

Technological Innovation in Public Organizations through Digital Government

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INTRODUCTION

The rapid adoption of computer networks, such as the Internet and the World Wide Web (WWW), within various segments of society has spurred an increased interest in using such technologies to enhance the performance of organizations in both the public and private sectors. While private sector organizations now commonly employ electronic commerce, or e-commerce, strategies to either augment existing business activities or cultivate new groups of customers, organizations at all levels of government have also begun to pay renewed attention to the prospects of using new forms of *information and communication technology* (ICT) in order to improve the production and delivery of services. As with many technologies, the increased use of ICT by government was in response not only to the increased use of ICT by government stakeholders, such as citizens or businesses, but also in response to a growing call for governmental reform during the 1990s. As public organizations at the federal, state, and even local level began to initiate organizational reforms that sought to bring private sector norms to government, they often sought to employ ICT as means to increase efficiencies and organizational coordination (Gore, 1998; Osborne & Gaebler, 1993). Such attempts to reform the operations of public organizations were a key factor in promoting an increased interest in use of new forms of ICT (Fountain, 2001). This growing focus on the broader use of ICT by public organizations came to be known as *digital government*.

The term, *digital government*, grew to mean the development, adoption, and use of ICT within a public organization's internal information systems, as well as the use of ICT to enhance an organization's interaction with external stakeholders such as private-sector vendors, interest groups, or individual citizens. Some scholars more specifically characterize this broader use of ICT by public organizations according to its intended purpose. Electronic government, or *e-government*, has often been used to describe the use of ICT by public organizations

to provide programmatic information or services to citizens and other stakeholders (Watson & Mundy, 2001). For example, providing an online method through which citizens could conduct financial transactions, such as tax or license payments, would be a typical e-government activity. Other uses of ICT include the promotion of various types of political activity and are often described as electronic politics, or *e-politics*. These types of ICT-based activities are often characterized as those that may influence citizens' knowledge of, or participation in, the political processes. For instance, the ability of an elected body of government, such as a state legislature, to put information about proposed legislation online for public comment or to actually allow citizens to contact members of the legislature directly would be a simple example of e-politics.

However, ICT is not a panacea for every organizational challenge. ICT can introduce additional challenges to the organization. For example, the increased attention on employing ICT to achieve agency goals has also brought to the forefront the potential difficulty in successfully developing large-scale ICT systems within U.S. government agencies. For example, the Federal Bureau of Investigation's (FBI) recent announcement that it may have to scrap its project to develop a Virtual Case File system that was estimated to cost \$170 million (Freiden, 2005). The adoption of new ICT is often marked by setbacks or failures to meet expected project goals, and this characteristic is certainly not limited to public organizations. However, adherence to public sector norms of openness and transparency often means that when significant problems do occur, they happen within view of the public. More significantly, such examples highlight the difficulty of managing the development and adoption of large-scale ICT systems within the public sector. However conceptualized or defined, the development, adoption, and use of ICT by public organizations is a phenomena oriented around the use of technology with the intended purpose of initiating change in an organization's technical and social structure. Since the development and

adoption of new ICT, or new ways of employing existing ICT, are necessarily concerned with employing new technologies or social practices to accomplish an organizational goal, they meet the basic definition of technological innovations (Rogers, 1995; Tornatzky & Fleischer, 1990). If public organizations are to improve their ability to adopt and implement new ICT, they should better understand the lessons and issues highlighted by a broader literature concerning technological innovation.

TECHNOLOGICAL INNOVATION AS A THEORETICAL FOUNDATION FOR DIGITAL GOVERNMENT

Since the adoption and use of ICT by public organizations can be considered a form of technological innovation, studies examining various aspects of the development, adoption, and eventual routinization of new technologies may illuminate the social and technological factors that influence digital government initiatives and strategies. Researchers often describe technological innovation in terms of loose overlapping stages or steps. Some conceptualizations of the innovation process include up to five progressive stages: awareness, matching, adoption, implementation, and routinization (Tornatzky & Fleischer, 1990). Other researchers have collapsed these five stages into just two broad phases, initiation and implementation, because each of the two stages is influenced by different factors (Damanpour, 1991). The initiation stage includes activities such as problem perception, information search, attitude formation, and the attainment of resources. Implementation includes activities such as modification of the technology or practice, the adjustment of necessary organizational practices or operations, early use and more routine use of the innovation. Regardless of the actual number of stages in the innovation process, it is important to note that the process may, or may not, occur in a linear fashion, and all innovations may not experience each stage. In fact, some research specifically highlights the occurrence of setbacks, and even reversals, with regards to the innovation process (Rogers & Agarwala-Rogers, 1976; Tornatzky & Fleischer, 1990).

While the broader process of technological innovation is often described in terms of stages, the interaction of the actual technology with the social and technical factors of the organization plays an important role in how the innovation will progress. A technology's particular characteristics strongly influence whether or not a particular technology will be adopted and implemented by a particular organization. While studies of innovation have examined numerous technologies, relative advantage, ease-of-use, and compatibility of the respective technol-

ogy seem to be repeatedly linked to whether or not a particular technology will be adopted by an organization (Tornatzky & Klein, 1982). The extent to which a particular technology alters current organizational processes or outputs also plays a key role in the innovation process. So-called, radical innovations usually involve a major transformation of an organization's processes or outputs, and/or significantly impact the organization's key stakeholders (Dewar & Dutton, 1986; Ettlie, Bridges, & O'Keefe, 1984). Radical innovations are clear departures from an organization's technological norms and, therefore, generally experience more risks for failure or setbacks than do technological innovations that involve only slight changes in an organization's current technological environment.

Several key types of organizational factors seem to influence the process of technological innovation. These include awareness or knowledge of the innovation, available resources, ties to the external environment, and organizational structure (Rogers & Agarwala-Rogers, 1976). During the initial stages of the innovation process, the organization must detect some need to use a new technology to alter organizational processes and performance, and must be aware of the potential advantage of employing a particular technology. This awareness may come in the form of personnel within the organization or from external experts, but the organization must be able to both detect the need to undergo technologically grounded change and match that need to a new technology that already exists or will be developed. Once the need for a technological innovation exists, the organization must then have enough resources to acquire the technology and integrate it into organizational processes. Resources may come in the form of expertise already possessed by an organization's personnel, existing technologies and technical infrastructure, or the financial assets required to attain such resources from outside the organization itself.

In addition to the role of knowledge and resources, an organization's structural arrangements can also play an important role in successfully adopting and developing new technologies. For instance, organizations with high levels of structural complexity, less formalization, and low centralization tend to adopt more technological innovations than do organizations with high levels of formalization and more centralized structural characteristics (Damanpour, 1991; Duncan, 1976). This does not mean, however, that such factors automatically promote the successful implementation of new technologies, since in some situations successful implementation often requires the resources and support of key organizational personnel, such as senior managers. Such support and attention might be available more readily in organizations with more formal and centralized organizational structures because senior managers may play a more central, and visible, role

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