Future Research on Cloud Computing Adoption by Small and Medium-Sized Enterprises: A Critical Analysis of Relevant Theories

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ABSTRACT

This paper delivers some initial insights into the range of theories that need to be integrated to provide a holistic explanation of Cloud Computing (CC) adoption by Small and Medium-Sized Enterprises (SMEs). To achieve this outcome, this paper firstly critiques the two commonly used Information Systems (IS) adoption/diffusion theories: the Technology Acceptance Model and Diffusion of Innovation Theory. It then evaluates the suitability of the Technology-Organization-Environment framework as an IS adoption theory and Actor-network Theory as an innovation translation approach for future research on developing an integrated theoretical framework for CC adoption by SMEs.

Keywords: Actor-Network Theory, Adoption, Cloud Computing, Information Systems (IS), Small and Medium-Sized Enterprises (SMEs), Technology-Organization-Environment Framework

INTRODUCTION

According to Marston et al. (2011, 176), Cloud Computing (CC) can be defined as “an information technology service model where computing services (both hardware and software) are delivered on-demand to customers over a network in a self-service fashion, independent of device and location.” CC represents “a fundamental change in the way Information Technology (IT) services are invented, developed, deployed, scaled, updated, maintained and paid for” (Marston et al., 2011, 176).

CC can deliver computing services to both individuals and organizations. Individuals use a web browser such as Internet Explorer or Firefox to receive computing services via the Internet (Kim et al., 2009), thus they only need to pay for the computing services they actually use. Although some CC service providers
apply subscription-based policies, numerous providers offer part or all of their services for free: for example, Yahoo (email services), Facebook (storing data such as pictures and videos), and Google (Google Docs). In terms of organizations, CC service providers are able to rent out their computing services (hardware and software) based on organizations’ actual demand (Jain & Bhardwaj, 2010). Hence, organizations are able to outsource their computing resources, or in other words, pay for accessing hardware and software outside their premises dynamically. This results in lower costs due to factors such as reduced electricity consumption and smaller IT staff requirements (Catteddu & Hogben, 2009). Amazon (e.g., Amazon Elastic Compute Cloud) is a vivid example of a cloud service provider that rents out its services to firms and organizations.

CC includes three forms: public, private and hybrid cloud (Marston et al., 2011; Das et al., 2011). Private clouds are on-premises clouds which are built inside the firm’s own firewall (Benton, 2010b). In other words, private clouds are considered as the internal clouds for firms and can be accessed by users in various departments of the enterprise (Kim et al., 2009). Therefore, individual business units will pay the IT department for these remote computing services (Low et al., 2011). In comparison, public clouds are referred to as the off-premises clouds where their IT infrastructures are built outside of the enterprises’ own firewall (Marston et al., 2011). Hybrid clouds are a combination of public and private clouds (Khajeh-Hosseini et al., 2010) whereby “typically, non-critical information is outsourced to the public cloud, while business-critical services and data are kept within the control of the organization” (Marston et al., 2011, 180). To incorporate the benefits of public clouds with the privacy and security of private clouds, most of the firms are expected to deploy hybrid clouds which will enable enterprises to transfer part of their IT services to the public cloud, while the rest are maintained internally (Khajeh-Hosseini et al., 2010, Benton, 2010b, Low et al., 2011).

CC comprises three service models, including Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS) (Goscinski & Brock, 2010, Wu, 2011, Low et al., 2011). In SaaS, cloud service providers offer their software applications via the Internet (Sultan, 2010). In comparison to conventional IT solutions, in SaaS, there is no need to download and install any software applications (Jain & Bhardwaj, 2010). However, the cloud service providers rent out their software applications over the Internet (Goscinski & Brock, 2010, Benton, 2010a, Wu et al., 2011, Low et al., 2011, Khajeh-Hosseini et al., 2010). Thus, individuals, firms and organizations pay for their services on-demand, based on a subscription pricing model (Benton, 2010a). At the platform level, CC service providers offer application developers which are nearly identical to the traditional desktop settings (Benton, 2010a). “The emergence of such platforms allows independent software vendors and IT staff to develop and deploy online applications quickly using third-party infrastructure” (Benton, 2010a). In IaaS, the CC service providers offer the on-demand raw computing resources to the users (Goscinski & Brock, 2010). Unlike traditional hosting services, which provide dedicated hardware to customers, IaaS model accommodate fluctuating demand from different user (Low et al., 2011). Therefore, greater elasticity and cost advantages compared to traditional datacenters are provided (Benton, 2010a).

The term ‘organizations’ includes Small and Medium-sized Enterprises (SMEs), enterprises that employ between 50 and 250 people and have an annual turnover not exceeding 50 million euro, and/or an annual balance sheet total not more than 43 million euro (European Union, 2009). According to Benton (2010b), cloud-based systems can assist organizations and enterprises, including SMEs, in four areas. First, the use of CC can enable SMEs to build a flexible ecosystem, enabling them to outsource part of their business and join with other business processes (i.e., team up with other parties) us-

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