

The Adoption of Public Agency Websites and Online Services
: On Efficiency, Power, and Legitimacy

Kyu-Nahm Jun

Assistant Professor
Department of Political Science
Wayne State University
kn.jun@wayne.edu

Christopher Weare

Research Assoc. Professor
School of Policy, Planning, & Development
University of Southern California
weare@usc.edu

ABSTRACT

This paper examines the organizational motivations underlying the rapid adoption of E-government websites and E-government services. Three strands of organizational theory – 1) contingency theory, 2) resource dependence theory, and 3) institutionalization theory – offer dramatically different accounts of the organizational dynamics that lead municipal governments to create and develop a web presence. The first emphasizes the need to attain technical efficiency within a complex environment, the second emphasizes the importance of internal power relationships, and the third emphasizes an organization’s need to develop legitimacy vis-à-vis peer organizations. We develop hypotheses based on each of these accounts and test them by analyzing the pattern of website adoption among municipal governments using event history analysis. From contingency perspective, we find that the greater the economic complexity in the external environment of the organization, the greater the likelihood of website adoption. Next, from a resource dependence perspective, our results indicate that having a focal department or an actor within a municipal government is positively related to the earlier adoption of websites. Lastly, we report evidence of institutional isomorphic pressure by comparing the early adopters and late adopters. We conclude by discussing how understanding the motivations behind website adoption help illuminate the likely impacts of E-government applications on governance more generally.

INTRODUCTION

Recently there has been an enormous increase in information technology (IT) investments in the public sector. DataQuest/Gartner Group projected that the spending by federal, state, and local governments on E-government would reach \$6.2 billion by 2005 in the U.S. up from \$1.5 billion in 2000 (Thibodeau, 2000). At the State level, information technology investment in states such as California, which ranks first, is about \$3.9 billion (Biancucci, Goode, Hunter, & Owings, 2001). In terms of committed investments, the public sector leads all other sectors of the economy save financial institutions, and it will account for 40 percent of all capital investment in the United States by 2004 (General Accounting Office, 2000; Layne & Lee, 2001).

One of the most popular uses of Internet in the government is the websites which are the newly established “front offices” of public agencies. Government agencies are expected to interact and provide more transactions online. Like the private sector, public agencies are establishing websites as a standard application to offer citizens and businesses with a single point of entry and contact to government services and agencies (Ronaghan, 2002). Fountain (2001) pointed out that, in general, government websites attempt to integrate the information services of “brick and mortar” agencies through the Internet.

This rapid adoption of new technologies by governments has spawned a broad academic debate on the promise that technological innovation can lead to improved governance. One camp, that can be called the techno-optimists, argue that web-based technologies can cut costs, enhance technical efficiency, and improve organizational effectiveness and responsiveness by improving governing process and redesigning government work flows. Another camp, called the techno-pessimists, argue that political and organizational inertia will impede significant changes in governance. They point out that despite the promises of using government websites to create customer-centric service delivery, the necessary integration of the so-called “back offices” is rare (Fountain 2001). This appears to reflect the difficulty in intra- or inter-organizational collaboration towards required level of integration.

This debate is far from being settled primarily because these technologies remain so new. Experience from private sector adoption of information technologies indicate that there was a long lag between initial investments in IT which accelerated in the 1960s and 1970s and the expected improvements to firm productivity that only became evident in the 1990s. This lag can be attributed to the difficulties in developing new organizational forms and processes that could take advantage of new information processing capabilities.

A central intervening variable, however, is the motivations that drive governments to adopt websites and specific web-based services. The techno-optimists implicitly argue that governments’ are motivated by an interest in improving technical efficiency, while techno-pessimists rely on motivations driven by internal bureaucratic politics or the need for external legitimacy as reasons to doubt the adoption of E-government applications will lead to efficiency enhancing reforms to governance. Thus, understanding these motivations helps elucidate the probably future course of E-government on governance.

To explore the motivations behind E-government adoption we employ different strands of organizational theory – contingency theory, resource dependency theory, and institutionalization theory – to draw out different implications of how the internal dynamics and the environmental pressures faced by governments shape their reaction to the technological opportunities offered by the Internet. We test these propositions using ICMA data on the diffusion of websites among United States municipalities between 1994 and 2003. We find that efficiency motivations play a significant role in adoption while internal organizational politics does appear to retard adoption. There is also scant evidence that the adoption of websites is merely an institutional response to conform to expectations of peer institutions.

STATUS OF WEBSITE ADOPTIONS AND TYPES OF TRANSACTIONS

At the early-stages of E-government, most public agency websites were characterized as a standalone site similar to a telephone directory (Deloitte & Touche, 2000). As they develop, they are expected to become more ‘intention-based,’ organizing around the groups of customers and interests. Ideally, government websites should provide citizens and businesses “the opportunity to deal seamlessly with a number of different departments, agencies, or for a related service provider” (Accenture, 2001). Currently, some sites offer not just information but also transactions – such as paying taxes online, getting permits and licenses, and paying fines. Such examples include, at the State level, State of California’s “My California” website which offers personalized access to information and services, for instance, tax refund status, Department of Motor Vehicles appointments, road conditions, and so on.

There is a prevalence of evaluative studies (Musso, Weare, & Hale, 2000; Weare, Musso, & Hale, 1999) and rankings (D. M. West, 2002; Darrel M. West, 2002) on the government agencies’ websites indicating that website adoption is becoming a standard E-government strategy, though the quality of the services offered remains varied. Gant and Gant (2002) for example report that the websites in most states remain fairly crude, offering public information but not the level of integration necessary to provide advanced transaction capabilities. These rankings of web site imply that there is a standard evolution of web-based services and accordingly there are a number of stage theories of E-government. Moon (2002), for example, proposes a developmental framework for E-government at the municipal level. First stage is where the focus is at the information provision function. Next is the increased two way communication between citizen and public agency. Third stage is to providing online service and financial transactions. The last stage involves the horizontal and vertical integration where integration of technologies used in the first and two stages should be adopted. The rhetoric within the field of E-government often speaks of striving for Moon’s (2002) fourth stage “which reflects the seamless integration of disparate, jurisdictionally separate, often geographically dispersed parts” (Fountain, 2001, p.26). Presently, however, websites in most cases do not necessarily entail actual integration of programs or services.

Although these stage theories are useful for evaluating the status of E-government, they offer little insight into why, how, and when governments are able to progress from one stage to another. They depend on the faith that technology and parallel organizational structures will evolve from simple to more complex forms. What is needed however is an understanding of the

internal and external organizational dynamics that drive technology decisions. In the next section we build on standard organizational theories to elucidate these dynamics.

THEORETICAL FRAMEWORK

Both internal and external organizational factors are important in understanding and explaining the adoption of websites at the municipal level. Parsons identified three types of organizational levels: technical, managerial, and institutional (Scott, 1998, p. 105). The technical level is where actual production and operations are carried out and is primarily concerned with achieving technical efficiency. The managerial level is where organizational structures are designed and production systems are maintained. Lastly, the institutional level is where organizations relate to their environment and importantly maintain their institutional legitimacy (Aldrich & Mindlin, 1978; Scott, 1987).

We theorize that website adoption and the patterns of online transactions will vary depending on the organizational levels involved and the types of environments in which a municipality operates. Specifically, in the next sections, we explore each level making reference to contingency theory, resource dependency theory, and institutionalization theory to identify these interrelationships and propose hypotheses.

The Technical Level: The Efficient Management of Uncertainty

Attaining some minimal level of technical efficiency is necessary for organizational survival, but the degree to which organizations must strive for greater efficiency depends on their selection environment. Government agencies rarely face as strong pressures as for-profit firms in competitive markets. Nevertheless, the need to compete with other areas to attract businesses and jobs to a municipality provide strong incentives for cities to adopt pro-business, growth policies (Peterson, 1981), and the force of globalization has certainly increased such competitive pressures.

Municipalities in this environment, according to the contingency perspective, adjust their organizational and task structures to maintain a “good fit” between these structures and the internal and external contingencies that the organization needs to control and coordinate (Lawrence & Lorsch, 1967). Viewing organizations from an information processing perspective (Galbraith, 1977; Tushman & Nadler, 1978), information technology provides a host of new options for addressing such contingencies. One main strategy for addressing informational contingencies has been to reduce informational needs through the standardization of procedures, but IT enables organizations to address such issues through increased information processing capacity (Galbraith 1977). For example, Danziger et al. (1982), found that municipalities adopted computer systems employed them to facilitate internal information processing tasks, thereby increasing efficiency. These early IT applications, however, focused on core organizational tasks and were not designed to address environmental contingencies by improving information processing with their external environment. The Internet, in contrast, offers tools for that are well designed for addressing external contingencies.

These external contingencies are a function of the complexity and uncertainty of an organization’s environment, and both factors increase the information processing needs for

effective task completion (Galbraith 1977). Thus, the efficiency benefits of investing in E-government systems increase as the complexity and uncertainty of a municipality's environment increases. This leads to our first proposition,

Proposition 1 (Task Uncertainty and Adoption): Website adoption is motivated by organizational needs to better manage environmental complexity and uncertainty through improve information processing capacities
Implications:

Hypothesis 1 The greater the complexity of the environment (as measured by population or economic diversity) the greater the likelihood that a municipality will adopt a website.

The Managerial Level: Power Maintenance and Website Adoption

The managerial level focuses on power relationships within and between organizations. In contrast to the efficiency motives that operate at the technical level that promote website adoption, the imperatives to develop and maintain power tend to operate as impediments to website adoption. The managerial perspective views uncertainty within an organization's environment mainly as a problem of the acquisition of scarce resources rather than a problem of the most efficient utilization of existing resources (Pfeffer & Salancik, 1978). One of the goals of management then is to avoid dependencies that require one's department or organization to cede power to others (Ulrich & Barney, 1984).

Information is one critical resource for agencies involved in the governing process. Control over the creation and use of information can buffer against dependencies on other organizations and can be used to create dependencies (Schweik, 2002). In this light, E-government strategies that seek to improve performance through more data-intensive collaborations at the same time pose significant risks to department managers by threatening to realign their dependency relationships. Specifically, sharing information through websites risks weakening existing power attained by control over information and creating new dependencies on others. These risks are sufficiently high that even in situations promising gains for all departments involved, they are unable to arrive at a mutually agreeable solution. These forces have long hindered the implementation of IT in the public sector. The public sector began to employ computers much more slowly than the private sector and research found partisan and bureaucratic politics tended to slow adoption of computer information systems in the 1960s and 70s (Danziger et al., 1982). Public organizations have embraced the Internet more rapidly but still Fountain (2002) finds that although information technology introduces tremendous potential for integration and collaboration across federal agencies, the "stovepipe" structures and managerial incentives continue to hinder the improvements to the governance processes.

The degree to which incentives to maintain control information impeded the development of E-government services depend on the particular structure of a municipal government in terms of

complexity and centralization. A more complex organizational form encompassing more departments or more centers of power creates additional opportunities for resistance to changes over control over information and impedes needed coordination. A centralized coercive power, in contrast, is often used to make necessary changes in the organizational structure. Palmer et al. (1993) pointed out that “actors controlling scarce and important resources may demand that organizations dependent on them adopt structures that serve their interests, and resource-dependent organizations may comply with these demands to secure their own survival” (p. 106). The literature in Electronic Data Interchange (EDI) adoption suggests that external pressure from the more powerful firms in buyer-supplier relationships played an important role in EDI adoption and its utilization (Hart & Saunders, 1997; Iacovou, Benbasat, & Dexter, 1995; M. Jun, Cai, & Peterson, 2000). Similarly, in such an environment, the adoption of websites would require some centralized coercion possibly through the creations of multiple-agency workgroups or by centralizing control over E-government services. Therefore, we propose that:

Proposition 2 (Coercive Power and Adoption): Fear of realignment of dependency relationships induces departments to resist sharing information in E-government initiatives unless they can be coerced to do so.

Hypothesis 2.1 The greater the number of departments in a municipality the more likelihood that the adoption of a website or advanced services will be delayed.

Hypothesis 2.2 The greater the centralization of control over E-government initiatives the greater the likelihood that the adoption of a website or advanced services will be delayed.

The Institutional Level: Gaining Legitimacy

Institutional theory argues that organizations are motivated by the need to gain organizational legitimacy from participants within or outside of the organization. This legitimacy provides for social acceptability and credibility. It is as significant as technical efficiency for organizational survival. Organizations attain legitimacy by accommodating institutional expectations even if these expectations do not improve technical performance. For example, institutional theorists argue that organizations adopt formal bureaucratic structures and procedures primarily because these are the prevailing rationalizations of the organization of work within society rather than necessarily an efficient response to the demands of their work activities (Meyer & Rowan, 1977; Scott, 2001). These isomorphic pressures help explain the high degree of homogeneity among organizations that perform highly varied tasks in highly varied environments (Abrahamson & Rosenkopf, 1993; DiMaggio & Powell, 1983; Greenwood & Hinings, 1996). In other words, Abrahamson and Rosenkopf (1993) argue that “increases in the number of organizations that adopt an innovation to solve a problem in the early stage of a diffusion can, in a latter stage, cause other organizations to adopt the innovation because of a bandwagon pressure arising from the threat of lost legitimacy and lost stakeholder support” (p. 492).

Similarly, the rapid adoption of websites can be explained as a response to isomorphic pressures to conform to contemporary norms rather than an effort to improve the efficiency of governance. One overt manifestation of these pressures is the many E-government rating systems that have been developed within government and academia to assess the adoption of information technology in the government sectors. Several institutions rank the progress of establishing E-government in the federal, state, and local level agencies, and governments feel pressured to improve on their performance on these metrics. Also, the E-government Act of 2002 has established standards calling for a single point of access from which citizens can access all government information and services. Such standard create powerful norms for the development of E-government that governments wish to attain to avoid being branded as laggards. Therefore, it is proposed that:

Proposition 3 (Legitimacy and website): Public agencies faced with increased demands of institutional isomorphic pressure will adopt websites to gain and maintain their legitimacy.

Hypothesis 3 Early adopters of E-government, when isomorphic pressures are low, will exhibit different motivations for adopting E-government applications compared to late adopters who develop E-government when isomorphic pressures are high.

DATA AND METHOD

This paper empirically tests hypotheses on the adoption of public agency websites and online transactions and why certain municipalities adopt early on in time while others chose not to do so. To adequately consider both the timing of the event (i.e., when the public agency website is adopted) and the occurrence of the event (i.e., whether the website is adopted or not), event history analysis – also known as, proportional hazard model or Cox regression model – is conducted to test these hypotheses (Allison, 1984; Box-Steffensmeier & Jones, 2004).. Compared to ordinary least squares (OLS) regression or logistic regression model, Cox regression model is the most appropriate statistical approach to this particular research question because the dependent variable takes into account of both the occurrence of the event itself (i.e., website adoption) and the actual timing of the event. That is, this method is most appropriate when a research question deals with “the notion of timing and change” (Box-Steffensmeier & Jones, 2004, p.2). As various studies using proportional hazard model pointed out, Cox regression model can fully address the dynamic nature of the change or the event of particular interest unlike logit or probit models. Due to its great benefits in explaining the questions that deals with the occurrence and the timing of events, which are of a general interest to social scientists, the utilization of event history analysis has been on the rise in various disciplines (Berry & Berry, 1990; Bienen & van de Walle, 1992; Felmlee, Sprecher, & Bassin, 1990; Hannan & Carroll, 1981; K. N. Jun, 2007; Tolbert & Zucker, 1983).

In Cox regression model or proportional hazard model, “hazard or risk” in this study is defined as the adoption of public agency website and risk set is defined as “the set of individuals who are at risk of event occurrence at each point in time” (Allison 1984, p.16). The dependent variable, the hazard rate for adoption of a website, measures the duration of time that a certain municipality spends in non-adoption stage before experiencing the event (i.e., website adoption). To clarify, hazard rate is the probability that a municipality would adopt website at a particular time given that the unit of analysis is at risk at that time (Allison 1984, p.16). Hazard rate, $h(t)$, can be formally stated as:

$$h(t) = \lim_{\Delta t \rightarrow 0} \frac{p(t, t + \Delta t)}{\Delta t}$$

where $p(t, t + \Delta t)$ is the probability that an event (i.e., adoption of website) will occur in the interval between time t and $t + \Delta t$. The hazard rate is determined both by time and different predictor variables. The general proportional hazard regression equation without time-dependent covariates is stated as follows;

$$h(t | X) = h_0(t) \exp(\beta X)$$

or

$$\ln \{h(t | X) / h_0(t)\} = \beta X$$

where $h(t)$ is the rate of transition from non-adoption (0) to adoption (1) of websites. X is a vector of covariates that might have an impact on the adoption of websites and β is a vector of regression coefficients. Lastly, $h_0(t)$ is a hazard function when $X = 0$.

Multiple sources of data are used in this study as in Table 1. First, the data on U.S. E-government development come from the International City/County Management Association’s (ICMA) Electronic Government Survey of 2000, 2002 and 2004. These surveys were administered to city and county governments in the United States and in this study we focus only on the municipal governments, excluding county governments. The survey questions were designed to collect data on various items related to E-government strategy and adoption pattern of different web services. This survey also provided information on whether a municipal government adopted websites or not, and also on the approximate year of the adoption.¹ Second, in order to understand the organizational and institutional environment of the municipalities we collected data on their economic, government, and demographic characteristics of the municipalities from the US Census. Specifically, 2002 Economic Census data provided information on the number of business establishments by North American Industry Classification System (NAICS). 2002 Census of Governments data on government organization surveyed general-purpose government and the status of public service provision. Lastly, 2000 US Census provides race/ethnic composition of the municipalities.

[INSERT TABLE 1 ABOUT HERE]

¹ This question is asked ICMA Electronic Government Survey of 2000.

In our sample of general-purpose governments, 1,690 municipalities are at risk of adopting a website. The time (year) of adoption was determined from an item in 2000 survey which asked the length of having a website and subsequent 2002 and 2004 survey. Furthermore, Census of Governments 2002 also has a question on whether central activity information is available on internet website.² From these multiple sources of data we were able to infer the approximate year of adoption. The period of the adoption was observed from 1994 to 2001. Table 1 provides the frequency distribution of year of adoption for cities and counties that was considered in this analysis. Of the 1,690 cases, 447 municipalities did not adopt a website during the observation period from 1994 to 2003 and those are considered right-censored cases. That is, municipalities that did not report having websites in 2004, were coded as “non-adopters as of 2003” (i.e., right-censored cases).

[INSERT TABLE 2 ABOUT HERE]

As in Table 3, we consider several predictors to test our propositions on adoption based on our theoretical framework. First, we measure the different levels of task uncertainty or environmental uncertainty by calculating index of dissimilarity or index of dispersion on 1) race/ethnic composition and 2) industry composition. As for the race heterogeneity, this measurement calculates the chance of people to meet other people who are not in their cohort in terms of specific characteristics (Lieberson, 1969) which is stated formally as:

$$Heterogeneity = 1 - \sum_{i=1}^s (Race_i)^2$$

where $Race_i$ indicates the proportion of race groups in the total population. A higher value indicates a higher level of environmental complexity. This measurement is also used for calculating economic environmental complexity by eight industry categories.

[INSERT TABLE 3 ABOUT HERE]

Second, the level of differentiation of public agencies is operationalized in two ways. First, we measure percent of services directly provide by the local public agency among nineteen public services areas.³ Second, we also measure this by calculating the heterogeneity of service delivery pattern since there are three groups of pattern; 1) one entity in charge of provision (in-house,

² Municipalities that responded to 2000 ICMA survey question on the length of year of having the website provided us useful information in approximating the year of adoption. That is, if they answered more than 5 years, then this was coded as “adopted websites in 1994” for the time variable. The year of adoption of the cases that did not have websites in 2001 are inferred from Survey 2002. There were cases where in Survey 2000 that the municipalities report they do not have websites as of 2000. However, the same municipalities were identified as reporting to have adopted websites in Survey 2002. Thus, for these cases it was assumed that those municipalities have adopted websites in 2001. This logic was used for 2004 ICMA data and 2002 Census of Governments data.

³ Those public services areas are: 1: Airports; 2: Ambulances; 3: Cemeteries; 4: Corrections; 5: Electric utility; 6: Fire protection; 7: Gas utility; 8: Health; 9: Hospital; 10: Housing; 11: Law enforcement (Police); 12: Library; 13: Nursing homes; 14: Parks and recreation; 15: Public transit; 16: Sewerage system; 17: Solid waste management; 18: Street; 19: Water utility.

private, other public), 2) two entities involved in service delivery; 3) three authorities involved. These three groups of service delivery patterns were the basis of calculating the Lieberman index.

Third, in the model we factored in the “forms of government” which were: 1) Mayor – council, 2) Council – Manager, 3) Commission, and 4) Town meeting. Generally, council-manager system tends to be centralized compared to other forms of government that were included in the category. Traditionally, council-manager systems were adopted as one of the structural devices for “reform” governments (Aiken & Alford, 1970). During the Progressive movement, the Reformers supported the council-manager form of government based on the business model of governance. Their main goal was to figure out the most efficient way of delivering public services and among their “good government” reforms, council-manager system was considered as an ideal type among different forms of government. Arguably, based on the historical background where council-manager system is rooted on the tendency where efficiency is the main policy objective, one can argue that from a technical efficiency perspective, council-manager system will tend to have positive impact on the adoption of public agencies and varieties of web services.

On the other hand Lockard (1962) pointed out that “a city manager with long tenure and support among influential community leads has a considerable base of power from which to act...It is hard to image a council that would move against a manager without taking account of the resources for counterattack at the disposal of the manager” (p.227). In this analysis, we assumed that a city manager in a council-manager form of government would have more power in the implementation of municipal website adoption compared to other forms of government. That is, from resource dependence perspective, it could be argued that if there is a central actor, such as the city manager or and IT department in charge, then there will be a greater push for the adoption of websites and varieties of web services. Lastly, other control variables such as population, geographical region, and the metro status were included in the model.

Furthermore, to understand the adoption of public services on their website, we conduct ordered logit model with same model specification identified in the previous proportional hazard model. The dependent variable is ordinal data where the first category is no website, second, adopted website but no online services,⁴ and lastly online services available through municipal websites. Three perspectives on motivation for adoption will be subsequently tested using this model.

RESULTS

Three proportional hazard models were tested and the results are reported in Table 4. The first column of Table 4 lists the predictor variables that were included in the final model. The succeeding three columns represent the results of the models of three time periods that were tested. The first model is from 1994 to 2003, which is the total time period of the observations, and the total period is broken into two sub-periods: 1) early adoption period from 1994 to 1998 and 2) late adoption period from 1999 to 2003. The total number of observations differs because

⁴ Online services that were offered throughout 2000- 2004 are considered in this study. Therefore, among the services that are offered which were not consistent throughout the three ICMA survey data are not included.

of data attrition due to missing values in the covariates. The model statistics of three models all resulted in high chi-square values and the p-values were statistically significant at the .001 level.

[INSERT TABLE 4 ABOUT HERE]

Throughout the entire time frame considered in this study, economic heterogeneity in the organizational environment had a positive impact on the hazard rate of website adoption. That is, the more heterogeneous the industry composition is in the external environment, the more likely and the faster the website adoption of the municipalities. This result also applies to the case of early adopters which indicates that at the technical level, public agencies indeed adopt website to better manage their organizational environment by ways in which they maintain “good fit” (Lawrence and Lorsh 1967) from contingency perspective and focusing on a higher level of technical efficiency. Our results suggest that there are movements towards this trend in municipal governments by adopting websites during 1994 – 1998. However, environmental complexity measured by racial heterogeneity was not found to be statistically significant.

Also, to understand the subsequent adoption of public services online, we ordered logit regression model reported in Table 5. Three stages of adoption models are conducted by each three year when the ICMA survey is administered. Similar pattern of result emerges regarding the impact of environmental economic complexity. That is, the positive coefficient of economic heterogeneity indicates that the higher level of heterogeneity increase the probability of higher level website development from no website to offering online transactions. This indicates that motivation to increase technical efficiency to address the environmental complexity also applies to the case of different web service adoption.

[INSERT TABLE 5 ABOUT HERE]

As presented in Table 4, the adoption hazard rate for municipalities that has a council-manager system is increased by 36.8%⁵ compared to the base case which is the Mayor-council system. This pattern of impact was same for early adopters and web service adoption in 2000. From resource dependence perspective, it is suggested that since a city manager would have more control over how the city is run than other actors in municipalities, this leads to higher rates of adoption of websites. There would be idiosyncratic differences among cities/counties by their size and institutional environment and thus, the capability of city manager would differ as well. However, we assumed that the tenure of city managers would be longer and this would contribute towards the power base of the city managers (e.g., control of city resources). Therefore, we also assume that compared to other forms of government council-manager systems would have more capability to push for the adoption of websites for their municipalities. This result can be augmented by the fact that if there were central department in charge then our results indicate that hazard rate for website adoption was greater throughout the time period considered in this study. This finding was consistent throughout the analyses both in proportional hazard model results and in ordered logit results.

⁵ This percentage is calculated by using antilog coefficient β ($\exp(\beta)$) in Table 4, and we use this number to trace the impact of independent variable on the hazard rate or odds-ratio. If $\exp(\beta) = 1$, it means that the odds between adoption and non-adoption is same. For instance, $\exp(\beta) = 1.368$ is $(100\% \times 1.368) - 100\% = 36.8\%$.

[INSERT FIGURE 1 ABOUT HERE]

In order to test the argument of the institutionalization theory, we followed Tolbert and Zucker's (1983) study of the adoption of civil service reforms in the U.S., and compared between early adopters and late adopters. Following their argument, if isomorphic pressure is the motivating force of website adoption we would find that for the later adoption cases the predictive power of the variables would diminish (Tolbert and Zucker 1983). That is, as more and more municipalities proceed to adopt websites, it is assumed that the predictors would become less relevant to the adoption (Tolbert and Zucker 1983) and different types of isomorphic pressure are in play. In Table 4, we compared between early adoptions (1994-1998) and late adoptions (1999-2003) and the coefficients for economic heterogeneity is no longer statistically significant, which suggests at least for the later adopters there is isomorphic pressure to adopt agency websites not because of technical efficiency reasons. We formally compare the coefficients of proportional models from two-sub periods in Table 6 using the Wald chi-square statistic for testing difference between the coefficients for early adopters and laggards (Allison, 1999).⁶

[INSERT TABLE 6 ABOUT HERE]

This comparison indicates that the changes in the magnitude of the coefficient between early adopters and late adopters signify certain isomorphic pressure to adopt websites. This is evident for the population size and whether central government is present at the time of adoption. In other words, one can argue along with the power perspective, one can argue that due to isomorphic pressure, for the laggard groups, having a central department in control of website adoption provide momentum for these municipalities. Furthermore, based on institutional bandwagon pressure argument, this also indicates central department or actor reacting to be "normal" by website adoption which is not necessarily based on the motivation to improve technical efficiency.

CONCLUDING DISCUSSIONS

This study addresses motivational factors that might determine first the adoption of websites and second different level web services. The major contentions are based on three major branches of theory in the study of organizations. First, the contingency theory based the level of technical efficiency provides a rational. Ultimately, this view focuses on the need to control and coordinate the highly differentiated complex subsystems to gain organizational effectiveness. The main motivation for adoption in contingency perspective is to establish a mechanism to manage the change in task uncertainty to improve the efficiency of the public agencies. We argue that the greater the environmental complexity, the faster the rate of website adoption which our model suggests this is the case for the overall website adoption from 1994-2003 and for early adopters from 1994-1998. From resource dependence perspective, the forms of government were found to be an important factor in the adoption of websites. Especially, council-manager systems, in

⁶ Allison (1999) argues that this test statistic is problematic because "the difference in the two coefficients... may be an artifact of differences in the degree of residual variation (unobserved heterogeneity) in the models" (p. 189). However there are also counter-argument to Allison's prescription in dealing with this issue (Williams, 2007)

which city managers have more control over managing municipal affairs compared to the other major players in municipal governance, was found to have resulted in higher rates of adoption. Moreover, when we compared between early adopters and late adopters the impact of having a central department in charge of the adoption, the hazard rate of adoption increases and this difference in coefficient was also found to be statistically significant. The implication from this finding is that if there is a focal group that pushes for the adoption of websites to increase their power base or increase other group's dependence, those municipalities were more likely to adopt websites. This interpretation of this result might be also possible from the contingency perspective of regaining "a good fit." That is, the literature on council-manger systems suggests that the main interests of city managers are economizing and increasing efficiency in the operation of public agencies. Therefore, it could also be argued that municipalities where higher level of efficiency and organizational effectiveness is more attended to, the more likely that they would have websites. Unfortunately our data did not allow us to test these competing hypotheses.

Lastly, institutionalization theory provides adequate explanation of the trendy adoption of websites at all levels of public agencies throughout the world. Nowadays, every type of organization is expected to have a web presence reflecting a change in how they should be organized. Government agencies are not an exception to this. They are required to provide public information through online channels, and there are expectations that they at least provide simple transactions to citizens. In other words, the isomorphic institutional pressures have an impact on the adoption of websites for the public agencies. Testing our institutionalization theory based propositions revealed some evidence of isomorphic pressures. For the innovators, dealing with economic complexity in the environment is a critical factor in determining the hazard rate of website adoption but this was not case for the laggards, as the two set of proportional hazard model results indicates.

In developing the theoretical argument of this paper we follow Tolbert's argument who states the importance of "specifying the points of intersection of different theoretical perspectives and combining these perspectives to provide more complete explanations" because "organizational phenomena are much too complex to be described adequately by a single theoretical approach" (1985, p. 12). One of the main purposes of this article is to compare theories that explore different aspects of the same problem and try to provide a richer explanation of the current developments of websites in public agencies. The contribution of this article will result from following the argument that in order for a field to prosper, the development of continuous competition and debate among alternative explanations is crucial. As Ulrich and Barney warned us, "the lack of comparison and integration among perspectives often results in the under-examining of many important similarities and differences among organizational perspectives" (1984, p. 471) which deprive us the opportunity for synthesis in theory development in the study of E-governance.

REFERENCE

- Abrahamson, E., & Rosenkopf, L. (1993). Institutional and Competitive Bandwagons: Using Mathematical Modeling as a Tool to Explore Innovation Diffusion. *The Academy of Management Review*, 18(3), 487-517.
- Accenture. (2001). E-Government: The Commitment Continues. from http://www.accenture.com/xdoc/en/Industries/Government/eGovernmentGBfinal_web.pdf
- Aiken, M., & Alford, R. R. (1970). Community Structure and Innovation: The Case of Urban Renewal. *American Sociological Review*, 35(4), 650-665.
- Aldrich, H., & Mindlin, S. (1978). Uncertainty and dependence: Two perspectives on environment. In L. Karpick (Ed.), *Organization and Environment: Theory, Issues, and Reality* (pp. 149-170). Beverly Hills, CA: SAGE Publications Inc.
- Allison, P. D. (1984). *Event history analysis: regression for longitudinal event data* (Vol. 07-046). Beverly Hills, CA: Sage Publications.
- Allison, P. D. (1999). Comparing Logit and Probit Coefficients Across Groups. *Sociological Methods & Research*, 28(2), 186.
- Berry, F. S., & Berry, W. D. (1990). State Lottery Adoptions as Policy Innovations: An Event History Analysis. *The American Political Science Review*, 84(2), 395-415.
- Biancucci, R. J., Goode, L. J., Hunter, P. A., & Owings, K. (2001). 2001 CFO survey--A preview: Electronic government. *Journal of Government Financial Management*, 50(2), 36.
- Bienen, H., & van de Walle, N. (1992). A Proportional Hazard Model of Leadership Duration. *The Journal of Politics*, 54(3), 685-717.
- Box-Steffensmeier, J. M., & Jones, B. S. (2004). *Event history modeling: a guide for social scientists*. Cambridge; New York: Cambridge University Press.
- Danziger, J. N., Dutton, W. H., Kling, R., & Kraemer, K. L. (1982). *Computers and Politics: High Technology in American Local Governments*. New York: Columbia University Press.
- Deloitte & Touche. (2000). *Through the site: Enterprise transformation for E-Government*.
- DiMaggio, P. J., & Powell, W. W. (1983). The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review*, 48(2), 147-160.
- Felmlee, D., Sprecher, S., & Bassin, E. (1990). The Dissolution of Intimate Relationships: A Hazard Model. *Social Psychology Quarterly*, 53(1), 13-30.
- Fountain, J. (2001). *Building the Virtual State: Information Technology and Institutional Change*. Cambridge: Cambridge University Press.
- Galbraith, J. (1977). *Organization Design*. Reading, MA: Addison-Wesley.
- General Accounting Office. (2000). *Electronic Government: Federal initiatives are evolving rapidly but they face significant challenges* (Testimony before the Subcommittee on Government Management Information and Technology, Committee on Government Reform, House of Representatives No. GAO/T-AIMD/GGD-00-179). Washington, D. C.: U.S. Government Printing Office.
- Greenwood, R., & Hinings, C. R. (1996). Understanding Radical Organizational Change: Bringing together the Old and the New Institutionalism. *The Academy of Management Review*, 21(4), 1022-1054.

- Hannan, M. T., & Carroll, G. R. (1981). Dynamics of Formal Political Structure: An Event-History Analysis. *American Sociological Review*, 46(1), 19-35.
- Hart, P., & Saunders, C. (1997). Power and Trust: Critical Factors in the Adoption and Use of Electronic Data Interchange. *Organization Science*, 8(1), 23-42.
- Iacovou, C. L., Benbasat, I., & Dexter, A. S. (1995). Electronic Data Interchange and Small Organizations: Adoption and Impact of Technology. *MIS Quarterly*, 19(4), 465-485.
- Jun, K. N. (2007). Event History Analysis of the Formation of Los Angeles Neighborhood Councils. *Urban Affairs Review*, 43(1), 107.
- Jun, M., Cai, S., & Peterson, R. T. (2000). EDI use and participation models: from the inter-organizational relationship perspective. *Industrial Management and Data Systems*, 100(8), 412-420.
- Lawrence, P. R., & Lorsch, J. W. (1967). Differentiation and Integration in Complex Organizations. *Administrative Science Quarterly*, 12(1), 1-47.
- Layne, K., & Lee, J. (2001). Developing fully functional E-government: A four stage model. *Government Information Quarterly*, 18(2), 122-136.
- Lieberman, S. (1969). Measuring Population Diversity. *American Sociological Review*, 34(6), 850-862.
- Lockard, D. (1962). The City Manager, Administrative Theory and Political Power. *Political Science Quarterly*, 77(2), 224-236.
- Meyer, J. W., & Rowan, B. (1977). Institutionalized Organizations: Formal Structure as Myth and Ceremony. *The American Journal of Sociology*, 83(2), 340-363.
- Moon, M. J. (2002). The evolution of E-government among municipalities: Rhetoric or reality? *Public Administration Review*, 62(4), 424.
- Musso, J., Weare, C., & Hale, M. (2000). Designing Web technologies for local governance reform: Good management or good democracy? *Political Communication*, 17(1), 1.
- Palmer, D. A., Jennings, P. D., & Zhou, X. (1993). Late Adoption of the Multidivisional Form by Large US Corporations: Institutional, Political, and Economic Accounts. *Administrative Science Quarterly*, 38(1).
- Peterson, P. (1981). *City Limits*. Chicago, IL: University of Chicago Press.
- Pfeffer, J., & Salancik, G. R. (1978). *The External Control of Organizations: A Resource Dependence Perspective*. New York: Harper & Row Publishers, Inc.
- Ronaghan, S. A. (2002). *Benchmarking E-government: A Global Perspective*. New York: Division for Public Economics and Public Administration, United Nations.
- Schweik, C. (2002). Some thoughts in response to the questions proposed for the Digital Government workshop. from http://www.ksg.harvard.edu/cbg/dgworkshop/Schweik_egov_questions.pdf
- Scott, W. R. (1987). The Adolescence of Institutional Theory. *Administrative Science Quarterly*, 32(4), 493-511.
- Scott, W. R. (1998). *Organization: Rational, Natural and Open Systems* (5th ed.). New York, NY: Prentice Hall.
- Scott, W. R. (2001). *Institutions and Organizations* (2nd ed.). Thousand Oaks, CA: Sage Publications, Inc.
- Thibodeau, P. (2000, Apr. 24, 2000). 'E-government' spending to soar through 2005. *Computerworld*, 34, 12.

- Tolbert, P. S. (1985). Institutional Environments and Resource Dependence: Sources of Administrative Structure in Institutions of Higher Education. *Administrative Science Quarterly*, 30(1), 1-13.
- Tolbert, P. S., & Zucker, L. G. (1983). Institutional Sources of Change in the Formal Structure of Organizations: The Diffusion of Civil Service Reform, 1880-1935. *Administrative Science Quarterly*, 28(1), 22-39.
- Tushman, M. L., & Nadler, D. A. (1978). Information Processing as an Integrating Concept in Organizational Design. *The Academy of Management Review*, 3(3), 613-624.
- Ulrich, D., & Barney, J. B. (1984). Perspectives in Organizations: Resource Dependence, Efficiency, and Population. *The Academy of Management Review*, 9(3), 471-481.
- Weare, C., Musso, J. A., & Hale, M. L. (1999). Electronic democracy and the diffusion of municipal web pages in California. *Administration & Society*, 31(1), 3.
- West, D. M. (2002). *State and Federal E-Government in the United States, 2002*. Providence: Taubman Center for Public Policy, Brown University.
- West, D. M. (2002). *Urban E-government, 2002*. Providence: Taubman Center for Public Policy, Brown University.
- Williams, R. (2007). *Using Heterogeneous Choice Models To Compare Logit and Probit Coefficients Across Groups*. Unpublished manuscript.

TABLES AND FIGURES

Table 1 Sources of Data

Data	Source
E-Government	- ICMA Electronic Government Survey of 2000, 2002, and 2004
Municipal Contexts	- Economic Census on the number of establishment by industry, 2002 - Census of governments, Local Government Census on public service delivery, 2002 - Demographic characteristics from US Census, 2000

Table 2 Website Adoption by Year

Year	Number of Adoptions	Number at Risk
1994	38	1,690
1995	97	1,652
1996	132	1,555
1997	233	1,423
1998	236	1,190
1999	125	954
2001	99	829
2002	67	730
2003	216	663
> 2003	447*	
Total	1,690	

(Note: * denotes right-censored cases)

Table 3 Variable and Measurement in Model Specification

Variables	Variable Name	Measurement
Environmental Complexity	COMPLEX.R	Race/ethnic heterogeneity - index of dispersion by race groups 1 Whites; 2 Blacks; 3 Asians; 4 Hispanic; 5 Others
	COMPLEX.E	Economic heterogeneity - index of dispersion by industry groups 31 Manufacturing; 4X Trade; 51 Information; 53 Real estate and rental and leasing 54 Professional, scientific, and technical services 56 Administrative and support and waste management 61 - 62 Social Services; 71 72 81 Other Services
Differentiation in Public Agencies	DIFFER1	% Directly delivered among 19 public service areas
	DIFFER2	Complexity in service delivery - index of dispersion by pattern of service delivery 1 One party in charge 2 Two parties in charge 3 Three parties in charge (Direct, Private, Public)
Population	LN.POP	Natural log of population
Form of Government	FOG	1 Mayor-Council; 2 Council-Manager; 3 Commission; 4 Town meeting
Geographic Region	REGN	1 Northeast; 2 North Central; 3 South; 4 West
Metro Status	METRO	1 Central; 2 Suburban; 3 Independent not located in Metropolitan Statistical Area
Central Actor in Charge of Website	DEPT.CEN	Central department (either IT or Manager) in charge of website at the time of adoption

Table 4 Proportional Hazard Models of website Adoption over Time, 1994-2003

<i>Proportional Hazard Model Results</i>									
Variables	Total Time period (1994-2003) N = 1346			Early Adoption Period (1994-1998) N = 1346			Late Adoption Period (1999-2003) N = 751		
	B	SE(B)	Antilog of Coefficient	B	SE(B)	Antilog of Coefficient	B	SE(B)	Antilog of Coefficient
Racial Heterogeneity	0.016	0.216	1.016	-0.065	0.217	0.937	0.440	0.323	1.553
Economic Heterogeneity	3.155***	0.706	23.453	1.913***	0.699	6.774	1.326	0.928	3.765
Differentiation in public agencies	0.064	0.262	1.067	0.159	0.267	1.173	0.198	0.411	1.219
Service delivery heterogeneity	-0.131	0.339	0.877	-0.016	0.336	0.984	-0.599	0.607	0.549
Ln(Population)	0.777***	0.049	2.174	0.495***	0.048	1.640	0.770***	0.081	2.160
Form of Government									
Mayor-Council†									
Council-Manager	0.314***	0.073	1.368	0.167**	0.073	1.182	0.165	0.105	1.180
Commission	0.015	0.245	1.016	0.087	0.245	1.091	0.031	0.330	1.031
Town Meeting	0.278	0.266	1.320	0.018	0.264	1.018	0.069	0.439	1.071
Region									
Northeast†									
North Central	0.271***	0.099	1.312	0.216**	0.098	1.241	0.160	0.142	1.173
South	0.129	0.108	1.138	0.168	0.108	1.183	-0.202	0.156	0.817
West	0.262**	0.119	1.300	0.232**	0.118	1.261	0.250	0.185	1.285
Metro Status									
Central†									
Suburban	0.491***	0.120	1.634	0.308***	0.117	1.361	0.621**	0.264	1.861
Independent	0.273**	0.139	1.314	0.110	0.135	1.116	0.362	0.281	1.436
Central dept in control	0.546***	0.069	1.726	0.325***	0.068	1.384	0.869***	0.109	2.385
<i>Model Statistics</i>									
Log Likelihood	12,724			13,603			5,025		
χ^2 (df)	1,038 (14)			507 (14)			431 (14)		

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

† Indicates the base case.

Table 5 Ordinal Logistic Models on Adoptions of Web Services over Time, 2000-2004

Variables	Year 2000 Status N = 1080			Year 2002 Status N = 2762			Year 2004 Status N = 3569		
	B	SE(B)	Wald	B	SE(B)	Wald	B	SE(B)	Wald
Racial Heterogeneity	-0.500	0.423	1.396	-0.368	0.251	2.150	-0.402	0.242	2.763
Economic Heterogeneity	4.708***	1.522	9.561	5.098***	0.734	48.190	4.315***	0.693	38.738
Differentiation in public agencies	0.139	0.510	0.074	-0.055	0.323	0.029	-0.257	0.304	0.716
Service delivery heterogeneity	0.685	0.613	1.248	0.276	0.425	0.422	0.622	0.393	2.503
Ln(Population)	0.682***	0.110	38.288	0.622***	0.058	115.174	0.364***	0.051	50.443
Form of Government									
Mayor-Council	0.365	0.452	0.654	-0.492	0.367	1.796	-0.094	0.324	0.084
Council-Manager	1.012**	0.449	5.081	0.014	0.366	0.001	0.394	0.323	1.487
Commission	0.100	0.693	0.021	-1.116**	0.486	5.267	0.080	0.422	0.036
Town Meeting†									
Region									
Northeast	-0.610***	0.230	7.041	-0.743***	0.146	25.834	-0.520***	0.135	14.922
North Central	-0.171	0.194	0.779	-0.238	0.127	3.518	-0.092	0.117	0.624
South	-0.130	0.181	0.511	-0.534***	0.121	19.514	-0.261*	0.111	5.564
West†									
Metro Status									
Central	0.158	0.245	0.417	0.109	0.198	0.305	0.221	0.170	1.689
Suburban	0.275	0.175	2.477	0.317***	0.093	11.556	0.268**	0.092	8.576
Independent†									
Central dept in control									
No central dept.	-0.498***	0.126	15.671	-0.931***	0.081	131.898	-0.655***	0.076	74.472
Central dept.†									
Threshold									
[EVENT.W0 = -1] No website	9.291	1.441	41.562	7.290	0.717	103.302	3.170	0.647	24.025
[EVENT.W0 = 0] No services	12.346	1.466	70.913	9.304	0.727	163.957	7.228	0.659	120.429
<i>Model Statistics</i>									
Log Likelihood	1,886.094			5,065.679			5,266.722		
χ^2 (df)	193.698 (14)			929.499 (14)			548.551 (14)		
Pseudo R-Square (Nagelkerke)	0.192			0.323			0.177		

*p<.05; **p<.01; ***p<.001; † Indicates the base case.

Table 6 Comparison of Early Adopters and Late Adopters (1994-2003)

Variables	Ratio of Coefficient	Chi-square Test for Difference	P-Value
Racial Heterogeneity	-0.1488	1.6913	
Economic Heterogeneity	1.4431	0.2556	
Differentiation in public agencies	0.8055	0.0062	
Service delivery heterogeneity	0.0270	0.7062	
Ln(Population)	0.6426	8.5433***	0.0035
Form of Government			
Mayor-Council†			
Council-Manager	1.0121	0.0002	
Commission	2.8261	0.0188	
Town Meeting	0.2576	0.0099	
Region			
Northeast†			
North Central	1.3512	0.1055	
South	-0.8290	3.8029†	0.0512
West	0.9251	0.0073	
Metro Status			
Central†			
Suburban	0.4963	1.1695	
Independent	0.3045	0.6517	
Central dept in control	0.3737	17.9577***	<.0001

†<.10; *p<.05; **p<.01; ***p<.001.

Figure 1 Hazard Function by Forms of Government

