerakkody 2007). However, while over 3,000 U.S. counties are providing an increasing range of online services, much of the research on local e-government has focused on cities and counties together or primarily on municipal e-government (Moon 2002; Edmiston 2003; Norris and Moon 2005; Scott 2006). Since few studies have focused on county e-government, reflecting the general trend toward counties in e-government and public administration literature, this research aims to fill the gap by
focusing exclusively on counties adoption of e-government in the three dimensions.

**Factors Affecting Local Use of E-Government**

The following section discusses the factors affecting e-government from previous literature and the hypotheses developed for the research study. The adoption and implementation of e-government involves considerable financial resources on the part of the county governments, and the availability of such resources is represented by the amount of the county IT budget. The size of the organization is also an important factor in adopting e-government and is represented in this research by the number of functions. Larger organizations tend to be more complex and include a greater number of professionals from diverse fields, characteristics that often lead to technical innovation (Norris and Moon 2005). Governments that have the support of the involved stakeholders tend to have higher levels of successfully run e-government than those that lack stakeholder support. This is because even with limited financial resources, these groups can find ways to innovate with the support of upper level management and officials committed to making e-government innovation part of the organizational goals (Ho and Ni 2004). The stakeholders considered in this research are elected officials, top administrators, and county employees. Previous research has found that cities with council–manager forms of government are more receptive to e-government initiatives than those with mayor–council forms of governments (Moon 2002), so this research assumes that counties with board of commissioners will have less sophisticated e-government practices than a county with a council–administrator form of government.

**Hypothesis 1:** A county with a board of commissioners’ form of government will have less sophisticated e-government practices than a county with a council–administrator form of government.

**Hypothesis 2:** A county with greater stakeholder support will have more sophisticated e-government practices than a county with lesser stakeholder support.

**Hypothesis 3:** A county with higher budget capacity will have more sophisticated e-government practices than a county with lower budget capacity.

**Hypothesis 4:** A county that provides more functions will have more sophisticated e-government practices than a county that provides lesser number of functions.

**Hypothesis 5:** A county with greater levels of IT contracting will have more sophisticated e-government practices than a county with lesser levels of IT contracting.

There are also factors external to the organizations that play a role in the success of e-government. As with most organizations, local governments are encouraged or discouraged to implement new technologies in part based on the technologies used by nearby governments, and because they share similar political and socioeconomic landscapes (Berry 1994). The transition to e-government involves a shift toward more external collaboration with other counties, nonprofits, and businesses (Ho 2002). Thus, county governments that incorporate external collaborative relationships tend to see the value of e-government more clearly and act accordingly with regard to funding and implementation. Finally, socioeconomic factors such as population and education are also considered influential to the implementation of e-government.

**Hypothesis 6:** A county that is subjected to greater pressure from neighboring counties’ e-government diffusion will have more sophisticated e-government practices than a county with lesser pressure from neighboring counties’ e-government diffusion.

**Hypothesis 7:** A county with greater external collaboration will have more sophisticated
Hypothesis 8: A county with a larger population will have more sophisticated e-government practices than a county with a smaller population.

Hypothesis 9: A county whose residents have higher education will have more sophisticated e-government practices than a county whose residents have lower education.

Method

The goal of this research is to examine the factors affecting counties’ implementation of the three dimensions of e-government: e-information, e-transaction, and e-participation. The data used to identify the dependent variables were gathered by reviewing the websites of specific counties using an e-government index with these three dimensions, which are discussed below. The index includes elements taken from the NCPP E-Governance Index and validated by a panel of experts including researchers and faculty specializing in the field.

E-Information

The evaluation of e-information determined whether county websites provided relevant, sufficient, and reliable information online. Accordingly, it looked for a schedule of agency offices hours, online contact information (specifically, information about each agency represented on the website), access to public documents, agency mission statements, and the minutes of public meetings. The evaluation also considered targeted audience links or channels that customize the website for specific groups like citizens, businesses, or other public agencies and checked for time-sensitive information like job vacancies or a calendar of community events.

e-Transaction

The evaluation for e-transaction examined the county websites for features that enable citizens to make utility payments, file taxes, apply for licenses/permits, and purchase tickets for community events. Some local governments also use the Internet for procurement, allowing potential contractors to access requests for proposals (RFPs) or even bid online for contracts. Others chronicle the procurement process by listing the total number of bidders for a contract online and in some cases, contact information for bidders. The research also analyzed for such e-procurement practices, along with the ability to purchase reports, documents, or books online.

e-Participation

The evaluation for e-participation examined whether county websites allow users to provide online comments/feedback to individual agencies or elected officials. It also considered whether local governments offered current information about county governance either online or through an online newsletter or e-mail Listserv and whether they were providing Internet-based polls on specific local issues. This dimension also included questions on the presence of online bulletin boards and discussion forums for gathering citizen input on public issues.

The index measures were coded either as 0, 1, or 3, with 0 denoting that no feature was present and 1 or 3 denoting the presence of each feature in either a simple or sophisticated manner, respectively. Each dimension consists of eight features, and the highest possible score for a county in each dimension was 24. In the e-information dimension, a website is scored as 1 if it provides information online in html format (e.g., as a web page), along with frequently asked questions (FAQ) without subcategories of topics and targeted audience links divided into two categories. A score of 3 is recorded if the website provides job listings online in a downloadable format (e.g., doc or pdf) or an online searchable database; FAQ with subcategories of topics; and if targeted audience links are divided into more than three categories. In the e-transaction dimension, a website is categorized as simple (score = 1) if it provides information for users to make their payments, where to call to apply for licenses, permits, tickets, and
access RFPs online in html format. A website is considered as sophisticated (score = 3) if it allows users to make payments online, apply for licenses, permits, online, or download payment/application forms that can be returned via fax or mail. In the e-participation dimension, a score of 1 indicates that the website has a newsletter in html format; posts a notice of gathering citizens’ opinion about policy issues; contains contact information (mailing addresses, phone numbers, or e-mail addresses) for reporting crimes, violations, or corruption; submitting comments, feedback, or complaints. A sophisticated website (score = 3) in the e-participation dimension has a newsletter that can be downloaded or distributed via e-mail; has online discussion forums and enables users to report crimes, violations, or corruption online; submit comments, feedback, or complaints through online forms; or provide forms for reporting and submitting in a downloadable format.

The independent variables involved in this research were collected from survey data and U.S. Census data. The survey data were collected between March 2009 and April 2009 from a web survey of administrators responsible for e-government in the selected counties (with websites). Those included were either the chief information officer, head of the IT department, or manager of IT operations. The research involves a large number of respondents, and so the online survey was preferred over the mail survey as it is cost effective and less time-consuming. The survey itself focused on the aforementioned internal and contextual variables, and was paired with the information on socioeconomic variables from the U.S. Census data. The names of the respondents were obtained from the National Association of Counties (NACO), and their contact information was gathered from the results of online searches. The survey was pretested with administrators who are familiar with IT functions.

**Findings and Discussion**

Before conducting the study, the counties with official websites were identified via their existing links on the NACO website. Those without websites on NACO were confirmed via Google search engine. Overall, 2,376 (76.5 percent) county governments had adopted official websites and among these potential survey respondents, 380 had e-mail addresses that did not function, and 237 declined to take the survey. From the resulting sample of 1,759 counties, 343 responded to the survey and their official websites were evaluated.

**Regression Analysis Results**

The statistical analysis to create a prediction model used ordinary least squares multivariable regression and Statistical Package for the Social Sciences software to analyze three dimensions of e-information, e-transaction, and e-participation. Prior to the analysis, certain predictor variables were recoded to best fit the hypotheses and those variables with missing values were replaced by the median of the variable. The variables that were recoded are form of government, IT budget, IT contracting, and neighboring websites. The variables with missing values (IT budget, IT neighboring websites, and IT contracting) were replaced by the median as it is less sensitive to extreme values and it allows the non-missing values of the other predictors to contribute to the model. The socioeconomic variables were transformed by taking the natural log to reduce the skewness. The predictor variables were tested for multicollinearity. The data were subjected to backward regression to identify the best set of predictor variables and to reduce the collinearity.

In all the three models, the collinearity statistics are below the threshold, and it can be stated that the predictor variables are not collinear. The data were also tested for linearity of the predictor–outcome relationship and normality of the errors. The linearity of relationship between the outcome and each of the predictor variables in the models was tested with a scatter plot and both the independence of errors and the homoscedasticity of errors assumptions hold in all three models. Also, the residuals are normally distributed in the three models, based on the normal probability plot. The backward regression resulted in the best fit model with seven predictors for e-information, five predictors in e-
transaction, and six predictors for e-participation. Based on the regression analysis, the adjusted $R^2$ is highest (.338) in the e-information model suggesting the best fit, followed by e-transaction (.254) and e-participation (.180).

The significant variables in the first model relating to e-information are stakeholder support (elected officials), IT contracting, external collaboration (counties), and education. In model 2, the variables pertaining to IT contracting, organizational size (no. of functions), are significant predictors of e-transaction, and only organizational size (no. of functions) is significant in explaining e-participation. The descriptive statistics of the dependent and independent variables are shown in Table 1 and regression results are represented by Table 2.

**Findings and Discussion**

The variable related to form of government was not found to be a significant predictor of counties’ e-government, unlike among municipal e-government; so, Hypothesis 1 is rejected across the three dimensions. Among the variables relating to stakeholder support, Hypothesis 2 is accepted with regard to elected officials’ support in model 1. Counties with greater support from elected officials have more sophisticated e-information practices since they can act as institutional catalysts capable of ensuring that government organizations continue to adopt new, innovative technologies that appeal directly to the public (Ho and Ni 2004). However, they seem to be less supportive of e-transaction or e-participation. Perhaps elected officials are less willing to support innovative strategies when they view it as a bureaucratic strategy to “technicalize” and avoid legislative scrutiny (Berman and Wang 2000; Kettl 1994).

Unlike in state and municipal e-government, county IT budget did not predict any variance in e-government services. Thus, Hypothesis 3 (IT budget) is rejected across the three dimensions. Counties providing a greater number of functions seem to be more willing to adopt e-government in order to integrate these functions across the many departments.

<table>
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<th>N</th>
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<td>84.36</td>
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Note: IT = information technology; M = mean; SD = standard deviation.
providing public services (Norris and Moon 2005). Hence, Hypothesis 4 is accepted with regard to e-transaction and e-participation; however, this variable was not significant in predicting e-information. Finally, counties that contract IT services have more sophisticated e-information and e-transaction practices. About 70 percent of the counties contract their IT services to private vendors, which include 80 percent of counties without IT departments, compared to 60 percent of those with IT departments. The variable dealing with neighboring counties’ websites was not found to be significant; Hypothesis 6 is rejected across the three dimensions. Hypothesis 7 is accepted in the e-information dimension since counties collaborating with other counties were found to provide more sophisticated e-informational services, while other collaboration variables were not found to be significant in predicting the dependent variables. Finally, counties with greater percentage of educated residents provide more sophisticated e-information practices rather than e-transaction and e-participation. The level of education in some ways tends to set a level of expectation for government in developing their websites (Weare, Musso, and Hale 1999).

**Conclusion**

The objective of this research is to explore the status of e-government implementation at the county government level, and to assess the factors contributing to their success in the three dimensions of e-government. Thus far, 76.5
percent of all counties had established websites and were in the process of fully adopting e-government. The survey results reveal that 16.7 percent had operated these websites for at least ten years, 41.8 percent had operated them for between six and ten years, and 12.7 percent had created websites in the last two years. As with any technology, counties that have just begun implementing e-government tend to benefit from the lessons learned by those at the forefront of the change. Likewise, as Rogers (2003) discusses, early adopters may run into difficulties sustaining their e-government technology, often leading to a leveling of performance and use. Thus, observers may find that the performance of e-government may differ greatly when comparing those who adopted the technology early and those who did so more recently (Gould 1997).

This research sheds light on the factors that determine adoption and success of e-government in counties. Findings suggest that counties with greater support from elected officials have a higher probability of providing more sophisticated e-information practices. However, although officials may initially lend support and enthusiasm for e-government, in the long run they are uncomfortable with the Internet and in some cases, lack familiarity and education about its general use. This lack of commitment and sustained enthusiasm can be a detriment to the success of a county’s e-government program. IT contracting is important to both the e-information and the e-transaction dimensions. The benefit of skilled IT contractors provides much benefit to county governments in the way of expertise and lowered overhead expenses. However, the idea of contractors managing the personal information often collected in e-transactions may make many citizens uncomfortable. In addition, as it is a contracting relationship and not an employer–employee relationship, counties may sometimes not be able to influence contractors to provide the appropriate services. As one respondent noted, they were unable to convince their IT contractor to provide citizen-centric e-government services. Similar to municipal e-government, many of the websites were successful in disseminating information and offering transactional services, but were not promoting citizen participation online (Scott 2006). However, counties can mitigate these risks by providing adequate IT training to their employees, which will also increase stakeholder support for e-government. The use of appropriate online privacy and security features can improve citizens’ acceptance and comfort with the county’s decision to outsource e-government services. Another important finding is the relationship between e-government and intergovernmental collaboration, in the e-information dimension. Counties are playing a growing role in regional economic development (Benton 2005) and are networking with their regional counterparts to share resources and experiences (Benton and Daly 1996). Such collaboration should also extend into the e-transaction and e-participation dimensions that in fact require more horizontal integration among counties.

This research makes an important contribution to e-government literature, which currently provides limited information on county e-government and also provides directions for future research. The results reported confirm previous e-government findings on the positive influence of organizational size (no. of functions) and education levels; they also open up possibilities for future research on the influence of elected officials, IT contracting, and intergovernmental collaboration. Moreover, the results shed light on the difference in attitudes of elected officials and IT contractors with regard to the three dimensions. Further research into these areas can provide vital understanding in the face of counties’ increasing involvement in the provision of public services and regional economic development efforts. Finally, states need to provide directions through appropriate framework and policies for county e-government, accompanied with sufficient funding, support, and recognition of best practices among counties. Despite these challenges, the outlook held by counties regarding e-government is largely optimistic, as they witness the positive benefits of the technological use.

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References
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