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A CLOUD UPDATE OF THE DELONE AND MCLEAN MODEL OF INFORMATION SYSTEMS SUCCESS

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ABSTRACT

As cloud computing became on one of the top technology investments in public and private organizations and represents expenses of billions yearly, little research was conducted about the factors that affect the success of cloud systems. This research study investigates the impact of free flow of information, flexibility of IT infrastructure, cloud system quality, IT security, and cloud privacy concerns on the increased net benefits of cloud computing use. The intent is to extend DeLone and McLean's Information Systems Success Theory for today's cloud-centric information technology world and add to the body of knowledge of cloud computing adoption. The results from surveying 117 IT professionals working in the United States with a minimum of three 3 years of experience were obtained and analyzed using Structural Equation Modelling (SEM) show that free flow of information and overall cloud system quality can lead to overall information systems success.

Keywords: cloud free flow of information, intention to use the cloud, cloud user satisfaction, cloud system quality

INTRODUCTION

According to the 2018, IT Trends Study of the Society of Information Management [16], CIOs list cloud computing as one of the top three largest technology investments of organizations between 2007 and 2017. Due to the advantages of cloud services, companies have increased their spending on cloud computing, but we know little about the factors that influence the success of cloud computing systems. The updated information systems (IS) success model (DeLone and McLean, [6]) is a research

framework that has explained information systems success considering the quality of the information, the system and the service that influence the use and user satisfaction that ultimately lead to net benefits. The framework has been used extensively in the IS literature but not yet in the context of cloud computing systems. This study seeks to fill that gap by using variables of the IS success model in the context of cloud computing systems and also include in this study other variable that are relevant to the study of cloud systems like the free flow of information, flexibility of IT infrastructure, and system quality that are recognized as the advantages of cloud computing, plus other factors that may constrain the use of the cloud such as security and privacy concerns. A critical factor for the success of innovations like cloud computing services is to understand the adoption criteria of targeted consumers [13].

BACKGROUND LITERATURE, MODEL, HYPOTHESES

Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to computing services [11] such as servers, storage, databases, networking, software, analytics, and more over the Internet. According to a 2016 Gartner report, Cloud computing represents expenses of billions yearly [23] in both private and public organizations. Cloud computing offers three distinct advantages over traditional pc/network server computing: free-flow of information [2], flexibility of IT infrastructure [14], and better system quality [21] in terms of better accessibility of pertinent information. It is important for IS research to better understand with empirical evidence the factors that influence the success of cloud systems. In this study we applied the updated IS success model developed by DeLone and McLean in 2003 [6] to the context of cloud computing adding components related to information security concerns, privacy, free flow of information, and cloud flexibility of IT infrastructure.

IT SECURITY CONCERNS

Despite the high number of approved projects to move to the cloud, companies may have a hard time completing them because of security and privacy concerns which are important to users [8]. Not properly assessing the right balance of privacy and security settings may foster cloud migration failure and the continued reliance on costly upkeep of ever more expensive and less functional legacy IT infrastructure. Klein and Rai defined IT Security Concerns as the degree to which an organization perceives that electronic procurement innovations provide safeguards to protect its users and to enable them to safely engage in online transactions. Through security safeguards provide a set of interpretive schemes for users to structure and understand how sensitive information can be protected for online transactions. Security has been identified as a major concern in Internet-enabled transactions. In this study, the variable of IT Security Concerns has been updated to mean the degree to which an organization perceives that security safeguards protect its users and enables them to safely engage in the cloud. It is important that users trust the IT environment (cloud) within where information processes occur to be safe and secure [10]. Because purchasing online usually involves sharing private information with sellers over the Internet, it is important that buyers not only trust suppliers, but also perceive the IT environment within which procurement processes occur to be safe and secure. These security issues range from system security to transactional security. At the system level, security refers to how successful the system is in preventing illegal access to confidential or sensitive company data. At the transaction level, security refers to the authenticity, integrity, confidentiality, and non-repudiability of origin of electronic messages that are exchanged. Indeed, failure to address these security issues has been found to discourage the use of online technologies [10]. Thus, the following hypotheses are presented:

H1: IT security concerns will have a negative association with intention to use the cloud

H2: IT security concerns will have a negative association with cloud user satisfaction.

CLOUD FREE FLOW OF INFORMATION

Free-flow of information takes place at an increasingly rapid and intuitive manner between people online thanks for the advent of sophisticated algorithms. Free flow of information refers to how large quantities of data can be transferred across individuals and organizational boundaries without encountering resistance [15]. Flexibility of infrastructure denotes how easy it is for a person or organization to transfer the information residing on personal computers with the greater cloud infrastructure. Years ago, integrating information between different systems required a customized networking integration, software integration/redesign, or at the very least data export/imports from one system to another. During the past ten years companies like Google, Amazon, and Face-

book have embedded algorithmic design in their computer applications enabling a more customized and intuitive web experience. Google has become the leading search engine in the world due to its ability to track web activity, build customized profiles, and deliver customized information through push and pull mechanisms to its users. Facebook is the leading social media company in that it utilized its algorithms to suggest friends and determine the type of content that is the most pertinent to users. The overall experience of the average web user is dramatically changed as a result. In the context of this study, free flow of information denotes cloud systems that facilitate those searches and change the user experience. Free flow of information refers to the extent to which large quantities of rich information can he transferred across individuals and organizational boundaries without encountering resistance [15, p. 397]. The fast and easy access to and transfer of information among individuals increases flexibility and adaptability for decision making and user satisfaction. Thus, the following hypotheses are presented:

H3: Cloud free flow of information will have a positive association with intention to use the cloud

H4: Cloud free flow of information will have a positive association with cloud user satisfaction

CLOUD FLEXIBILITY OF IT INFRASTRUCTURE

Flexibility of the information technology infrastructure is defined as the flexibility of the information technology infrastructure within a company's internal IT system. Cloud Flexibility of infrastructure in this study does not indicate scalability but merely denotes how easy it is for a person or organization to integrate the information residing on personal computers with the greater cloud infrastructure. Flexibility accommodates deviations from anticipated action. There is recognition today that an effective IT infrastructure should be able to handle variation in requirements without substantially increasing costs. As IT infrastructures with flexible standards allows for choices from a set of options, procurement standards flexibility extends the range of options that procurement managers have available [10]. Years ago, integrating information between different systems required a customized networking integration, software integration/redesign, or at the very least data export/imports from one system to another. Information could be shared provided the same platform, operating system, and software was being utilized. They are designed to run off the web browser platforms which are already designed to with over 95% of personal computers, tablets, and smartphones. Additionally, users can download and install applications running on Apple, Google, or Microsoft platforms that will constantly update themselves 24 hours a day. The construct has been updated and adapted to fit a cloud computing framework where the emphasis is flexibility of the information technology infrastructure using a cloud system. A flexible IT infrastructure facilitates rapid development and implementation of IT applications that enhance customer service process performance by enabling the organization to respond swiftly to take advantage of emerging opportunities or to neutralize competitive threats. To the extent that the flexibility of IT infrastructure varies across firms in the insurance industry, and to the extent that a flexible infrastructure enables firms to implement IT applications to support customer service more efficiently and effectively, the variance in infrastructure flexibility could explain differences in the performance of the customer service process across these firms [14]. Thus, the following hypotheses are presented:

H5: Cloud flexibility of IT infrastructure will have a positive association with intention to use the cloud

H6: Cloud flexibility of IT infrastructure will have a positive association with cloud user satisfaction

CLOUD SYSTEM QUALITY

In this study, Cloud System quality refers to the ease with which information can be accessed or extracted from the cloud. In previous studies, system quality was the ease with which information can be accessed or extracted from the system. System quality was a construct utilized in the Information Systems Success Model [6]. System quality was analyzed as a direct determinant of usefulness and ease of use, respectively and encompasses reliability referring to the dependability of system operation. System quality encompasses accessibility which refers to the ease with which information can be accessed or extracted from the system as well as timelines which refers to the degree to which the system offers timely responses to requests for information or action. User satisfaction primarily has been measured by various subsets of beliefs about specific systems, information, and other related characteristics (e.g., IT service). System quality was a significant determinant

of system satisfaction [21]. Thus, the following hypotheses are presented:

H7: Cloud system quality will have a positive association with intention to use the cloud

H8: Cloud system quality will have a positive association with cloud user satisfaction

CLOUD PRIVACY CONCERNS

Information privacy concerns refer to the extent to which an individual is concerned about organizational practices related to the collection and use of his or her personal information [17]. Information Privacy Concerns was studied in the context of electronic commerce [18] but not in the context of cloud computing. Consequently, much attention has been devoted to information privacy as one of the issues critical to the success of e-commerce. Nonetheless, the information privacy of many individuals seems to have been seriously threatened, if not compromised. Studies have unequivocally found Internet users' information privacy concerns to be a major antecedent of their willingness to divulge personal information to online companies. When organizations mishandle personal information, users with high levels of information privacy concerns are more likely to share their negative experiences with their friends and relatives because they tend to believe that the loss from the organizations' risk taking will be significant to their close acquaintances [18, p. 509]. Users with high levels of information privacy concerns are also more likely to speak against organizations that threaten their information privacy [17]. Online users can perceive threats to the privacy of their information in numerous practices by online companies and respond in ways not limited to refusal to divulge information. Among the other options available to wary online users are removal of their personal information from the database of online companies and the lodging of complaints with third-party privacy organizations. In this study, Cloud Privacy Concerns has been updated to reflect the degree to which an internet user is concerned about the safety of one's personal information stored on the cloud. Thus, the following hypotheses are presented:

H9: Cloud privacy concerns will have a negative association with intention to use the cloud

H10: Cloud privacy concerns will have a negative association with cloud user satisfaction

INTENTION TO USE THE CLOUD

DeLone and McLean's updated Information Systems Success theory [6] looked at the Intention to Use as the participant's intention to use mobile Internet and ecommerce. Behavioral intention to use was first utilized in information systems research in Technology Acceptance Model theory [4]. Venkatesh also utilized this construct in his update to Technology Acceptance Model theory [19] and in his Unified Theory of Acceptance and Use of Technology [20]. In this study, we adapted the variables to the context of cloud systems, referring to the participant's intention to use the cloud to avail of its impact or benefits. Thus, following the IS Success model, the following hypothesis is presented:

H12: Cloud user satisfaction will have a positive association with intention to use the cloud

CLOUD USER SATISFACTION

In the original Information Systems Success theory (DeLone and McLean [5]) user satisfaction meant the participant's satisfaction with their use of the Internet. Beliefs about reliability certainly will affect one's attitude toward the system, which will shape behavioral beliefs about using the system (e.g., ease of use). It is the system ease of use [12] that directly influence attitude toward use and, ultimately, usage [21]. For this study, use used the variable of Cloud User Satisfaction referring to the participant's satisfaction in using the cloud. Thus, the following hypothesis is presented:

H12: Cloud user satisfaction will have a positive association with intention to use the cloud

CLOUD NET BENEFITS

Net Benefits was a construct utilized in the Information Systems Success Model [6] defined as the most important success measure that captures the balance of positive and negative impacts of the e-commerce on our customers, suppliers, employees, organizations, markets, industries, economies, and even our societies. As the impacts of IS have evolved beyond the immediate user, researchers have suggested additional IS impact measures, such as work group impacts interorganizational and industry impacts, consumer impacts, and societal impacts. Clearly, there is a continuum of ever-increasing entities, from individuals to national economic accounts, which could be affected by IS activity. The choice of where the impacts should be measured will depend on the system or

systems being evaluated and their purposes. Rather than complicate the model with more success measures it was deemed best to group all the impact measures into a single impact or benefit category called "net benefits". In the context of this study, Intention to Use refers to the participant's intention to use the cloud to avail of its impact or benefits. “Cloud Net Benefits” is the most important success measure that captures the balance of positive and negative impacts of the cloud on our users and organizations as perceived by individual users. User Satisfaction is the participant’s satisfaction in using the cloud. Therefore, we see a positive relation between the latter two constructs and net benefits. Thus, the following hypotheses are presented:

H11: Cloud net benefits will have a positive association with intention to use the cloud

H13: Cloud net benefits will have a positive association with user satisfaction

H14: Intention to use the cloud will have a positive association with cloud net benefits

H15: Cloud user satisfaction will have a positive association with cloud net benefits

The conceptual research model for this study, shown in Figure 1, updates Systems Success Theory according to cloud dynamics.

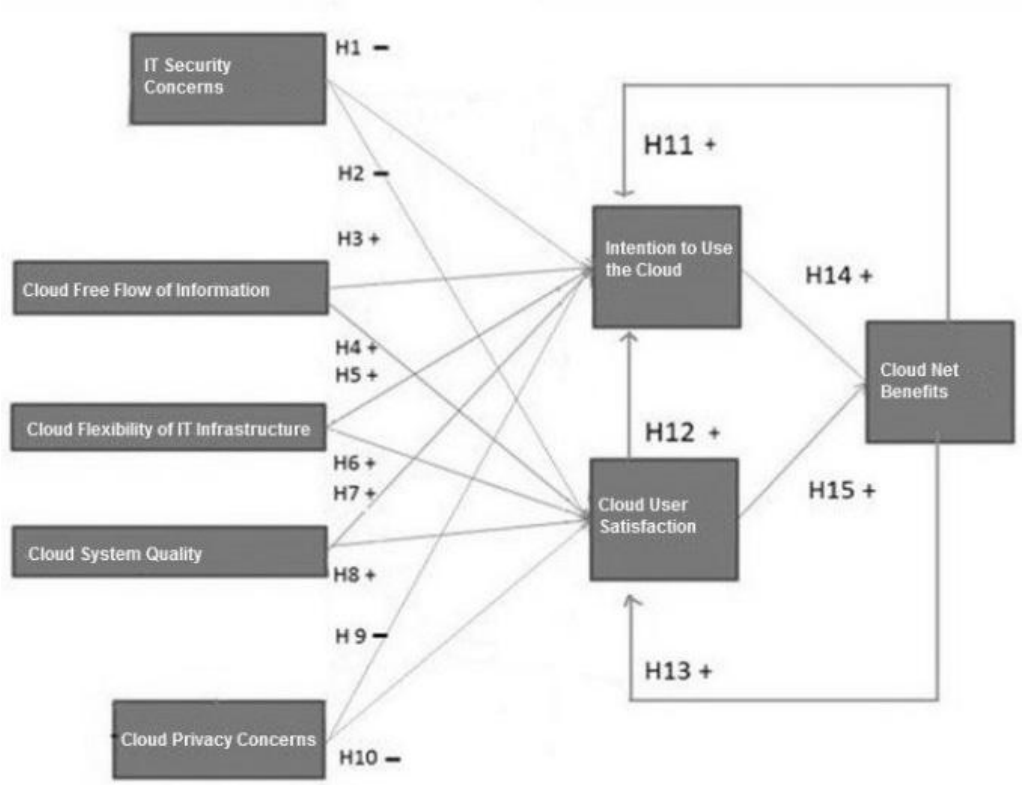

Figure 1: Research model

METHODOLOGY

The link of the online survey was distributed via e-mail to a convenient sample of IT professionals in the United States. Participants were not allowed to continue if they did not acknowledge being presently employed as an IT professional with at least three years of experience. The survey was posted online using Google Forms. Questionnaire answers were based on 5-point Likert scales.

DEMOGRAPHICS

The final sample had 107 usable responses. The respondents' age was broken down 34% between 40-50, 28.2% between 50-60, 20.5% between 30-40, 11.1% over 60, and 6% between 18-30 years old. 87.2% of the respondents were male and 12.8% per female. The occupational titles of the respondents were from a very diverse array of IT specialties spanning IT development, academia, administration, analysis, and management. Among the respondents there were 6 CEOs, 2 CIOs, 3VPs, 13 Engineers, 7 PhDs, 19 Directors/COOs, 10 Managers, 3 Professors/Instructors, and 8 Analysts. The respondents worked in a very diverse array of 27 different industries with the largest group being the Military (19.7%), Information Services (16.2%), Healthcare (13.7%), and Finance (12.8%). 40.2% of the respondents worked for organizations with over 5000 employees, 16.2% for organizations with 10-50 employees, 15.4% for organizations with 50-200 employees 14.5% for organizations with 200-1000 employees, and 13.7% for organizations with 1000-5000 employees. Concerning total IT work experience, 36.8% had 15-25 years, 21.4% had 5-15 years, 19.7% had 3-5 years, and 15.4% had over 30 years. Despite their established successful careers in the US IT industry, 41% of the respondents did not have an IT related college degree. 23.9% had an IT related Master degree, 20% had an IT related Bachelor degree, and 6% (7) had an IT related PhD degree. 85% of the respondents considered their current professional role to be very technical. 86.3% of the respondents never had their cloud data hacked into. The respondents were asked to think about one cloud service they use and to respond to the question thinking about that one cloud service. The most popular choices were Amazon Web Services (20), iCloud (12), MS Office 365 (8), OneDrive (7), Google Drive (6), Dropbox (6), Box.com (4), and Azure (2).

RELIABILITY AND VALIDITY

All the measures used in this study came from previous studies where they had acceptable reliability and validity of the scales. The scales were updated to fit cloud computing context. To ensure the survey questions were understandable and that they measured what they were meant to measure a pilot test was performed prior to collecting and testing the data. The pilot test was composed of 10 individuals who had at least 7 years' experience as salaried IT professionals. They were asked to answer and review the questions and to provide qualitative feedback on how well they understood the questions. From their collective feedback the survey was slightly modified to increase clarity of the questions. A structural model assessment began ensuring that the measurement model was acceptable, reliable, and valid. The table below shows the results for the measurement model. Reliability was assessed by examining composite reliability and the average variance extracted (AVE). For composite reliability, a threshold of 0.70 is preferable [3]. Results for composite reliability values ranged from 0.88 to 0.95, surpassing the 0.70 level. The AVE values ranged from 0.66 to 0.88, with values of 0.50 and greater considered acceptable [7].

Table 1: Construct AVE, Composite Reliability and Cronbach's Alpha

	AVE	**Composite Reliability**	**Cronbachs Alpha**
Flexibility of IT Infrastructure	0.80	0.92	0.87
Cloud Free Flow of Information	0.80	0.95	0.93
Intention to Use the Cloud	0.82	0.93	0.88
Cloud Net Benefits Cloud	0.71	0.88	0.80
Cloud Privacy Concerns	0.82	0.94	0.92
Cloud User Satisfaction	0.84	0.96	0.96
IT Security Concerns	0.66	0.90	0.89
System Quality	0.88	0.95	0.93

ANALYSIS AND RESULTS

The hypotheses from the model were tested for significance, polarity and strength using SmartPLS bootstrapping. The path analysis statistics indicate the significance, strength, and direction of the structural model latent variable theoretical relationships. The twelve hypotheses of the revised Information Systems Success Model were tested by looking at the variance explained with the R-square values in the endogenous variables. SmartPLS allowed for bootstrapping using 5000 subsamples resulting in T-statistics. T-statistic values of 1.96 or more are considered significant with 95% confidence. Hypotheses

11 and 13 were eliminated because they rendered the model non-recursive in that it had internal feedback loops. No variety of SEM handles non-recursive models very well. There are some workarounds, but it was a lot simpler just to forgo those feedback links in this study. Table 2 displays the results for the revised Information Systems Success Model structural analysis with the path coefficients, T-statistics, P-values and hypothesis test results. At a 99.9% confidence level, 5 links are significant. Path coefficients reflect the strengths of the relationships between the independent and dependent variables. The R2 value indicates the predictive power of a model for the dependent variables. This model accounts for 70 percent of the variance in Cloud Net Benefits, 58 percent of the variance in Intention to Use the Cloud, and in 64 percent of the variance in Cloud User Satisfaction.

Table 2: Results Summary of Tested Hypotheses

Hypothesis	Relationship	Beta	T-statistic	Path Coefficient	Hypothesis Support
H1: IT security concerns are negatively related to intention to use the cloud	SS -> IU	-.247	0.44	-0.06	Not Supported ***p0.05
H2: IT security concerns are negatively related to cloud user satisfaction	SS -> US	-.324	0.91	-0.09	Not Supported ***p0.05
H3: Cloud free flow of information is positively related to intention to use the cloud	FF -> IU	.617	1.79	0.21	Not Supported ***p0.05
H4: Cloud free flow of information is positively related to cloud user satisfaction	FF ->US	.677	**2.35**	0.33	**Supported *p<0.05**
H5: Cloud flexibility of IT infrastructure is positively related to intention to use the cloud	FI -> IU	.469	1.23	0.11	Not Supported ***p0.05
H6: Cloud flexibility of IT infrastructure is positively related to cloud user satisfaction	FI -> US	.433	0.53	-0.05	Not Supported ***p0.05
H7: Cloud system quality is positively related to intention to use the cloud	SQ -> IU	.612	0.31	0.04	Not Supported ***p0.05
H8: Cloud system quality is positively related to cloud user satisfaction	SQ ->US	.713	**4.35**	0.54	**Supported *p<0.05**
H9: Cloud privacy concerns are negatively related to intention to use the cloud	IP -> IU	-.243	0.95	0.09	Not Supported ***p<0.05
H10: Cloud privacy concerns are negatively related to cloud user satisfaction	IP -> US	-.283	0.30	0.02	Not Supported ***p<0.05
H12: Cloud user satisfaction is positively related to intention to use the cloud	US -> IU	.655	**3.90**	0.48	**Supported *p<0.05**
H14: Intention to use the cloud is positively related to cloud net benefits	IU -> NB	.730	**5.07**	0.44	**Supported *p<0.05**
H15: Cloud user satisfaction is positively related to cloud net benefits	US -> NB	.713	**5.34**	0.46	**Supported *p<0.05**

Note: H11 and H13 were eliminated because they rendered the model non-recursive in that it had internal feedback loops.

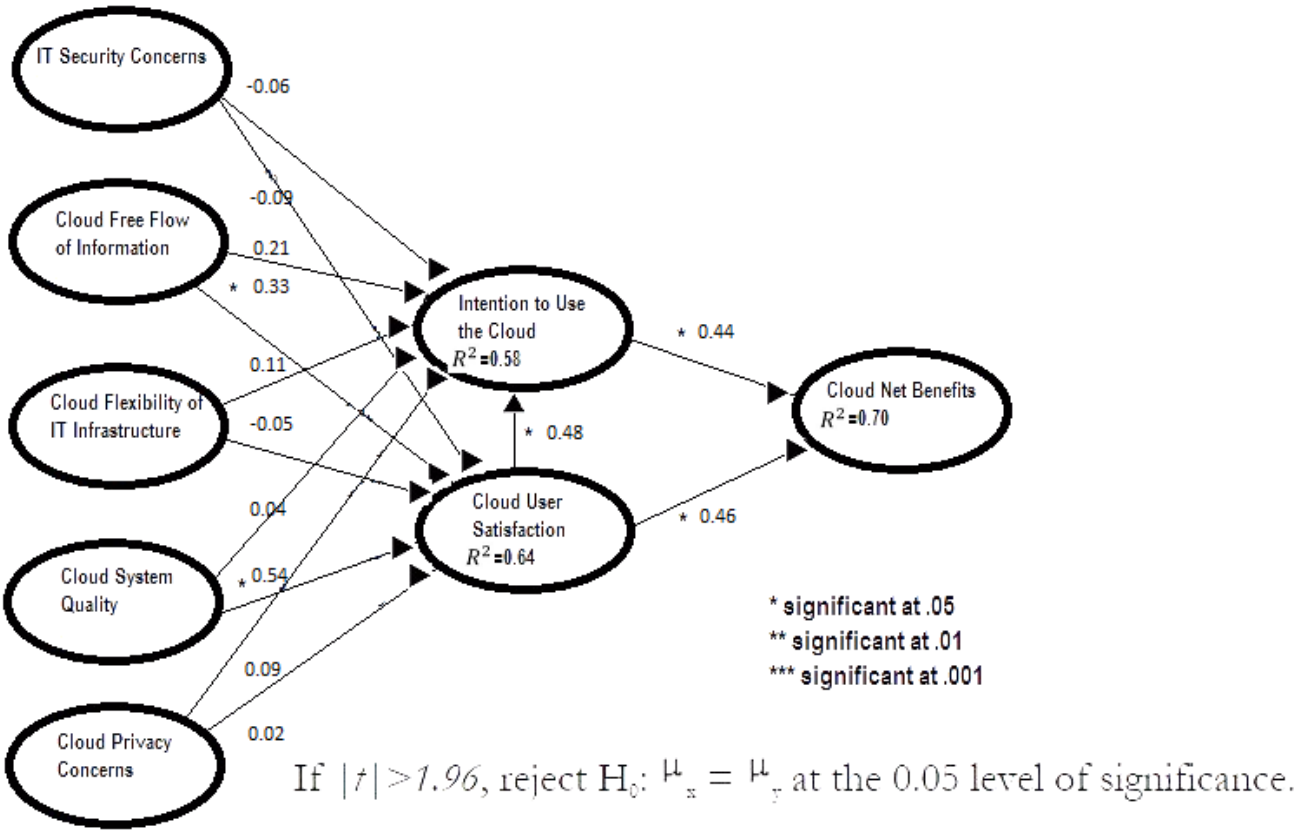

Figure 2: Final Model of Cloud System Success and Free Flow of Information

Below is a summary of the results of the thirteen tested hypotheses (after eliminating H11 and H13):

H1: Not significant with a T-statistic of 0.44 and a path coefficient of -0.06, meaning that there is no evidence in the data that supports the existence of a path between IT security concerns and intention to use the cloud.

H2: Not significant with a T-statistic of 0.91 and a path coefficient of -0.09, meaning that there is no evidence in the data that supports the existence of a path between IT security concerns and cloud user satisfaction.

H3: Significant with a T-statistic of 1.79 and a path coefficient of 0.21, meaning that there is a moderate to strong positive relationship between cloud free flow of information and intention to use the cloud.

H4: Significant with a T-statistic of 2.35 and a path coefficient of 0.33, meaning that there is a moderate to strong positive relationship between cloud free flow of information and cloud user satisfaction.

H5: Not significant with a T-statistic of 1.23 and a path coefficient of 0.11, meaning that there is no evidence in the data that supports the existence of a path between cloud flexibility of IT infrastructure and intention to use the cloud.

H6: Not significant with a T-statistic of 0.53 and a path coefficient of -0.05, meaning that there is no evidence in the data that supports the existence of a path between cloud flexibility of IT infrastructure and cloud user satisfaction.

H7: Not significant with a T-statistic of 0.31 and a path coefficient of 0.04, meaning that there is no evidence in the data that supports the existence of a path between cloud system quality and intention to use the cloud.

H8: Significant with a T-statistic of 4.35 and a path coefficient of 0.54, meaning that there is a moderate to strong positive relationship between cloud system quality and cloud user satisfaction.

H9: Not significant with a T-statistic of 0.95 and a path coefficient of 0.09, meaning that there is no evidence in the data that supports the existence of a path between cloud privacy concerns and intention to use the cloud.

H10: Not significant with a T-statistic of 0.30 and a path coefficient of 0.02, meaning that there is no evidence in the data that supports the existence of a path between cloud privacy concerns and cloud user satisfaction.

H12: Significant with a T-statistic of 3.90 and a path coefficient of 0.48, meaning t there is a moderate to strong positive relationship between cloud user satisfaction and intention to use.

H14: Significant with a T-statistic of 5.07 and a path coefficient of 0.44, meaning that there is a moderate to strong positive relationship between intention to use and net benefits.

H15: Significant with a T-statistic of 5.34 and a path coefficient of 0.46, meaning that there is a moderate to strong positive relationship between user satisfaction and net benefits.

DISCUSSION OF FINDINGS

The hypotheses results of this study provide answers to the following research questions that correspond to their aforementioned related hypothesis numbers H1 to H15:

RQ1. This study showed that IT security concerns do not have a significant relationship to intention to use. Initial data analysis showed a negative correlation between the two data points. However, path analysis revealed that there was no significant relationship was found for IT security concerns on intention to use. In other words, even though users were concerned with the security safeguards inherent to the system this did not significantly compel them to not use, stop using the system, and not recommend it to others.

RQ2. This study showed that IT security concerns do not have a significant relationship to cloud user satisfaction. Initial data analysis showed a negative correlation between the two data points. However, path analysis revealed that no significant relationship was found for IT security concerns on cloud user satisfaction. In other words, even though users were concerned with the security safeguards inherent to the system this did not impact their satisfaction using the system.

RQ3. This study showed that cloud free flow of information has a positive relationship to intention to use the cloud. Initial data analysis showed a positive correlation between the two data points. However, path analysis revealed that no significant relationship was found for cloud free flow of information on intention to use the cloud. In other words, users being pleased with the system's ability to push and share relevant information did not make them feel more compelled to use, keep using the system, and recommend it to others.

RQ4. This study showed that cloud free flow of information has a significant relationship to cloud user satisfaction. Initial data analysis showed a positive correlation between the two data points. Path analysis also revealed that a significant positive relationship was found for cloud free flow of information on intention to use the cloud. In other words, the more a user pleased with the system's ability to push and share relevant information the more they feel satisfied using the system.

RQ5. This study showed that cloud flexibility of IT infrastructure had no significant relationship to intention to use the cloud. Initial data analysis showed a no correlation between the two data points. Path analysis also revealed that no relationship was found for flexibility of IT infrastructure on intention to use the cloud. In other words, the user perception of the cloud systems IT infrastructure flexibility had no effect on their compulsion to use, keep using the system, and recommend it to others.

RQ6. This study showed that cloud flexibility of IT infrastructure had no significant relationship to cloud user satisfaction. Initial data analysis showed no correlation between the two data points. Path analysis also revealed no relationship was found for cloud flexibility of IT infrastructure on cloud user satisfaction. In other words, the user perception of the cloud systems IT infrastructure flexibility had no bearing on the user's overall satisfaction using the cloud system.

RQ7. This study showed that cloud system quality did not have a significant relationship to intention to use the cloud. Initial data analysis showed a positive correlation between the two data points. However, path analysis revealed no significant positive relationship was found for cloud system quality on intention to use. In other words, higher system quality did not make users feel more compelled to use, keep using the system, and recommend it to others.

RQ8. This study showed that cloud system quality has a significant relationship to cloud user satisfaction. Initial data analysis showed a positive correlation between the two data points. Furthermore, path analysis revealed a significant positive relationship was found for cloud system quality on cloud user satisfaction. In other words, the higher the cloud system quality the more they would feel satisfied using the system.

RQ9. This study showed that cloud privacy concerns do not have a significant relationship to intention to use the cloud. Initial data analysis showed a negative correlation between the two data points. However, path analysis revealed no significant negative relationship was found for cloud privacy concerns on intention to use the

cloud. In other words, even though users were concerned with the privacy risks of sharing personal information to the cloud this did not make them less compelled to use, keep using the system, and recommend it to others.

RQ10. This study showed that cloud privacy concerns do not have a significant relationship to cloud user satisfaction. Initial data analysis showed a negative correlation between the two data points. However, path analysis revealed no significant relationship was found for cloud privacy concerns on cloud user satisfaction. In other words, even though users were concerned with the privacy risks of sharing their information on the cloud this did not cause them to be less satisfied with the cloud system.

RQ12. This study showed that cloud user satisfaction has a significant relationship to intention to use the cloud. Initial data analysis showed a positive correlation between the two data points. Furthermore, path analysis revealed a significant positive relationship was found for cloud user satisfaction on intention to use the cloud. In other words, the more a user was satisfied with the cloud system the more they would feel compelled to use, keep using the system, and recommend it to others.

RQ14. This study showed that intention to use the cloud has a significant relationship to cloud net benefits. Initial data analysis showed a positive correlation between the two data points. Furthermore, path analysis revealed a significant positive relationship was found for intention to use the cloud on cloud net benefits. In other words, the more a user would feel compelled to use, keep using the system, and recommend it to others the more a user would believe that the cloud brought benefits to users, organizations, and society.

RQ15. This study showed that cloud user satisfaction has a significant relationship to cloud net benefits. Initial data analysis showed a positive correlation between the two data points. Furthermore, path analysis revealed a significant positive relationship was found for cloud user satisfaction on cloud net benefits. In other words, the more a user was satisfied using the cloud system the more a user would believe that the cloud brought benefits to users, organizations, and society.

LIMITATIONS OF THE STUDY

A limitation in the research method was that this research is fully reliant on one source of survey data that was collected once. The study only tested if the latent variables were related and how they were related.

This research showed that cloud systems quality and the free flow of information are driving users to use cloud systems. Although privacy and security are important concerns of most users there was no evidence to show that privacy and security concerns negatively impact their satisfaction and willingness to use the cloud, these concerns are not so great to drive away users altogether. Managing privacy and security risks both at the user and system administrator level will permeate the use of cloud systems for years to come as users continue to expect evermore freedom of information that the cloud provides.

Flexibility of infrastructure was not deemed a factor driving use or satisfaction. However, it is possible that it may have been had the survey been targeted solely to systems administrators and developers as they are the personnel tasked with building and expanding current no-cloud and cloud systems.

Future research may focus on why IT security and cloud privacy concerns do not slow down the rate of cloud adoption. Perhaps users were not afraid of having their data hacked into because it never happened to them. For those few who had been hacked perhaps they did not pay a high personal price. Perhaps users realize that even if they do not use the cloud banks, online companies, medical centers, and many other organizations are already storing their information on the cloud anyway. It is also possible that users deem IT security and cloud privacy measures to be secure enough. It is possible that they survey administered in this study may yield different results as the mindset of cloud computing progresses from a pioneering stage to a more established and integrated with the rest of society.

CONCLUSION

This research examined the impact of critical free flow of information on the transformative use of cloud computing thereby updating DeLone and McLean's Information Systems Success Theory to make it relevant to today's cloud-centric information technology world. It has added to the body of knowledge of cloud computing adoption that has largely ignored the impact of IT security/privacy concerns. This study examined cloud computing implementation through the lens of revision of IS Success theory. This research examined the impact of free flow of information, flexibility of IT infrastructure, system quality/accessibility, IT security and cloud privacy concerns on the increased net benefits of cloud computing use. Although users perceive the privacy and security risks of using the cloud considerable, this study showed that they do not impact cloud user satisfaction and intention to use. This research shows that an appropriately crafted cloud migration strategy focusing on free flow of information and overall cloud system quality can lead to overall information systems success.

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