Journal of International Technology and Information Management

Volume 22 | Issue 3 Article 1

11-3-2013

Getting Heads into the Cloud: Pre-Adoption Beliefs and Attitudes

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Getting Heads into the Cloud: Pre-Adoption Beliefs and Attitudes Regarding a Cloud-Based Platform Shift at a Public University

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ABSTRACT

This paper reports on the first phase of a 2-phase confirmation-disconfirmation study in which we conduct a pre-implementation survey of employees at a mid-sized university who are about to have their desktop computers replaced with cloud based systems. Specifically, we are interested in their pre-adoption attitudes toward the system and use intentions. We test a model that predicts pre-adoption attitudes based on individual characteristics including computer self-efficacy and perceptions of the IT department that will be implementing the cloud system (perceptions of trust and service quality). We find that perceptions of the IT department influence pre-adoption perceptions of control over the system, which influences perceived usefulness and pre-adoption use intentions. Findings are highlighted in terms of implications for research and practice, in particular, we stress the importance of the ability of IT departments to manage user's perceptions of trust and service quality to the success of IT initiatives.

INTRODUCTION

Individual level attitudes and beliefs about information systems are influenced by a variety of factors, including perceptions of control (Jasperson, Butler, Carte, Croes, Saunders, & Zhang et al., 2002), service quality (Delone & McLean, 1993; Tan, Benbasat, & Cenfetelli, 2013), computer efficacy (Keith, Babb, Furner, & Abdullat, 2011) , social interactions (Furner, Racherla, & Zhu, 2012) and perceived utility (Keith, Babb, Furner, & Abdullat, 2010). In addition, attitudes are dynamic, changing as the user accumulates more experience with the system (Brown, Venkatesh, & Goyal, 2012). In particular, Bhattacherjee and Premkumar (2004) note that as users continue to use a system, they experience changes in satisfaction with the system and confirmation or disconfirmation of expectations about the system, which results in modified beliefs, attitudes and usage intentions. The implication is that understanding user attitudes and beliefs about a system is best accomplished with longitudinal research.

Longitudinal approaches are relatively rare among attitudinal information system studies, which is surprising given the dynamic nature of beliefs and attitudes about information systems, and the importance of these attitudes to information systems usage outcomes. When a new system is introduced that is substantially different from the traditional system, users' pre-adoption attitudes and beliefs about the system, its utility and ease of use are formed based on limited information and no experience (Brown et al., 2012). In these situations, users will form their attitudes and beliefs based on information provided to them by the system's provider, social interactions and their computer efficacy. These pre-adoption beliefs and attitudes are important as they are expected to influence expectations about the system, which will interact with their actual experience with the system to flavor post-adoption attitudes and continued usage intentions.

Bhattacherjee & Prekumar (2004) argue that individual characteristics have the initial impact on

ISSN: 1543-5962-Printed Copy ISSN: 1941-6679-On-line Copy

pre-adoption attitudes, which shape use intentions. There are a number of individual characteristics and pre-adoption attitudes that may come into play, and in order to create actionable guidelines for system designers, researchers are tasked with identifying and investigating these factors (Petter, Delone, & McLean, 2013; Wu & Chen, 2005). As part of a larger effort to understand the factors and dynamics that influence attitudes and intentions, the current study examines individual level characteristics that influence pre-adoption attitudes and intentions regarding a real cloud based computer system that will replace a desktop based system at a mid-sized University in the Southwest United States. The cloud computing context is becoming increasingly relevant to practitioners as well as IS researchers, particularly in the study of adoption (Cegielski, Jones-Farmer, Wu, & Zhazen, 2012; Loebbeck, Thomas, & Ullrich, 2012). The current study contributes to research on individual differences in IS attitude formation (i.e.Agarwal & Prasad, 1999; Alwahaishi & Snášel, 2013) while employing a sample of real, working users for whom adoption is mandatory in a context relevant to researchers and practitioners alike.

The primary research questions are as follows:

1. What individual level factors influence pre-adoption attitudes?
2. How do pre-adoption attitudes influence usage intentions?

The results reported in this manuscript are part of a longitudinal study that seeks to model the influence of pre-adoption attitudes, experience with the system, disconfirmation and satisfaction on post adoption beliefs, attitudes and usage intentions.

Information systems researchers have sought to identify the factors that make information systems successful for decades (e.g. Swanson, 1974). Indeed defining information system success has been a challenge itself. Researchers generally agree that information systems use is an excellent proxy for success, and have been operating under this paradigm for decades (Hartwick & Barki, 1994). Roby (1979) developed a model that linked system characteristics and individual characteristics to information systems use. Using sales people as a sample, he demonstrated that a number of individual level factors, including job performance, tendency to communicate with team members and perceived urgency influenced an individual's likelihood to use a system.

Since 1989, the Technology Acceptance Model (Davis, 1989) has been the dominant framework for explaining individual differences in information systems use (Bagozzi, 2007). While the model, which is based on the Theory of Planned Behavior, is simple: individual's perceptions of ease of use and usefulness will influence their use, it has served as a foundation for numerous subsequent studies. Many such studies added system level antecedents to explain perceived usefulness and perceived ease of use, while others looked at individual level determinants. Until recently, studies built on this framework assumed that individual level determinants of use intention were static. Bhattacherjee & Premkumar (2004) proposed a two stage model which accounted for individual level attitudes and intentions about a system in the pre-use stage, and modified attitudes and intentions in a post-implementation stage. Following Bhattacherjee & Premkumar (2004) and Brown et al. (2012), we develop a 2-stage model of cloud use intention based on trust, computer efficacy and perceived service quality. In the current paper, we report on the first step in our longitudinal study, where we demonstrate a relationship between

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individual characteristics, system perceptions and use intentions.

This paper proceeds as follows. In the following section, we review relevant literature and develop our research model. Next, we outline our methodology and present our findings. These findings are then discussed in terms of implications for current research and practice. Summarizing remarks conclude the paper.

RESEARCH MODEL

This study is phase one of a longitudinal effort aimed at understanding how pre-adoption attitudes impact post adoption attitudes and usage. Figure 1 illustrates the framework for our two part study, which is informed by Bhattacherjee & Premkumar's (2004) two-stage model of cognition change. Our overall framework postulates that individual characteristics influence pre-adoption attitudes toward the system, which will in turn influence pre-adoption use intentions. Once the user is given the new system and has had the opportunity to use it for some time, we predict that their attitudes and use intentions will change: pre-adoption attitudes will go through a process of disconfirmation, which will influence satisfaction and post-adoption attitudes, which will alter post-adoption use intentions. In the current study, several individual characteristics are identified which we predict will influence pre-adoption attitudes, as illustrated in Figure 2. Individual characteristics that we measured included perceptions about the Office of Information Technology (perceptions of service quality and trust), which was responsible for the implementation of the cloud based computing system, and computer self-efficacy. Pre-adoption attitudes included perceptions of control over the cloud system and perceived usefulness. Individual hypotheses are outlined below.

Figure 1: Framework for Longitudinal Study

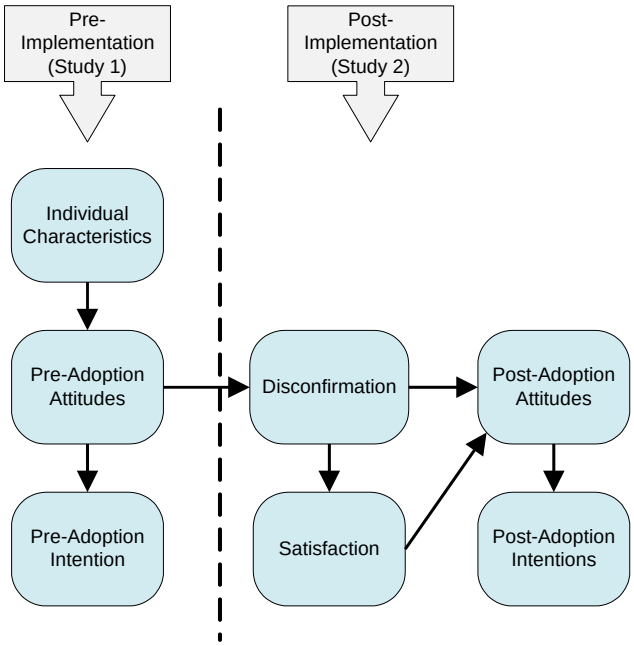
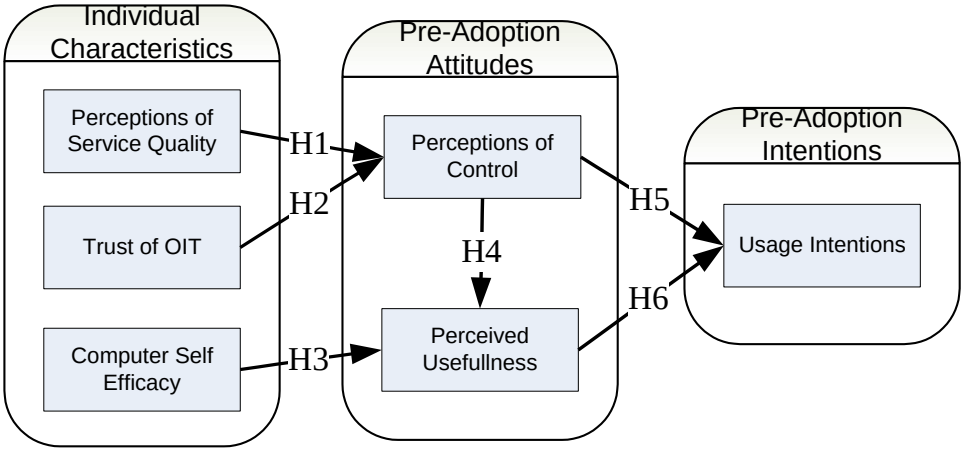


Figure 2: Research model for pre-adoption study.



Perceptions of Service Quality and Control

Pitt et al. (1995) note that most studies of IS effectiveness focus on product quality, however much of the value added by IS is added by way of services. They argue for the inclusion of a service quality component in assessments of IS effectiveness (the authors specifically study the suitability of Parasuraman et al.'s (1991) SERVQUAL instrument). Service quality is a measure of the gap between an individual's service expectations and service experience (Hsieh, Rai, Petter, & Zhang, 2012). Marketing researchers have long sought to understand the factors that play a role in the development of service quality perceptions (e.g. Boulding, Karlra, Staelin, & Zeithaml, 1993; Hsieh et al., 2012; Zeithaml, Berry, & Parasuraman, 1988). In an IS setting, service quality has been shown to be related to user satisfaction (Kettinger & Lee, 1994; Landrum, 2004; Myers, Kappelman, & Prybutok, 1997; Pitt et al., 1995; Yang, Cai, Zhou, & Zhou, 2005), perceived usefulness (Landrum, 2004), usability (Yang et al., 2005), behavioral intentions (Boulding et al., 1993; Kettinger & Lee, 2005; Myers et al., 1997) and outsourcing success (Grover, Cheon, & Teng, 1996).

Perceived behavioral control, or simply 'control,' is a component of the theory of planned behavior (Ajzen, 2002) which Wu and Chen (2005, p. 787) define as "a person's perception of ease or difficulty toward implementing the behavior in interest." Control has been used as a predictor of a variety of behaviors in organizational and IS contexts (e.g. Ajzen, 1991, 2002; Chau & Hu, 2001; Venkatesh, 2000; Warkentin, Gefen, Pavlou, & Rose, 2002). According to Ajzen (2002), individuals who believe that the outcome of a circumstance is controllable are more likely to engage in behaviors which lead to more desirable outcomes than individuals who do not believe that outcomes are controllable. This rationale has led to a surge in interest among organizational researchers into the factors that lead to feelings of control (Chau & Hu, 2001).

In the context of our study, the university faculty and staff who will have their desktop PCs replaced with cloud-based clients have had extensive previous experience with the Office of Information Technology (OIT), and have thus already developed perceptions of service quality. Following Myers et al. (1997), we treat perceptions of service quality provided by the OIT as an individual difference variable that will be used to predict a pre-adoption attitude (perceived

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control) about a system which has not yet been delivered. Specifically, we posit that individuals that have experienced a smaller gap between their service expectations and service experience (that is, those who have stronger perceptions of service quality) will expect future service quality to remain high, and will form beliefs that the OIT will continue to provide them with computing systems that will satisfactorily facilitate the accomplishment of their information processing tasks (i.e., they will have better control over future tools provided by the OIT). Conversely, if a user has had an experience with OIT that did not meet their expectations, leading to perceptions of weaker service quality, that user will form beliefs that OIT will provide them with a tool which does not enable them to accomplish their information processing tasks, and thus will experience a pre-adoption perception of less control.

H1: Individuals who perceive service quality to be better will have stronger perceptions of control over the cloud system.

Trust and Control

Trust has been a topic of substantial interest to information systems researchers, in particular in the electronic commerce and system adoption and use literature. Garbarino & Johnson (1999) define trust as "customers' confidence in quality and reliability of the services offered by an organization." We adopt this definition of trust, rather than the definition that is dominant in e-commerce literature, which focuses on beliefs about the intent of the trust target to act opportunistically, since our cloud computing context involves a relationship with a service provider (a department of the same organization that the subjects work at) where quality and reliability are of primary concern to the users, rather than getting 'ripped off' by an opportunistic merchant. In the system adoption and use literature, trust in the entity that provides a computer system has been tied to a number of outcomes, including perceived usefulness and ease of use (Gefen, 2004; Gefen, Karahanna, & Straub, 2003; Tung, Chang, & Chou, 2008; Wu & Chen, 2005), intention to use (Gefen et al., 2003; Hart & Saunders, 1997; Taylor & Todd, 1995; Tung et al., 2008; Warkentin et al., 2002; Wu & Chen, 2005), and perceived behavioral control (Taylor & Todd, 1995; Warkentin et al., 2002; Wu & Chen, 2005). For this study, we adopt the idea of identification based trust, where a trustor trusts a trustee if they believe that the trustee shares some objective of the trustor (McAllister, 1995). In our context, individuals vary in the degree to which they believe that the OIC shares their objectives, and thus vary in the degree to which they trust the OIT.

Venkatesh (2000, 346) describes perceived behavioral control as "a construct that reflects situational enablers or constraints to behavior." As noted in the previous paragraph, the relationship between trust and perceived control has been empirically demonstrated in a number of studies, following the proposition that individuals who perceive a match between the objectives of the trust target and themselves are more likely to believe that the trust target will support their efforts to meet those objectives (Warkentin et al., 2002). In the cloud computing context, we predict that individuals who report trusting the service provider (OIT) will believe that OIT has their best interests in mind, and will design a cloud-based system that will effectively facilitate their information processing needs, that is, they will have control over the system. Conversely, individuals who do not trust the OIT will form beliefs that OIC does not share their interests, and will not form beliefs that the OIC will provide them will tools that will enable the accomplishment of their information processing tasks.

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H2: Individuals who trust the Office of Information Technology will have stronger perceptions of control over the cloud system.

Computer Self-Efficacy and Perceived Usefulness

Self-efficacy, which is derived from Bandura's Social Cognitive Theory (Bandura, 1977, 2002), is a process by which individuals observe their own behavior and make assessments of their ability to accomplish specific tasks (Bandura, 1982). Self-efficacy has been used as an individual level variable as a predictor of a variety of work related outcomes. In order for self-efficacy to be useful as a predictor, it has to be measured in terms of a specific context (Hardin, Chang, & Fuller, 2008; Marakas, Yi, & Johnson, 1998). Compeau and Higgins (1999, p. 191) define Computer Self-Efficacy (CSE) as "an individual's perceptions of his or her ability to use computers in the accomplishment of a task…rather than reflecting simple component skills." Within information systems research, CSE has been used to predict a number of computer use behaviors and attitudes, including use intention (Compeau et al., 1999; Igbaria & Iivari, 1995), use anxiety (Compeau et al., 1999; Igbaria & Iivari, 1995; Thatcher & Perrewé, 2002), perceived usefulness and ease of use (Igbaria & Iivari, 1995; Mun & Hwang, 2003), satisfaction (Agarwal, Sambamurthy, & Stair, 2000) and the tendency to use new systems in innovative ways (Agarwal et al., 2000; Klein, 2007; Thatcher & Perrewé, 2002).

Since a switch to the cloud represents a mandatory, substantial and impossible to ignore adjustment in how users conduct their daily work, the switch is likely to produce anxiety (this argument is consistent with Hsieh et al. (2012)). Igbaria & Iivari (1995) argued that those with high CSE will experience less computer anxiety, and that they will be better suited to understand the potential benefits of new systems. Further, the cloud based architecture does carry benefits that knowledgeable individuals should be able to identify. Using a sample of 450 employees at 81 Finish organizations, the authors conducted a survey in which computer self-efficacy, computer anxiety, perceived usefulness and system usage were measured. Findings indicated that CSE had a positive influence on both anxiety and perceived usefulness. Consistent with these findings, we predict that users who better understand the capabilities and operations of a cloud computing system will be better able to assess the potential usefulness of the system that those who do not.

H3: Individuals who score high on Computer Self-Efficacy will perceive the cloud system to be more useful.

Control and Perceived Usefulness

According to Ajzen (2002), controllability refers to "the extent to which performance is up to the actor." The theory of planned behavior views a lack of control as a specific impediment to behavioral intention, since individuals who feel that they do not have control over a behavior will avoid the behavior when doing so is possible (Ajzen, 1991). TAM researchers have attempted to explain this tendency by using perceptions of usefulness as a moderator between control and behavioral intention (e.g. Taylor & Todd, 1995; Warkentin et al., 2002). TAM researchers note that when users perceive that they have control over a system, that is, that they will be able to use

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the system as they see fit, they believe that they will be able to use the system to accomplish their tasks (that is, they will have higher perceptions of usefulness) (Venkatesh, Morris, Davis, & Davis, 2003; Wu & Chen, 2005). We expect this relationship to hold in a cloud computing context: those individuals who believe that they will have control over the cloud system are expected to have a more positive view of the potential of the system to facilitate their information processing needs, and as such they are expected to report that the system will be more useful.

H4: Individuals who perceive that they have more control over the cloud system will perceive the system as more useful.

Control and Use Intentions

Control has long been studied as a component of the theory of planned behavior. According to Ajzen (2002), perceptions of control "account for considerable variance in intentions and actions." Since control refers to an expectation that the user will be enabled or hindered from performing a behavior (Venkatesh, 2000), individuals who feel that they have control are more likely to form intentions to engage in that behavior (Chau & Hu, 2001). Following this logic in a cloud computing context, we predict that users who feel like they have control over a system are more likely to see the system as a tool for accomplishing their objectives, and thus report higher intentions to use the system. This argument is consistent with the findings of (Chau & Hu, 2001; Taylor & Todd, 1995; Venkatesh, 2000; Venkatesh et al., 2003; Warkentin et al., 2002; Wu & Chen, 2005).

H5: Individuals who perceive that they have more control over the cloud system will report higher use intentions.

Perceived Usefulness and Use Intentions

The theory of planned behavior serves as the theoretical underpinning for the technology acceptance model (TAM) (Davis, 1989). TAM is one of the most widely studied models in information systems (Tung et al., 2008), and has been found to be effective at predicting adoption intentions (Venkatesh et al., 2003). TAM argues that use intentions are predicated on two major factors: perceived ease of use, or the extent of effort the subject expects that they will need to devote in order accomplish their tasks with the system, and perceived usefulness, or the extent to which the subject believes the system can be used to accomplish their task. Numerous studies have demonstrated that when subjects believe that a system will be useful, their use intentions are stronger (Tung et al., 2008; Venkatesh, 2000; Venkatesh et al., 2003; Warkentin et al., 2002; Wu & Chen, 2005). TAM has been extended to include a number of moderators and antecedents to perceived ease of use as well as perceived usefulness (Venkatesh et al., 2003). We expect the relationship between perceived usefulness and use intentions to hold in a cloud computing context: individuals who expect the new system to be more useful are expected to report stronger use intentions.

H6: Individuals who perceive that the cloud system is useful will report higher use intentions.

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Having described our model of pre-adoption attitudes and use intuition, we now move to a discussion of the methodology.

METHODOLOGY

In order to test our hypotheses, we surveyed 100 individuals who were selected to be first to received cloud-based desktop replacements at a medium-sized university. The following subsections outline the procedures, analysis and results of our study.

Study Context & Design

The study took place at a medium-sized (7,750 student) state university in the southwestern US. The Office of Information Technology (OIT) supports approximately 2,500 PC based desktops on campus. In 2011, the OIT as well as many other campus divisions were faced with the threat of substantial budget cuts. Up until that point, most faculty and staff received new PC based desktops every two years, which represented a substantial cost to the university. While computer lab equipment replacement times varied, lab computer replacement still represented a substantial cost. The average replacement cost of a PC was $950. The OIT developed an Infrastructure as a Service (IAAS) architecture, which would allow bare bones cloud clients to serve as desktop replacements, and keep users' profiles and data in a centralized location on the cloud. Cloud-based clients cost $350, approximately 1/3 of the cost of PCs.

Before conducting our study, we interviewed the CIO of the university in order to understand the motivation for the switch. The CIO indicated that cost savings was not the primary goal, rather, he viewed "operational excellence" as the primary objective the endeavor. As an example, he indicated that under the new cloud based infrastructure, students working in the labs would have better mobility, as files that they save to their virtual profile would follow them as they moved from lab to lab, as would browser settings and other preferences. Indeed, using a VPN, users could log into their virtual profiles from off campus and have access to their data. The CIO also noted that the university administration supported the initiative, and that the university already had a healthy infrastructure in place and a staff with relevant expertise, and he expected a smooth technical implementation. However, he lamented a perceived lack of support and even some resistance from the user base, many of whom he stated did not "see the big picture."

Our conversation with the CIO took place approximately 10 weeks before the first implementations were to occur. The OIC planned to replace 10 faculty and staff PCs with cloud based clients each day for 10 working days. These first 100 individuals did not know in advance that they would be receiving the first batch of cloud clients, nor did they know about the timeframe, although faculty and staff were aware that the switch to the cloud was imminent.

Measures

In order to test our hypotheses, we developed a web-based survey which measured perceptions of service quality, trust, computer self-efficacy, pre-adoption perceptions of control and usefulness, and pre-adoption use intentions. Service quality was measured using 5 items taken

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from Kettinger & Lee (2005). Pre-adoption perceptions of control were measured using 4 items adopted from Venkatesh (2000), while the 4 items used to measure trust were adapted from Gefen et al. (2003) with minor alterations to include references to the OIC. Computer self-efficacy was measured using 5 items adapted from Thatcher & Perrewé (2002). The 4 items used to measure usefulness and 3 items used to measure use intention were developed for this study. The items used appear in Appendix 1, and were measured on a 7 point Liketert style scale. The instrument and procedures were approved by the Institutional Research Board of the University.

Data Collection

The OIC provided the researchers with a list of the first 100 users who were scheduled to receive new cloud clients, and these individuals served as our sampling pool. Approximately 8 weeks before implementation was set to begin, an e-mailed link to the web-based survey was sent to these individuals. In order to ensure honest responses, all submissions were kept anonymous. Follow up e-mails were sent each week until two weeks before the implementation. Subjects completed the survey online, and anonymity was assured.

Analysis & Results

A total of 50 usable responses were analyzed. Before computing values for our independent variables, an exploratory factor analysis with a Varimax rotation was conducted on the items provided in the survey (using SPSS 15). Table 2 shows the results of our factor analysis, which indicated no cross loadings. Chronbach's for our variables, which are reported in Table 1, were all very strong, exceeding the .07 threshold (Hair, Anderson, Tatham, & Black, 1998). The Pearson's correlations matrix (shown in Table 2) was examined to identify potential problems associated with multicollinearity between the independent variables. None of the correlations exceeded the 0.8 threshold, indicating that multicollinearity between the independent variables is not a cause for concern (Hair et al., 1998).

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Table 1: Factor Loadings and Reliabilities.

	Factor					
Survey Item	Usefulness	CSE	Service Quality	Use Intention	Control	Trust in OIC
ServiceQua_1	-.092	.061	.578	.380	.156	-.068
ServiceQua_2	-.142	-.104	.767	.087	-.111	.032
ServiceQua_3	.198	-.019	.787	-.107	.082	-.036
ServiceQua_4	.038	-.061	.813	-.009	.195	.030
ServiceQua_5	.103	.026	.804	.038	.034	.057
TrustOIC_1	.054	-.168	.380	.267	.399	.617
TrustOIC_2	.393	-.160	.007	.113	-.060	.623
TrustOIC_3	-.067	-.054	.314	.078	.394	.653
TrustOIC_4	.207	.044	-.211	-.185	.002	.794
Control_1	.328	-.045	.247	.238	.629	.061
Control_2	.336	.350	.218	.066	.517	.025
Control_3	.375	-.037	-.040	-.399	.576	.295
Control_4	.382	.042	.002	.236	.778	.028
Usefullnes_1	.942	-.046	.016	.133	.177	.133
Usefullnes_2	.946	-.055	.015	.137	.167	.131
Usefullnes_3	.949	-.039	.006	.131	.181	.124
Usefullnes_4	.883	-.084	.108	.207	.242	.080
UseIntenti_1	.259	-.033	.038	.882	.122	-.006
UseIntenti_2	.224	-.036	-.021	.868	.172	-.012
UseIntenti_3	.120	-.114	.093	.887	-.017	.095
CSE_1	-.104	.807	-.159	-.030	.079	-.035
CSE_2	-.061	.742	.066	.076	-.061	.072
CSE_3	-.251	.829	-.066	-.051	.003	-.106
CSE_4	.181	.718	-.025	-.130	-.048	-.279
CSE_5	.025	.802	-.009	-.081	.026	.042
Chronbach's □	0.989	0.849	0.859	0.928	0.808	0.072
Number of Items	4	5	5	3	4	4

Table 2: Correlations.

	Service Quality	Trust in OIC	Control	Usefulness	Use Intention	CSE
Service Quality	1					
Trust in OIC	0.236	1				
Control	0.251	0.449	1			
Usefulness	0.104	0.359	0.610	1		
Use Intention	0.171	0.195	0.276	0.364	1	
CSE	-0.077	-0.201	0.069	-0.123	-0.131	1

Data were analyzed using simple linear regression. Hypothesis 1 predicated that individuals who perceive service quality to be high will have stronger perceptions of control over the cloud system. This hypothesis is supported ($p = 0.078$). Hypothesis 2 predicted that individuals who express greater trust in the OIT will have stronger perceptions of control over the cloud system. This hypothesis is supported ($p<0.001$). Hypothesis 3 predicted that individuals who score

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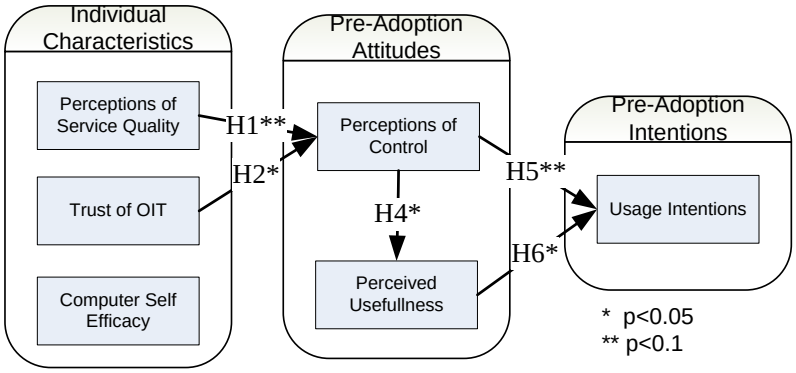
higher in CSE will report stronger perceptions of usefulness. This hypothesis was not supported (p=0.399). Hypothesis 4 predicted that individuals who perceive more control over the cloud system will also perceive the system as more useful. This hypothesis was supported (p < 0.001, 0.610). Hypothesis 5 predicted that individuals who perceive more control over the cloud system will have stronger usage intentions. This hypothesis was supported (p=0.052). Finally, hypothesis 6 predicted that individuals who perceived the new cloud system to be useful would have stronger use intentions. This hypothesis was supported (p = 0.009, 0364). An evaluated model is presented in Figure 3.

Figure 3: Evaluated Model.



DISCUSSION

This study is the first step in a longitudinal exploration of how attitudes develop and evolve during the implementation of a new system. Specifically this study investigates the influence of individual characteristics on pre-adoption attitudes and pre-adoption usage intentions. Our findings indicate that perceptions about the IT department, service quality and trust, influence pre-adoption perceptions of control that users will have over the system. These perceptions of control influence both pre-adoption usage intention and perceptions of usefulness.

We were not able to find support for hypothesis 3, which had predicted that individuals who score high on CSE would better understand the benefits of the cloud system, and thus form a more accurate pre-adoption understanding of its usefulness. It is possible that many users do not view the cloud as beneficial, rather they see it as detrimental. If this is the case, we would expect to see a significant negative relationship between CSE and perceived usefulness. However, we were not able to identify a relationship between computer self-efficacy and pre-adoption perceived usefulness of the cloud system, neither positive nor negative. It seems clear that subjects formed their pre-adoption views about the usefulness of the system based on other factors, such as their perceptions of control over the system.

Looking at our overall results, it is interesting to note that of the individual level characteristics that we identified, the only two that had an impact on pre-adoption attitudes were perceptions about the OIT (perceptions of service quality and trust). This implies that in our sample,

differences in perceptions about the IT department itself play an important role in the formation of pre-adoption attitudes. While we did not study an exhaustive list of individual characteristics, and others are certain to play a role, out finding that perceptions about the IT department had a stronger influence than other individual characteristics is intriguing.

Limitations

This study is not without its limitations. While subjects did consist of real users who will soon be using the cloud based computing system, it was confined to a single mid-sized university. It is likely that the results are not fully generalizable, as other factors specific the people of the region, the politics of the university and OIT could have come into play.

Implications

Studying the factors that influence use intention is a classic objective of Information Systems research. Attitudes about new systems are dynamic, and as such, understanding what influences the evolution of these attitudes requires longitudinal studies. This study is a first step toward that understanding. By identifying which individual characteristics influence pre-adoption attitudes, we have augmented our understanding of the system usage phenomena. Specifically, our finding that perceptions of the Office of Information Technology (perceptions of service quality and trust) were most important in the development of pre-adoption attitudes is important, because the OIT has some ability to influence these perceptions. This finding implies that practitioners can improve pre-adoption attitudes by engaging in a campaign of impression management before announcing a substantial system rollout.

While few adoption studies have taken a longitudinal approach to understand evolving attitudes toward a system, Bhattacherjee & Prekumar (2004) are a notable exception. Beyond expanding Bhattacherjee & Premkumar's model to include individual characteristics, we also advance our sample selection to overcome one of the major shortcomings of their study: rather than studying students in a Data Communications class as Bhattacherjee & Premkumar did, we study working professionals who are receiving a new system which they will use at work every day.

In addition, as Loebbeck et al., (2012) point out "Despite the growing attention being given to cloud computing by researchers and practitioners, the deployment of cloud computing is still in its infancy." As such, cloud adoption is of primary concern to practitioners and researchers alike (Cegielski et al., 2012). While much research on cloud-based application adoption focuses on macro-level adoption (i.e. Cegielski et al., 2012; VanderMeer, Dutta, & Datta, 2012) the current study investigates an important an often overlooked component of the cloud-adoption process: acceptance and intended use by individuals.

Finally our findings imply that there are some individual characteristics, which IT departments cannot control (computer self-efficacy), which do not seem to have an influence on pre-adoption attitudes about the system. However, the individual characteristics that an IT department may be able to influence (trust in the IT department and perceptions of service quality) do seem to influence pre-adoption attitudes and intentions. These findings are both empowering to practitioners and raise new questions for researchers. Specifically, these findings should lead

researchers to focus their efforts on identifying individual characteristics that not only influence outcomes, but which are also controllable (at least to some extent) by IT professionals. This narrowing of focus to controllable factors, should it occur, could move adoption research from being reflective to being actionable.

CONCLUSIONS

Information system adoption and use are momentous areas of research. Despite the dynamic nature of system use, few studies employ a longitudinal methodology, opting instead for a snap shot of attitudes and use. In this study, we reported on the first phase of a longitudinal investigation of attitudes and use intentions. We began this phase with two research questions:

1. What individual level factors influence pre-adoption attitudes?
2. Do pre-adoption attitudes influence usage intentions?

Using a real-life implementation of a cloud-based desktop replacement program at a mid-sized public university, we answered these research questions by modeling the relationships between individual characteristics (computer self-efficacy), attitudes about the OIC (trust and perceptions of service quality) and pre-adoption use intentions. This model was tested using a pre-adoption survey of real end-users.

Results indicate that pre-adoption use intentions are indeed influenced by pre-adoption attitudes about the system, specifically perceptions of control and perceived usefulness. We also determined that individual level factors do influence pre-adoption attitudes, however perceptions of the IT department had more of an influence on pre-adoption attitudes than any other factors. Our findings are particularly interesting given that as this paper is being written, the individuals whom we interviewed are currently making the switch to the new cloud system, and we will soon see how these pre-adoption attitudes influence post-adoption attitudes.

After implementation, a second survey of users is planned, in which we will assess both the confirmation/disconfirmation of the pre-adoption beliefs identified in this study as well as satisfaction with the system. These will be used to predict post-adoption attitudes and post-adoption use intentions. This promises to give us a fuller picture of the dynamic interplay between expectations, satisfaction and use intention over time, and is expected yield more useful insight for researchers as well as practitioners.

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  ISSN: 1543-5962-Printed Copy ISSN: 1941-6679-On-line Copy

APPENDIX 1

ITEMS USED FOR THIS STUDY
Perceptions of Service Quality Items:

The Office of IT has up-to-date hardware and software for supporting my computer
The employees at the Office of IT are dependable
The employees at the Office of IT give prompt service to all the users
The employees at the Office of IT have the knowledge to do their job well
The Office of IT has XXU employees' best interests at heart

Trust in OIC Items:

The OIC would…
protect my personal information stored on my virtual cloud computer
share my personal information stored on my virtual cloud computer
not use my personal information stored on my virtual cloud computer for unethical purposes
use my personal information for reasons other than making my virtual computer more useful

Computer Self Efficacy Items:
In General, I think I have the ability to…
install new software applications on a computer
identify and correct common operational problems with a computer
remove data and applications that I no longer need from a computer
log in remotely and use my computer's resources from another computer.
transfer files from my computer to another computer using the Internet

Perceived Control Items:
I have sufficient control over using the system
I have the knowledge and the resources necessary to use the system
The system is not compatible with my daily line of work
Given the resources, it would be easy for me to use the system

Perceived Usefulness Items:
Using the new system will improve my performance
Using the new system will increase my productivity
Using the new system will enhance my effectiveness
Using the new system would help me accomplish my daily tasks more quickly

Use Intention Items:
I intend to use new cloud-based virtual computer as usual
I predict I would use new cloud-based virtual computer
I plan to use new cloud-based virtual computer

ISSN: 1543-5962-Printed Copy ISSN: 1941-6679-On-line Copy