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Abstract

E-government has become a burgeoning field for research on the nature of relationships among government, citizens and technology. In most cases, studies on the subject adopt viewpoints that reflect ideas taken from the technological imperative and/or strategic choice views. These two perspectives may paint an incomplete picture of the effect digital government will have on governments and their relationships with citizens and technology, as they both fail to take into account the fact that social and organizational structures undergo constant change, with information technology itself an integral element of those structures. Viewing e-government through the lens of structuration theory offers researchers interesting possibilities in exploring these relationships and insights into the complex interactions that shape the relationships among government, citizens and technology.

Keywords: Digital Government, E-government, Structuration Theory

1. Introduction

With the phenomenal growth of the Internet and e-commerce (Edmiston 2003), governments across the world have felt pressure to join the digital revolution (Strejcek and Theil, 2002). "E-Government" (also referred to as "Digital Government") is the result of attempts to accomplish this objective. Up to this point, there has been a struggle to precisely define digital government (Roy 2003), but of more concern is the fact that there has been no unifying theoretical framework for understanding the phenomenon (Gronlund 2005). In most cases, articles on e-government adopt viewpoints that reflect ideas taken from either the technological imperative or strategic choice views. This tendency may pigeonhole research regarding the possible effects and breadth of e-government, because these viewpoints treat technology and its use as objective and measurable, when in reality they are ultimately tied to contextual factors and individual groups or users and their interpretations of the technology. Neither the deterministic nor the strategic choice view adequately addresses this aspect of technology's recursive relationship with organizations and users.

The pervasive focus on IT use within organizations is also inadequate to fully explain the e-government phenomenon, as the scale is much greater and the context is different and more complex. Unlike businesses in the private sector, government as an overarching entity does not

have clearly defined tasks such as increasing profits or expanding market share. Instead, it strives to achieve broad goals such as the safety, freedom, and economic well-being of its citizens while attempting to balance conflicting interests from different constituent groups. What is needed is a theoretical framework that specifically addresses e-government issues under this light.

Gronlund (2005) introduces a theoretical perspective that establishes such a framework. In his perspective, e-government is viewed as an interactive phenomenon involving three interrelated entities: formal politics, administration and civil society. The model draws upon structuration theory's emphasis on the relationship between organizational structure and its members (Barley 1990; Markus and Robey, 1988; Roberts and Grabowski, 1996) to trace the recursive influence between an organization's properties and member behavior, in which change is often triggered by the introduction and implementation of new technology. In turn, the technology is often used in new or different ways from those initially envisioned and producing unforeseen consequences, thus altering both the organizational properties and the use of the technology itself.

The IT focus in Gronlund's model lies in examining the technology-facilitated interactions within and among three spheres of e-government domain (formal politics, administration and civil society) and what impact technology can have on these relationships. Information technology is viewed as an integral element of these spheres rather than a separate entity, as it enables some actions, constrains others, and is itself shaped by those same actions over time. Thus, the design and implementation of technology is inextricably linked to its use within organizational and social contexts.

In this paper, we use structuration theory to examine salient e-government issues in hopes of raising interesting and important research questions and inspire future research in the nascent field of e-government. We begin by briefly examining theoretical viewpoints represented in e-government research. Advantages of structuration theory are then discussed, followed by an examination of how technology has enabled change in government structure and how it may further enable or constrain processes associated with e-government.

2. Theoretical Background

Consistent with the tradition of IT research in the context of organizations, extant literature on e-government research largely falls into two categories based on how technology is treated within the organizational framework: technological determinism, which views technology as an immovable coercive entity that has deterministic outcomes; and strategic choice, which views technology as a tool that is used to serve specific organizational objectives. However, both viewpoints fail to recognize that technology often plays the dual role of both independent and dependent variable in many organizational and societal scenarios (Orlikowski 1992). On the other hand, structuration theory (Giddens 1984) based views acknowledge this dynamic by focusing on the effect technology can have on structure and the effect structure can have on technology, and therefore may provide a deeper understanding of e-government issues. In this section we review the literature on both technological deterministic and strategic choice perspectives in the context of e-government and then develop a structuration view of e-government research.

2.1 Technological Determinism

Technological determinism posits that technology is an overarching macrosocial force that exerts influence on organizational structure, individual action, and society in general. Determinism theorists argue that technological advances constrain organizational and societal choices and place emphasis on the monolithic nature of technology (Marx and Smith, 1994). Therefore, any business or societal processes that are commissioned, designed and deployed are wholly dependent upon current technology. Technological determinism views technology as self controlling or self determining - a force that is external to society yet is nevertheless an influential determinant of social and organizational change.

The power technology exerts in influencing change has been viewed both negatively and positively, as expressed by the technological utopianism and anti-utopianism views (Kling 1996). Technological utopianism views technology as the vehicle able to bring about utopian visions of society and focuses on highlighting the positive aspects of technology, assuming it will be used for good. Technological anti-utopianism represents the opposite view of technology, framing it as a means to facilitate social orders that are harsh or destructive.

In the context of e-government, when research reflects the deterministic point of view, it is usually in the form of utopianism, with emphasis placed on the current and future melding of Internet technology with government functions (Chen 2002; Devadoss et al. 2002). Most research reflects the notion that digital government is the inevitable wave of the future, with much to be gained and little to be feared. Articles addressing the dangers and threats inherent in digital government, such as unequal access to information and security threats, are relatively sparse (Halchin 2002; Shelley et al. 2004; Weber et al. 2003).

A strict deterministic outlook has disadvantages from both the utopian and anti-utopian viewpoint; although the utopian view of technology may stimulate hope in future possibilities and expand the realm of conceived possibility, it can be unrealistic and even misleading because it distracts attention from societal assessment of dilemmas and social choices that must be made to best use new technology. For example, privacy advocates are increasingly concerned about the danger advanced information technology presents to citizens (Colvin 2004; Onselen and Errington, 2004; Woodward 1997). The more heavily humans rely on technology, the more potentially dangerous it can become. Clearly, a utopian view of technology, in which technology will always be used for the improvement of society, is dependent upon which constituency is involved or represented. The anti-utopian brand of technological determinism does well in warning against the dangers technology presents, yet does so by taking the extreme opposite view – technology is viewed with a wary eye and only its negative possible effects are emphasized.

2.2 Strategic Choice

The strategic choice viewpoint offers theorists a less constraining conceptualization of technology. Technology is viewed as one of many useful tools that can be employed to accomplish goals established by organizational actors such as managers and employees. While technological determinism views technology as the independent variable and organizational or societal structure as a dependent variable, the strategic choice view (or the "organizational imperative") flips the relationship (Markus and Robey, 1988). The strategic choice view presumes that managers are the key players in the use and effect of technology (Orlikowski and

Iacono, 2002). IT is not viewed as an external force, but rather as a tool in the hands of organizational planners that will be used in its intended manner. The usual application of this principle involves manager decisions followed by subordinate use.

The main weakness of the strategic choice view is that technology is often used in manners different from those originally planned and produces unintended consequences (Orlikowski 1992). Indeed, the universal principle of actions producing unintended consequences applies to technology as much as it does to any other field. For example, GPS technology is currently used in automobiles and telephones as a way for users to determine their location, yet the technology could just as easily be used by the government to track its citizens (Crouch 2001). The same concern has been raised regarding RFID technology (Sullivan 2004). The Internet was originally used by the military and academia as a way of exchanging research related materials, yet now it is used for entertainment, financial transactions, information dissemination, and a host of other activities, completely altering the ways business is conducted and the manner in which people interact.

As well, the use and impact of technology is difficult to measure in any objective fashion because of the different groups it affects. For example, a municipal government's view of the success of traffic control video cameras may be very different from the view of an ordinary citizen who is concerned with personal privacy. The Internet is valued by countless millions as a way to search for legitimate information and entertainment, but many view it as a dangerous portal through which users can become addicted to pornography and other related vices (Stack et al. 2004).

In each of these cases, the technology in question is treated as objective and measurable, yet its exact impact and consequences are ultimately tied directly to the objectives of individual groups or users and their views of the technology and how it is used. Therefore, context is extremely important when designing and implementing information technologies. Neither the deterministic nor the strategic choice view adequately addresses this aspect of technology's recursive relation with organizations and users.

2.3 Structuration Theory

The relationships among technology, people, and organization have been a central focus of research within the IT field (Orlikowski and Robey 1991; Robey and Boudreau, 1999), often exemplified by examination of the interaction between organizational structure and members through the use of structuration theory outlined by Giddens (1984) and instantiated in different contexts by many subsequent studies (Barley 1990; Orlikowski 1992; Markus and Robey, 1988; Roberts and Grabowski, 1996). The recursive influence between an organization's structure and member behavior entails a relationship in which change if often triggered by the introduction and implementation of new technology. Indeed, social and organizational structures undergo constant change, and information technology is an integral element of those structures, as it enables some actions, constrains others, and is itself shaped by those same actions over time. Thus, the design and implementation of technology is inextricably linked to its use within organizational and social contexts. The properties of the technology constrain its own use and lead to an emergent set of rules and resources that shapes patterns of interaction among actors, organizations, and the technology itself (Orlikowski 1992).

This blending of organizational intentions and technology often gives rise to unexpected consequences; neither the technology nor the organizational properties can be accurately predicted when the interaction between the two is taken into account. Rather, in all phases of a technology's existence - from conception, to design, deployment, use, evaluation, and modification - the human actors involved can mediate effects in unpredictable manners. This is an especially important reality to keep in mind, because traditional government culture can lead to thinking that tends to accept technologies as artifacts with stable features and a fixed role (Allen et al. 2001). However, social structures undergo constant change, and information technology itself is an element of that social structure, shaped by actors and organizations over time. Prediction from a structuration theory viewpoint therefore requires a detailed understanding of organizational processes in addition to knowledge about the intentions of actors and the features of the information technology. It is this dynamic that makes structuration theory simultaneously complex and promising.

3. E-Government Research Using the Lens of Structuration

Structuration is "a social process that involves the reciprocal interaction of human actors and structural features of organizations (Orlikowski 1992)." In the case of e-government, structuration can be seen as involving three broad entities: government, technology, and citizens. These three are interrelated in that the relationship between government and citizens is increasingly shaped and mediated by technology, in effect altering the "structural properties" of the government/citizen relationship. Structural properties refer to the rules and resources that define human interactions with organizations (Orlikowski 1992), in this case government. Government will continue to feel pressure to restructure itself in order to maintain the viability of its relationship with citizens (Layne and Lee, 2001). Government restructurations in response to this pressure will necessarily include the introduction and implementation of new technologies within government (Dean 1999), and may themselves create further change in the structural properties of the government/citizen relationship. In turn, this change will be enabled through the use of technology that has been developed and implemented both to enact, and as a result of, the structural changes within government (see Figure 1).

Although the changes brought about by the structuration process are often positive (Cullen and Houghton, 2000; Devadoss et al. 2002), structuration theory also stresses focus on the unintended and possibly negative consequences of the process (Edmiston 2003; Jaeger 2003). In this section, we examine what, why, and how technologies have triggered change in government structure and in the citizen/government relationship. We then look at obstacles that may hinder the structuration process, and finish by examining unintended consequences of the use of technology.
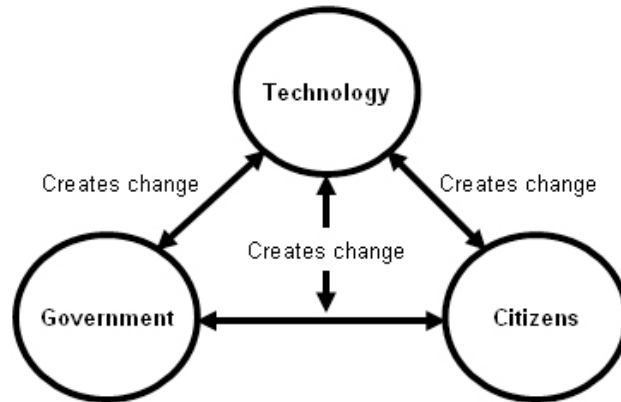
Figure 1: The relationship among technology, government and citizens

3.1 Structuration Technologies

Structuration technologies are technologies that either intentionally or unintentionally enact structural change by shaping structural properties between or within entities. A structuration technology is defined by its use – in essence, if a technology enacts structural change, it can be considered a "structuration technology." This definition is quite broad, and many information technologies fall within it. It should be noted that context is important, as the structural effect of technology use will be different depending on the context in which it is used.

The most obvious example of technologies that have changed the manner in which citizens interact with government is web sites and portals. Instead of waiting hours in line for various government information and services, citizens now have immediate access to much of it on the Internet. Thus far, online government functions have primarily been used for information dissemination (Lee 2002). The primary focus is government's ability to facilitate shorter and more efficient search methods (Whitson and Davis, 2001), with success factors such as ease of information access, information accuracy, information relevance, and information freshness (Cullen and Houghton, 2000). Although user-friendly information transactions have been seen as the key to success, it is likely that citizens will demand higher levels of service and transparency, much in the same way that consumers continually expect more features and services from private sector organizations (Zhang and Dran, 2001). This trend has already begun, as a host of government services are now becoming available electronically, such as tax filing and payment (Wang 2002), license registration and renewal (Allen et al. 2002), and interaction with government officials (Jaeger 2003). Some states have even experimented successfully with online voting (O'Looney 2000), which has the ability to 1) involve voters who are usually too apathetic to drive to polls and stand in line, and 2) increase the involvement of those with access to the Internet.

As more government services are being made available online, not only does the relationship between citizens and government change, but government must restructure itself in order to facilitate the evolving relationship. The increasing number and complexity of government services available online necessitates increased coordination among government agencies, exemplified through higher levels of horizontal and vertical integration. Horizontal integration refers to same-level integration across different government functions and services (Layne and Lee, 2001). In horizontal integration, databases across different functional areas communicate

with each other and share information so that information obtained by one agency will propagate throughout all government functions. Information technology's full impact on transforming the structural properties of the government/citizen relationship can only be realized through the horizontal integration of government services across different functional areas. For example, when a citizen applies for a driver's license after moving to another state, the basic residence record could be propagated to different functional service branches of government such as the Social Security Administration and the local election department so that the citizen does not have to fill out a personal record form for each governmental agency (Layne and Lee, 2001).

Technology	Activities and Actions Enabled	Unintended Consequences
Government web sites and portals	Citizen access to information and services: • Tax filing (Wang 2002) • Access to government information (Cullen and Houghton, 2000) • Vehicle registration (Allen et al. 2001) • Business license application and renewal (Layne and Lee, 2002)	• Identity theft (Jaeger 2003) • Illegal use of citizen information (Jaeger 2003) • Privacy violations (Friedman 2000)
	• B2B transactions (Devadoss et al., 2002)	• Private-public conflict (Heeks 2003) • Narrowed field of possible business partners • Standardization problems
	• Online voting (O'Looney 2000)	• Voting fraud and tampering (Zetter 2003) • Voting problems due to system blackout • Shift in the balance of political power • Digital divide expansion (Edmiston 2003)
Government databases	• Quicker search times (Allen et al. 2001) • Increased collaboration among government agencies (Layne and Lee, 2002) • Increased safety (Dean 1999) • Improved medical care (Orentlicher and Healy 1998)	• Identity theft (Jaeger 2003) • Illegal use of citizen information (Jaeger 2003) • Privacy violations (Friedman 2000)
Voter databases	• More personalized campaign marketing (Onselen and Errington, 2004)	• Privacy concerns (Onselen and Errington, 2004) • Increased spam
Political web sites	• Citizen access to information (Bowers-Brown and Gunter, 2002) • Increased citizen political involvement (Gibson and Ward, 2000)	• Digital divide expansion (Edmiston 2003) • Technology-influenced voting choices (Bowers-Brown and Gunter, 2002)
RFID	• Tracking student location and class attendance (Sullivan 2004) • Verifying government employees (Strickland and Hunt, 2005)	• Privacy violations (Strickland and Hunt, 2005) • System abuse (Strickland and Hunt, 2005)
GPS	• Tracking terrorist activity (McCullagh 2003) • Crime prevention (Crouch 2001)	• Privacy violations (McCullagh 2003)

Table 1: Structuration technologies

Vertical integration is the connection of local, state and federal governments for different functions or services (Layne and Lee, 2001). The goal of vertical integration is to integrate state systems with federal and local systems for cross referencing and checking. For example, a drivers license registration systems at state DMV's might be linked to a national database of truckers. Though the databases may be in different physical locations, the connections will become more and more cohesive as the databases are used for cross-checking purposes. Truckers who become licensed in a state would become a part of a national database of truckers at the federal level, and this vertical integration would ensure a trucker who had a license revoked in one state would not be easily licensed in other states (Allen et al. 2001). Another example is the business licensing process (Layne and Lee, 2001). In a vertically integrated system, once a citizen files for a business license with the city government, the information would automatically be sent to the federal government to obtain an employer identification number.

Horizontal and vertical integration are both reliant on an increase in the use of database technology to maintain data consistency and web technology to facilitate data transfer. The restructuration of government apart from the increasing use of interconnected databases would not be possible, depriving citizens of benefits such as safety, convenience, and security. An especially prominent topic is the use of government databases to centralize medical and criminal records. The past few years has witnessed discussion of the creation of a national health records database administered by the federal government (Alberta 2001). If personal health-care information were stored centrally, physicians and public-health officials would be able to quickly locate data needed to prevent, diagnose and treat disease and cope with medical emergencies. For example, if a person had a serious accident while in a different state, doctors there would have instant access to the patient's medical records. Locating the patient's family doctor and faxing the patient's medical history would be unnecessary, and if the patient had allergies to certain drugs, the doctors would be aware of it (Orentlicher and Healy, 1998).

The FBI and police departments across the nation have already created and linked databases to form a system known as the National Crime Information Center (Dean 1999). The FBI uses the system to link databases kept by state and local law enforcement agencies containing personal information and criminal histories to their national crime database. The goal is to increase information sharing across crime agencies in order to improve public safety. The NCIC includes fingerprints and mug shots, so when a criminal is detained by a state or local police officer, a fingerprint may be transmitted via computer to the NCIC database to locate relevant information. Governments are also using technologies such as RFID (Sullivan 2004), GPS (Crouch 2001), and Internet-connected video cameras (Marche and McNiven, 2003) in crime prevention efforts. The information retrieved through these means is often transmitted via the Internet and then stored in government databases. The net effect is an increase in government's awareness of possible criminal activities, although privacy issues are a growing concern (McCullagh 2003; Strickland and Hunt, 2005). The successful use of these technologies depends in large part upon increased horizontal and vertical integration, and the use of the technologies themselves may encourage further integration.

In summary, technology has dramatically altered the structural properties of the relationship between government and citizens. Information flow has increased in both speed and capacity between the two entities, and horizontal and vertical integration within government has been

triggered by the need to interact with and serve citizens. This integration has in turn been accomplished through the expansion in use of database and web technologies.

3.2 Opportunities and Obstacles

Perhaps the greatest hurdle facing government restructuring is transforming government culture into one that accepts change and is eager to implement and market new technologies in an attempt to improve the relationship with citizens. Large scale change within government agencies can be very difficult (Jaeger and Thompson, 2003). As a general rule, people are uncomfortable with change. Public employees themselves admit this tendency, and research suggests that this reluctance and similar personal issues such as turf battles are more consequential than technical barriers in implementing new technologies in state and local governments (Edmiston 2003). A recent U.S. government study found that the biggest concerns for e-government managers were not technical issues, but were policy issues such as lack of coordination and collaboration between agency leaders, agency-centric thinking, and lack of communication (Whitehouse.gov).

This problem may be especially salient when dealing with horizontal integration, which by its nature may require significant changes in the mindsets of government agency directors. When thinking in terms of information needs or transactions, many directors perceive their department as most important and ignore or disregard other agencies (Layne and Lee, 2001). This "silo" structure may work in industrial settings in which functions and services are specialized for economies of scale, but it may be counterproductive in an e-government context because of the need for horizontal integration. Allen et al. (2001) argue for a transformation in public sector governance and accountability as a necessary action for achieving digital government success.

Another pressing issue facing e-government is to how best to develop the infrastructure required to electronically link government and citizens. To establish cost-efficiency and provide effective implementation of services, government is expected to increase the number and depth of relationships with private vendors, which will likely result in disputes over contracting, insourcing, outsourcing and a proper private-public mix of IT solutions (Allen et al. 2001), not to mention concerns about security. Businesses are significant taxpayers and substantial consumers of government services, and thus have a significant financial interest in the development of e-government. Public-private partnerships (PPP) are an important component of e-government transition financing in many of the state and local governments that have successfully launched major e-government initiatives (Edmiston 2003). For example, IBM developed Arizona's vehicle registration program and operates the program on its own servers for $1 per transaction and 2% of revenues, resulting in significant cost savings (Snell and Moore, 1999).

The increase in public-private partnerships and the focus on transforming government will necessarily effect changes in the structure of government and its relationship with citizens. The increase in PPP's will necessitate new rules and regulations to help define the relationships, entailing an increase in centralization forces within government. Not only must actual business transaction protocol be established, but security procedures and controls must be put into place. Security is an especially salient issue in the online environment, and has been cited as a concern that may work to limit government involvement with private vendors (Allen et al. 2001). An alternative view is that PPP's may make government more accountable (Armstrong 1998). The

practice of involving external stakeholders could strengthen accountability to citizens by increasing transparency and bringing private sector know how to the table. Although the future extent of PPP activity is unknown, it appears certain that activity will increase, thus effecting change in the relationship between the government and citizens, not only through PPP's, but indirectly through the effect PPP's will have on services offered to the public at large.

3.3 Unintended Consequences
The dramatic structural changes facing government as a result of the digital revolution may result in a number of unintended consequences enabled by the increasing use of advanced information technologies. Particular concern arises regarding the topics of security and privacy. As the amount of information passed online between government and citizens continues to increase, the possibility for security breaches and misuse of information also increases. Identity theft is a growing problem that has been facilitated in large part by Internet technology and its inherent security flaws, and citizen trust in online transactions continues to lag thanks to high profile hackings of major corporations, academic institutions, and the even the CIA (Edmiston 2003). Security issues in e-government can include protecting against hackers and viruses, ensuring integrity of electronic records, halting authorized sharing or disclosure of information, and preventing the interception or falsification of information (Jaeger 2003).

The move towards greater horizontal and vertical integration within government will likely result in greater centralization of data, which may increase vulnerabilities and exacerbate privacy problems. The concept of privacy for the individual based on obscurity evaporates as databases share and match personally identifiable information with each other (Friedman 2000). The security concerns raised by September 11 and high crime rates has served to increase government surveillance and horizontal and vertical integration; internet-connected cameras are now commonplace in many large cities, tracking citizens to monitor everything from traffic violations to drug dealing (Marche and McNiven, 2003). In essence, as the amount of information collected by the government continues to rise and is stored in centralized databases, the opportunity for privacy violations and information misuse by either outside entities or government itself increases dramatically. As well, the public continues to be wary of government's increasing access to personal information. For example, Americans are extremely guarded about their medical information, and the overwhelming majority would not want their medical records stored in a national computerized database (Gallup 2000). 78 percent of Americans feel it is very important that their medical records be kept confidential, and 92 percent are opposed to allowing government agencies to have access to their medical records without permission.

Political parties have also begun to utilize databases to store information on potential voters (Onselen and Errington, 2004), and although the information is not as sensitive in nature as that stored by government agencies, privacy and security issues still arise, such as those created by the Homeland Security and the Patriot Act. The principles behind Homeland Security and the Patriot Act, while intended to increase public security, may have a negative impact on the dissemination of information that has been such a vital part of the transition to e-government. Recent alterations to federal laws by the Patriot Act in response to the threat of terrorism (Halchin 2002) may dramatically affect how the U.S. federal e-government sites collect information about users of the sites while limiting the amount of information available from

those sites (Jeager et al. 2003). In recent months, increasing amounts of federal agency online content has simply disappeared through agency security Web-scrubbing efforts (Aldrich et al. 2002). This is in direct contradiction to the spirit of e-government, and may substantially limit the number and scope of e-government initiatives. Indeed, Homeland Security has the potential to have a sizeable impact on e-government in terms of information access, privacy, security, and information collection (Jaeger 2003). In summary, increased security measures may partially counteract government agency attempts to be more open to citizens and transparent about the data they collect, which may serve to decrease citizen trust in government.

Another unintended consequence of e-government has been the creation of a "digital divide" between technology literate and technology illiterate blocks of civil society (Shelley et al. 2004; Weber et al. 2003). The digital divide may become an increasingly serious issue as large portions of society have the potential to eventually lose touch with government as information and services become increasingly digitized. The divide is relevant across racial lines, social class and educational attainment. For example, whites are more likely to own a computer (53.5%) and have Internet access (43.0%) than are non-Whites (39.4% and 29.1%, respectively), and urban citizens are more likely to have computers and Internet access than rural citizens (Edmiston 2003). Substantial differences in Internet access also appear across income and education lines (77.7% for the greater than $75,000 income class vs. 12.7% for the less than $15,000 class, and 64.0% for the college educated vs. 11.7% for those without a high school diploma). This fact that minorities, low-income and less educated sectors, and rural dwellers have less access to the Internet, and thus digital government services, is problematic for any democratic government, which by nature must attempt to give adequate consideration to all elements of civil society. It may also be problematic in the political sphere, as the increasing use of Internet technology by political organizations will only be relevant for that part of the public that is computer and Internet literate.

As we can see, there are a number of possible negative effects associated with the advent of e-government, brought about primarily through the increasing use of information technology. Although the benefits may be enormous, the possibilities for information misuse, information inequity, and privacy violations are also sizeable. It is thus recommended that government agencies focus on these issues during e-government initiatives and implementation schemes.

4. Conclusion

The topic of e-government is a promising field for research on the nature of relationships among government, citizens and technology. The amount of research in the field continues to grow, but most of it reflects ideas taken from the technological imperative and/or strategic choice views. These two perspectives may paint an incomplete picture of the effect digital government will have on governments and their relationships with citizens and technology, as they both fail to take into account the fact that social and organizational structures undergo constant change, with information technology itself an integral element of those structures. As an alternative, structuration theory can be used to view the relationships among government, technology, and citizens. The relationship between government and citizens is shaped and mediated by technology, altering the structural properties of the government/citizen relationship. Government responses to this relationship may create further change in the structural properties of government and the government/citizen relationship.

The framework presented in this article offers some interesting research possibilities. One avenue of research is examining what specific internal structural changes government has made in response to pressures exerted by the government/citizen/technology relationship. What obstacles have arisen during these processes, and what success factors can be identified? What have the consequences of change been? Also, what technologies are employed in achieving structural change, and how are they used? How do they contribute to horizontal and/or vertical integration, and what effects does increased integration bring?

Another topic is the unintended consequences of increased digitization and how these may affect the relationship between government and citizens. Technology is often used in ways other than intended, and its effects are also often unintended. What unintended effects will current or future technologies have? How will they be used? What are the positive and negative outcomes associated with use, and how will they affect government's relationship with citizens? Clearly, structuration theory offers researchers a number of interesting possibilities in exploring digital government by examining the dynamic relationship among government, citizens and technology.

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