Adoption of open government data among government agencies

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ABSTRACT

With an emerging interest in open government data (OGD) around the world, there has been an increasing need for research on the determinants of OGD adoption. This study examines factors influencing the adoption of OGD among government agencies in Taiwan to fill the existing knowledge gap. Accordingly, based on previous research on innovation adoption, we develop a research model that integrates the technology–organization–environment (TOE) framework and the following four factors that are central to adoption decisions: perceived benefits, perceived barriers, organizational readiness, and external pressures. We examined this model through survey data from 342 government agencies of the Executive Yuan in Taiwan. The results show a significant positive relationship among perceived benefits, organizational readiness, and external pressures and the adoption of OGD by government agencies. This study creates a valuable reference for other countries in the early stages of OGD initiatives and has significant implications for governmental policy practitioners.

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1. Introduction

"Making public sector information freely available in open formats and ways that enable public access and facilitate exploitation has been termed open government data (OGD)" (Kalampokis, Tambouris, & Tarabanis, 2011, p. 17). In recent years, we have witnessed a renewed interest in OGD around the world. Considerable open data policies have been developed, for example, by the United States (White House, 2009, 2013), the United Kingdom (Mayo & Steinberg, 2007), Europe (European Commission, 2003), and Australia (Office of the Australian Information Commissioner, 2011). Nevertheless, most of these initiatives are still in their infancies, resulting in less research to understand the execution of the policies and their impacts.

Although OGD initiatives are guided by national policies, they are accompanied by many impediments. Previous research has shown several factors that obstruct the use of OGD, such as the institutional and technical levels, the task complexity of handling the data, data access, data use, data deposit, legislation, and information quality (Janssen, Charalabidis, & Zuiderwijk, 2012; Zuiderwijk, Janssen, Choenni, Meijer, & Alibaks, 2012). Clearly, these barriers discussed are related not only to the technical nature and data users but also data providers. Considering that the concept of OGD is still in its infancy, if public sectors were not ready for the adoption and usage of OGD, the cost of investment would be simply wasted and have no substantial impact. An understanding of OGD adoption among government agencies, therefore, is crucial to the success of any OGD initiative.

Several studies have been discussed concerning OGD in recent years that have concentrated on different issues, such as policy-making related perspectives (Zuiderwijk & Janssen, 2014), OGD and technology (Lorenzi, Vaidya, Chun, Shafiq, & Atluri, 2014), strategic frameworks for OGD initiatives (Jetzek, Avital, & Bjorn-Andersen, 2012; Meijer & Thaens, 2009), and analysis of benefits and barriers (Janssen et al., 2012; Zuiderwijk et al., 2012). Some past studies have explored factors that influence OGD adoption in government agencies; however, no studies have explored this issue from innovation adoption perspectives.

OGD are innovations that result from new government services that are offered via information technology (IT) platforms. Understanding the determinants of OGD adoption in government agencies from an innovation perspective can help reveal and acquire insight into challenges associated with this emerging trend. We thus review studies related to innovation adoption to develop our research framework. We employ Tornatzky and Fleischer's (1990) technology–organization–environment (TOE) framework to conduct a systematic analysis of the factors that influence OGD adoption in public sector organizations. The factors employed have been extensively used in innovation adoption studies and are appropriate for explaining factors that influence government agency OGD adoption decisions (i.e., perceived benefits, perceived barriers, organizational readiness, and external pressures).

This study was conducted in Taiwan, which is an ideal venue for two reasons. First, over the past several years, Taiwan's efforts to provide e-government services have been well-recognized. Second, the Taiwanese government officially launched an OGD policy in 2012. Government data interchange among government agencies is critical in the early stages of OGD initiatives. Thus, by identifying and understanding the factors that determine government agencies' adoption of OGD in Taiwan, this study can create a valuable reference for other countries.

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This study contributes to the literature in several ways. First, this study presents a new perspective on innovation adoption to identify significant determinants of OGD adoption. Second, this study serves as a first attempt to advance knowledge on OGD adoption by empirically testing a research model that integrates various aspects of the TOE framework, cost–benefit perspectives, organizational readiness, and external pressures of institutional theory in the context of OGD innovation. Finally, the managerial implications of this study will benefit governmental policy practitioners.

This paper is organized as follows: the following section reviews relevant literature on OGD, OGD adoption as an innovation, and a theoretical framework of OGD adoption. Hypotheses are developed based on TOE framework in Section 3, while research methodology is presented in Section 4. This is followed by research results, discussion of findings, and implications in subsequent sections. The paper concludes with contributions, limitations, and directions for future research.

2. Background

2.1. Open government data

In recent years, an increasing number of studies have discussed OGD. Their efforts offer an understanding of OGD from the following three perspectives: (1) policy-making; (2) implementation; and (3) impact.

2.1.1. Policy-making

Some previous studies have introduced and compared current policies with regard to OGD (e.g., Bates, 2014; Janssen, 2011; Jung & Park, 2015; Zuiderwijk & Janssen, 2014). For example, Zuiderwijk and Janssen (2014) develop a framework for comparing open data policies to create a better understanding of the common and differentiating elements in the policies and to identify the factors affecting the variation in policies. The framework encompasses the factors of environment and context (Eskelinen, Frank, & Hirvonen, 2008; Huijboom & Van den Broek, 2011), policy content (Harrison et al., 2011; Rothenberg, 2012), performance indicators (Dawes & Helbig, 2010; Dawes, Pardo, & Cresswell, 2004; Harrison et al., 2011) and public values (Harrison et al., 2012). More recently, Jung and Park (2015) also provide an overview of the background and content of the Open Public Data Directive, a long-term plan to implement South Korea's "open public data" policy from 2013 to 2017. These efforts contribute to the development of new open data policies and the improvement of existing open data policies.

2.1.2. Implementation

The second line of research in OGD has mainly centered on the implementation of OGD. The related issues include the impediments to OGD (Huijboom & Van den Broek, 2011; Janssen et al., 2012; Meijer & Thaens, 2009; Zhang, Dawes, & Sarkis, 2005; Zuiderwijk et al., 2012), OGD and technology (Kavanaugh et al., 2012), predictors of OGD adoption (Zuiderwijk, Janssen, & Dwivedi, 2015), evaluation of OGD initiatives (Attard, Orlandi, Scerri, & Auer, 2015; Ganapati & Reddick, 2012), guiding models for OGD implementation (Lee & Kwak, 2012; Solar, Daniels, López, & Meijueiro, 2014; Veljković, Bogdanović-Dinić, & Stoimenov, 2014), and a classification scheme (Kalampokis et al., 2011) or strategic frameworks (Jetzek et al., 2012; Meijer & Thaens, 2009) for OGD initiatives. For instance, many studies have investigated numerous impediments to opening and using data. The factors that obstruct the use of open data are revealed from different viewpoints, such as data provider (e.g., institutional level) and data user (e.g., data access, data use, data deposit, and task complexity). In addition to the two human-related perspectives, the impediments also have a technological nature, which can be observed in several studies that explore technologies to facilitate access to OGD (Kavanaugh et al., 2012; Lorenzi et al., 2014). Moreover, Ganapati and Reddick (2012) examine the extent to which state governments in the United States have adopted open e-

government initiatives in terms of transparency, participation, and collaboration. The results show that nearly two-thirds of the Chief Information Officers of state surveyed felt that they have achieved high levels of open e-government. Furthermore, several studies have developed guiding models (Lee & Kwak, 2012; Solar et al., 2014), and frameworks for strategic options (Jetzek et al., 2012; Meijer & Thaens, 2009) or a classification scheme (Kalampokis et al., 2011) for OGD initiatives. These studies contribute to a deeper understanding of initiatives and provide agencies criteria for generating and prioritizing OGD initiatives.

2.1.3. Impact

There are relatively little empirical data available on the effects of the various policy approaches used when opening data. Although the release of government data may ultimately lead to significantly enhanced efficiency, some obstacles have emerged and may account for less than expected gains, such as lack of technological knowledge in the public sector, negative attitudes among public officials, and a lack in recognition of the value of data (Halonen, 2012). In addition, several studies discuss this issue with different research focuses. For example, Jetzek et al. (2012) proposes a framework of strategic options to guide a structured analysis of the economic and social impacts of OGD emphasizing its value to both the public and private sectors. They expect OGD initiatives to generate value and substantial returns through increased transparency, efficiency of government activities, citizen participation and entrepreneurial activity. In addition, Janssen et al. (2012) analyze the benefits of and barriers to open data systems by synthesizing people's experiences with open data obtained from interviews and a group session. Furthermore, Kassen (2013) explores the empowering potential of open data at the local level as a useful platform to promote civic engagement projects and provide a framework for future research and hypothesis testing. These efforts reveal the potential enormous value of OGD that is expected to substantially impact public and commercial sectors, non-profit initiatives, civic engagement, etc.

OGD are critical policies because they ultimately ensure government information transparency (Jaeger & Bertot, 2010). Despite considerable attention that has been dedicated to OGD, no overview on determinants of OGD adoption among public agencies based on perspectives of innovation adoption has been conducted. In the following section, we discuss OGD adoption from an innovative perspective and review research on innovation adoption to develop our research framework.

2.2. Open government data adoption: an innovation perspective

The OGD concept is not only a political idea but also a new government service provided via IT platforms. According to Kassen (2013), OGD is often depicted as a political entity that "advocates for citizens' rights to have free access to information about their government at the federal and local level via the use of digital government platforms" (e.g., Lathrop & Ruma, 2010; Meijer, Curtin, & Hillebrandt, 2012; Robinson, Yu, Zeller, & Felten, 2009). The technological nature of OGD has also been examined in previous research.

Kassen (2013) notes that OGD can be described as "an official web-portal launched at the federal or local level aimed at making certain types of governmental datasets publicly accessible via internet in a machine readable format". A machine-readable format is one of significant principles for implementing OGD. According to the U.S. Office of Management and Budget (2013), to ensure that released data are fully accessible and usable by end users, formats should be machine-readable (i.e., data are reasonably structured to allow for automated processing). Such a structure is often standards-based and attached to high quality metadata so that it can be easily located and linked to similar information using standard web search applications.

All ideas, practices, or objects that are viewed as new by an individual or other unit of adoption are called innovations (Rogers, 1995). As a government service delivered via new technology applications, OGD can be viewed as an innovation. Numerous previous studies on