CLOUD ADOPTION: RELATIVE ADVANTAGE OR IT FASHION?

Research in Progress

Ariana Polyviou, Athens University of Economics and Business, SingularLogic S.A., Athens, Greece, apolyviou@aueb.gr
Nancy Pouloudi, Athens University of Economics and Business, Athens, Greece, pouloudi@aueb.gr
Katerina Pramatari, Athens University of Economics and Business, Athens, Greece, k.pramatari@aueb.gr

Abstract

Cloud computing is a recent trend that has transformed the IS resource provisioning industry. However, the hype that cloud computing has received lately in combination with the ‘must-deploy’ imperative usually used by its promoters, makes it easy for decision makers to lose track of the reasons that make cloud computing valuable to business. At the same time, the IS research community has focused on addressing the factors that affect cloud adoption, paying little attention to the impact of external factors. Reviewing earlier work on diffusion of innovation theory and based on a preliminary qualitative research, we note that a main driver for cloud adoption is a set of factors that mark its relative advantage compared to earlier provisioning service models. Taking into account our interview data and fashion management theory, we extend earlier research work by introducing the tendency of organizations to follow IT fashion as a reason that also influences cloud computing adoption. We therefore propose a research model that takes into account both relative advantage and fashion drivers for cloud adoption and we discuss further steps and control dimensions for empirically testing this model in future work.

Keywords: Cloud adoption, Fashion Management, Hype, Relative Advantage.

1 Introduction

In order to consider strategic and organizational change dilemmas related to innovations and decide whether to adopt or reject an innovation, it is necessary for decision makers to understand the consequences that the adoption of the innovation would bring to the organisation (Rogers, 1995). If the consequences of the innovation can be clearly understood, then the decision making process can be a purely rational one, derived solely on the efficiency drivers that are associated with the innovation. However, at certain stages of the diffusion, the consequences arising by the adoption of the innovation are difficult to be understood. Seizing this opportunity, fashion setters (e.g. consultants, gurus etc), create hype around selected innovations and promote them as ‘must-deploy or fail’ opportunities in an effort to influence the adoption of the innovation (Abrahamson, 1996; Kieser, 1997). As a result, at certain stages of diffusion the ‘know-why’ of adopting the innovation is muddled with the hype that surrounds the innovation (Swanson, 1994) and hence waves of fashionable innovations often end up shaping practise (Wang, 2001).
Cloud is a relatively new service technology deemed to have revolutionised technological service provisioning in the last years. For the purposes of this paper, we consider cloud as defined by the National Institute of Standards and Technology (NIST): comprising three service models: Infrastructure-As-A-Service (IaaS), Platform-As-A-Service (PaaS) and Software-As-A-Service (SaaS) and capturing five essential characteristics; on-demand self-service, broad network access, resource pooling, rapid elasticity, measured service (Liu, et al., 2011). Cloud has been characterized as the upcoming ‘fifth utility’, besides water, gas, electricity and telephone (Buyya, et al., 2009). At the same time, consulting companies urge to promote cloud by predicting its adoption rate to grow exponentially in the next few years (Anderson, et al., 2013), cloud vendors are already actively participating in cloud associations, forums and exhibitions. Based on these we could anticipate that hype about cloud computing has already boomed.

So far, cloud computing adoption research has been to some extent challenged by the academic community. Initial empirical efforts to understand cloud computing adoption have focused mainly on the advantages and the disadvantages of the technology per se (Janssen & Joha, 2011; Köhler, et al., 2010; Khajeh-Hosseini, et al., 2010). Recently, some empirical studies attempted to understand cloud adoption by also considering external factors and their impact on the adoption (Morgan & Conboy, 2013; Alshamaila, et al., 2013). This was achieved mainly by deploying the Technology-Organisation-Environment (TOE) framework of Tornatzky and Fleischer (1990). Although these studies contributed to cloud adoption literature by considering factors that go beyond the technology context and are associated to the organisation and the environment, they failed to capture the hype that surrounds cloud and therefore they did not address whether IT fashion also influences cloud adoption.

Beyond the relative advantage that the cloud technology brings compared to previous systems, through this paper we argue cloud adoption is also influenced by the tendency of organisations to follow IT fashion. Aiming to contribute to the understanding of cloud adoption decisions, we propose a framework that juxtaposes relative advantage and IT fashion in respect to their impact on the intention to adopt cloud. To form our framework we draw on both; diffusion of innovation and fashion management theories and the results of an exploratory qualitative study. In Section 2 we present our theoretical background in more detail and discuss existing literature on cloud computing adoption. Building on Section 2 and a preliminary qualitative study on cloud computing adoption, in Section 3 we develop a set of research hypotheses and model and we discuss the next steps for empirically testing it. Section 4 summarises the paper and outlines the expected contribution.

2 Literature review

2.1 Theoretical background

According to the theory of diffusion of innovation, innovation is an idea, practice or technology that is new to an organization which is considering its adoption (Rogers, 1995). Diffusion of innovation occurs when the new idea is spread to organisations through certain channels (e.g. mass-media) over time. After becoming aware of the innovation and gaining initial knowledge about it, organisations are expected to develop an attitude towards it (favourable or unfavourable) and then to decide whether to adopt or reject it (Rogers, 1995). At this stage, decision makers are looking for reasons justifying why the innovation should be adopted. As an innovation’s adoption decision usually involves a high level of uncertainty, decision makers seek information or means that could assist them in evaluating the innovation and increase their understanding about the innovation’s potential consequences. Rogers (1995: 212), outlines aspects that influence the decision to adopt; among them relative advantage, defined as the degree to which the innovation is perceived as a better idea compared to the one it supersedes.
The literature on innovation diffusion attempts to explain how information about the consequences of an innovation can assist its adoption decision and the extent of the diffusion. However, beyond the benefits that a technological innovation can bring to the organisation, several parameters relevant to the context into which the innovation is to be introduced may influence the decision to adopt. To support this view, Tornatzky and Fleischer (1990) have introduced a Technology-Organizational-Environment (TOE) framework in order to extend the theory on diffusion of innovation beyond the technological context by including the organisational and environmental contexts of the innovation adoption (Tornatzky & Fleischer, 1990). By organisational context, the authors aim to capture the characteristics of the organisation (e.g. processes, structure) that may facilitate the adoption of the innovation. By environmental context, authors refer to factors external to the organisation that may present opportunities or constraints for innovations. The TOE framework is valuable because innovation adoption research fails to sufficiently consider the business context and the integration of the overall environment (Swanson, 1994).

Fashion management theory comes to extend diffusion of innovation theory, by suggesting the consideration of the social setting of the innovation. This is achieved by drawing on information about the adopters of the innovation based on their social norms and pressures (Abrahamson, 1996). Fashion management considers fashion as a relatively transitory belief that a technique is fresh, efficient and lays a forefront of management practise (Abrahamson, 1991). In other words, the theory on fashion management urges innovation diffusion research to consider certain social groups, defined by Abrahamson (1996) as fashion setters and their impact on the innovation diffusion. Fashion setters, such as consultants, gurus, journalists and academics, selectively promote innovations as ‘must-do’ or ‘best-practises’ arising by the early adopter’s anecdotal success through mass-media reports such that they formulate a certain perception towards the words that describe the particular innovation. In this way, the uncertainty which is usually associated with the decision to adopt the innovation and its potential consequences is covered with apparent simplicity of choice for the decision makers; to adopt or fail (Kieser, 1997). While the amount of organisations adopting the innovation rises, the collective belief becomes stronger and hence it builds a self-reinforcing cycle through which management fashion and innovation diffusion level build on one another and generate a bandwagon phenomenon towards the innovation (Wang, 2010).

2.2 Cloud adoption

Most of existing research efforts investigating cloud computing adoption decisions attempt to shed light on cloud adoption factors mainly by considering the advantages and disadvantages and the consumer preferences on the technology (Janssen & Joha, 2011; Khajeh-Hosseini, et al., 2010; Anandasivam, et al., 2010; Giessmann & Stanoevska, 2012; Polyviou, et al., 2014). These efforts attempt to understand cloud adoption by focusing on the technology per se and hence they fail to capture the external factors may also influence the decision to adopt which arise if we consider the context in which the cloud technology is to be introduced. Identifying this gap, some work towards this direction has recently appeared, which formulates the research hypotheses and analyses the empirical findings in accordance to the TOE framework that includes also organisational and environmental coefficients relevant to the adoption (Morgan & Conboy, 2013; Alshamaila, et al., 2013).

Earlier studies on information systems adoption have successfully used the TOE framework as the basis for their study (Chau & Tam, 1997; Kuan & Chau, 2001; Vadapalli & Ramamurthy, 1997). Although the TOE framework may have been suitable for explaining the adoption of IS in the past, it may be inadequate for explaining cloud computing adoption. This conclusion arises if we examine the indications of the studies using the TOE model for cloud computing adoption. According to their results, adoption factors tend to be of psychological and technical nature (Morgan & Conboy, 2013). By psychological, authors refer to the perceptions towards the term ‘cloud’ itself, which according to
their findings seem also to be influencing cloud adoption. As the study clarifies, psychological factors are not categorized under the clusters of the TOE framework and warrant further research. Identifying this gap in the literature, through this paper we propose the consideration of fashion management theory as a supplementary lens for understanding cloud computing adoption. As already noted, cloud might be currently ‘conforming to the fashion hyperbole of many IT innovations’ (Whitley, et al., 2013) and hence we urge the need to consider the influence of IT fashion on forming perceptions towards cloud and impacting cloud adoption. Therefore, building on fashion management theory, we form the first research question guiding the proposed study: a) Is cloud computing adoption influenced by IT fashion?

In addition, as identified by Morgan & Conboy, (2013), except the psychological factors, cloud adoption factors tend to be of technical nature. This finding is also supported by Alshamaila et al. (2013), indicating that of all the aspects considered by their quantitative study based on TOE framework, only Relative Advantage (classified in the Technology context of TOE framework) is evaluated as significant. Thus, building on these findings, through this paper we challenge the opposition of the factors that characterise cloud’s relative advantage to factors that are relevant to following IT fashion. As a result, we form the second research question directing the suggested research: b) To what extent is IT fashion influencing cloud computing adoption compared to the factors associated to cloud’s relative advantage?

Aiming to contribute on the understanding of cloud adoption decisions, through this section we have formed the two research questions framing the objective of the proposed work. In the following section, the hypotheses arising are being formed using related literature as well as the results of an exploratory study conducted.

3 Hypotheses and model development

Aiming to enrich and corroborate previous findings of cloud adoption research, a preliminary qualitative research entailing 24 semi-structured interviews was carried out. Interviewees from six different European countries (Austria, Germany, Greece, Italy, Poland and the U.K.) were included. Three different types of interviewees were involved to ensure that a large spectrum of the different perspectives would be captured. More specifically, interviewees were either representatives of a) organisations purchasing cloud services (13), b) cloud vendors (6) or c) policy making bodies in the field of ICT (5). Institutions purchasing cloud services were either private or public organisations. The interviewees from such purchasing organisations were enrolled in high-level managerial positions (e.g. CIOs, directors etc), interviewees from cloud vendors were either product or technical managers for the cloud services offered whereas policy making executives were public sector representatives with large involvement in the cloud strategy at a national or regional level. The interview agenda concerned the reasons that influence organisations to adopt cloud services and included open-ended questions such that interviewees were allowed to discuss and spontaneously identify the reasons for cloud adoption and any difficulties that they have faced while migrating to the cloud. Each interview was associated to an interview transcript. Given the exploratory nature of the study, interview quotes were iteratively read and grouped under sub-themes and themes emerging. Then the themes and the relevant quotes were shared and discussed among the authors. In the next paragraphs, we present the main conclusions of this preliminary qualitative study, by analysing our main findings in the light of existing work in the literature. Based on our preliminary findings, we compose our initial hypotheses that split into two parts, one concerning the influencing factors related to the Relative Advantage and one concerning factors related to IT fashion. Indications derived through our preliminary study, highlight benefits that are relevant to the advantage that cloud computing incorporates compared to the system that existed before. This finding is in line
with existing work underlining the importance of technical factors and Relative Advantage in particular (Morgan and Conboy, 2013; Alshamaila et al., 2013) as one of key reasons leading to cloud adoption. Taking this one step further, in order to clarify the concept of Relative Advantage, we draw on the material collected through our interview transcripts. We identify the benefits of cloud computing denoted by the interviewees that are relevant to the definition of Relative Advantage as defined by Rogers (1995).

First of all, interviewees highlighted *cost reduction* as one of the reasons for adopting cloud solutions. This is a factor incorporated with the ability that cloud provides to ‘pay for what you use’, reduce the total expenditure on IT resources (including hardware and software investment) and minimise the capital expenditure, since no up-front investment is required (Lutz, 2010; Armbrust , et al., 2009; Janssen & Joha, 2011). Considering that such characteristics were not supported by previous technologies, we could anticipate that cost reduction is a factor incorporated under the Relative Advantage concept. In addition, *portability* has been denoted as one of the capabilities that cloud adoption can bring to the organisation (“...it is accessible from anywhere. Hence employees could even work from home without been obliged to stay in their offices.” [iPI3]). Portability has also been identified in previous works that consider cloud computing adoption factors and is defined as the ability to access the service from any device globally (Köhler, et al., 2010; Iyer & Henderson, 2010). Considering that traditional in-house systems did not offer this feature, we could also group the portability factor under the Relative Advantage cluster. Another factor indicated by the interviewees that falls closely to the Relative Advantage is the *reduction of IT management overhead* such that adopters are allowed to focus on their core businesses (“...concentrate to IT management and not to technical things like IT backend. We concentrate ourselves to the client. It allows us to focus on our main purpose.” [iPG1]). This factor has also been identified through previous studies and is viewed as the ability that cloud offers to move the core of the IT operational and management to the cloud provider (Janssen & Joha, 2011; McAfee, 2011). Moreover, *ease of collaboration* has been also identified as a factor relevant to the adoption of cloud services. As clarified by related literature, cloud makes it easier to share data and collaborate by working on the same files and this is something cloud predecessors were not able to provide so efficiently (Köhler, et al., 2010). Finally, another factor identified by the interviews which fall under the Relative Advantage cluster is *data redundancy* (“...Municipalities do backup maintenance; with cloud solutions this backup would not be necessary as data are all stored in the cloud” [iPI4]). Data redundancy has already been identified by previous researchers and for our research we define this factor as the service and data redundancy characteristic which makes failure recovery and backup available (Lutz, 2010; Janssen & Joha, 2011).

Based on the above, we form the first part of our hypotheses that fall under the concept of Relative Advantage:

**H1:** *Perceived cost reduction positively influences intention to adopt cloud services*

**H2:** *Perceived portability positively influences intention to adopt cloud services*

**H3:** *Perceived reduction of IT management overhead positively influences intention to adopt cloud services*

**H4:** *Perceived improved ease of collaboration positively influences intention to adopt cloud services*

**H5:** *Perceived data redundancy positively influences intention to adopt cloud services*

Moreover, the second part of our hypotheses, concerns the impact of IT fashion on cloud adoption intention. Vendors included in our qualitative study, among others, denoted that the evaluation of risks and benefits associated with cloud computing is a difficult process for decision makers. Based on this, we can argue that it is difficult for the decision makers to minimise the uncertainty associated to the consequences of cloud adoption. At the same time, Morgan and Conboy (2013) underlined that
psychological factors of cloud adoption such as the perceptions towards the term ‘cloud’ need to be further addressed. Throughout our preliminary study insights, it seems that vendors use the term ‘cloud’ when promoting their services although they acknowledge that their customers may not understand the exact definition behind term (“We used the term cloud [...] because that’s really positive at least in Germany. We believe that many people come from an internet search [...] -Do you think that people who search for ‘cloud’ understand what they are searching for? No!”[iV5]). Moreover, most of the vendors interviewed are promoting their cloud products through various channels e.g. local IS events and conferences, CIO’s strategy forums etc. Summarising the above, we can conclude that ‘cloud’ seems to be a buzzword, not fully understood by its adopters, which is currently being widely hyped incorporating the feeling of ‘best practise’ and ‘must-adopt’ technology.

This conclusion is in line with the premises of fashion management theory. Authors from the Information Systems community have already focused on IT fashion management theory (Lee & Collar, 2003; Wang & Ramiller, 2009; Newell, et al., 1998) and some have also challenged the IS community to research the IT fashion setting. According to the theory, in the case of IT fashion, vendors, consultants, market research analysts, researchers and gurus use articles, conferences advertisements and reports aiming to push the innovation’s adoption and influence the (Wang, 2010). Through the fashion setters’ pressure, ‘new technologies’ spread among organisations and become the ‘next big thing’ to attract the managerial attention. The greater the exposure, the greater is likely to experience the ‘brainwash’ made by the fashion setters’ promotion, which forms a view towards the IT innovation as revolutionary, efficient and at the edge of practice (Wang, 2010). On the other side of the supply chain, organisations constantly seek to remain consistent (or competitive) with their institutional environment through being progressive (Meyer & Rowan, 1977). As a result, they often seek to adopt the ‘best practices’ without even overcoming the uncertainty associated with the potential consequences that the new IT service will bring to the organisation. Considering the above in combination with the hype about cloud, we argue that it is necessary to address the tendency to follow IT fashion and its impact on the intention to adopt cloud. Hence we form the following hypotheses:

H6a: Greater fashion setter pressure positively influences the intention to adopt cloud services
H6b: Greater fashion setter exposure positively influences the intention to adopt cloud services
H7: Greater perceived progressiveness positively influences the intention to adopt cloud services
H8: Greater adoption of previous innovations positively influences the intention to adopt cloud services

Based on the hypotheses defined in this section we form the model of our study, as illustrated in Figure 1. Through this model we aim to address whether IT fashion impacts the intention to adopt cloud services and compare the impact of IT fashion to factors clustered under Relative Advantage that seem to be important for the intention to adoption cloud.

As a next step, we plan to use existing literature and the findings of our qualitative study to define the constructs and items to be used in forming our instrument. Dimensions arising through our preliminary study (e.g. organisational size, industry type and age of the organisation) appear at present to be suitable control variables for our study. Following the final definition of the research model, the resulting research instrument (questionnaire) with the relevant items will be distributed, inviting responses from organisations of various sizes and service models (e.g. IaaS, PaaS, SaaS) across Europe. We acknowledge that depending on their business processes and type of industry, organisations may be using different service models and hence their perception about the cloud may vary (e.g. if cloud is used to support their e-commerce activity, their perception of cloud may be more relevant to IaaS). Therefore, we intend to change the phrasing of items (without jeopardising their core focus) in order for the questionnaire to be more understandable by our responders.
4 Conclusion

Through this paper we have advocated that cloud is currently hyped. Up to now researchers tackling cloud computing adoption have deployed theoretical frameworks which prevented them from capturing whether hype also influences cloud adoption, despite the fact, that some of their results could not be explained through the lenses of the framework deployed (e.g. psychological factors). As a result, through this paper we identify the need for new theoretical frameworks to address cloud computing adoption that can advance this shortcoming. By drawing on fashion management, diffusion of innovation theories and qualitative data, this paper contributes by suggesting a framework that could help us in extending our current understanding of cloud adoption. In addition it attempts to clarify how the relative advantage of cloud is currently being perceived. Testing the proposed hypotheses may shed further light on the understanding of cloud adoption decisions and may provide additional support for the temporal relevance of traditional theories in capturing the IT innovation adoption.

Acknowledgements

The research leading to these results has received funding from the European Union’s Seventh Framework Programme (FP7-PEOPLE-2010-ITN) under the RELATE Marie Curie ITN project (grant agreement n°264840) and has received the support of SUCRE project (FP7 framework).

References


