Cloud Computing in eGovernment: Proposing a Conceptual Stage Model

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ABSTRACT

Electronic Government (eGovernment) is currently facing significant challenges particularly due to the economic crisis which suggests governments should provide more with fewer resources. During the last few years, cloud computing emerged as a new computing paradigm with significant potential. The use of cloud computing in eGovernment has inevitably attracted significant attention from the research community. However, views of researchers and practitioners about the ways and the extent to which cloud computing can be adopted at the national level in order to facilitate eGovernment vary notably. The aim of this paper is to map cloud computing adoption by governments. For this purpose, a stage model was developed by employing the thematic analysis method based on both academic and grey literature. The proposed model is applicable at the national level and consists of four stages: ad-hoc eGov cloud solutions, cloud-based public services, eGov cloud(s) and diffusion of cloud computing in eGov. It should be noted that at this phase the authors’ research is of an exploratory nature thus the model has not been validated with empirical data. Its purpose is to facilitate further research on the topic and help governments determine their progress in adopting cloud computing.

KEYWORDS


INTRODUCTION

Most governments around the world use Information and Communication Technology (ICT) to provide services in a more effective way. Although the benefits from adopting Electronic Government (eGovernment) can be considerable, its implementation is restricted by important barriers, such as high costs (Ebrahim & Irani, 2005; Pokharel & Park, 2009; Tsaravas & Themistocleous, 2011), absence of experts (Ebrahim & Irani, 2005; Pokharel & Park, 2009), heterogeneous and incompatible information systems, and security and private issues (Ebrahim & Irani, 2005; Tsaravas & Themistocleous, 2011).

Cloud computing has recently emerged as a new paradigm in which “data and computation are operated somewhere in a cloud, which is some collection of data centers owned and maintained by a third party” (Jin et al., 2010, p.3). Cloud computing suggests that, using the internet, the organization is able to increase or decrease its computing resources depending on the actual needs (Belanger & Van Slyke, 2012, p. 130). Cloud computing includes three service models: Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). Computing resources that can be acquired via the cloud include software applications (SaaS model), development platforms (PaaS model) and/or storage, processing power and other technical infrastructure (IaaS model).

Scholars have shown a vivid interest in cloud computing adoption by companies. More specifically, they have tried to determine the factors that affect the decision to adopt cloud computing. Complexity,
technological readiness, top management support, firm size, competitive pressure and relative advantage are among the most frequently listed determinants of cloud computing adoption (Low, Chen, & Wu, 2011; Gangwar, Date, & Ramaswamy, 2015; Hsu, Ray, & Li-Hsieh, 2014; Lin & Chen, 2012; Oliveira, Thomas, & Espadanal, 2014). The factors of cloud computing adoption usually differ depending on the context or the specific characteristics of the firm. For example, the adoption of cloud computing by SMEs is affected by additional factors such as geo-restriction, innovativeness, ease of use, convenience and external computing support (Alshamaila, Papagiannidis, & Li, 2013; Gupta, Seetharaman, & Raj, 2013). In addition, the adoption of a cloud ERP has been found to be affected by switching benefits and costs and perceived risk (Fan, Wu, Chen, & Fang, 2015).

The promising benefits of cloud computing has also led an increasing number of public sector authorities worldwide to rush on adopting it to some extent. The United States of America is the first country to even launch a cloud computing strategy. The boost of cloud computing has inevitably led academics and practitioners to investigate its overall suitability for eGovernment. However, there is still significant absence of journal articles on the topic. In addition, there are different views about how cloud computing can be implemented in an eGovernment context that range from realizing cloud computing as just a form of IT outsourcing to an evolutionary paradigm that will reform the whole structure of eGovernment. Clarifying and evaluating the different options of integrating cloud computing into eGovernment will help practitioners in road mapping and decision making. Also, it will highlight the research gaps in the area, facilitating the growth of relative literature. As Rana et al. (2011) have noted in their literature review of eGovernment research, most of the studies in the area focus on the overall growth of eGovernment in different countries, although knowledge for more specific areas of development in eGovernment at wider level is also required.

The main goal of this study is to map cloud computing adoption by governments. In order to achieve this goal we conducted a literature review following the guidelines of Webster and Watson (2002). Then, we analyzed the academic and grey literature in the topic, by conducting a thematic analysis, an approach that “identifies key themes in the text” and “can be used to build theoretical models or to find solutions to real-world problems” (Guest, MacQueen and Namey, 2012, p. 17). The results are presented in the form of a stage model that contains states of cloud computing adoption by national governments. We expect that the proposed model will help towards organizing the growing literature and will start a discussion on the topic of cloud computing adoption by governments.

The remainder of the paper is organized as follows: First, we review the most well-known IT and eGovernment stage models and then we describe the methodology that was followed in order to form the conceptual stage model. The Results section comes next, in which the themes that were derived from the analysis and the stage model are presented. The last two sections – Discussion and Conclusions – are dedicated to discussing the study’s results, implications, directions for future work and concluding remarks respectively.

STAGE MODELS IN IT AND EGOVERNMENT RESEARCH

Stage models have been widely used in the literature to describe various phenomena such as organizational life cycle, product life cycle, change management etc. They are based on the assumption that there are predictable patterns in the growth of organizations, IT maturity, and the growth of living organisms that can be presented as stages or phases (Gottschalk & Solli-Sæther, 2009, p.109). According to King and Teo (1997) these stages are sequential in nature, describe a hierarchical progression that is not easily reversed and include a wide variety of organizational activities and structures. In the Information Systems literature, stage models have been used to capture the adoption
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