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Factors That Contribute to The Resistance to Cloud Computing Adoption by Tech Companies vs. Non-Tech Companies

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by

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An Abstract of a Dissertation Submitted to Nova Southeastern University in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

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Cloud computing (CC) may be the most significant development in recent history for businesses seeking to utilize technology. However, the adoption of CC hinges on many factors, and can have a greater positive impact on organizational performance. This study examined the different factors that contribute to the resistance to CC adoption. Anchored in The Theory of Technology-Organization-Environment (TOE), the study used a qualitative, grounded theory approach to develop a theoretical model for the acceptance of CC across firms. CC can have significant effects on efficiency and productivity for firms, but these effects will only be realized if IT usage becomes utilized globally. Thus, it was essential to understand the determinants of IT adoption, which was the goal of this research. The central research question involved understanding and examining the factors of resistance that contribute to cloud computing adoption across firms. Data was collected through semi-structured interviews with 22 chief information officers (CIOs) of various firms, including those considered technology companies (TCs) and those considered non-technology companies (NTCs). Data was analyzed using qualitative thematic analysis to determine what factors influence the adoption of CC systems and, moreover, to determine what factors create resistance to the adoption of CC in firms despite its well-documented advantages and benefits. Additionally, by examinging and focusing on the factors of resistance, the rsults of this study were generalized across a wider array of firms located in the Southeastern region of the US.

A total of 12 categories were identified. These were organized into two groups. The core category being financial risks represented the probability of loss inherent in financing methods which may impair the ability to provide adequate return. The categories lack of knowledge, resistance to change, excessive cost to adopt, and cost saving fit under financial risks. Together these categories were indicators of the factors of resistance to adopt cloud computing technology. The core category security risks represented the overall perception of privacy in online environment. The categories process of research, accessing organization fit, perceived security risks, phased deployment, approval to adopt, and increase flexibility fit under security risks. Together these categories were direct indicators of the factors of resistance that contribute to the adoption of cloud computing technology by both TC and NTC. The result of this study showed that the predominant and critical factors of resistance that contribute to cloud computing adoption by TC were financial risks and security risks vs. security risks by NTC. A critical distinction between TC and NTC is that 86.4% of NTC's participants did not care about cost, they only cared about data security.

A model was subsequently developed based on the lived experiences of Chief Information Officers (CIOs) who have been faced with challenges regarding cloud acceptance, and cloud computing adoption. The theoretical model produced by this study may guide future researchers and enhance the understanding and implementation of cloud computing technologies. The results of this study will add to the body of literature and may guide companies attempting to implement cloud computing to do so more successfully.

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I would also like to thank the 24 CIOs who agreed to be interviewed as part of my research. All of them are high level executives and had busy schedules; and, for each of one of them to agree to be interviewed, speaks highly of their desire to help others better understand the practice and process that an enterprise employs when adopting new technology. Their perceptions, experience, and the information that they shared with me regarding cloud computing added value to my personal body of knowledge and to the richness of my research.

My Wife Becky and my three children Dr. Natasha Bica, Jeiccy James Hakim and Marsha Elizabeth Orr deserve special recognition, because they provided the support needed for me to succeed.

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Chapter 1

Introduction

Background

Most companies using technology daily are not companies developing or selling technology in the information technology industry. Thus, these companies routinely invest in technology to assist them with their daily activities, and too often feel they get routine results as they have little knowledge on technology and its uses and benefits (Fitzgerald, Kruschwitz, Bonnet, & Welch, 2014). One technology that offers the potential to give more than routine results, however, is cloud computing (CC). Cloud computing in its simplest definition, is storing, transferring data, and accessing programs over the Internet instead of a local computer's hard drive (Oktadini & Surendro, 2014). Cloud computing may be the most significant development in recent history for businesses seeking to utilize technology, and it is expected to lead to a great revolution and new paradigm in business computing (Loukis & Kyriakou, 2015). Cloud computing helps organizations to better leverage their investment in Information Technology (IT) resources and allow them to respond more quickly to changing business needs for IT services. Therefore, in recent years, the adoption of cloud computing has become vital for businesses, in many industries around the world. Cloud computing is a new model of computing that promises to provide more flexibility, less expense, and more efficiency in IT services to end users (Chang, Walters, & Wills, 2016). Cloud computing has been

envisioned as the next generation paradigm in computation, but many still resist the idea of cloud adoption (Sun, Zhang, Xiong, & Zhu, 2014). However, cloud computing will have a positive impact on organizational performance only if managed effectively (Al-Jabri, 2014).

Adoption of cloud computing hinges on many factors including but not limited to the technical aspects, cost (Chang, Walters, & Wills, 2016), and security of cloud data (Chang, Kuo, & Ramachandran, 2016). Although some of these factors have been studied (e.g. Gupta, Seetharaman & Raj, 2013 in the context of small businesses), the larger question of creating a model of the factors influencing adoption still requires extensive work, especially since many of these factors may be contextual (Oliveira, Thomas, & Espadanal, 2014). Therefore, in the proposed study the focus was, to examine the factors of resistance which influenced the adoption of cloud computing. Thus, the result of this study was a theoretical model that can, among other things, help firms to make more effective and educated decisions.

Cloud computing has several benefits for companies, which is why cloud computing is being widely implemented. Computing resources can be provisioned and released on-demand with minimal user and service provider interaction (Nuseibeh, 2011). Loukis and Kyriakou (2015) argued that cloud computing is the most significant development in the area of business exploitation of technology, which is expected to lead to a great revolution and new paradigm in business computing. Cloud computing helps organizations to better leverage their investment in Information Technology (IT) resources and allow them to respond more quickly to changing business needs for IT services. There has been massive growth in vast data generated through cloud computing

(Hashem et al., 2015). Addressing vast data is a time-demanding and challenging task which needs a large technological infrastructure in order to guarantee successful data analysis and processing (Hashem et al., 2015). However, cloud computing can have a greater positive impact on organizational performance only if managed effectively (Al-Jabri, 2014). There are several factors that affect the adoption of cloud computing and firms must evaluate these factors systematically before adopting cloud-based solutions (Oliveira, Thomas & Espadanal, 2014).

The remainder of this paper is structured as follows: In the next section, the problem statement of the research will be presented. This will be followed by the relevance and significance of the research. Then, the goals of the research and research questions. Next, the theoretical framework is presented, followed by the barriers and issues along with the assumptions, limitations and delimitations of the research. The next chapter reviews the literature, followed by the research approach for the study. The paper will then conclude with the milestones the study aims to achieve, the resources it will require, a summary of the proposed study, and the reference section.

Problem Statement

The adoption of technological innovations within companies is increasing. With the fast development of storage and processing technologies as well as the triumph of the Internet, technological resources have become more accessible and more powerful than before (Avram, 2014). The problem is that while cloud computing is of increasing interest to firms globally, many are discovering greater obstacles and costs to the implementation of cloud computing than anticipated (Avram, 2014), as the perception of and attitude toward cloud computing is affected by numerous factors which may drive or

halt its adoption (Stieninger, Nedbal, Wetzlinger, Wagner, & Erskine, 2014). Despite the apparent decisive advantages offered by cloud computing, not all companies have adopted and adapted to the rapid changes that this new form of remote data storage represents (Khanagha (2015). The implementation of cloud computing can be perceived by corporate executives as a double-edged sword, due to the costs and other practical considerations involved in switching from original IT systems onto cloud systems (Hsu, Ray, & Li-Hsieh, 2014).

Cloud computing can have significant effects on efficiency and productivity for firms (Almorsy, Grundy, & Müller, 2016), but these effects will only be realized if IT usage becomes utilized globally. Thus, it was essential to understand the determinants of IT adoption, which is the goal of this research. While small and medium firms may consider cloud computing unreliable (Gupta et al, 2013). Security concerns may also play a role (Chang, Kuo, & Ramachandran, 2016). However, at present there has been no successful attempt to create a comprehensive model of the factors influencing cloud computing adoption and their nature in context (Oliveira et al., 2014). Thus, research is needed to explore the adoption beyond the standard models of technology acceptance (Sharma, Al-Badi, Govindaluri, & Al-Kharusi, 2016), and to develop an exploratory, multi-theoretical model of the factors influencing cloud computing adoption (Stieninger et al., 2014).

Relevance and Significance

Technology and the incorporation thereof is becoming an increasing necessity for companies of all sizes. According to Alshamaila, Papagiannidis, and Li (2013), the use of technology can improve business competitiveness, and has provided genuine

advantages for small- and medium-sized enterprises. Because of this and similar results, a worldwide movement in some of the most advanced economies has, in recent years, sought to improve productivity and efficiency in industrial manufacturing by incorporating the latest advances in technology. This vision recognizes that the adoption of emerging technologies and their relative weight in the new competitive approaches to manufacturing will grow in the years to come and will open completely new solutions and services (Posada et al., 2015). However, at present, this growth is not as fast as has been predicted in many places (Oliveira, Thomas, & Espadanal, 2014). Small to Medium Enterprises (SMEs), in particular, often do not even consider cloud services reliable at all, despite the noted advantages they gain from these services (Tehrani, & Shirazi, 2014). This suggests that there is a problem with respect to the adoption of cloud computing technology—and many scholars have sought to explore the reasons for this through a number of theoretical lenses and in a number of contexts (e.g. Chang, Walters, & Wills, 2016; Gupta et al., 2013).

Although these studies are illuminating, and all provide valuable insight into the nature of the problem and the various factors that can arise to improve or inhibit the adoption of cloud computing, none has yet successfully developed a unified model. Indeed, Stieninger et al. (2014) noted that most studies make use of the TAM framework, but their work suggested a need to move beyond this framework as it does not include several factors they found to be highly influential. And, in reviewing the literature on cloud computing, Sharma et al. (2016) identified a number of common factors in studies of cloud computing adoption, but went on to call for an exploratory, multi-theoretic model of cloud computing adoption.

These suggest a literature gap that the current study can help to bridge, contributing meaningfully to the scholarly discussion of cloud computing and cloud computing adoption. From this academic significance, the study also has the potential to create professional significance. Although the model created by this study would require validation through future quantitative research, should it prove accurate, then it would provide a useful tool for both academics and IT personnel to understand and gauge cloud computing adoption. Furthermore, national and regional governments are aware of the importance of cloud computing technologies in industry (Posada et al., 2015), and the results of this study may provide a basis for understanding cloud computing resistance in a government context as well as a for-profit one, or allow governments to design policies that more accurately promote cloud computing use.

Providing insight to the factors influencing resistance in cloud computing adoption for technological and non-technological companies may yield significant insight for cloud computing providers. Cloud computing providers might be able to use the results of this study to re-assess what they offer to firms, and re-design their packages to suit technological and non-technological companies better according to the influencing factors pin-pointed through this proposed study. Separating the facilities available for individuals, and NTC firms would create the possibility for targetted marketing and lead to easier and more informed decision-making for firms according to their specific requirements.

Dissertation Goal

The goal of this study was to determine which factors contribute to firm resistance regarding cloud computing, in order to build a theoretical model of cloud computing

acceptance, the factors that influence them, and the ways in which firm characteristics may influence these factors based on the lived experiences of CIO's who have been faced with challenges regarding cloud computing implementation. The theoretical model produced by this study may guide future researchers and enhance the understanding and implementation of cloud computing technologies. The results of this study will add to the body of literature and may guide companies attempting to implement cloud computing to do it more successfully.

Research Questions

Given the purpose of this study, which was to determine the factors that influence resistance to cloud computing, the current research answered the following research questions:

RQ1: Which factors contribute to firm resistance to the adoption of Cloud Computing Technologies and approaches?

RQ2: What was the process followed by Chief Information Officers to adopt or reject Cloud Computing Technology?

RQ3: Which resistance factors were significant enough to reject Cloud Computing Technology?

RQ4: What were the consequences of the Chief Information Officers' decisions in adopting or rejecting Cloud Computing Technology?

These qualitative research questions informed the direction of this research both theoretically and methodologically (Agee, 2009).

Theoretical Framework

As stated previously, the vast evolving technological environment is resulting in rapid changes, and as a result companies have to renew their strategies to rely more on technology. The online environment has created a new wave of technological innovations, which have impacted the way people interact with the environment (Ratten, 2012). The adoption of complex IT innovation requires an advantageous technology portfolio, organizational structure, and environmental strategy (S. Salleh, Bohari, & Khedif, 2013). Hence, the theoretical framework of this study was derived from the IS/IT adoption theory, specifically from the technology-organization-environment (TOE) framework. The TOE framework was created by Tornatzky, Fleischer, and Chakrabarti (1990). The TOE framework describes factors that influence technology adoption and its likelihood. TOE describes the process by which a firm adopts and implements technological innovations is influenced by the technological context, the organizational context, and the environmental context (Tornatzky et al., 1990).

This framework is suited for this proposed study as it involves the process a firm follows when implementing a technological innovation, such as cloud computing, as well as other outside contexts which may influence this process in numerous ways. This proposed study seeks to explore the possible organizational characteristics which may influence the cloud computing implementation or resistance thereof. Rogers (2002) posited that an individual or organizations may adopt or reject an innovation based on the characteristics of such innovation. The proposed theoretical framework will be discussed further in the light of application in Chapter 2.

Barriers and Issues

Barriers. There were four foreseeable key barriers in this study:

1. Although qualitative interviews allow the researcher to obtain great depth of information, they also create a large volume of work in collecting, transcribing, interpreting and analyzing data (Yin, 2013). Therefore, sample sizes must remain relatively small.
2. Contacting and recruiting participants on the Chief Information Officer level may prove difficult due to the busy schedules and demands on the time of high level corporate executives.
3. Collection of the data from the participants promptly. The data collection method is an integral part of research design, that is why is very critical to gather data in a timely manner that will help the researcher to analyze the same in the shortest period. Time is of the essence in the field of technology, where innovation can quickly lead to results becoming outdated (Almorsy et al., 2016).
4. Organizational culture of the participants. Some organizations are very protective of their data and may not permit their information to be used by a third party.

Issues. Issues that the researcher needed to overcome during the second phase of the Dissertation process "Dissertation – Proposal" are:

1. The issue related with "Security Threat". In this unstable economy, organizations are taking precaution when supplying information to a third party. Depending on the type of organization, the decision maker may elect not to answer our inquiry or may delay their response until they get clearance from their compliance department. The reason is that cloud users face

security threats both from outside and inside the cloud. Many of the security issues involved in protecting clouds from outside threats are similar to those already facing large data centers (Armbrust et al., 2010). This issue may be mitigated by ensuring the confidentiality of collected data in analysis and reporting.

2. Designing appropriate interview questions. Although qualitative data collection is more flexible than quantitative instrumentation, questions still may be poorly chosen, either by suggesting answers where it inappropriate or failing to elicit the appropriate information (Turner III, 2010). To mitigate this, the researcher developed an interview guide that was reviewed by three experts in the field prior to data collection (Turner III, 2010)

Assumptions, Limitations, and Delimitations

Assumptions, limitations, and delimitations for this study was the fundamental basis for conducting this research. Without assuming the scope of the study, the research problem itself could neither exist nor be understood.

Assumptions. The assumptions that were made regarding data collection from the participants in this study include: they will answer the interview questions completely and truthfully; and their answers accurately reflect their understanding of the different factors of resistance that prevent cloud computing adoption. Another critical element of this study were the twin assumptions that qualitative methodology and grounded theory can be used to gain a meaningful understanding of participants' experiences and the subjective reality that they represent. Inherent in this was also the assumption that

theoretical saturation represents an appropriate point to terminate sampling in creating a meaningful theoretical model.

Limitations. Transferrability is not assured for any qualitative design (Merriam & Tisdell, 2015); however, the results of this study should at least be reasonably generalizable to firms in Houston, Texas. In addition, as the result of a qualitative study, the theoretical model generated will not be validated until follow-up quatitative research is undetaken in order to validate it. While the results will in be assured to apply only to the specific firms involved in the study, the selection of the sample characteristics were such that the model will be as broad as possible. However, remains possible that the chosen sample will fail to capture all factors that influence the adoption of cloud computing by firms outside the study sample or outside the selection of industries and other firm characteristics included in the sample.

Another limitation for this study was the perspective of the individuals interviewed. As participants will relay information based on their own personal experiences within their specific organizational structure, the information may be biased. Bias is present in every study design, and even though researchers should try to reduce bias, outlining possible sources of bias allows more significant critical assessment of the findings as well as conclusions (Smith & Noble, 2014).

Delimitations. The delimitations were the characteristics that limited the scope of this research and defined the boundaries of this study. In this research, there were several delimitations in the design of this study, which are outlined below.

1. This research was specifically delimited to study of the factors that contribute to the resistance to cloud computing adoption.

2. This study was delimited to organizations located only in the United States of America, specifically, to firms located in Houston, Texas.
3. This study was delimited only to participants working in the functional area of IS.

Definitions of Terms

This study was based on terminology and concepts related to the Internet and cloud computing technology and its application in the business setting. Some of the terminology may be unfamiliar to the reader, for this, explanation and definition of the key terms is provided to assist the reader to understand the terms within the context they are used in this study.

Actors: According to Mell and Grance (2011) actors are disjoint and do not (currently) inherit from one another. We adopt the definition of "actor" given by Cockburn (1992) to be, essentially, anything with "behavior" such as a person or a program. (By definition, actors are: unidentified-user, cloud-subscriber, cloud-subscriber-user, cloud-subscriber-administrator, cloud-user, payment-broker, cloud-provider, transport-agent, legal-representative, identity-provider, attribute-authority, and cloud-management-broker). Additionally, Liu et al. (2011) defined actors as an entity that manages the use, performance and delivery of cloud services, and negotiates relationships between Cloud Providers and Cloud Consumers.

Broad Network Access: Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms such as Mobile phones, tablets, laptops, and workstations (Hagen, 2001; Mell & Grance, 2011; Sato, Ohta, & Tokizawa, 1990).

Cloud Auditor: By definition, Liu et al. (2011) assert that a party that can conduct an independent assessment of cloud services, information system operations, performance and security of the cloud implementation is a Cloud Auditor.

Cloud Carrier: Is the intermediary that provides connectivity and transport of cloud services from Cloud Providers to Cloud Consumers. Cloud carriers provide access to consumers through network, telecommunication and other access devices (Mell & Grance, 2011).

Cloud Computing (CC): Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction (Mell & Grance, 2011).

Cloud-Management-Broker: A service that provides cloud management capabilities over and above those of the cloud provider and/or across multiple cloud providers. Service may be implemented as a commercial service apart from any cloud provider, as cross-provider capabilities supplied by a cloud provider or as cloud-subscriber-implemented management capabilities or tools (Mell & Grance, 2010).

Hybrid Cloud: The cloud infrastructure is a composition of two or more distinct cloud Infrastructures (private, community, or public), that remain unique entities, but are bound together by standardized or proprietary technology that enables data and application portability such as cloud bursting for load balancing between clouds (Mell & Grance, 2011).

Infrastructure as a Service (IaaS): The capability provided to the consumer to provision processing, storage, networks, and other fundamental

computing resources where the consumer can deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, and deployed applications; and possibly limited control of select networking components. (Bhardwaj, Jain, & Jain, 2010; Mell & Grance, 2011).

Measured Service: Cloud systems automatically control and optimize resource use by leveraging metering capability at some level of abstraction, appropriate to the type of service (e.g., storage, processing, bandwidth, and active user accounts). Resource usage can be monitored, controlled, and reported, providing transparency for both the provider and consumer of the utilized service (Mell & Grance, 2011; Takabi, Joshi, & Ahn, 2010).

On-demand Self-Service: A consumer can unilaterally provision computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service provider (Mell & Grance, 2011; Takabi et al., 2010).

Platform as a Service (PaaS): The capability provided to the consumer to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages, libraries, services, and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly configuration settings for the application-hosting environment. (Beimborn, Miletzki, & Wenzel, 2011; Mell & Grance, 2011).

Private Cloud: The cloud infrastructure is provisioned for exclusive use by a single organization comprising multiple consumers (e.g., business units). It may be owned, managed, and operated by the organization, a third party, or some combination of them, and it may exist on or off premises (Mell & Grance, 2011; Zhang, Cheng, & Boutaba, 2010).

Rapid Elasticity: Capabilities can be elastically provisioned and released, in some cases automatically, to scale rapidly outward and inward commensurate with demand. To the consumer, the capabilities available for provisioning often appear to be unlimited and can be appropriated in any quantity at any time. (Dillon, Wu, & Chang, 2010; Mell & Grance, 2011).

Resource Pooling: The provider's computing resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned per consumer demand (Hanly & Tse, 2001; Mell & Grance, 2011; Wischik, Handley, & Braun, 2008).

Service Level Agreement (SLA): The SLA serves as the foundation for the expected level of service between the consumer and the provider (Patel, Ranabahu, & Sheth, 2009). A service level agreement (SLA) is a formal contract between a service provider and a subscriber that contains detailed technical specifications called service level specifications (SLSs); (Fawaz, Daheb, Audouin, & Pujolle, 2004).

Software as a Service (SaaS): The capability provided to the consumer to use the provider's applications running on a cloud infrastructure. The applications are accessible from various client devices through either a thin client interface, such as a web browser (e.g., web-based email), or a program interface. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems,

storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings (Mell & Grance, 2011; Vaquero, Rodero-Merino, Caceres, & Lindner, 2008).

Technology-Organization-Environment (TOE): The TOE is an organization-level theory that explains that three different elements of the firm's context influence adoption decisions. These three elements are the technological context, the organizational context, and the environmental context. All three are posited to influence technological innovation (Baker, 2012).

List of Acronyms

Below is a list of the various acronyms used throughout the entire research study which may assist the reader and serve as a guide.

ASP	Active Server Pages
BDS	Big Data Solutions
CIO	Chief Information Officer
CT	Communication Technology
IaaS	Infrastructure as a service
IDE	Integrated Development Environment
ME	Market Exchange
NIST	National Institute of Standard and Technology
PaaS	Platform as a service
PEOU	Perceived Ease of Use
PU	Perceived Usefulness
RFID	Radio-Frequency Identification

SaaS	Software as a Service
SLA	Service Level Agreement
TC	Technological Company
NTC	Non-Technological Company
TOE	Technology Organization Environment

Summary

This chapter discussed the rationale for this study. The literature showed that even though intensive research has been conducted on the topic of cloud computing, both within TC and NTC's, there is still a gap between the expected utilization of cloud computing and the observed utilization. Cloud computing is of increasing interest to firms globally, yet many are discovering greater obstacles and costs to the implementation of cloud computing than anticipated (Avram, 2014). The goal of this qualitative, grounded theory study was to determine which factors contribute to firm resistance regarding cloud computing and whether firm characteristics, such as TC or NTC, serve to influence these factors. These data were then used to build a theoretical model of cloud computing acceptance, the factors that influence them, and the ways in which firm characteristics may influence these factors.

Cloud computing is revolutionizing the traditional means of the IT industry by making it possible for them to provide access to their infrastructures as well as application services for other firms on a subscription basis (Garg, Versteeg, & Buyya, 2013). Cloud computing can have significant effects on efficiency and productivity for firms (Oliveira & Martins, 2011), but these effects will only be realized if IT usage becomes utilized globally. Thus, it was essential to understand the determinants of IT

adoption. The perception of and attitude toward cloud computing is affected by numerous factors which may drive or halt its adoption (Stieninger et al., 2014). The findings of this study may benefit a wide variety of firms in understanding what holds them back from cloud computing services in their daily operations, considering, that cloud computing services plays a significant role in the use of innovative technologies.

The theoretical framework of this proposed study was derived from the IS/IT adoption theory, specifically from the technology-organization-environment (TOE) framework (Tornatzky et al., 1990). This framework is suited for this proposed study as it involves the process a firm follows when implementing a technological innovation, such as cloud computing, as well as other outside contexts which may influence this process in numerous ways. Furthermore, there were several barriers, issues, assumptions, limitations and delimitations associated with this proposed study. Assumptions, limitations, and delimitations for this study were the fundamental basis for conducting the research; without them, the research problem itself could neither exist nor understood. Chapter 2 of this study will review the related literature and Chapter 3 will discuss the methodology.

Chapter 2

Review of the Literature

Introduction

The aim of this qualitative, grounded theory study was to determine which factors contribute to firm resistance regarding cloud computing and whether firm characteristics, such as being TC or NTC, serve to influence these factors. These data were then used to build a theoretical model of cloud computing acceptance, the factors that influenced them, and the ways in which firm characteristics may influence these factors. Cloud computing (CC), Technology Companies (TC) and Non-Technology Companies (NTC) are confusing terminologies to many, even in this dynamic information age. The differences in organizational structure as well as the different resources available for TCs and NTCs may contribute to the resistance to implement cloud computing, while cloud computing may be very beneficial for these companies. cloud computing in its simplest definition, is storing, transferring data and accessing programs over the internet instead of using your computer's hard drive (Marston, Li, Bandyopadhyay, Zhang, & Ghalsasi, 2011).

It was essential to understand the determinants of IT adoption, as it may be advantageous to many companies. Cloud computing can have significant effects on efficiency and productivity for firms. The perception of and attitude toward cloud computing is affected by numerous factors which may drive or halt its adoption

(Stieninger et al., 2014). Though intensive research has been conducted on the topic of cloud computing, both within tech and non-tech companies, there is still a gap between the expected utilization of cloud computing and the observed reality. This review of the literature has provided valuable insight on the current views of researchers based on the studies they conducted regarding cloud computing and its benefits and barriers.

The adoption of technological innovations within companies is increasing. With the fast development of storage and processing technologies as well as the triumph of the Internet, technological resources have become more accessible and more powerful than before (Avram, 2014). Cloud computing is of increasing interest to firms globally, yet many are discovering greater obstacles and costs to the implementation of cloud computing than anticipated (Avram, 2014). It was of significance to further explore the implementation of cloud computing as well as the factors surrounding its implementation.

Research Strategy

The most applicable journals, published research, and literature related to cloud computing, the benefits of cloud computing, the resistance factors involving cloud computing, non-tech companies, and service models was sourced through several databases. The search for sources was prioritized to display research published since 2013 in order to attain the most current research. Most of the research included in this literature review was published since 2013. The databases included Google Scholar, DeepDyve, ProQuest (ABI/INFORM), EBESCO-host, JESTOR, ACM (Digital Lib), Emerald, and Science Direct and ERIC. The search terms included: *TAM, technology acceptance model, cloud computing, barriers, resistance, benefits, service models, tech companies, TC, non-tech companies, NTC, technological companies, no- technological*

companies, *TOE*, *theory*, *technology-organization-environment*, *framework* and combinations of these terms. Studies that were believed to be relevant to the purpose and research questions of the current study were included in this comprehensive literature review. Of the 69 sources obtained for this chapter, 55 articles (80%) were published between 2013 and 2016, and 14 articles (20%) were published prior to 2013. The literature that were included in this review were peer reviewed articles, comprehensive published reviews, and case studies. Most of the studies included were quantitative in research design.

About 11% of the articles reviewed in this study were geographically located outside of The United States of America. The constructs revealed as result of the literature review, related to studies relevant to firms located outside of the US will be only listed for reference in Table 1. The reason is that this study is limited only to firms located within the United States of America, specifically in Houston, Texas. In other words, the generalization of this research will be limited to the study population and will not be implied beyond.

Theoretical Framework

The evolving online environment has resulted in a new wave of technological innovations, which affects the way people interact with the environment (Ratten, 2012) The adoption of complex IT innovation require advantageous technology portfolio, organizational structure, and environmental strategy (S. Salleh et al., 2013). Hence, the theoretical framework of this study was derived from the IS/IT adoption theory, specifically from the technology-organization-environment (TOE) framework. The TOE was created by Tornatzky et al. (1990). The TOE framework describes factors that

influence technology adoption and its likelihood. TOE describes the process by which a firm adopts and implements technological innovations is influenced by the technological context, the organizational context, and the environmental context (Tornatzky et al., 1990). This framework was suited for this proposed study as it involves the process a firm follows when implementing a technological innovation, such as cloud computing, as well as other outside contexts which may influence this process in numerous ways. This proposed study seeeks to explore the possible organizational characteristics which may influence the cloud computing implementation or resistance thereof. An individual or companies may adopt or reject an innovation grounded on the characteristics of such an innovation (Zolkepli & Kamarulzaman, 2015).

Several researchers have applied the TOE model in their studies regarding IT innovations. Gangwar, Date, and Ramaswamy (2015) aimed to integrate the TAM model with the TOE framework to utilize in cloud computing adoption at an organizational level. The researchers developed a conceptual framework through the use of organizational and technological variables of the TOE framework and external variables of the TAM model while environmental factors were suggested to have a direct influence on cloud computing adoption (Gangwar et al., 2015). The researchers utilized a questionnaire to collect information from 280 participating companies in finance, IT, and manufacturing industries in India (Gangwar et al., 2015). The results identified relative compatibility, advantage, organizational readiness, complexity, top management commitment, as well as training and education to be significant variables affecting cloud computing adoption utilizing perceived ease of use (PEOU) and perceived usefulness (PU) as moderating variables (Gangwar et al., 2015). Trading partner support and

competitive pressure were also found to directly influence cloud computing adoption intentions (Gangwar et al., 2015). The model was found to explain 62 percent of cloud computing adoption (Gangwar et al., 2015). The researchers suggested that the model could be utilized as a guide to make sure of a positive outcome of cloud computing adoption in companies (Gangwar et al., 2015). This study integrated two of the known IT adoption models in order to improve the predictive power of the resulting model (Gangwar et al., 2015).

Other researchers conducted a similar study to the proposed study, and utilized the TOE framework to investigate the influencing factors of cloud computing adoption. The researchers posited that business leaders and managers globally were investigating the plethora of benefits resulting from cloud computing, regardless of cost savings (Borgman, Bahli, Heier, & Schewski, 2013). The researchers aimed to investigate the influence of cloud computing adoption on the competitiveness of specific companies, particularly focused on the expanded business networks, improved agility, and enhanced decision-making that may be provided by cloud computing (Borgman et al., 2013). Simultaneously, the factors regarding the company which may inhibit or support cloud computing adoption are not thoroughly understood (Borgman et al., 2013). This study utilized Tornatzky et al.'s TOE framework to examine the factors affecting cloud computing adoption (Borgman et al., 2013). Another goal was to conceptualize as well as understand the way in which IT governance structures and processes may moderate the influencing factors (Borgman et al., 2013). The researchers conducted a quantitative study including 24 global organizations representing various industries (Borgman et al.,

2013). The results of the study indicated that the organization and technology context influenced implementation decisions (Borgman et al., 2013).

Another group of researchers utilized the TOE framework to investigate the impact of publicized facts of the adoption of big data solutions (BDS) in organizations. The researchers postulated that as witnessed with new technology adoption within companies, BDS also holds some threat to security and other challenges, specifically as a result of the characteristics of BD itself such as the velocity, volume, and variety of data (K. A. Salleh, Janczewski, & Beltrán, 2015). Although several security considerations that were associated with the adoption of BDS had been publicized, it remained unclear if these publicized facts had any effect on the adoption of BDS (Ahmad Salleh et al., 2015). Thus, the purpose of the study conducted by Ahmad Salleh et al. (2015) was to investigate the security factors by placing focus on the affect that several organizational security views, technological security factors, as well as security factors linked to environmental influence have on the adoption of BDS (Ahmad Salleh et al., 2015). The researchers utilized the TOE framework as the primary conceptual framework (Ahmad Salleh et al., 2015). This research was conducted through a Sequential Explanatory Mixed Method approach (Ahmad Salleh et al., 2015). The quantitative method was used utilizing an online questionnaire survey (Ahmad Salleh et al., 2015). The results of the quantitative process were further explored through a case study (Ahmad Salleh et al., 2015). The results of this research were expected to contribute practically and theoretically (Ahmad Salleh et al., 2015). The research further aimed to yield a security factor conceptual model regarding BDS adoption (Ahmad Salleh et al., 2015).

Alternatively, researchers have also applied the TOE framework to investigate radio-frequency identification (RFID) adoption in the retail industry. The researchers postulated that their study proposed and tested a framework to predict RFID adoption intent (Wamba, Bhattacharya, Trinchera, & Ngai, 2017). The study aimed to understand the subsequent antecedents regarding RFID adoption in a retail setting (Wamba et al., 2017). Grounded on the TOE framework, the research developed and validated the framework in order to examine the effect of 12 contextual determinants on RFID adoption in retail under four selected categories: organizational, technological, value-chain, and environmental (Wamba et al., 2017). Data were collected from 74 experts from different business (Wamba et al., 2017). The results indicated that competitive pressure, relative advantage, catalyst agent, as well as value chain complexity were significant determinants of the adoption of RFID in retail (Wamba et al., 2017). The results suggested that environmental characteristics were very significant to consider in the adoption of RFID along with value chain and technological characteristics (Wamba et al., 2017).

This review of researchers who have previously utilized the TOE framework in several studies on the adoption of new technology have shown that this framework is appropriate for the proposed study. Cloud computing is regarded to be new technology which is implemented or rejected in a plethora of companies in various industries, and this study's aim was to explore the influencing factors. The table below show further use of the TOE framework in other studies.

Table 1. *References for The Theoretical Model*

Context	Factors	References
Technological	Data Security; Complexity Compatibility; Cost.	(Lian, Yen, & Wang, 2014).
	Initiation; Adoption; Implementation; IS maturity.	(Grover & Goslar, 1993).
	Trial-ability; IT Infrastructure; Compatibility-IT; Strength-Security Systems; Limited Technical Expertise.	(Tehrani & Shirazi, 2014).
	Relative Advantage; Complexity; Scalability.	(Al-Jabri, 2014); (Valier, McCarthy, & Aronson, 2008).
	Internet-Availability-Bandwidth; Interoperability Issues; Multi-Tenancy	(S. Salleh et al., 2013).
	Vulnerability; Data Security; Privacy; Lack of Trust.	
Organizational	Relative; Advantage; Top manager's support; Adequate resources; Benefits.	(Lian et al., 2014).
	Size; Centralization; Formalization.	(Grover & Goslar, 1993).
	Conformity-Work Culture; Organizational Structure and Size.	
	Top management support; Company size; Ownership of Data; Organization Readiness.	(Tehrani & Shirazi, 2014).
		(Al-Jabri, 2014).
		(S. Salleh et al., 2013).
Environmental	Government policy	(Grover & Goslar, 1993).
	Perceived industry pressure.	
	Environmental uncertainty.	(Tehrani & Shirazi, 2014).
	Technical Provider Support; Skilled Vendors; Influence of Market Scope; Nature of Industry; Government; Competitors.	
	The level of Competition; Trading Partners; Rules & Regulation.	(Al-Jabri, 2014).
	Service Providers Sustainability/Integrity; Government Initiatives; Service Level Agreement (SLA).	(S. Salleh et al., 2013).

Review of the Literature

To inform the study, a literature review was carried out to determine what is already known about cloud computing and the resistance factors that prevent the adoption of cloud computing technologies. Specifically, the review provided an overview of cloud computing, benefits of cloud computing, the known resistance factors to cloud computing, as well as NTCs in relation to cloud computing. The available service models of cloud computing were also discussed. According Stieninger et al. (2014) the perception of and attitude toward cloud computing is affected by numerous factors which may drive or halt its adoption. The review of the literature sets the foundation to explain the factors that contribute to the resistance to cloud computing adoption as well as the currently known benefits thereof needed for further exploration by the researcher.

Current Research Topics in Cloud Computing

For some companies, moving core applications and data from their data centers to the cloud is a serious strategic decision that requires careful consideration, research and in many instances board approval. Even though industry analysts expect the cloud market to exceed $240 billion by 2017, some firms are hesitant to leave their existing infrastructure for the promise of a brighter future in the cloud (Comfort, 2014). Therefore, it is of great importance to conduct further research on resistances factors affecting cloud computing adoption.

The current research on cloud computing makes way for further directions for research. Chen and Zhang (2014) postulated that the general cloud computing approach discussed so far, as well as the specific VCL implementation of a cloud, represents the continuation of a number of research directions and opens some new ones. For example, economy-of-scale, economics of image and service construction depend on the ease of

construction and mobility of these images, not only within a cloud but also among different clouds. The research on cloud computing is, while currently quite active, still relatively new, resulting in many seminal works as the field begins to mature (Rai, Sahoo, & Mehfuz, 2015). One important and particularly active area of research is cloud migration, or the movement of existing legacy data systems into the cloud environment (Rai et al., 2015). Similarly, Morgan and Conboy (2013) conducted research drawing on three case studies of service providers and their customers. These studies suggested that the factors impacting cloud computing adoption tend to be psychological as well as technical, and thus this area of research has two sides; the acceptance of adoption side, on which many businesses continue to favor their legacy systems for a variety of reasons (Rai et al., 2015), and the technical side. One aspect of the technical side is security, which has not yet been solved but is the subject of much active, current research (Chang, Kuo, & Ramachandran, 2016).

Another area of research involves smaller firms. While small and medium enterprise in general has been studied a fair amount (e.g. Tehrani & Shirazi, 2014), there is more to be done. This especially applies to startups, which may be considered "default" cloud users due to their lack of any existing infrastructure and how well cloud computing suits their need for scalability (Repschlaeger, Erek, & Zarnekow, 2013). This also extends to enterprise in developing countries, where the conditions may be different (Gupta et al., 2013) and the factors driving cloud adoption can also be different than those found in developed nations (Ratten, 2014).

Overall, it is widely acknowledged that cloud computing has the potential to transform a large part of the IT industry, but it has not yet reached this potential, and the

need for research on the issues surrounding the adoption of cloud computing has received relatively little attention (Li, Troutt, Brandyberry, & Wang, 2011; Morgan & Conboy, 2013; Tehrani & Shirazi, 2014). This suggests that there is a need for an appropriate theoretical model to use when implementing new technology, which was the secondary goal of the proposed study. Further research on cloud computing would be valuable to the current body of literature, as well as further insight on the factors influencing the decision to implement or reject cloud computing adoption.

Cloud Computing

Cloud computing is an evolutionary way of doing business. Cloud computing services are enabling individuals and companies to store basically unlimited data as well as access low-cost, low-scale data processing instantly (Feinleib, 2014). The latest development in cloud computing has aided the realization of computing as a utility (Garg, Vecchiola, & Buyya, 2013). Amazon and Google have also started offering cloud computing services through "pay as you go" packages (Garg et al., 2013). This progress has resulted in the market infrastructure evolving into Market Exchange (ME) which facilitates trading between cloud computing providers and consumers (Garg et al., 2013).

Furthermore, as a result of the rapidly changing technological environment, cloud computing services are becoming more accessible. The fast development of storage and processing technologies as well as the Internet's success have resulted in computing resources becoming more powerful, cheaper, and more available (Sadiku, Musa, & Momoh, 2014). Avram (2014) further posited that the technological trends resulted in the need for cloud computing defined as general utilities which could be leased and released by the users via the Internet on-demand. Organizations' experience of cloud computing is increasing, and as such they are moving more core functions to cloud platforms

(Avram, 2014; Taleb, 2014). Cloud computing services and its adoption were also revealed to be significantly more complex compared to initial expectations, specifically regarding system integration, data management, as well as multiple cloud provider management (Avram, 2014). Cloud computing is of increasing interest to firms globally, yet many are discovering greater obstacles and costs to the implementation of cloud computing than anticipated (Toosi, Calheiros, & Buyya, 2014). Furthermore, companies are not thoroughly informed on the benefits and barriers of the adoption of cloud computing when they are making decisions, whether they decide to implement it or reject it (Avram, 2014).

As stated by several researchers previously, cloud computing is new technology which could be greatly beneficial for many companies. Cloud computing is a current computational paradigm which offers innovative business models for companies to implement IT without needing upfront investment (Almorsy, Grundy & Müller, 2016). However, even though there are several potential gains related to cloud computing, the security of cloud computing is still in question which affects cloud computing adoption (Almorsy et al., 2016).

Cloud computing is an excellent and valuable technological resource. Buckholtz, Ragai, and Wang (2015) defined cloud computing as a term used to refer to a new paradigm—some authors even speak of new technology—that flexibly offers IT resources and services over the Internet. Cloud computing is a recent trend in IT that moves computing and data away from the desktop and portable PCs into large data centers (Dikaiakos, Katsaros, Mehra, Pallis, & Vakali, 2009). Dikaiakos et al. (2009) pointed out that cloud computing refers to applications delivered as services over the Internet as well as to the actual cloud infrastructure—namely, the hardware and systems

software in data centers that provide these services. The National Institute of Standard and Technology (NIST) defined cloud computing as a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources such as networks, servers, storage, applications, and services (Gutierrez-Garcia & Sim, 2013). These resources can be rapidly provisioned and released with minimal management effort or service provider interaction.

The diagram below, Figure 1A depicts the Visual Model of Cloud Computing. NIST defines cloud computing in terms of five essential characteristics, three cloud service models, and four cloud deployment models (Gutierrez-Garcia & Sim, 2013). Figure 1A shows three distinct categories within cloud computing: Software as a Service, Platform as a Service, and Infrastructure as a Service. (Figure 1A is authorized to use per e-mail from L. Badger ((personal communications, June 22, 2016) as shown in Appendix A). More recent literature has continued to reference these definitions, suggesting that the basic foundational elements of cloud computing have become relatively static (Jula, Sundararajan, & Othman, 2014).

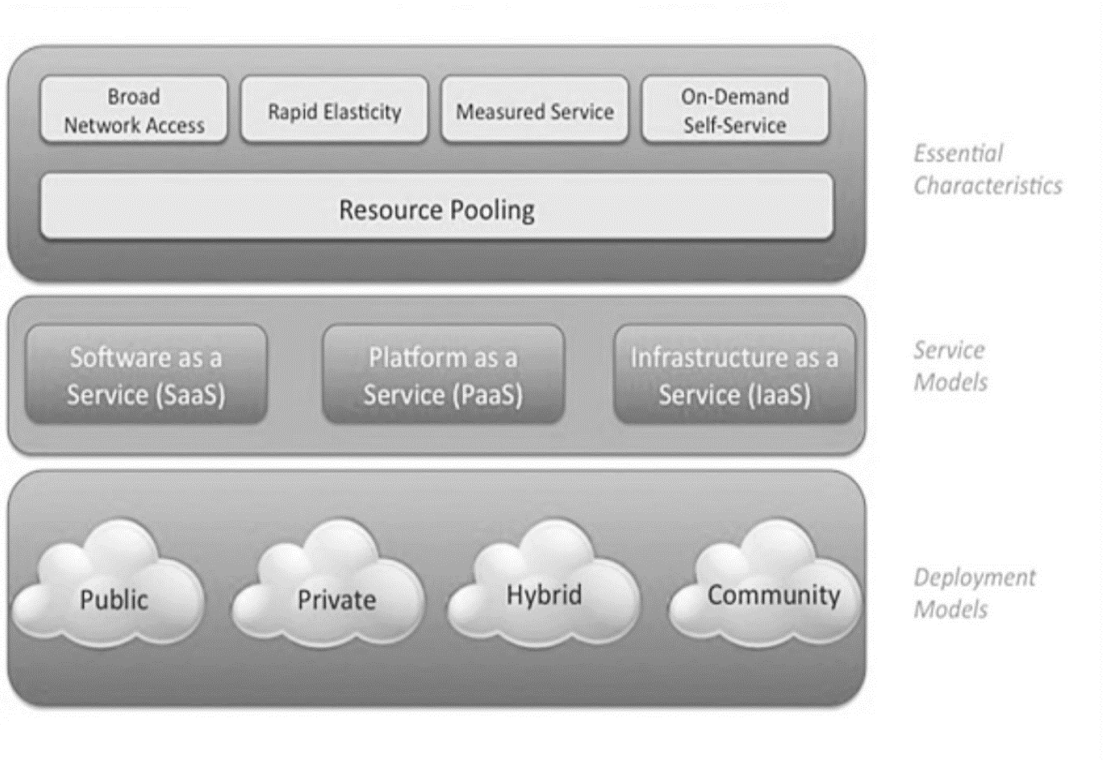


Figure 1A. NIST's Visual Model of Cloud Computing Definition. Adapted from "The NIST Definition of Cloud Computing," by P. Mell and T. Grance, 2011, *National Institute of Standard and Technology, 53*(6), 50.

For further clarification on the architecture of cloud computing, Figure 1A-1 by Liu et al. (2011) presents an overview of the NIST cloud computing reference architecture, which identifies the major actors, their activities, and their functions in cloud computing. The diagram depicts a generic high-level architecture and is intended to facilitate the understanding of the requirements, uses, characteristics and standards of cloud computing. Figure 1A-1 is authorized to use per e-mail from L. Badger (personal communications, June 22, 2016) as shown in Appendix A.

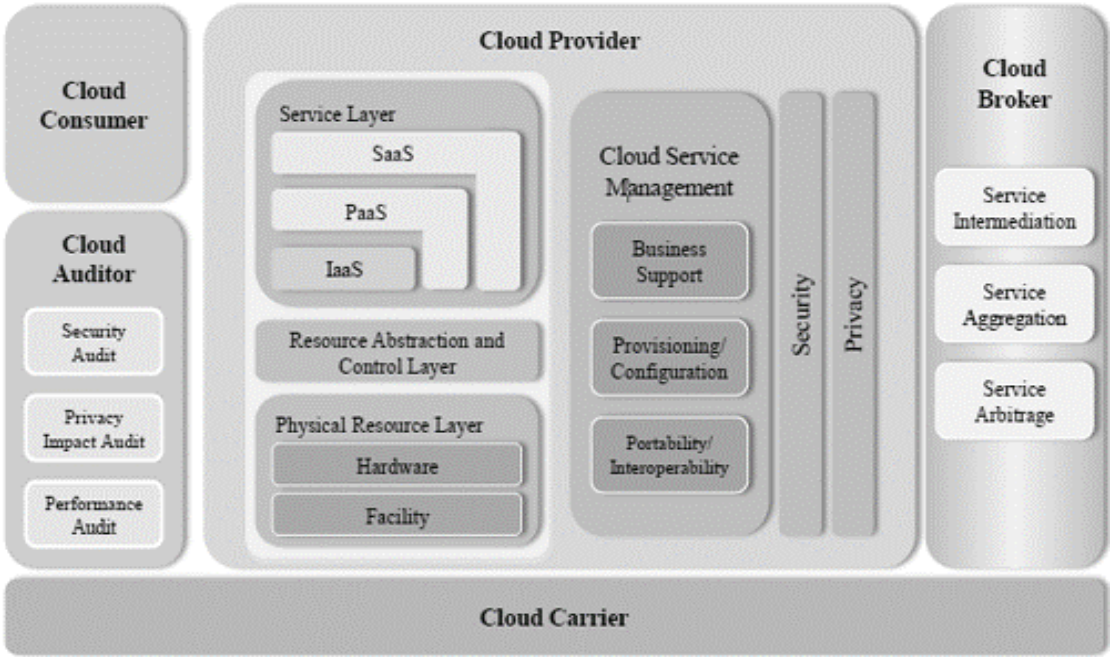


Figure 1A-1: Cloud Computing reference architecture. Adapted from "The NIST Definition of Cloud Computing," by P. Mell and T. Grance, 2011, *National Institute of Standard and Technology, 53*(6), 50.

In sum, cloud computing is seen as a viable and beneficial option in technological advancement for different types of companies. The most significant threat related to cloud computing is the security of data, as information is stored in the cloud or the Internet, which subsequently makes the data hackable. However, even though there are several potential gains related to cloud computing, the security of cloud computing is still in question which affects cloud computing adoption (Almorsy et al., 2016). For companies working with highly confidential information, this may be the most significant challenge. Companies are also not fully informed on cloud computing. Avram (2014) posited that companies are not thoroughly informed on the benefits and barriers of the adoption of cloud computing when they are making decisions, whether they decide to

implement it or reject it. Further research and revolutionary solutions to the concerns of companies are needed.

Benefits of Cloud Computing

Cloud computing is attractive to business owners as it eliminates the requirement for users to plan for provisioning. One of the key features of cloud computing is the capability of acquiring and releasing resources on-demand, creating extreme scalability and flexibility (Jula et al., 2014). Companies who are just starting up may particularly benefit from cloud computing services, as they often do not manage an internal IT infrastructure (Walterbusch, Martens, & Teuteberg, 2013). The objective of a service provider, in this case, is to allocate and de-allocate resources from the cloud to satisfy its service level objectives (SLOs), while minimizing its operational cost (Jula et al., 2014). Cloud computing provides many benefits, from a hardware provisioning and pricing point of view (Gutierrez-Garcia & Sim, 2013).

Furthermore, cloud computing provides a variety of benefits, as stated previously, including economic savings, configurable computing resources, and service flexibility (Khalil, Khreishah, & Azeem, 2014). The first of these aspects is appearance of virtually infinite computing resources available on demand, quickly enough to follow load surges, thereby eliminating the need for cloud computing users to plan far ahead for provisioning (Gutierrez-Garcia & Sim, 2013). Another of these is that the ability to pay for use of computing resources on a short-term basis as needed, and release them as needed, thereby rewarding conservation by letting machines and storage go when they are no longer useful (Gutierrez-Garcia & Sim, 2013).

The benefits of cloud computing have been investigated by several researchers. From a business prospective, the key benefits of cloud computing are that it is a service model in which computing services (both hardware and software) are delivered on-demand to customers over a network in a self-service fashion, independent of device and location (Jula et al., 2014). The resources required to provide the requisite quality-of-service levels are shared, dynamically scalable, rapidly provisioned, virtualized and released with minimal service provider interaction (Pragya Gupta & Gupta, 2012). Furthermore, users pay for the service as an operating expense without incurring any significant initial capital expenditure, with the cloud services employing a metering system that divides the computing resource into appropriate blocks (Gutierrez, Boukrami, & Lumsden, 2015).

Cloud computing provides many benefits to businesses and could provide 24/7 access to business-critical applications, reduced costs from not having to manage the infrastructure, and increase agility. Cloud computing is a model which enables universal, convenient, on-demand network access to a shared pool of configurable computing resources (Wubben et al., 2014). Within the communication technology (CT) environment, cloud computing is perceived as a provider for cost-efficient, flexible, more efficient mobile network adoptions (Wubben et al., 2014). Characteristics of cloud computing platforms include virtualization, on-demand provisioning, elasticity, resource pooling, multitenancy, and service metering (Wubben et al., 2014).

Cloud computing adoption may be beneficial to any industry, including education and health care. Müller, Holm, and Søndergaard (2015) posited that cloud computing is getting attention from researchers and practitioners and an increasing number of

organizations are implementing cloud computing. Companies have primarily focused on reducing fixed IT costs and utilizing the flexible IT resources offered by cloud computing (Müller et al., 2015). In addition, being a disruptive technology, cloud computing enables new innovative business models and services which encompasses decreased marketing times, enable operational efficiencies and engage customers in new ways (Müller et al., 2015). The researchers also stated that the research on cloud computing is still in early stages and organizations and researchers need knowledge regarding the potential applications and possible pitfalls of cloud computing in order to utilize its full potential (Müller et al., 2015).

Several researchers have investigated and stated the potential benefits of cloud computing adoption in companies. As stated previously, characteristics of cloud computing platforms include virtualization, on-demand provisioning, elasticity, resource pooling, multitenancy, and service metering (Wubben et al., 2014). Cloud computing provides a variety of benefits including economic savings, configurable computing resources, and service flexibility (Khalil et al., 2014). However, it was also stated that the research on cloud computing adoption, as well as its benefits and possible downfalls or barriers is still young, and that further research is needed in order for companies to make informed decisions on cloud computing adoption (Müller et al., 2015). As such, the results of the proposed study would provide valuable knowledge with regard to cloud computing adoption.

Known Resistance Factors to Cloud Computing

As stated previously, cloud computing is a cost-effective, flexible, and established delivery platform for consumer or business IT services via the Internet. Unfortunately,

cloud computing also presents added risk as a result of essential services being outsourced to third parties, which makes it more difficult to maintain data security and privacy, support service and data availability, as well as demonstrate compliance (Hashizume, Rosado, Fernández-Medina, & Fernandez, 2013). More specifically, sharing data with the cloud service provider has been found to be the main scientific problem which separates cloud computing security from other computing security (Arapinis, Bursuc, & Ryan, 2013). Xiao and Xiao (2013) also stated that the core challenge is data security as well as the privacy of information processed and stored in the service provider's systems. Shahzad (2014) postulated that although security pitfalls regarding cloud computing services had been investigated from a technical point of view, research had failed to clarify the reason why consumers still use cloud services despite their distrust.

Although the cloud computing offers attractive and compelling features, it has unique challenges which also discourage adoption. This makes it imperative to appreciate and comprehend the adoption drivers and barriers (Prashant Gupta, Seetharaman, & Raj, 2013). Since 1993, researchers across the globe have conducted a different type of research, investigating the factors of resistances that inhibit the adoption of cloud computing (Grover & Goslar, 1993). An early study by Grover and Goslar (1993) presented a research model consisting of three sets of variables: environmental factors, structural (organizational) factors, and information systems (IS) factors. These variables are hypothesized to influence the initiation, adoption, and implementation of telecommunications technologies.

Additionally, He and Xu (2015) reported on the factors that influence the adoption of cloud computing by firms belonging to the high-tech industry. The data collected from 111 companies belonging to the high-tech industry in Taiwan revealed that relative advantage, top management support, firm size, competitive pressure, characteristics have a significant effect on the adoption of cloud computing (He & Xu, 2015). In a study based on data collected from 676 European companies from three industries (glass, ceramics, and cement), Loukis and Kyriakou (2015) found that both the sophistication and electronic interconnection of a firm's IT infrastructure had a positive effect on its propensity to adopt cloud computing. The researchers found that some firms view cloud computing as a means to reduce their need to invest in IT infrastructure, while other firms instead view it as a way of supporting and facilitating production while also reducing the costs of external IT collaboration (Loukis & Kyriakou, 2015).

In recent years, several theories have emerged trying to explain the determinants factors of Ccloud computing adoption (Yeboah-Boateng & Essandoh, 2014b). The Technology Organization Environment (TOE) framework is an organization-level theory that explains that three different elements of a firm's context influence adoption decisions (Yeboah-Boateng and Essandoh (2014a). These three elements are the technological context, the organizational context, and the environmental context (Yeboah-Boateng & Essandoh, 2014b). All three are posited to affect technological innovation (Baker, 2012). Additionally, Shaikh and Karjaluoto (2015) reviewed an innovation adoption decision factors that classify innovation decision factors into three dimensions. These decisions are entity factors (resource slack, Internet expertise, and risk propensity), decision object factors (perceived relative advantage and perceived ease of use), and context factors like

perceived competitive pressure (Shaikh & Karjaluoto, 2015). These factors are most likely to influence SMEs' intention to adopt and continue to use (Shaikh & Karjaluoto, 2015).

Several factors influence an individual decision to make use of cloud computing services. Karahanna, Straub, and Chervany (1999) pointed out that an individual's intention to adopt (or continue to use) the IT is determined by two basic factors: one reflecting personal interests and one reflecting social influence. The personal factor, attitude toward adopting (or continuing to use) the IT, reflects the individual's positive and negative evaluations of performing the behavior (Karahanna et al., 1999). The social influence factor, subjective norm, refers to the individual's perceptions of the social pressures to adopt or not adopt or to continue or stop using (Karahanna et al., 1999). This notion, though old, has been supported by more recent literature such as a study by Ratten (2014), who found that cloud computing use is socially driven in both the United States and China, but that the precise dimensions of this social motivation differed significantly between these two contexts. Additionally, in a recent study, Yeboah-Boateng and Essandoh (2014a) found that the lack of internal knowledge and expertise is rated as the biggest barrier to cloud adoption amongst SMEs in developing economies. The authors further pointed out that poor internet access and connectivity is the next challenge identified to cloud adoption by SMEs (Yeboah-Boateng & Essandoh, 2014a). As anticipated based on the literature, security and trust are the other two concerns that greatly affect businesses considering cloud computing (Yeboah-Boateng & Essandoh, 2014a).

The high level of awareness and usage of cloud services in developed countries often makes security and trust as the main barriers to cloud adoption (Yeboah-Boateng & Essandoh, 2014a). For example, in a study conducted in Switzerland, Brender and Markov (2013) examined the facts to determine if cloud computing risks are well understood and whether proper mitigation practices have been studied and proposed. Their findings suggested that there existed a sufficient degree of risk awareness and the ability to focus specifically on those risks and controls that are relevant to the IT function to be migrated to the cloud (Brender & Markov, 2013). Also, Brender and Markov (2013) pointed out that whether to adopt cloud services may depend not only on the company's size, technological expertise, and corporate culture but also on the type of processes or data to be migrated. The security levels of multiple cloud applications are also not necessarily equal to one another, leaving some forms of cloud computing more vulnerable than others (Almorsy et al., 2016).

Often, the adoption of new technology within a company suffers resistance. In contradiction to the abovementioned researchers, Jha and Bose (2016) argued more generally that many innovations face resistance, and that opposition to new technologies is not new. Regardless of the context—whether the innovation is a consumer product targeted at a particular segment of the population or a technology for businesses—in each of these cases, certain actors are opposed to the innovation. Jha and Bose (2016) suggested that, at the organizational level, opponents of acceptance can be rivals of the technology provider, competitors of technology users, customers of the firm using the technology, nonprofit organizations, or government or technology experts. On the other hand, at the individual level, opponents can be people who totally reject the innovation,

environmental or health organizations, or public interest groups (Cavusoglu, Hu, Li, & Ma, 2010).

Furthermore, some of the most significant factors in cloud adoption in today's tumultuous economy are the cloud challenges in business context. Chang, Walters, and Wills (2016) pointed out that there are three business challenges described as follows. Firstly, all cloud business models and frameworks proposed by leading researchers are either qualitative or quantitative (Chang, Walters, et al., 2016). Secondly, there is no accurate method for analyzing cloud business performance other than the stock market, and thirdly, communications between different types of clouds from different vendors are often difficult to implement (Chang, Walters, et al., 2016). Often workarounds require writing additional layers of APIs, or an interface or portal to allow communications (Chang, Walters, et al., 2016).

In today's unstable market conditions, businesses across the globe are looking for ways to lower their IT infrastructure investment cost. Cloud computing enables firms to reduce their IT infrastructure costs. However, despite these benefits, organizations face obstacles adopting cloud services, including uncoordinated adoption by stakeholders, small business, and technical acumen, and data security (Garrison, Kim, & Wakefield, 2012). Security of cloud computing services is often a primary concern of firms who decide against cloud computing adoption (Chang, Kuo, & Ramachandran, 2016).

It has also been stated that cloud computing services do not necessarily provide more features when compared to existing Active Server Pages (ASP). Lee, Chae, and Cho (2013) indicated that, according to the 2008 report by the National Information Society Agency (NIA) and the 2009 report by the National IT Industry Promotion

Agency (NIPA), suppliers of cloud computing have been providing services that do not significantly differ from the existing ASP. Since then, more cloud services have begun to develop, offering more cloud incentives, but these are relatively new (Rittinghouse & Ransome, 2016). Thus, since cloud computing is only beginning to offer fundamentally new services, the availability and security of the services are the primary factors in determining their appeal. In addition to security concerns, IT infrastructure cost plays a significant role in cloud adoption. Establishing a cloud computing platform requires different types of investments in such areas as hardware, software, and systems integration (Chang, Walters, et al., 2016). For this reason, costs will also be a critical factor in the adoption decision. Based on the above discussions, this dimension is composed of four variables. These variables are data security, complexity, compatibility, and costs (Lian et al., 2014).

As stated previously, individuals or companies are often not well informed on cloud computing adoption. Yang, Sun, Zhang, and Wang (2015) investigated IT professional's perceptions and attitudes towards adopting cloud computing in Taiwan. Despite the efforts made by providers such as HP and IBM, the interview data suggests that many IT professionals do not have an in-depth understanding of the cloud, nor are they aware of its benefits to businesses (Yang et al., 2015). Furthermore, for cloud computing to take off in the IT sector in Taiwan cloud service providers and other stakeholders such as government and leaders in the IT industry may need to do more (Yang et al., 2015). Therefore, for cloud computing to grow, it is important to understand the factors that can influence its rate of adoption.

Several factors should be taken into account when deciding to implement cloud computing services besides financial gains. Khajeh-Hosseini, Greenwood, Smith, and Sommerville (2012) highlighted the challenges of cloud adoption in enterprises and showed that decisions on migrating IT services to the cloud should not only and simply be driven by cost considerations but should also take a range of socio-technical factors into account. The adoption of cloud computing in enterprise environments is non-trivial (Khajeh-Hosseini et al., 2012). Understanding the organizational benefits and drawbacks is far from straightforward because the suitability of the cloud for many classes of systems is unknown or an open research challenge.

Furthermore, organizations face several limitations when using private cloud to process data. Nepal and Choo (2015) found that the first limitation when using private cloud to process healthcare application data is scalability. However, the changing volume, velocity, and variety of data make it difficult to plan private cloud capacity accurately, and private cloud is often either under- or overprovisioned (Nepal, Ranjan, & Choo, 2015). Private cloud is always built with limited scalability, to reduce capital investment (Nepal & Choo, 2015). In other words, the organization faces several limitations when using private cloud to process their data, resulting in a considerable amount of organizational change that will affect peoples' work in significant ways (Khajeh-Hosseini et al., 2012).

A large amount of research has been conducted on the factors influencing the resistance of cloud computing adoption. Aside from the primary concern of security, several other concerns were mentioned, including that cloud computing may not offer as many features as ASP. Sharing data with the cloud service provider has been found to be

the main scientific problem which separates cloud computing security from other computing security (Ryan, 2013). An early study by Grover and Goslar (1993) presented a research model consisting of three sets of variables which are hypothesized to influence the initiation, adoption, and implementation of telecommunications technologies: environmental factors, structural (organizational) factors, and information systems (IS) factors. Yeboah-Boateng and Essandoh (2014a) found that the lack of internal knowledge and expertise is rated as the biggest barrier to cloud adoption amongst SMEs in developing economies.

Service Models

There are several service models of cloud computing. Currently cloud computing is transforming the utilization of IT (Kar & Rakshit, 2015). Several vendors offer services where storage, computing, and application resources is dynamically provisioned based on the utilizer's need (Kar & Rakshit, 2015). Cloud computing is used by organizations to minimize their IT costs by transferring software costs to 3rd parties who provide software-as-a-service (SaaS) or platform-as-a-service (PaaS) (Gonçalves & Ballon, 2011). However, the needs of different utilizers vary significantly (Kar & Rakshit, 2015). To increase revenue, flexible pricing is needed, which may address diverse requirements systematically (Kar & Rakshit, 2015). The cloud model is composed of five essential characteristics (on-demand self-service, broad network access, resource pooling, rapid elasticity, and measured service), three service models (detailed below), and four deployment models such as private clouds, community clouds, public clouds and hybrid clouds (Mell & Grance, 2011). The three service models of cloud computing are:

Software as a Service (SaaS). SaaS provides a consumer with access to the provider's applications running on a cloud infrastructure managed by the cloud computing service provider (Branch, Tjeerdsma, Wilson, Hurley, & McConnell, 2014; Gutierrez-Garcia & Sim, 2013). The applications are accessible from various client devices through either a thin client interface, such as a web browser (e.g. web-based email), or a program interface (Gutierrez-Garcia & Sim, 2013). However, customers using cloud computing do not have control of underlying cloud applications or infrastructure (which they using), aside from specific user configurations (Branch et al., 2014).

Platform as a Service (PaaS). PaaS provides a consumer with the capability to deploy infrastructure in a cloud setting, in the form of consumer-created or acquired applications created using programming languages, libraries, services, and tools supported by the provider (Branch et al., 2014; Rittinghouse & Ransome, 2016) Similar to SaaS, the consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly configuration settings for the application-hosting environment (Rittinghouse & Ransome, 2016). Generally, the users are provided with an Integrated Development Environment (IDE) or several IDE's to facilitate development (Branch et al., 2014). Examples include Microsoft Azure and the Google App Engine (Branch et al., 2014).

Infrastructure as a Service (IaaS). IaaS provides to the consumer with processing, storage, networks, and other fundamental computing resources where the consumer can deploy and run arbitrary software, which can include operating systems

and applications (Branch et al., 2014; Gutierrez-Garcia & Sim, 2013). The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, and deployed applications; and possibly limited control of select networking components like host firewalls (Gutierrez-Garcia & Sim, 2013). The abovementioned provides the cloud user with resources on-demand like CPU and Storage (Branch et al., 2014). Still, the physical infrastructure like hardware, servers, and networks are managed by the cloud computing service provider. Amazon is an example of an IaaS provider (Branch et al., 2014).

As technological needs increase, cloud computing providers have to continue to create and provide services according to the needs of their customers. The increased tendency to use cloud computing encourages vendors to provide services with a variety of functional and nonfunctional (quality) features (Jula et al., 2014). Cloud computing service providers face harsh competition in supplying enhancements of quality service due to the exponential growth of offered services (Jula et al., 2014). Selecting appropriate services from the available service pool, overcoming composition restrictions, determining the significance of quality parameters, focusing on the specific characteristics of the initial problem, as well as addressing rapid changes regarding the service properties are some of the most significant issues to investigate and address (Jula et al., 2014).

Other models. In addition to these basic models, recent literature has suggested that the potential for cloud services will continue to grow. Some current and future additions to the model include identity as a service, which addresses issues of corporate and personal identity through a cloud approach, as well as issues of location

identification, and compliance as a service (Rittinghouse & Ransome, 2016). The growing number of services available on cloud platforms is in itself suggestive of the need for improved cloud adoption and understanding of the determinants thereof.

This section in the literature review discussed the available service models for cloud computing briefly. The current models are SaaS, PaaS and IaaS. More research should be conducted regarding the types of companies which fit best with the available service models, and whether they are categorized as TCs or NTCs. Further research should also be conducted regarding the benefits and challenges regarding each of the available service models.

Summary

Cloud computing is seen as a viable and beneficial option in technological advancement for different types of companies. For companies working with highly confidential information, this may be the most significant challenge. Companies are also not fully informed on cloud Computing. Avram (2014) posited that companies are not thoroughly informed on the benefits and barriers of the adoption of cloud computing when they are making decisions, whether they decide to implement it or reject it. Further research and revolutionary solutions to the concerns of companies are needed.

Overall, the review of the literature revealed that data security is one of the major issues which reduces the growth of cloud computing (Almorsy et al., 2016). The most significant threat related to cloud computing is the security of data, as information is stored in the cloud or the Internet, which subsequently makes the data hackable. In general, when firms consider cloud adoption, data security, privacy, complexity, compatibility, competitors, and government regulations are some factors of resistance

that influence the adoption decision (Tehrani & Shirazi, 2014). In other words, the challenge is how to ensure data confidentiality and integrity when storing such data but still make it highly available, process it to extract actionable information for decision makers (Nepal & Choo, 2015). However, even though there are several potential gains related to cloud computing, the security of cloud computing is still in question which affects cloud computing adoption (Almorsy et al., 2016).

In addition, the literature revealed that the future of computing lies in cloud computing, whose primary goal is reducing the cost of IT services while increasing processing throughput, reliability, availability, and flexibility and decrease processing time (Hayes, 2008). Therefore, as a result of the literature review, Table 1 on p. 26 depicts the common factors of resistance that influence cloud computing adoption. In Table 1, p. 26, some key factors of resistance are highlighted to distinguish them as the predominant factors influencing the adoption decision and the same will be of the researcher's interest to investigate.

Several researchers have investigated and stated the potential benefits of cloud computing adoption in companies. Characteristics of cloud computing platforms include virtualization, on-demand provisioning, elasticity, resource pooling, multitenancy, and service metering (Wubben et al., 2014). Cloud computing provides a variety of benefits including economic savings, configurable computing resources, and service flexibility (Khalil, Khreishah & Azeem, 2014; Rong et al., 2013). Also, some research has been conducted on the factors influencing the resistance of cloud computing adoption. Aside from the primary concern of security, several other concerns were mentioned. An early study by Grover and Goslar (1993) presented a research model consisting of three sets of

variables which are hypothesized to influence the initiation, adoption, and implementation of telecommunications technologies: environmental factors, structural (organizational) factors, and information systems (IS) factors. Yeboah-Boateng and Essandoh (2014a) found that the lack of internal knowledge and expertise is rated as the biggest barrier to cloud adoption amongst SMEs in developing economies.

The literature review discussed the available service models for cloud computing briefly. The current models are SaaS, PaaS and IaaS. More research should be conducted regarding the types of companies which fit best with the available service models, and whether they are categorized as TCs or NTCs. Further research should also be conducted regarding the benefits and challenges regarding each of the available service models.

In conclusion, this study will yield valuable results and add to the current body of literature on cloud computing. However, the existing literature revealed and suggested such a variety of factors influencing cloud computing adoption, as to suggest that there may be more. Additionally, this review of the literature shed little light on the firm-level influences on cloud computing adoption, such as whether a firm is a TC or an NTC. Therefore, it is of great importance and critical to further investigate the factors that affect, negatively, the adoption of cloud computing. It was stated that the research on cloud computing adoption, as well as its benefits and possible downfalls or barriers is still young, and that further research is needed in order for companies to make informed decisions on cloud computing adoption (Müller et al., 2015). As such, the results of this study would provide valuable knowledge with regard to cloud computing adoption.

Chapter 3

Methodology

Introduction

The literature showed that even though intensive research has been conducted on the topic of cloud computing, both within technological and non-technological companies, there is still a gap between the expected utilization of cloud computing and the observed reality. The goal of this qualitative, grounded theory study was to determine which factors contribute to firm resistance regarding cloud computing and whether firm characteristics, such as technological or non-technological companies, serve to influence these factors. These data was then used to build a theoretical model of cloud computing acceptance, the factors that influence them, and the ways in which firm characteristics may influence these factors. This chapter discusses the methodology for this study, the instrumentation, the population sample, validity and reliability, as well as the means for data collection. Chapter 4 of this study discusses the results obtained from the data and Chapter 5 provides a summary and conclusions to the study.

Research Methodology

The methodology for the current study is qualitative. Qualitative research is, by nature, descriptive and exploratory; thus, a qualitative approach is appropriate in new or emerging areas of research (Yin, 2013). The study of cloud computing is one such area; research in cloud computing is still in an early stage, with continually emerging new issues (Toosi et al., 2014). Additionally, although the above review of the literature highlights some of the reasons for resistance to cloud computing adoption, there is reason

to believe that this model may be incomplete. For example, none of the factors in the above model serve to adequately model the differences between firms in different industries, or TCs vs. NTCs. Much of the existing literature has either been focused on specific industries or in specific areas, resulting in a lack of theoretical power in a model based on this literature alone.

In addition, qualitative research is particularly apt for exploring participants' opinions and perceptions (Turner III, 2010), and existing work indicates that such psychological factors may be an importance aspect of cloud computing adoption (Morgan & Conboy, 2013). In addition, qualitative studies tend to focus on issues of "what" or "how" (Yin, 2013), which are the words that define the proposed research questions for the current study. By contrast, quantitative research focuses on determining the relationships between variables (Creswell, 2013; Yilmaz, 2013). Thus, a quantitative study would be ideal for determining the degree of relationship between the factors this study seeks to identify and the degree of cloud computing acceptance or resistance in firms, but this approach would be ill-suited to determining these factors in this first place. Furthermore, a mixed-methods study will also not be appropriate for this proposed study. Mixed method studies involve the collection and analysis of qualitative and quantitative data in a single study and data is collected concurrently. Researchers who conduct a mixed-method study need to have an in-depth understanding of quantitative and qualitative research methods (Merriam & Tisdell, 2015). Since the aim of this study was to establish the factors influencing the acceptance or rejection of cloud computing in order to create a theoretical model, no form of quantitative analysis is needed. Thus, once this study establishes a theoretical model, future quantitative or mixed-method studies

would be able to operationalize and test these relationships, but such research would not be appropriate before such a model is fully developed.

Research Design

The specific research design chosen for this study was grounded theory. Grounded theory is one of the fundamental approaches in qualitative research, and deals with developing theoretical models out of raw data (Glaser & Strauss, 1967). In a grounded theoretic approach, the researcher collects data without any prior assumptions as to the results, focusing on the central phenomenon, and then develops theoretical constructs and relationships solely based on this data (Glaser & Strauss, 1967). Thus, the result of grounded theory is an organically developed theoretical model with solid roots in reality, a model which grows and develops as data are collected(Glaser & Strauss, 1967). The grounded theory approach is appropriate in this case due to the need to develop a general model for the acceptance of cloud computing.

Due to being developed based solely on data collected through the study, this model should be more cohesive and potentially more complete than a model created through the splicing together of results from various studies under various circumstances. For a comprehensive understanding of the research design, Figure 3A-Theory generation process, presents an overview of the different steps that were taken in this study, to gather and analyze the data, and to generate the new theory regarding the different factors that contribute to the resistance to cloud computing adoption by TC vs. NTC.

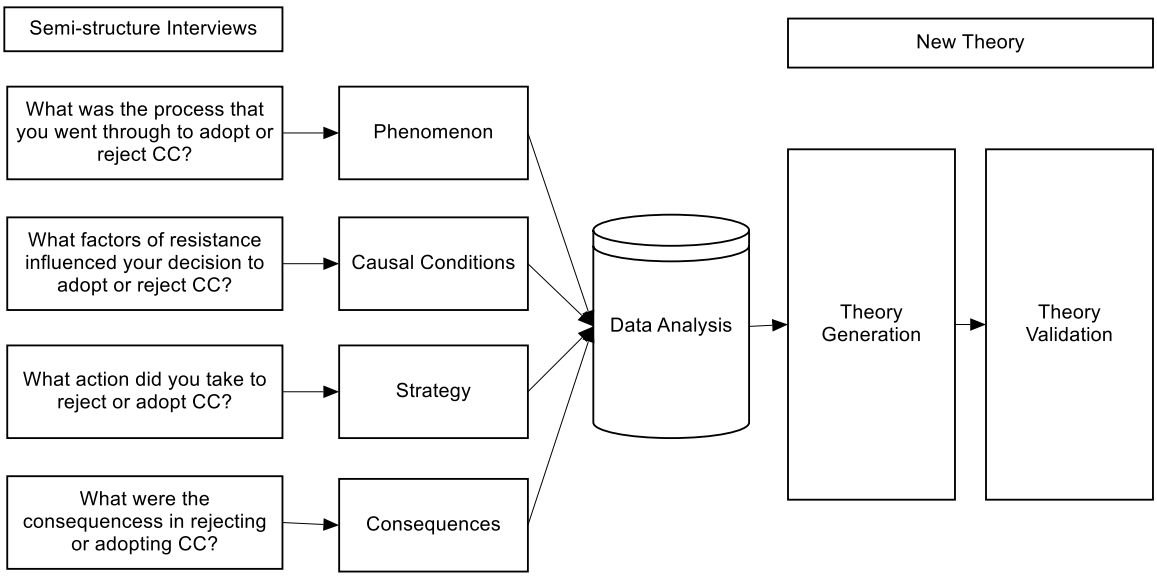


Figure 3A-Theory generation process

Population and Sample

This study used a purposive convenience sample technique to recruit Chief Information Officers of technological and non-technological companies, located specifically in the Southeastern region of The United States and, who hold a college degree. The participants represented a wide range of firms of different sizes and in different industries, especially including both technological and non-technological companies. Additionally, the Chief Information Officers should have IT industry experience, including but not limited to at least one year in the position of Chief Information Officer for a firm in order to ensure that there is relatively representative of the experiences of Chief Information Officers. The study included Chief Information Officers with varying degree of tenure in the position. In addition, this study included firms that have successfully implemented cloud computing models and those that have failed or chosen not to do so to provide a wider variety of perspectives on cloud

computing adoption. An inclusion of equal number of Chief Information Officers from technological and non-technological companies in a variety of industries provided valuable insight into successful or failed cloud computing implementation.

In qualitative research, unlike quantitative designs, the objective is not any set number of participants. Qualitative data collection is limited not by statistical power analysis, but by the notion of theoretical saturation. Saturation is said to occur when additional participants in a study no longer provide new, meaningful additions to the data (Creswell, 2013). Thus, qualitative data must be analyzed as it is collected to determine when the point of saturation has been reached, and data collection should continue until saturation is reached. However, the existing literature gives some general guidelines; for PhD studies, the mean number of participants in grounded theory-based designs is 32 (Mason, 2010). Thus, the initially proposed sample size was 12 to 24 participants, a number which may change based on when saturation is achieved. Should it be necessary to conduct interviews with more than 12 to 24 participants it will be conducted as such.

Sampling were combination of purposive and snowballing. Initially, the researcher purposively sampled participants through contacting firms that fit the desired sample profile described above and requesting to speak with the Chief Information Officer. In addition, however, participants were asked to recommend other Chief Information Officers who meet the characteristics of the sample; this technique allowed the researcher to avoid unnecessary work in finding CIOs who were appropriate for participation, as well as offering an easier method of contacting these recommended participants. Data collection was in the form of audio recordings, which then was transcribed for analysis. Once the data was transcribed, the researcher went back to the

participants to confirm the accuracy of the same. This step was helpful to verify the validity of the data.

Instrumentation

Interviews were conducted in person, in the participants' offices to ensure privacy while maintaining a strong connection between setting and subject, and lasted approximately 30-60 minutes. In this study, the qualitative instrument has been developed by the author. The researcher had this interview guide reviewed by three experts in the field of cloud computing to ensure it covers the appropriate issues and elicits the desired responses. The instrument is divided into three sections. The first section contains demographic data, such as position of the interviewee, place of work, years of experience, level of education, and type of company if it is technological or non-technological companies. The second section describes the project, the purpose of the study, what will be done with the data collected to protect the confidentiality of the interviewee, and how long the interviewee will take. The third and final section of the instrument contains four brief open-ended questions, which allow participants maximum flexibility for responding to the questions. The first question serves as an icebreaker to relax the interviewee and motivates them to talk, such question would be: In your opinion, which factors contribute to a firm's resistance to the adoption of cloud computing technology and appraoches?. The core questions, Question 2 through 4 address major research questions in this study. The third section of the instrument protocol, presented under Appendix B, lists four brief open-ended questions, these questions helped the researcher gather the proper and valid data, that identified the core phenomenon, the causal conditions, the strategy implemented, and the consequences

regarding the factors of resistance that contribute to cloud computing adoption by technological versus non-technological companies.

At the beginning of the interview process, the author explained to the participants that there are no foreseen risks associated with this study. Before the interview begins, the participants completed and sign a consent form stating that their involvement in the study is voluntary. In this study, the identity of the participants will be protected. Copy of the interview protocol is presented under Appendix B.

Research Procedures

Data collection commenced through the use of semi-structured interviews. Semi-structured interviews consist of the researcher preparing an interview guide that contains sample questions and a list of topics which are used to guide the interview (Turner III, 2010). This affords the researcher a certain level of control over the interview, but also the flexibility to use follow-up, guiding, or prompting questions to probe deeper into participants' experiences and opinions (Turner III, 2010). Thus, semi-structured interviews can produce rich data that provide the researcher a deep understanding of a participant's opinions, experiences, and perceptions (Creswell, 2013).

Plan for Data Analysis

The resources that were required to conduct this research included a sample size of 22 participants. The participants represented a wide range of firms of different sizes and in different industries, especially including both TCs and NTCs. Additionally, the Chief Information Officers have IT implementation experience including but not limited to at least one year in the position of Chief Information Officer in the functional area of IS, from various organizations located in Houston, Texas. The participants for this study

were selected from targeted populations using purposive and snowball sampling. The interview guide was prepared using library resources.

To give validity to the study, responses collected from the participants were transcriped using a transcription service firm located in Houston, Texas. All trancribed data were analyzed using NVivo qualitative data analysis software as depected in Appedix G. Data analysis were carried out with the aid of NVivo qualitative data analysis software, which assisted in the coding and management of data. Overall analysis were carried out through the conventions of qualitative thematic analysis, a standard analysis technique in grounded theory (Corbin & Strauss, 1990). In thematic analysis, data are first coded to identify themes—that is, shared ideas that occur in one or more account (Corbin & Strauss, 1990). Such a theme might include "how being a technology company affects cloud computing adoption." Once these broad codes have been established, the researcher uses the data to develop sub-themes within the themes and to draw connections between two or more themes, taking great care to ensure that these relationships are actually supported by the data (Corbin & Strauss, 1990).

Finally, all the themes were grouped around the central theme—in this case, resistance to cloud computing adoption—and further relationships were theorized. These themes and their relationships, deeply grounded in the data, provide a theoretical model of phenomenon and the important theoretical constructs (Corbin & Strauss, 1990). To ensure confidentiality, personally identifying data was anonymized before it is used in analysis so that all conclusions may be substantiated in the results with citations from the data. The data was also being stored responsibly to ensure the confidentiality, and only the researcher will have access to the data.

Ethical Considerations

Prior to implementing and distributing the interview protocol to the target population, the researcher sought the required approval from the Nova Southeastern University Institutional Review Board (IRB). In addition, the researcher provided a copy of the completed and required CITI training program on human subject research basic course, that was taken on 05/12/2015.

Informed consent procedures were carefully followed, with the researcher providing the participants with documentation of the study, its purpose, the confidentiality measures that will be taken, and withdrawal procedure. To ensure the participants confidentiality, the researcher did not associate the responses of the participants with their identity. In this study, to protect the identity of the participants, aliases were used to identify the participants, and the information collected during the interview will be kept in a secure location, and only the researcher will have access to the same. In this study, the author has respected the privacy and anonymity of the participants. During the interview process, the author informed the participants that participants can choose to stop participating at any time, without any penalty. Participants were required to sign the informed consent forms prior to the interviews being conducted.

Validity and Reliability

In order to ensure the credibility of the data collected for this study, the researcher will accurately portray the results of this study. Merriam and Tisdell (2015) postulated that researchers should attempt to get as close to reality of the subject matter and participants as possible through the use of questions, interviews, and observations. This ensures the data to be more truthful and trustworthy which would make it easier for the researcher to understand the situation being explored (Merriam & Tisdell, 2015). To

maintain credibility, an experienced colleague crosschecked as well as validate the collected data for this study.

To reduce the chance for bias and increase the validity and reliability of this study, the Chief Information Officer's selected for this study have no prior relationship with the researcher and were selected through a combination of purposeful sampling and snowballing. A grounded theory approach was selected as the appropriate research design for this study, which includes the researcher to collect data without any prior assumptions of the results, focusing on the central phenomenon, and then developing theoretical constructs and relationships solely based on this data (Glaser & Strauss, 1967). Thus, the result of grounded theory is an organically developed theoretical model with solid roots in reality, a model which grows and develops as data are collected (Glaser & Strauss, 1967). Using grounded theory ensures for further validity and reliability.

Furthermore, semi-structured interviews can produce rich data that provide the researcher a deep understanding of a participant's opinions, experiences, and perceptions (Creswell, 2002; Turner III, 2010). Interviews were conducted in person, in the participants' offices to ensure privacy while maintaining a strong connection between setting and subject, ensuring the reliability of the data obtained.

The researcher utilized all the above-mentioned processes to ensure that concise, clear, and accurate procedures were in place which will add to the validity of the study (Creswell, 2013).

Milestones

The following outline presents the elements that were evaluated, researched and analyzed during the dissertation process:

1. Developed and presented during the winter term-2017 a Dissertation Idea Paper.
2. Developed and submited for approval during the summer term-2017, to the Dissertation Committee and to the Institution Review Board (IRB), a Dissertation Proposal aimed at studying the factors of resistance that affect the adoption of Cloud Computing by firms.
3. Developed an interview guide during the ninth week of the winter term-2017. Additionally, the interview guide was reviewed by three experts in the field of cloud computing to ensure it covers the appropriate issues and elicits the desired responses.
4. During the summer term-2017, in the tenth week of the summer term, the author prepared and presented the Dissertation Proposal, and with the Dissertation Committee's approval, the author started the data collection process by contacting firms and Chief Information Officers.
5. During the fall term-2017, the author of this research defended the Dissertation Proposal, and with the Dissertation Committee's approval, the author started the data collection process and the final stages of data analysis and planned to present the Dissertation Report to the Dissertation Chair for approval.

Conclusion

In sum, the problem is that although intensive research has been conducted on the topic of cloud computing, both within tech and non-tech companies, there remains a gap between the expected utilization of cloud computing and the observed reality. Therefore, the goal of this qualitative, grounded theory study was to determine what factors contribute to firm resistance to cloud computing and whether firm characteristics, such as technological or non-technological companies, serve to influence these factors. These data was then used to build a theoretical model of cloud computing acceptance, the factors that influence them, and the ways in which firm characteristics may influence these factors. The study drew data from qualitative interviews and analyzed these data through qualitative thematic analysis to create a theoretical model grounded entirely in the data.

The specific research design chosen for this study was grounded theory. Grounded theory is one of the fundamental approaches in qualitative research, and deals with developing theoretical models out of raw data (Glaser & Strauss, 1967). The researcher utilized several processes to ensure that concise, clear, and accurate procedures were in place which added to the validity of the study. The resources that were required to conduct this research included a sample size roughly12 to 24 participants. The participants in this study represented a wide range of firms of different sizes and in different industries, especially including both TCs and NTCs. The results of this study may be of use to future researchers, firms adopting cloud computing, cloud computing providers, and policymakers.

Chapter 4

Results

Introduction

The goal of this study was to determine which factors contribute to firm resistance regarding cloud computing; in order to build a theoretical model of cloud computing acceptance, the factors that influence them, and the ways in which firm characteristics may influence these factors based on the lived experiences of Chief Information Officers (CIOs) who have been faced with challenges regarding cloud computing implementation. Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction (Mell & Grance, 2011). Four research questions were used to guide the study, including:

RQ1: Which factors contribute to firm resistance to the adoption of Cloud Computing Technologies and approaches?

RQ2: What was the process followed by Chief Information Officers to adopt or reject Cloud Computing Technology?

RQ3: Which resistance factors were significant enough to reject Cloud Computing Technology?

RQ4: What were the consequences of the Chief Information Officers' decisions in adopting or rejecting Cloud Computing Technology?

Semi-structured interviews were conducted with a purposive convenience sample of 22 CIOs of technological and non-technological companies, located specifically in the Southeastern region of the United States, and who hold a college degree. Interview data were transcribed and then analyzed in NVivo, using the qualitative thematic analysis procedure described by Corbin and Strauss (1990). Four major themes emerged during data analysis to answer the four research, including: Financial risk, lack of knowledge, resistance to change, and security risk contribute to firm resistance; CIOs followed processes of researching cloud computing, assessing organizational fit with cloud computing, phased deployment of cloud computing, and gaining approval from organizational leaders for cloud computing; Perceived security risks, excessive cost, poor fit with organization, and lack of flexibility in cloud computing were considered significant enough to result in the rejection of cloud computing, and; Consequences of adopting cloud computing included cost savings and increased flexibility. Chapter 4 includes a description of the relevant demographic characteristics of the study participants, a presentation of the results of the data analysis, and a summary of the results.

Demographics

Participants were 22 CIOs of technological and non-technological companies, located specifically in the Southeastern region of the United States and, who hold a college degree. Participants were assigned pseudonyms to ensure confidentiality. Eleven participants were from non-technological companies (NTCs), and 11 participants were from technological companies (TCs). Relevant demographic characteristics of participants from TCs are depicted in the table in Appendix D, and relevant demographic

characteristics of participants from NTCs are depicted in the table in Appendix E. A twelfth participant from an NTC, designated 31NTC, was removed from the study because he was not located in the Southeastern region of the United States. A twelfth TC participant, designated 30TC, was removed from the study because the researcher learned that this participant was not a CIO. No data were gathered from 31NTC or 30TC.

Results

Data were first coded to identify *themes*, or shared ideas that occurred in one or more accounts (Corbin & Strauss, 1990). Once these broad codes were established, the researcher used the data to develop sub-themes within the themes and to draw connections between two or more themes, taking great care to ensure that these relationships were actually supported by the data (Corbin & Strauss, 1990). Finally, all the themes were grouped around the central theme, which was resistance to cloud computing adoption. The table in Appendix F depicts the themes and sub-themes that emerged during data analysis, and indicates how many TC and NTC participants supported each sub-theme.

This presentation of results is organized by research question. Results associated with the first research question indicated which factors contributed to firm resistance to adopting cloud computing (CC). In relation to the second research question, results indicated what processes CIOs followed when they adopted or rejected CC. Results related to the third research question indicated which resistance factors were considered significant enough to result in a firm's rejection of CC. Results associated with the fourth research question indicated the consequences of CIOs' decisions to adopt or reject CC.

Research question 1: Which factors contribute to firm resistance to the adoption of Cloud Computing Technologies and approaches? One theme emerged during data analysis to answer the first research question.

***Theme 1: Financial risk, lack of knowledge, resistance to change, and security risk contributed to firms' resistance to CC adoption*.** All participants supported this theme. Four sub-themes emerged during the analysis of data related to this major theme, including: *Financial risk contributed to firms' resistance to CC adoption*; *Lack of knowledge contributed to firms' resistance to CC adoption*; *Resistance to change contributed to firms' resistance to CC adoption*, and; *Security risk contributed to firms' resistance to CC adoption*.

Sub-theme 1: Financial risk contributed to firms' resistance to CC adoption. Seven TC and four NTC participants indicated that financial risk contributed to their firms' resistance to the adoption of CC. Participant 20NTC compared the resistance factors *financial risk* and *security risk* and indicated that financial risk or *cost* had been the predominant consideration:

> Cost was the biggest factor...So in reality some people fear a security issue, but it was actually better for us to go to the cloud because it offered enhanced security. So those factors were kind of why we adopted this idea. The prominent factor for me to adopt Cloud Computing was one, that is cost. (20NTC, interview response)

21NTC indicated that the adoption of CC involved a transition from capital expenditures to service or operating costs, and that some managers resisted this change: "Another factor is the migration of costs from capital expense to operating expense. This is a financial frustration more than a blocker, but it does give CFOs pause as they look at

financial performance over time." 2TC also referred to the transition from capital expenditures to operating costs as a resistance factor:

Cloud computing (CC) has grown beyond its initial stages. Initially CC was just storage of my information. CC has expanded into a service. Resistance also comes as understanding what are the difference again accounted all the risk of information and now making either hardware of infrastructure investment or platform investment or application investment. That I am typically owning the infrastructure in comparison to now I am not owning the infrastructure and now I am subscribing to it or lease the services or running that application or even the functional operation of it outside of my organization. So, these are key factors to resistance to CC adoption. (2TC, interview response)

In discussing resistance to the transition from capital expense to operating expense during the adoption of CC, 3TC noted that capital assets depreciate over time:

> The other thing is that you know it is cost, so, on premises software is capitalized typically where cloud computing is operational expense, ah, we face that battle as well. So, cost is definitely operational expense perspective vs, depreciation over multiple years on capital assets like Oracle Systems, SAP and other similar systems. So, I came from the world of SaaS basically, I have run operation for the majority of my career, as providing services to customers. So, I was not afraid of doing software as a service. So operational expenses pay for the services for people like you and me. So, where capital is more a tangible asset. Physical assets, like storage systems or capitalized software that can be run on premises. (3TC, interview response)

In the experience of 22TC, investments in legacy systems had been the most important resistance factor to the adoption of CC:

> The first obstacle to move to the cloud is existing investment in the legacy systems. Especially these companies that did invest heavily in the hardware and software, in training personnel, installation of equipment and so on, it is very difficult to move their data to the cloud. You have to take into account that if you want to move your data to the cloud you have to change staff, data center location and train new personnel. Training is a huge component when you are talking about large corporation. In our case, our systems are on the premises and we use the application in the cloud. For us to move completely to the cloud, this mean we have to change the whole systems, and this is a lot of investment. We are not ready to do that because of investment issue. (22TC, interview response)

24NTC associated financial risk with another resistance factor, lack of knowledge, in referring to the cost of adopting CC as an unknown: "The last factor that I know it is a resistance factor is the unknown cost to move to the cloud."

Sub-theme 2: Security risk contributed to firms' resistance to CC adoption. Seven TC and nine NTC participants referred to perceived security risk as a factor contributing to firms' resistance to adopting CC. 25NTC summarized the perceived security concerns, including loss of control of data, loss of data, and unauthorized access to data: "Security, including access controls, network breach and data loss and inability to recover data in the event of a disaster, or should the relationship dissolve, plus loss of control over both the application and data." 12NTC indicated that perceived security risk could make firms reluctant to trust CC service providers:

> Our business leaders they were not sure who to trust. They were fearing about security breaches that they did not understand. It is a comfort level. Mentality must do something with it. Confidentially, availability, agility and risk of the data are the nature of the risks. (12NTC, interview response)

29TC also spoke of distrust of CC service providers as a concern related to CC:

> The other factor was the concern that we don't know how secure is the cloud for our data. Some of our people they did not feel comfortable with the cloud, because they did not know where the data will reside, and who is controlling the same, and if we can have access to our data in time of need. (29NTC, interview response)

17NTC related security not only to the potential for unauthorized access to a firm's data, but to the potential for data to be lost or otherwise become unavailable when the firm needed it:

> Security is to be very difficult for us to get over...I don't have an intellectual property, I am not holding customer data, so I really don't have to be concerned about the personal data of the 250 people that are operating at their level, I have to be concerned about our portfolio information. The investments and stuff that we are trading, they are already using Bloomers, they have been for like for ...30 years...Bloomer is one of the original SaaS solutions, right, and it has got our portfolios in it. So somehow, they got over that problem or fear a long time ago. So...as we move each system, right now we are uploading our HR systems from an on premise loss and implementation, it is going to take us well into the next year to move up to the Workday SaaS solution, one of the biggest premier

> solutions there is for HR. So the three questions we're asking, right, what's the security, what is my data availability, my system availability, is the system going to go down on me and not be available to do business and if so what is the risk, who cares? And what is the, the hardest one for me to still get over is the potential for data loss because as long as you are on my premise and I have the server, I am backing that server up and I can actually hold the tape. so, in summary, the resistance factors are security, availability and data loss. (17NTC, interview response)

1NTC associated the security risk of CC with the potential for unreliable access and data loss, and overall with the firm's perceived loss of control over its data:

> The first one would be things encompassing security. And when I think about the security I'm including things like access controls, a breach of that network and ultimately a data loss...an inability to recover data in the event of a disaster or should the relationship dissolve. So if I've engaged in a cloud provider and I mean, basically which kind of goes to the third one so I'll mention that one because they do relate to each other. And that would be loss of control over both the application or applications, plural……of the data itself, right? So I think in the traditional on premise kind of configuration, one of the key things is around the fact you do control it and you control every dimension of it – who has access to it, how it's secured, and so on. So when you go out to the cloud, this is very typical of the kind of resistance that you run into because for some of us old guys who have been around for a while, we don't like that idea of losing control over the data and the applications. (1NTC, interview response)

20NTC associated the perceived loss of control over data with the emotion of fear:

> What I would say on this one is probably one word, fear. It's a perceived fear of losing control of their infrastructure, maybe a fear of service level agreement of time not being met or possibly a fear of security for their data. (20NTC, interview response)

In the experience of 22NTC, the sensitivity of the data being moved to the cloud could contribute to resistance associated with a perceived security risk:

> Data owners is a big hurdle to overcome. Who will have access to the data and who will own the data. In my opinion data access is the biggest hurdle to adopt cloud computing. The risk is regarding data access control over the personal identifiable data that we have. This is the biggest hurdle in my opinion. The risk of adoption is to understand the risk and mitigate that risk by understanding how you can protect your data from being accessed by a third party. We have different kind of data. Personal data, government data, security data, tax data and so on. So when you go out to the cloud, this is very typical of the kind of resistance that you run into. We don't like that idea of losing control over the data and the applications. (22NTC, interview response)

22TC associated the resistance factor of a perceived security risk with another resistance factor, lack of knowledge, specifically on the part of organizational leaders who did not understand CC technology:

> Safety and security of the data is robust in the cloud, but it still has some vulnerability. One of the struggle that we have is convincing our executive that the security of our data in the cloud is good. The problem is that you can't

> convince them because they don't have the technical background and they don't understand the logic behind the cloud. One of the elements that make it hard on us to convince our executive is the news that is going around, that scare them from taking that leap of faith to adopt the cloud. They listen to the outside world more than they listen to us. For executive, security and proximity is a key issue. To be secure they need to see it and touch it. (22TC, interview response)

In 9TC's experience, resistance to CC due to a perceived security risk was often associated with lack of knowledge of CC technology:

> People have the assumption that security is one of the major factor in any organization. The question that people in an organization ask is that: do we have secure environment; do we know if we are secure in the cloud. The problem is that people think, that having your data in the cloud is less secure, and you may not have access to the information or control over the information. The fact is that a lot of people don't understand technology enough to really embrace. It is very important to know that stakeholders will decide based on their knowledge, and that is a huge factor of resistance. In summary, the security factors are: Loss of data, the other factor is that does other people has access to my information, who is looking over my shoulder. Is it secure and under my control? Is my personal and corporate information secure enough in the cloud. (9TC, interview response)

5NTC spoke of having to reassure organizational leaders of the security of CC, because security risk was the predominant resistance factor for upper management:

> We don't want any failure or breach of security in our information, make sure that you know what you are doing. I can tell you they careless what service provider

> you are going to use if it is secure, you can use any server provider. The upper management, they know if you are going onto the cloud make sure that it is safe nothing else. It is a major step for us if there is any risk, upper management wanted to understand why we wanted to use any new software or move our info to other server. And their question is: Is it convenient, is it safe, is it beneficial, is it risky, are we secure and sure that we can control our application and IT infrastructure once we move onto the cloud, nothing else. (5NTC, interview response)

24NTC expressed that a firm's legal counsel could raise objections to the migration of data to the cloud:

> The legal department that instate the policy of the company is one of the major factor of resistance. My legal counsel asks a lot of questions of what we are moving to the cloud and why we are moving to the cloud, and they ask question as to what we still have on premises. Legal concern is that we know when we have our data on premises, but we don't know what other people will do with our data, that is the legal fear that we face on daily basis. (24NTC, interview response)

Sub-theme 3: Resistance to change contributed to firms' resistance to CC adoption. Seven TC and five NTC participants reported that firms' resistance to change contributed to resistance to the adoption of CC. 27TC summarized this resistance factor: "The main factor of resistance is people and their mentality to adopt new technology." Resistance to change could appear in CIOs, who might be reluctant to modify a working system, according to 3TC: "I think IT professionals typically want control over the thing

they do, in many cases sort of old school CIOs are resistance to change and, anyway if it is not broken don't fix it." 1NTC described an organization's resistance to change as "psychological," and associated it with reluctance to reorganize priorities in order to accommodate the service provider's operational requirements:

> When you get into the cloud environment, you're often forced to accept updates, upgrades, things like that are never convenient for you, right? And, so it can cause business disruption and requires you to adjust priorities especially when do things like software as a service or infrastructure as a service. And again, the cloud provider comes to you and says, "In two weeks we're doing this update. I need all of your users to test." Well, that's never convenient, right? So, and I really kind of thought about this first question, those were the four main things for me. I think the idea that it's psychological is very, very key. (1NTC, interview response)

22TC described the necessity for organizations to adapt to the standardized and less-secure nature of CC as a "cultural change" that a firm might resist:

> The cloud support only one type of systems, this means that we will lose a lot of customized application that fit our needs that others don't need. So this is another resistance in other cases when you want to move your customized systems and the cloud only use the cookie cutter system that does fit your need and applications. Another factor is the cultural change. A lot of executive expressed a lot of concern to move our data to the cloud. Though the security in the cloud is robust, it still raises a lot of concern about the data in the cloud. So that is a challenge, the

organization culture. The readiness to accept the changes. (22TC, interview response)

24NTC spoke of resistance to change as a characteristic of rank-and-file employees, as opposed to managers:

> In my organization when we started evaluating cloud computing technology, the main factor was the employees' resistance to change. A lot of our team have been doing a lot of thing a certain way for a long time and sometime their own identity and their role as the administrative assistance, and that sometimes it will cause a lot of tension for them to think about. O my GOD, I need to do this thing in a different way, and that can be very stressful for them, so I think that mental way to get the employees on board is not a thing that I would under emphasize. I have to make sure that the employee tries the new technology, that is a huge factor to convince the employee to use the new tools. (24NTC, interview response)

In the experience of 9TC, resistance to change was associated with employees' and managers' comfort with older systems:

> I must tell you, it is old school mentality of the users and decision makers. Many high-level executives stated, well we have done it in a way that is successful why we have to change now, why we have to change a system that is working. If it is working why we have to mess it up. Well, this is the thing, they were doing the process in the same way for a long time and they are not willing to change. Psychological behavior starts kicking in. Ah, I don't know if we need new system, leave the system in place, we don't need to mess up the working system. I can tell you, even though there is openness for new thing, there is that resistance for new

process and implementation of new technology. They are comfortable with the old system. (9TC, interview response)

7NTC reported that resistance to change could come from customers as well as management:

> The resistance factors come from the customer. The customer resist to wait on us to do our due diligence. They want the answer right away. Some time, we need to be able to give the customer quick answer and if we don't we lose the customer. For this reason, our company had problem in adopting the Cloud because they did not know how we can support the customer if we don't have full control over the equipment and the IT infrastructure. Our company is in the service and supply and if we don't have access to the data in time we may lose the customer. The resistance also came from management and their attitudes toward new technology. Each officer in the company has different attitude toward the adoption of new technology. Our management did not have the experience with Cloud Computing, and they were hesitant in taking that risk. At the beginning, we had to train our management to understand the benefit of CC. (7NTC, interview response)

Sub-theme 4: Lack of knowledge contributed to firms' resistance to CC adoption. Three TC and three NTC participants indicated that lack of knowledge about CC contributed to firms' resistance to adopting CC. 9TC stated, "In my opinion lack of knowledge is a huge resistance because people they don't take the time to know about the technology." 12NTC associated lack of knowledge with fear, and attributed firms' lack

of knowledge of CC and CC service providers to the fact that the needed information had not been available:

> The predominant fear for a company to use SaaS was a Cloud Computing, they were unsure that the providers were reputable or they are going to follow good or bad practices and it is taking a decade and half for the market to prove the service providers and work slowly and incrementally with these providers. Businesses are more and more starting to trust the Cloud. Most reputable providers today, are audited by outside firms, and for prospective customers are willing to share the information. Fear and uncertainty are the predominant factors of resistance. In other words, how I can integrate the existing software security systems with the service providers and how I can eliminate risks from the operation itself. How I can monitor the service provided to our company is not misused. Those technologies are skyrocketed in the last few years. Another factor is to know who is doing what in the Cloud. Taking a while for the market to trust the service providers by the service providers. (12NTC, interview response)

21NTC stated that consumers were often uninformed about CC, such that the resistance factor was,

> Primarily ignorance. Not in a bad way, but that people just aren't familiar with what "the cloud" is. Ironically, virtually all consumers are already cloud users. Whether they use Gmail for their personal email, share with their friends and family on social media, or use google or Apple to back up their phones, we are all experienced cloud users. (21NTC, interview response)

26TC associated resistance to the adoption of CC with ignorance and lack of experience on the part of a firm's employees:

> The majority of the employees don't have experience with cloud computing. So, the technologies guys in general wanted to take risk as long as they understand the technology and its benefits, and if they don't have experience with cloud computing, they will not take the decision to adopt said technology. (26TC, interview response)

Research question 2: What was the process followed by Chief Information Officers to adopt or reject Cloud Computing Technology? One theme emerged during the analysis of data related to the second research question.

Theme 2: CIOs followed processes of researching cloud computing, assessing organizational fit with cloud computing, phased deployment of cloud computing, and gaining approval from organizational leaders for cloud computing. All participants supported this theme. Analysis of data related to this theme resulted in the emergence of four sub-themes, including: *CIOs followed a process of assessing organizational fit with cloud computing*; *CIOs followed a process of researching cloud computing*; *CIOs followed a process of phased deployment of cloud computing*, and; *CIOs followed a process of gaining approval of organizational leaders for cloud computing*.

Sub-theme 5: CIOs followed a process of researching cloud computing. Seven TC and six NTC participants supported this sub-theme. Participants reported that they had researched CC by querying vendors and by conducting independent research. 10NTC met with vendors to learn about CC and the safeguards that were available to prevent data loss:

> For me the adoption was carefully weighed many years ago (2007) when considering on premises versus cloud infrastructure. With budget constraints and a small team, I had to adopt a hybrid approach of moving services to the cloud while retaining a few services locally. The process involved meeting with selected vendors and fully understanding their business and operating models. Understanding their processes and procedures for backup, restoration and change management as well as emergency support. Once I had a comfort level it became simply a matter of implementation. (10NTC, interview response)

12NTC conducted independent research by seeking information via the internet and communicating with other CC customers:

> So, what I did was research on the internet of the different providers and systems and talking to other that have gone through the process. I studied the problem very carefully and researched the answer to the same. I speak with others that are going through the same experience, evaluate the process and listen to each other's problems and concerns. So, the study and research piece was almost the first think that I did. (12NTC, interview response)

For 17NTC, research began with gathering information about organizational needs, and continued with seeking vendors who could meet those needs and researching their security safeguards:

> So the first layer is to look at the solutions that your business is trying to accomplish and then as part of that, come up with your shortlist of vendors that fit the requirements that best fit your need. Then you start to drill down on the architecture and the security and you see who's got encrypted data at Best, who

> has got encrypted on transit and at Best, who really seems to have a robust model and for the most part the majority of the company dictates that a little bit and we usually try to stick with the major players in the game, but recently we were doing a financial systems review and we were looking at four different companies. Well, one of them did not have the data encrypted at best and the other three did. (17NTC, interview response)

28TC spoke with service providers and with other CC customers:

> As a company we evaluated everything related with cloud computing. We spent a lot of time talking to the service providers and to our friends in the industry to learn more about their experience with cloud services. (28TC, interview response)

7NTC began with independent research of CC and later began to discuss CC with service providers:

> Because technology is changing, we followed the process of research to investigate the benefit of CC for our organization. Research was the first step that we deployed...I have a lot of other friends that understand CC and I did seek their help and advice. The process that we followed was a simple process to research the benefit of CC and present the product to our management. The second step in our process was inviting different service provider to present their product. We worked very hard to select the right service provider for our organization. (7NTC, interview response)

9TC researched his own organization's needs and researched service providers' ability to meet those needs:

> The process that we went through, we went through a lot of research. The other process that we went through is looking deeply on our issue here in our organization and look for solution to the problem...we look hard and long in the market for the best solution and best service provider, we compared service providers and cost of each systems. We researched the market for competitors to find out the best service provider for the job. When we had all the pertinent information, I did make a presentation to the president, the vice president and with their approval I proceeded to adopt the new technology that is to store our data in the Cloud. (9TC, interview response)

Sub-theme 6: CIOs followed a process of gaining approval from organizational leaders for cloud computing. Five TC and six NTC participants indicated that they had followed a process of seeking the approval of organizational leaders when adopting CC. 1NTC stated, "part of our process was looking for executives to sponsor this idea and to help us pursue business cases." 23TC described the process of gaining the approval of organizational leaders:

> First, you have to get the buy-in, you like it or not you have to be political to get your point across to the people that make the decision. So, in summary you have to get the buy-in before you go public and make sure that you have the right support for the buy-in. So, what I did I worked diligently for months, worked with counterpart with the vice-president and others to get the support, and demonstrate the value to them in adopting cloud computing, before I brought in front the full board. So, you have to slowly demonstrate the value, and point out why this is a good decision to adopt, and you also have to find a way to sell it differently to

different audience. In other words, you have to know what they care about. So when I am presenting my case to them, I have to know what they need and what they know about the technology. You have to formulate your message to fit the actors' need. (23TC, interview response)

28TC described a process of using service providers to pitch CC to upper management:

> The main process that we went through was very simple one, we started to sell the idea internally and made lot of presentations on cloud computing and its benefit and brought service providers to make presentations and some of our high-level executives went to a seminar to understand the benefit of cloud computing. We sold the idea to our high-level executive and made sure that the board of director know as much as we know about the benefit and saving when using cloud computing. It took us almost one year, but at end it was worthy. (28TC, interview response)

5NTC described a process of addressing the fears of people in the firm, beginning with executives and continuing with staff:

> Once you understand what bothered people [about adopting CC], started to address from executive all the way, or to contradict their main concerns, okay. So, for example, if the main concern was security, hey look, target was act but they're not on the cloud. No one was act on the cloud. So that was the approach trying to find what was the main element that drove people's fear and trying to address it very slowly in all levels or in the organization to plant the idea that what you thought is not actually what's happening. And once we have that we start slowly, slowly to move more and more staff. So that was the approach trying

> to find what was the main element that drove people's fear and trying to address it very slowly in all levels in the organization to plant the idea that what you thought is not actually what's happening. (5NTC, interview response)

Sub-theme 7: CIOs followed a process of phased deployment of cloud computing. Five TC and five NTC participants reported that they followed a process of phased or multi-stage deployment when their firms adopted CC. 12NTC described a process of trials and "baby steps" in adopting CC:

> About the Cloud, we started virtualizing our systems and stated using the Cloud and started that more heavily about four and half years ago. We started hands on implementing the process to move to the cloud but with baby steps. Evaluation and recommendations. When for the first time we considered to adopt the cloud, we did evaluate the services and the providers of such services. Our business leaders they were not sure who to trust. We started with trials and proves of concepts and learned how the systems work and slowly but surely moving more and more applications to the cloud. (12NTC, interview response)

For 21NTC, the phased-deployment process involved introducing cloud applications one at a time, beginning with the one most likely to win popular support from employees:

> We started by deploying the most impactful cloud application for all of our users, office productivity. This not only moved some of our most vulnerable daily business processes to the cloud so that everyone in the company started to realize the benefits of improved productivity and collaboration. This begins the education process across all employees. (21NTC, interview response)

28TC spoke of deploying the “least risky” CC applications first, and then progressing into applications that were perceived as riskier:

> We tried to deploy the systems as slow as we can. We did not want to deploy every application to the cloud. We started with the least risky application and we went very slow, so we don’t jeopardize our systems and applications. (28TC, interview response)

22NTC described a phased-deployment process that included a pilot program:

> In reference to adoption of cloud computing, what we are doing here is piloting some programs to help us decide what kind of system is more beneficial and convenient to us. We already work with Microsoft and with other companies that manage our e-mails and other applications, also we are looking at other vendors that offer other solutions as well. What we are doing is to understand how cloud computing fit with our services and our on premises applications. (22NTC, interview response)

22TC described a process in which CC adoption was gradually “rolled out” to an increasing number of applications and staff members:

> To move into the cloud is a gradual process, that we adopted internally and externally. The first thing is giving our team control over the process. My team was in charge to migrate to the cloud. We gave our team enough time to move the data center to the cloud. There was no pressure on them to move it fast to the cloud. They took their time to do it right...So it took us one and half years to move our systems to the cloud. Then, what we did is gradual rollout of the data to the cloud. So, what we did is migrate the management system by systems to the

> cloud. Another point is that we did not bring everybody at once, we did it gradually to allow the users to be comfortable with the application in the cloud. That process took us almost one year to migrate everything to the cloud. (22TC, interview response)

9TC oversaw the beta-testing of CC applications with a relatively small group of staffers before rolling CC applications out to the rest of the firm:

> I did a progressive thing, where I introduced part of it and start bringing slowly the system and its implementation. I did the method of beta testing, with smaller group and started to convince others to use the new system. So, within six months the buy in was done and all the organization start using the new system and now we are hardware free, we don't maintain any hardware on premises. We only maintain the elemental systems that we need but all is in the Cloud. (9TC, interview response)

Sub-theme 8: CIOs followed a process of assessing organizational fit with cloud computing. Four TC and five NTC participants reported that they followed a process of assessing whether CC would be a good fit for their organizations. For 22NTC, assessing organizational fit involved a process of checking the compatibility of CC applications with existing operational needs:

> We make sure that we have good platform to operate and protect the data and that the platform is secure. So, as we move forward and adopt the solution, we made sure that our applications are aligned with the operation that we have in place. (22NTC, interview response)

23TC described a process of assessing CC's fit with existing human capital and infrastructural resources:

> I first reviewed and done full assessments of my entire team. Of course, I was very nice with them, but if someone doesn't have the right skill, then that person will not be good fit for my strategy. So, I assessed all the resources that we have, I looked at our current budget, and found that there is room for spending and expanding, then I looked at my infrastructures, in this case at our data center and determine when it is due for upgrade, this means, if the system is very new, then we have time to plan our strategy accordingly and have some time to deal with financing issues. This process of assessment tells me if the data systems is very old. In our case, the systems were five years old systems, then we have to act on it very soon. (23TC, interview response)

Like 23TC, 27TC described a process of assessing CC's fit with existing staff's capabilities and with existing organizational infrastructure: "The first step was to make an inventory of our own infrastructure and find out how much our people know about cloud computing."

Research question 3: Which resistance factors were significant enough to reject Cloud Computing Technology? One theme emerged during the analysis of data related to the third research question.

Theme 3: Perceived security risks and excessive cost were considered significant enough to result in the rejection of cloud computing. Two sub-themes emerged during the analysis of data associated with this theme, including: *Perceived security risks were considered significant enough to result in the rejection of cloud*

computing and *Excessive cost was considered significant enough to result in the rejection of cloud computing*.

Sub-theme 9: Perceived security risks were considered significant enough to result in the rejection of cloud computing. One TC and six NTC participants reported that they considered security risks, if present, to be significant enough to result in the rejection of CC. 7NTC reported that concerns about data loss would have resulted in the rejection of CC if these concerns had not been adequately addressed: "The factors that I struggled with was the concern of the employees with the risk of losing the data of our customers and personal information." 17NTC reported that concerns about data security and terms of service in the event that the ownership of a service provider changed hands had been the most significant resistance factor:

> So security jumps out first, how secure is my data, how secure is the environment that I am working in? Then it's, okay, availability, what's their history been and what do they have upcoming, are they merging with another company. You ask the question, are they going to be sold out or merge with other companies. You could lose out to this one in a month after you bought the thing, right? So next week I am bought by Oracle, okay, if I was on that, I am not but if I am on that sweep for three years and Oracle buys them, what's Oracle going to do with that back end? Is it going to be, my data going to stay in the same place or are they going to move, I know that, you have to respect my agreement to some point but I also know Oracle and they will come up with a way to do what they want. So... you kind lose control over that data the second you sign on with these guys...And even with so many companies, like Microsoft, I mean you have been a mega

company in order to have language changed favorable to you for breaches or indemnification or limits of liability. (17NTC, interview response)

1NTC reported that concerns about the security of data would have resulted in the rejection of CC if they had not been satisfactorily addressed:

> Things like security, inability to recover data, loss of control, forced upgrade and things like that. So the things…in terms of deciding what vendor to go with…you have to take a very risk-based approach to it and figure out ways to mitigate those risks...before you go into cloud, you got to understand that the data that you store out there you've got to have a mechanism to get it back. (1NTC, interview response)

2TC's primary resistance factor was concern about the security of personally identifiable information, or "Risk, and specifically Personally Identifiable Information. When we talk about technology and we talk about risk what we are really saying is that I don't want to be on the front cover of the Wall Street [Journal]."

Sub-theme 10: Excessive cost was considered significant enough to result in the rejection of cloud computing. Three TC and two NTC participants reported that they would have rejected CC if they had found its cost excessive. 19TC stated that excessive cost was the only potential reason for rejecting CC:

> The main factor really is around cost, you know. It's not cheaper than being on premise then, I'm not going to use it. One of the main reasons, you know, I would move to the cloud is because I would be saving money. But if I'm not saving money, there's no reason for me to go to the cloud. So the only factor, that would be the cost, financial cost. (19TC, interview response)

24NTC had adopted CC for some applications and rejected it for others because of considerations of cost:

> Often it come down to cost. Does this cost more or does this cost less? Now, let me share with, that is why we have gone to cloud, but we have not taken everything to the cloud. The number one reason for that is that our cost is very low. Plus, we don't have a good business driver to move all applications to the cloud, because we know it will cost us more. (24NTC, interview response)

3TC had rejected CC because of its cost:

> In our case we adopted and rejected Cloud Computing. In some cases, we run a very large a private cloud, so, I run these virtual machines for very little money $100 a year for medium virtual machine. If I get Amazon, it is going to be three to four times as much. So, we wanted to make sure we are putting the right resources on the right Cloud. So, if you run it on the private Cloud for $100, so why you spend a $1,000 on private Cloud? (3TC, interview response)

7NTC had needed to allay organizational leaders' concerns about cost before CC could be adopted:

> The biggest resistance was the cost factor of adopting new technology. The other big factor is the up-front cost of the technology. The officers of the company they did not want to lay out a large amount of cash. Our people fear new innovation. It is very hard to convince the officers to spend money. (7NTC, interview response)

Research question 4: What were the consequences of the Chief Information Officers' decisions in adopting or rejecting Cloud Computing

Technology? One theme emerged during the analysis of data related to the fourth research question.

Theme 4: Consequences of adopting cloud computing included cost savings and increased flexibility. Two sub-themes emerged during the analysis of data related to the fourth theme, including: *Consequences of adopting cloud computing included cost savings* and *Consequences of adopting cloud computing included increased flexibility*.

Sub-theme 11: Consequences of adopting cloud computing included cost savings. Nine TC and seven NTC participants reported that the consequences of adopting CC included cost savings. 18TC reported that cost savings associated with CC adoption had allowed employees to handle a rapidly growing workload: "The cloud saves the county a lot of money and the cloud allows the IT department, because we're not growing, the IT to bring back ours to do more value-added jobs and not just upgrading servers." According to 19TC, "the cost is definitely our biggest factor. We're looking to save money." 20NTC indicated that cost savings associated with CC adoption might take years to realize, but were nevertheless expected:

> With the reduction of stuff and increase in service, we are a couple of years into it, but our costs have not dropped enough yet. At first they went higher and that was anticipated, and now they are dropping and they're about equal to where they were prior to optimization and centralization. We anticipate in the next year to two we'll start seeing that drop, so we'll start realizing that savings...we no longer have to buy hardware, so we're going to start realizing those savings dramatically as we move forward more in the years to come. (20NTC, interview response)

22TC's organization had saved on training and maintenance costs after adopting CC:

> The consequences that we see the cost reduction in our operation. We see significant cost reduction for us. The vendor see as a win-win situation, is a benefit to the vendor and cost reduction to the user. The other benefit is the reduction in support services, and maintenance cost-saving. Now, we can support our servers remotely, we don't have to be driving around. This is a huge saving to our organizations. The operation is more efficient with the cloud, and the training is much better and easier and less costly to our organization. (22TC, interview response)

For 26TC, the cost savings had been realized through replacing capital expenditures with service costs:

> The benefit comes from the financial saving associated with services vs. capital expenditure, especially in a company like ours, we will periodically capitalize other things, we pull in the amortization period from three years, which most companies do it in one year. Ahh, we accelerate that capitalization period because we are in extremely financially solvent business, and we tend to finance all our own investment vs, going out to the private or public market looks for funding. So, the benefit that people see is that we don't have to capitalize, actually paying on a service basis, so what we will see overtime is reduction in other costs at our dedicated center, and no need to replace hardware. (26TC, interview response)

28TC's organization had realized savings in four areas: "We are saving ton of money on security, on maintenance, on update and on upgrade." 7NTC's organization did not save enough money through adopting CC that, in 7TC's opinion, the company had been salvaged from insolvency: "If we have not adopted CC we may have lost the company

because of the operation cost of the company. I think, if we did not deploy CC we may have no other choice but sell the company at very low price." Adopting CC had allowed 9TC's organization to focus on its strengths, rather than diverting resources into hardware maintenance and software development, areas in which it was less strong: "we adopted the Cloud and now we are saving money on services. We don't need to maintain hardware and develop software."

Sub-theme 12: Consequences of adopting cloud computing included increased flexibility. Three TC and four NTC participants reported that the consequences of adopting CC included increased organizational flexibility. For 12NTC, the flexibility of CC had facilitated organizational growth:

> The net result I am spending more because the company is growing as I use more application in the Cloud. I can scale up or down in an agile way in comparison to these business that maintain their services on the premises. In general, I can scale faster with Cloud Computing. (12NTC, interview response)

In 22TC's organization, the increased flexibility associated with CC adoption had benefitted customers:

> The other and most important aspect is customer satisfaction. Our students and parents are much happy and they can access our system from any place. They can be on vacation, they can get into the systems at any time and in any place. (22TC, interview response)

For 3TC's organization, the ability to access services from anywhere benefitted employees and made the firm more agile:

> The outcome is that my people will be able to access our systems from anywhere on any kind of device. The adopted systems were very easy to use and was compatible with our existing systems. The new systems were publicly available for our people, they can access it without going through the virtual private network and jumping through a lot of hoops. Because when you are on the road and doing a lot of sales you don't have the time to get on your computer and find the internet connection and find the v.p.n. When you think about Salesforce, you have everything you need over here. So, that is flexibility, best of breed, capabilities, because these people are very agile. (3TC, interview response)

Summary

The goal of this study was to determine which factors contribute to firm resistance regarding cloud computing, in order to build a theoretical model of cloud computing acceptance, the factors that influence them, and the ways in which firm characteristics may influence these factors based on the lived experiences of Chief Information Officers (CIOs) who have been faced with challenges regarding cloud computing implementation. In order to achieve this, semi-structured interviews were conducted with 11 CIOs of non-technological (NTC) companies and 11 CIOs of technological (TC) companies. Four research questions were used to guide the study.

The first research question was: Which factors contribute to firm resistance to the adoption of Cloud Computing Technologies and approaches? Findings indicated that financial risk, lack of knowledge, resistance to change, and security risk contributed to firms' resistance to CC adoption. The second research question was: What was the process followed by Chief Information Officers to adopt or reject Cloud Computing

Technology? Participants reported that CIOs followed processes of researching cloud computing, assessing organizational fit with cloud computing, phased deployment of cloud computing, and gaining approval from organizational leaders for cloud computing. The third research question was: Which resistance factors were significant enough to reject Cloud Computing Technology? Findings indicated that perceived security risks and excessive cost were considered significant enough to result in the rejection of cloud computing. The fourth and final research question was: What were the consequences of the Chief Information Officers' decisions in adopting or rejecting Cloud Computing Technology? Results indicated that consequences of adopting cloud computing included cost savings and increased flexibility. The table in Appendix F depicts the themes and sub-themes that emerged during the data analysis, and the same table, indicates how many TC and NTC participants supported each sub-theme. Table 2 in Appendix F provides a list of technological, organizational and environmental contexts that support the thematic analysis of the current research. Chapter 5 includes interpretation and implications of these findings.

Chapter 5

Conclusions, Implications, Recommendations, and Summary

While cloud computing is of increasing interest to firms globally, many are discovering greater obstacles and costs to the implementation of cloud computing than anticipated (Avram, 2014), as the perception of and attitude toward cloud computing is affected by numerous factors which may drive or halt its adoption (Stieninger et al., 2014). Despite the apparent decisive advantages offered by cloud computing, not all companies have adopted and adapted to the rapid changes that this new form of remote data storage represents (Khanagha (2015). The purpose of this study was therefore to determine which factors contribute to firm resistance to cloud computing. The study was done in order to build a theoretical model of cloud computing acceptance, the factors that influence acceptance, and the ways in which firm characteristics may influence these factors based on the lived experiences of Chief Information Officers (CIOs) who have been faced with challenges regarding cloud computing implementation. It is intended that this study will contribute to the literature and will inform best practices cloud computing implementation in the future.

Overview of the Chapter

This chapter completes the study. The first section reiterates the findings as they answer the research questions guiding the study. Conclusions are drawn, and the model is illustrated, explained, and expanded upon with the literature. Following the discussion of conclusions drawn is a discussion of the theoretical and practical implications.

Recommendations for future research and for practice are outlined, followed by a summary of the chapter.

Conclusions

Research Question Findings

Four research questions were used to guide the study:

RQ1: Which factors contribute to firm resistance to the adoption of Cloud Computing Technologies and approaches?

RQ2: What was the process followed by Chief Information Officers to adopt or reject Cloud Computing Technology?

RQ3: Which resistance factors were significant enough to reject Cloud Computing Technology?

RQ4: What were the consequences of the Chief Information Officers' decisions in adopting or rejecting Cloud Computing Technology?

Relevant to RQ1, one theme emerged: Financial risk, lack of knowledge, resistance to change, and security risk contributed to firms' resistance to CC adoption.

Relevant to RQ2, one theme emerged: CIOs followed processes of researching cloud computing, assessing organizational fit with cloud computing, phased deployment of cloud computing, and gaining approval from organizational leaders for cloud computing.

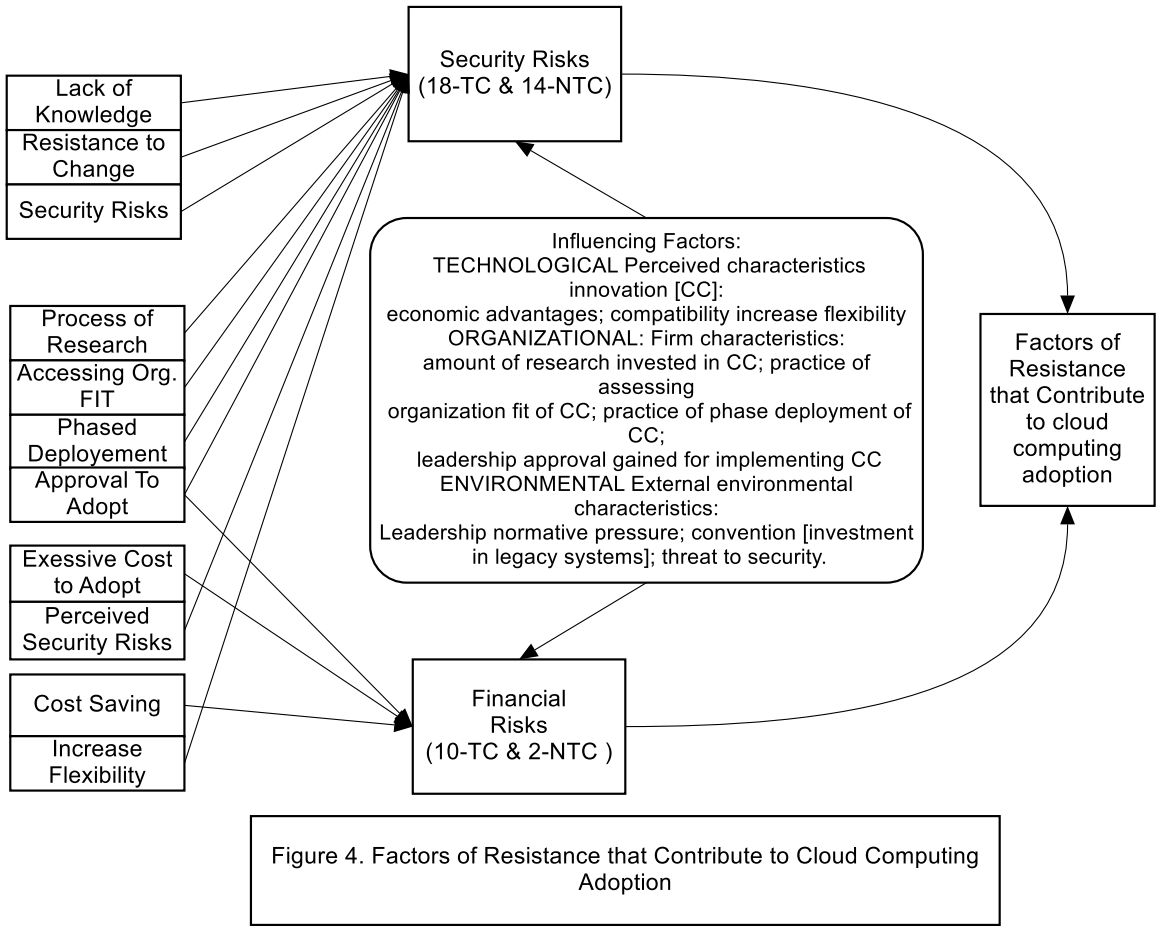
Relevant to RQ3, one theme emerged: Perceived security risks and excessive cost were considered significant enough to result in the rejection of cloud computing

Relevant to RQ4, one theme emerged: Consequences (advantages) of adopting cloud computing included cost savings and increased flexibility

Based on the lived experiences of Chief Information Officers (CIOs) who have been faced with challenges regarding cloud computing implementation, cloud computing

acceptance and adoption was found to be influenced by 11 TOE factors as well as by 12 resistance factors. These 12 factors of resistance were organized into two groups. The core category being financial risks represented the probability of loss inherent in financing methods which may impair the ability to provide adequate return. The categories lack of knowledge, resistance to change, excessive cost to adopt and cost saving fit under financial risks. Together these categories were indicators of the factors of resistance to adopt cloud computing technology. The core category security risks represented the overall perception of privacy in online environment. The categories process of research, accessing organization fit, phased deployment, approval to adopt and increase flexibility fit under security risks. Together these categories were direct indicators of the factors of resistance that contribute to the adoption of cloud computing technology by both TC and NTC. The following model was derived from these findings. (See Figure 4.). Figure 4 shows the predominate and critical factors of resistance that contribute to cloud computing adoption by TC as security risks and financial risks vs. security risks by NTC. It is very important to point out that, only two NTC's participants cared about financial risks. NTC's participants in general shared their concern about loss of data and cared only about data security. A critical distinction between TC and NTC is that 86.4% of NTC's participants did not care about cost, they only cared about data security, and shield sensitive data from external and internal actors. A participant 7NTC stated "The connection between data breaches and monetary loss isn't always clear"

Figure 4. *Model of the factors of resistance that contribute to cloud computing adoption based on study findings.*



Specific TOE factors revealed by this study include technological, organizational, and environmental factors. Technological factors include the firm-perceived characteristics of the innovation [cloud computing], including its economic advantages, its affording of increased compatibility, and its affording of increased flexibility of use. Organizational factors include firm characteristics, including the amount of research invested in cloud computing; the firm's practice of assessing organizational fit of cloud computing; the firm's practice of phased deployment of cloud computing; and leadership approval gained for implementing cloud computing. Environmental factors involve

external environmental characteristics, including leadership normative pressure, typical business convention (s) [such as investments in legacy systems]; and threats to security. These factors combined contribute to resistance factors to adopt and adapt to cloud computing that specifically involve financial risk, such as excessive cost(s), value depreciation, and migration of costs from capital to operating expenses; poor cloud computing fit with the organization; the lack of cloud computing flexibility; the lack of firm and/or leader knowledge about cloud computing; firm resistance to change; and, again, security risk(s) such as loss of data, loss of control of data, and unauthorized access to data.

These findings are in part consistent with the findings of previous research, as outlined in Table 2 to expand the model generated based on the findings of this study. In terms of technological factors, the present study findings relevant to cost align with those by (Lian et al., 2014); findings relevant to IT compatibility/fit align with those by (Tehrani & Shirazi, 2014); and findings relevant to security align with those by (S. Salleh et al., 2013).

In terms of organizational factors, the present study findings relevant to managerial support align with those by Lian et al. (2014) and Tehrani and Shirazi (2014); findings relevant to organizational fit align with those by Grover and Goslar (1993); and findings relevant to practice and protocol involving phased deployment of cloud computing and assessing of organizational fit of cloud computing align with those by Grover and Goslar (1993) and (S. Salleh et al., 2013).

In terms of environmental factors, the present study findings relevant to normative pressure(s) align with those by Grover and Goslar (1993) and (Tehrani & Shirazi, 2014);

findings relevant to convention align with those by Tehrani and Shirazi (2014); and findings relevant to external threats to security align with those by (S. Salleh et al., 2013).

Theoretical and Practical Implications

The findings of the study have theoretical and practical implications, as described below.

The findings of this study are partially consistent with IS/IT Adoption Theory and the research literature, in the technology-organization-environment (TOE) context (Tornatzky et al., 1990). Of the several technological factors previous research has identified; cost security factors remain. According to IS/IT Adoption Theory within the Technological context, cost, complexity, compatibility, availability, reliability, and security are key factors influencing adoption of and adaptation to cloud computing (Lian et al., 2014; Ray, 2016; S. Salleh et al., 2013; Tehrani & Shirazi, 2014). According to the findings of this study, especially implicated are cost and security factors. These suggest that what will be of concern for the organization will be decisions regarding the expertise level of the current IT staff in terms of dealing with security threats and the security mechanisms as well as expertise a cloud vendor has to support the organization in adoption of cloud computing technology (Ray, 2016).

According to IS/IT Adoption Theory within the Organizational context, top management support, skill of IT resources, and organizational culture readiness and adaptability (or innovativeness) are among the key factors influencing adoption of and adaptation to cloud computing (Grover & Goslar, 1993; Lian et al., 2014; Ray, 2016; S. Salleh et al., 2013; Tehrani & Shirazi, 2014). According to the findings of this study, especially implicated are resource investments in research, practices for phased

deployment and assessment, top leadership approval /support, organization/leader knowledge about cloud computing, and resistance to change factors. These suggest that what will be of concern for the organization will be decisions regarding internal and external support; skill, knowledge, and expertise of management and IT; and the extent of change that will be incurred by the organization's structure and culture (Ray, 2016).

According to IS/IT Adoption Theory within the Environmental context, normative pressure(s), external and internal convention(s), and, again, external threats to security are among the key factors influencing adoption of and adaptation to cloud computing (Grover & Goslar, 1993; Ray, 2016; S. Salleh et al., 2013; Tehrani & Shirazi, 2014). According to the findings of this study, these factors are all implicated, suggesting that what will be of concern for the organization will be decisions regarding current conventions in the industry *versus* conventions within the organization; the practice by the competition to adopt cloud computing; and vendor expertise with security (Ray, 2018).

Recommendations

Based on the findings of this study as well as on the research literature, there are some recommendations for practice and future research that might behoove organizations yet to adopt cloud computing.

Recommendations for Practice

As a number of study participants highlighted, what has to begin cloud adoption is research and assessment of cloud services and cloud service providers. Then, each TOE adoption context might be tackled with questions to be asked by leadership. For instance, according to Ray (2016), the following might be asked in each TOE context:

Technological. Besides costs, where what will be of concern for the organization will be security, such questions and prompts might include the following:

- What is the expertise level of the current IT staff in terms of dealing with security threats? and
- What security mechanisms and expertise does the potential cloud service provider offer?

Organizational. Where what will be of concern for the organization will be decisions regarding internal and external support; skill, knowledge, and expertise of management and IT; and the extent of change that will be incurred by the organization's structure and culture, such questions and prompts might include the following:

- What support is in place on the part of management for investigating, assessing, and deploying cloud computing?
- What skills, knowledge, and/or experience does the IT department have and need to have to implement cloud applications?
- Is the organizational culture one of innovation? And Where is the attitude toward/resistance to change stagnating the potential for innovation adoption?

Environmental. Where what will be of concern for the organization will be decisions regarding current conventions in the industry *versus* conventions within the organization; the practice by the competition to adopt cloud computing; and vendor expertise with security, such questions and prompts might include the following:

- Sorting through any hype, what does the industry promote?

- What are the similarities and differences between what the firm is currently implementing and what outside competitors are currently implementing?
- What vendor's/service providers have the most promising [reliable] security mechanisms in place?

Following the provocative inquiry, select strategies would be recommended for each factor within each TOE context. Some of these include the following:

Knowledge/skill enhancement of IT and top management. According to Gangwar, Date, and Ramaswamy (2015), where the cloud technology is user friendly, firms can implement "…computing resources and IT solutions without going into detail or having deep knowledge to operate them" (p. 4). However, for management, not having the technical background should not be a deterrent to understanding the logic behind the cloud, either. Instead, top management can research briefly and/or can trust IT to do the reviewing of cloud services offerings. Essentially, it would be up to management to hire the appropriately equipped and knowledgeable IT human resources and talent to close the gap where their knowledge of cloud computing is limited.

Security Measures. Strategies for improving or ensuring top security measures have been recommended by authorities such as Chang, Kuo, and Ramachandran (2016), who offer a multi-layered security amalgam that integrates firewall, identity management, and encryption based on the development of Enterprise File Sync and Share technologies—a system that offers optimum protection from internal and external security threats.

Reformed attitudes toward change. According to Alharbi, Atkins, and Stanier (2016), as the present study found, one of the top determinants influencing the adoption of cloud computing is the attitudes toward change. This includes, according to the findings of the present study, resistance to change. However, successful adoption of any new technology requires changes to be made to organizational structure, processes, and, hence, puts great demands of change management. The extent of uncertainty that will arise with the adoption of cloud computing will need to be taken into serious consideration, with improved knowledge acquisition and enhance security options, a change in attitude toward change in general opens up the organizational culture for innovation (Ray, 2016).

Recommendations for Future Research

Based on the scope and limitations of the present study, there are some future research recommendations. First, as the result of a qualitative study, the theoretical model generated will not be validated until follow-up quantitative research is undetaken in order to validate it. While the results will in be assured to apply only to the specific firms involved in the study, the selection of the sample characteristics are such that the model was made as broad as possible. However, it remains possible that the chosen sample will fail to capture all factors that influence the adoption of cloud computing by firms outside the study sample or outside the selection of industries and other firm characteristics included in the sample. This means that future research could include studies across industries, to compare the factors of adoption and rejection of cloud computing technologies by industry. Second, another recommendation in this respect might be to conduct research using different participants. Where the responses to the

interview questions were given by 22 CIOs of technological and non-technological companies, located specifically in the Southeastern region of the United States, future research could involve IT specialists, employees, and other talent from specific industries, such as medicine and healthcare, education, financial institutions, etc., as the resistance factors might be different or differently embellished.

Third, the research questions posed to guide this study and the interview questions asked of participants of this study did not often stray beyond TOE contexts. Indeed, much research and discussion emphasized technological and organizational factors and therefore resulted in limited discussions of external, governmental, market, industry, and other forces and factors that might equally influence adoption of or resistance to adopting cloud computing. In this respect, future research might consider what trickle-down, direct, or indirect effects outside forces have on the firm's decisions to adopt or reject cloud computing.

Summary

The goal of this study was to determine which factors contribute to firm resistance regarding cloud computing, in order to build a theoretical model of cloud computing acceptance, the factors that influence them, and the ways in which firm characteristics may influence these factors based on the lived experiences of Chief Information Officers (CIOs) who have been faced with challenges regarding cloud computing implementation. In order to achieve this, semi-structured interviews were conducted with 11 CIOs of non-technological (NTC) companies and 11 CIOs of technological (TC) companies. Four research questions were used to guide the study: *Which factors contribute to firm resistance to the adoption of Cloud Computing Technologies and approaches? What was*

the process followed by Chief Information Officers to adopt or reject Cloud Computing Technology? Which resistance factors were significant enough to reject Cloud Computing Technology? and *What were the consequences of the Chief Information Officers' decisions in adopting or rejecting Cloud Computing Technology?* One theme emerged from each research question, resulting in factors that contribute to the adoption of or the rejection of cloud computing for an organization.

A model was subsequently developed based on the lived experiences of Chief Information Officers (CIOs) who have been faced with challenges regarding cloud computing implementation, cloud computing acceptance, and cloud computing adoption and featured 11 Technological, Organizational, and Environmental (TOE) influencing factors as well as 12 resistance factors organized into two groups, that fit under the core categories of financial risks and security risks. These factors, found to be consistent with those identified in previous research, were found to have theoretical and practical implications that informed recommendations for best practices implementation of cloud computing technologies. The theoretical model produced by this study may guide future researchers and enhance the understanding and implementation of cloud computing technologies. The results of this study will add to the body of literature and may guide companies attempting to implement cloud computing to do so more successfully.

Appendix A

PERMISSION TO USE FIGURES

From: Zadok Hakim
Sent: Monday, June 20, 2016, 11:13 AM
To: mark.badger@nist.gov
Subject: Cloud Computing Structure

Good evening Mr. Badger:

Greeting, this is Zadok, a Ph.D. student at NSU, I am trying to illustrate the Cloud Computing structure in research that I am conducting. I found one paper published by NIST, (Special Publication 500-292) on Cloud Computing Structure. I would like to ask for permission to use the figure in my research. Would you please let me know if it is ok to use the figure in my research? The figure will be properly credited and cited in the reference section of the dissertation and the research paper.

Awaiting to hear from you,

Respectfully yours,

Zadok

zh57@nova.edu

AUTHORIZATION FROM NIST TO USE FIGURES

From: Badger, Mark Lee (Fed) <mark.badger@nist.gov>
Sent: Monday, June 20, 2016, 1:00 PM
To: Zadok Hakim
Cc: Bohn, Robert B. (Fed); Messina, John V. (Fed)
Subject: Re: Cloud Computing Structure

Dear Zadok,

In a word: YES.

Our publications may be used by nongovernmental organizations and are not subject to copyright in the United States.

Attribution would, however, be appreciated by NIST.

Thanks.

Lee

Lee Badger

Group Manager

Computer Security Division

Information Technology Laboratory

National Institute of Standards and Technology

(301) 975-3176

lee.badger@nist.gov

Appendix B

Interview Protocol

Title: Factors That Contribute to The Resistance to Cloud Computing Adoption by Tech Companies vs. Non-Tech Companies.

Time of Interview: _____

Date: _____

Interviewee Code: _____

Position of Interviewee: _____

Type of Company: _____ TC _____ NTC

Years of Experience: _____ Years (+/-) Level of Education: _____

Purpose of the study: This qualitative grounded theory study is to explore the lived experiences and perceptions of 12 to 24 CIOs working in both TC and NTC, located in the Southwestern region of the US, to better understand the factors they percieved to be contributors to the resistance to CC adoption by TC vs. NTC.

Lengthe of the Interview: 30 to 60 minutes.

Consent Form: Before the interview begins, the participants will complete and sign a consent form.

Questions:

1.- In your opinion, which factors contribute to firm resistance to the adoption of CC technology and approaches?

2.- What was the process that you went through to adopt or reject CC technology?

3.- Which resistance factors were significant enough to reject CC technology?

4.- What action did you take to adopt or reject CC technology?

5.- What were the consequences of your decision in adopting or rejecting CC technology?

ALL INFORMATION RELATED WITH PARTICIPANTS AND THEIR IDENTITIES WILL BE MAINTAINTE CONFIDENTIAL

Appendix C

Consent Form

NOVA SOUTHEASTERN UNIVERSITY
College of Engineering and Computing

Consent Form for Participation in the Research Study Entitled
Factors That Contribute to The Resistance to Cloud Computing Adoption by Tech Companies vs. Non-Tech Companies

Funding Source: None.
IRB protocol #:

Principal investigator(s)
Zadok Hakim
1114 Dominion Dr.
Katy, Texas 77450
Cell (281) 701 7049

Co-investigator(s)
Dr. James L. Parrish, Jr. PhD - Chair
Department of IS and Cybersecurity
College of Engineering and Computing
Nova Southeastern University
3301 College Avenue
Fort Lauderdale, FL 33314
(954) 262-2043

For questions/concerns about your research rights, contact:
Human Research Oversight Board (Institutional Review Board or IRB)
Nova Southeastern University
(954) 262-5369/Toll Free: 866-499-0790
IRB@nsu.nova.edu

Site Information
Conference Room
1114 Dominion Dr.
Katy, Texas 77450

What is the study about?
You are invited to participate in this research. The main purpose of this phase of the study is to investigate, through the use of interview the different factors of resistance that influence the decisions of Chief Information Officer (CIO) to adopt Cloud Computing Technology. This study will examine the resistance factors that influence the adoption of

CC Technology by Tech Companies **(**TC) vs. Non-Tech Companies (NTC). The data collected in this phase of the research will be analyzed independently and merged with the data collected from the 12 to 24 participants who provided semi-structure interviews.

Why are you asking me?

You are invited to participate in this study because you were identified by the researcher as Cloud Computing user and expert. A Cloud Computing expert in this research is defined as a Cloud Computing user who has a minimum working experience not less than one year serving as CIO in the IS area of an organization. There will be at least 12 to 24 participants in this phase of the research.

What will I be doing if I agree to be in the study?

You will be interviewed by the researcher. Mr. Zadok Hakim will ask you questions about Cloud Computing Technology attributes that have been selected for the semi-structure interview. The researcher will not be asking you any personal questions. The researcher will present to you an interview guide with six questions that will be used to guide the interview. Only your expert opinion on the inclusion and exclusion related with the Cloud Computing Technology attributes will be sought. In this phase of the research there will be no survey instrument for you to complete. The interview is expected to last no more than 30 to 60 minutes. If during the interview, you decided to end the interview and no longer willing to continue voluntarily participation, Mr. Hakim will end the interview.

Is there any audio or video recording?

During the interview, the researcher will use audio recorder. The audio recordings will be available to be heard by the researcher, personnel from the IRB, and by the dissertation chair, Dr. James Parrish. To safe guard your privacy, the recording will be kept securely in the researches' office in a safe environment and in a locked file cabinet. The recording will be kept for a period of 36 months from the time of the interview. After that time, the recording will be destroyed by deleting all recording. Your confidentiality for things you say during the recording cannot be guaranteed. The researcher will try to limit access to the storage media as it is stated in the first part of this paragraph.

What are the dangers to me?

In this kind of research, risks to the participants are minimum. They are not thought to be greater than other risks that participants experience every day in the work place. Being recorded, it means that confidentiality cannot be guaranteed. If you have any question about the research or your research rights, or if you experience and injury because of the research, please contact Mr. Zadok Hakim at (281) 701-7049. You may also contact the IRB at the number and address indicated above with questions about your research right

Are there any benefits for taking part in this research study?

This research will not have a direct benefit to the participants. The result of this study will be of great benefit to organization that use Cloud Computing as a vender and to companies that are resistant to use Cloud Computing solution in their daily operation. The generalization of the result of this research will be help Cloud Computing Venders to

develop better Cloud Computing solution, and be more informed of what customers are interested in. The result of this study will help users to understand the benefit of Cloud Computing solution, and to identify the factors of resistance that contribute to CC adoption by TC vs. NTC

What will I get paid for being in the study? Will it cost me anything?

There are no costs to you. A small incentive, a $35 gift card, dinner for one will be offered as a thank you for participating in this study.

How will you keep my information private?

The questions that will be asked during the interview will not require any personal or confidential information linked to you. The transcript of the audio recording will not have any personal information that could be linked to you in any way. As previously stated, the recording will be kept securely in the researches' office in a safe environment and in a locked file cabinet. The recording will be kept for a period of 36 months from the time of the interview. After that time, the recording will be destroyed by deleting all recording. All information obtained during this research is strictly confidential unless disclosure is required by law. The IRB, regulatory agencies, or the dissertation chair, Dr. James Parrish may review research records.

What if I do not want to participate or I want to leave the study?

Participation in this study is voluntary. You have the right to leave this study at any time or refuse to participate. If you do decide to leave or you decide not to participate, you will not experience any penalty or loss of services you have a right to receive. If you choose to withdraw, any information collected about you before the date you leave the study will be kept in the research records for 36 months from the conclusion of the study but you may request that it not be used.

Other Considerations:

If significant new information relating to the study becomes available, which may relate to your willingness to continue to participate, this information will be provided to you by Mr. Zadok Hakim.

Voluntary Consent by Participant:

By signing below, you indicate that

- this study has been explained to you
- you have read this document, or it has been read to you
- your questions about this research study have been answered
- you have been told that you may ask the researchers any study related questions in the future or contact them in the event of a research-related injury
- you have been told that you may ask Institutional Review Board (IRB) personnel questions about your study rights
- you are entitled to a copy of this form after you have read and signed it
- you voluntarily agree to participate in the study entitled *Factors That Contribute to The Resistance to Cloud Computing Adoption by Tech Companies vs. Non-Tech Companies*

Participant's Signature: _____ Date: _____

Participant’s Name: _____ Date: _____

Signature of Person Obtaining Consent: _____

Date: _____

Appendix D

Demographic Characteristics of Participants from Technological Firms

Respondent	Years of experience	Level of education	# of employees in firm
2TC	32	MS	350
3TC	35	BS	9,500
9TC	30	MS	87
18TC	5	MS	5,000
19TC	18	MS	150
22TC	22	MS	12,000
23TC	20	MS	1,672
26TC	10	MS	3,000
27TC	12	MS	1,200
28TC	20	MS	3,200
29TC	11	MS	800
30TC	25	BS	Fewer than 500

Appendix E

Demographic Characteristics of Participants from Non-Technological Firms

Respondent	Years of experience	Level of education	# of employees in firm
1NTC	27	MS	5,000
5NTC	22	BS	3,600
7NTC	7	MS	728
10NTC	23	MS	1,000
12NTC	25	MS	136,000
17NTC	29	MS	18,175
20NTC	15	MS	2,000
21NTC	32	BS	11,000
22NTC	14	MS	180
24NTC	20	PhD	6,500
25NTC	28	MS	5,000

Appendix F

Data Analysis: Themes, Sub-Themes, and Number of Participants Supporting Each Sub-Theme

Research question	Theme answering research question	Sub-theme	# of TC participants supporting sub-theme	# of NTC participants supporting sub-theme
RQ1: Which factors contribute to firm resistance to the adoption of Cloud Computing Technologies and approaches?	Theme 1: Financial risk, lack of knowledge, resistance to change, and security risk contributed to firms' resistance to CC adoption	Financial risk contributed to firms' resistance to CC adoption	7	4
		Lack of knowledge contributed to firms' resistance to CC adoption	3	3
		Resistance to change contributed to firms' resistance to CC adoption	7	5
		Security risk contributed to firms' resistance to CC adoption	7	9
RQ2: What was the process followed by Chief Information Officers to adopt or reject Cloud Computing Technology?	Theme 2: CIOs followed processes of researching cloud computing, assessing organizational fit with cloud computing, phased deployment of cloud computing, and gaining approval from	CIOs followed a process of assessing organizational fit with cloud computing	4	5
		CIOs followed a process of researching cloud computing	7	6
		CIOs followed a process of phased deployment of cloud computing	5	5
		CIOs followed a process	5	6

	organizational leaders for cloud computing	of gaining approval from organizational leaders for cloud computing		
RQ3: Which resistance factors were significant enough to reject Cloud Computing Technology?	Theme 3: Perceived security risks and excessive cost were considered significant enough to result in the rejection of cloud computing	Perceived security risks were considered significant enough to result in the rejection of cloud computing	1	6
		Excessive cost was considered significant enough to result in the rejection of cloud computing	3	2
RQ4: What were the consequences of the Chief Information Officers' decisions in adopting or rejecting Cloud Computing Technology?	Theme 4: Consequences of adopting cloud computing included cost savings and increased flexibility	Consequences of adopting cloud computing included cost savings	9	7
		Consequences of adopting cloud computing included increased flexibility	3	4

Appendix G

Example Source Data and Codes

<Internals\\10NTC> - § 1 reference coded [7.21% Coverage]

Reference 1 - 7.21% Coverage

The decision also afforded me the ability to support doubling revenues with the same headcount and relatively flat operating budget.

<Internals\\18TC> - § 1 reference coded [15.92% Coverage]

Reference 1 - 15.92% Coverage

the cloud saves the county a lot of money and the cloud allows the IT department, because we're not growing, the IT to bring back ours to do more value added jobs and not just upgrading servers. But really doing value added digital transformation with the same number of people and that has allowed us not to have to hire people even though their county is growing exponentially. And we're growing, we're getting thousands of citizens in every quarter into the county. We are not having to add employees and that maintains our costs or keeps our costs low because of technology, so it's a big driver. Technology enables the county to grow really effectively because of the way we use technology and we leverage the cloud. So I hope I answered all your questions

<Internals\\19TC> - § 1 reference coded [13.81% Coverage]

Reference 1 - 13.81% Coverage

So the financial is definitely the most important. But I know that a lot of people do adopt the cloud because they don't have resources to support a hosting environment internally. So in that case, it will be convenience. But for us, Kurt, you know, we really do have the resources to be able to support an internal data center environment, so the cost is definitely our biggest factor. We're looking to save money. Of course, there is always hesitance when you're doing something new. But once I explained whether it was a good idea or not, then, they were on board. I mean, my position, SCIL, is to make those kinds of decision. But, of course, you have to make sure that there is a consensus. I wouldn't say that there was a resistance but, of course, they asked questions, very good questions about access to the data and how secure it is. But once I laid their fears, then we're all on the same page and that we're all moving forward. But I wouldn't say that I ever encountered any resistance.

<Internals\\1NTC> - § 1 reference coded [3.69% Coverage]

Reference 1 - 3.69% Coverage

that there's no decision regarding a cloud strategy that really includes cost. I think a lot of people get into cloud thinking there's going to be cost savings and the fact of the matter is there's really none. It's pretty even. And the big component of that has to do with the cost of the software itself, the cost of the cloud software itself, only represents about 10%, 10% to 20 % of an implementation project. So my point of all this is to say about organizational education especially at the executive ranks, right? So, I wouldn't say that we followed any formal process but we did follow kind of our typical the way that we approach new technology, right? You evaluate, look for feasibility, build a business case, look at your design, look at your compatibility, things like that. It ultimately will

lead you down the path to do the solutions that sort of best fits your environment and the business frankly from a functional perspective.

<Internals\\20NTC> - § 2 references coded [20.32% Coverage]

Reference 1 - 11.36% Coverage

So the private cloud is a multiagency private cloud. With the reduction of stuff and increase in service, we are a couple of years in to it, but our costs have not dropped enough yet. At first they went higher and that was anticipated, and now they are dropping and they're about equal to where they were prior to optimization and centralization. We anticipate in the next year to two we'll start seeing that drop, so we'll start realizing that savings. Yes so we're actually starting to move applications into the public cloud, such as a government agency, we would be using their government solutions, and the string [Phonetic] [0:04:17] such as Azure and AWS are what we are looking at. We've actually started, we've got one application out already and we're looking at doing more. I believe we will be moving, data centers also into an Azure or AWS scenario in the future.

Reference 2 - 8.95% Coverage

We no longer have that issue with moving to the cloud, as well as we no longer have to buy hardware, so we're going to start realizing those savings dramatically as we move forward more in the years to come. I'd absolutely recommend going to the cloud. Especially, if they're dealing with a budgeting cuts or a potential single point of failure for resources, to consider not only just moving to the cloud, but also moving to platform as a service, versus just infrastructure. That's our main goal right now with our applications just to get them on a platform as a service scenario, not just standing up infrastructure as a service.

<Internals\\21NTC> - § 1 reference coded [20.00% Coverage]

Reference 1 - 20.00% Coverage

There really haven't been any consequences, unless we consider improved collaboration, improved productivity, lowering overall cost of operations consequences

<Internals\\22TC> - § 1 reference coded [14.69% Coverage]

Reference 1 - 14.69% Coverage

Really, the consequences that we see the cost reduction in our operation. We see significant cost reduction for us. The vendor see as a win-win situation, is a benefit to the vendor and cost reduction to the user. The other benefit is the reduction in support services, and maintenance cost-saving. Now, we can support out servers remotely, we don't have to be driving around. This is a huge saving to our organizations. The operation is more efficient with the cloud, and the training is much better and easier and less costly to our organization. Now, it is much easier to operate the systems from the backend side and from the frontend side.

<Internals\\23TC> - § 1 reference coded [1.99% Coverage]

Reference 1 - 1.99% Coverage

The benefit is financial and operation efficiency. In summary, it is cost saving and economy of scale.

<Internals\\24NTC> - § 1 reference coded [15.33% Coverage]

Reference 1 - 15.33% Coverage

The users have more access that they have before, so the consequences are greater services for a lower cost. So, in our case that work out very well and we have great success, so our employees have been very happy with that. I thing in these cases we communicated a lot with our end uses and they were up to date with the project. We

communicate a lot about what we are doing, what we will be changing and so forth. We defiantly worked with legal on the contract, so we make sure where our data is going to be and that we knew that we have control over that data, and we knew that if we exit the contract we will know what will happen with our data and how we can control the same. So, for us it was a great success to move to the cloud. Now, we have not moved all our data center to the cloud, the reason is cost. We ae moving with baby steps to accomplish our objective. Right now, we have the right data center in the cloud.

<Internals\\26TC> - § 1 reference coded [19.60% Coverage]

Reference 1 - 19.60% Coverage

I did my job for five months, so I may not have the same answer that you may get from other CIOs that have been on the job for two years and doing this for a long time, but, the benefit comes from the financial saving associated with services vs. capital expenditure, especially in accompany like ours, we will periodically capitalize other things, we pull in the amortization period from three years, which most companies do it in one year. Ahh, we accelerate that capitalization period because we are in extremely financial solvent business, and we tend to finance all our own investment vs, going out to the private or public market looks for funding. So, the benefit that people see is that we don't have to capitalize, actually paying on a service basis, so what we will see overtime is reduction in other costs at our dedicated center, and no need to replace hardware.

<Internals\\27TC> - § 1 reference coded [20.00% Coverage]

Reference 1 - 20.00% Coverage

The outcome was very beneficial to our company, we saved time and saved money on maintenance, cost of operation and on security. Our personnel were very happy with the outcome. Now, we are moving all our application to the cloud.

<Internals\\28TC> - § 1 reference coded [20.00% Coverage]

Reference 1 - 20.00% Coverage

Everyone in our company are happy with the result. We ae saving ton of money on security, on maintenance, on update and on upgrade. Now, our high level executives see the benefit of our decision and they are pleased with the outcome. The owners wanted to know that we are not going to jeopardize our operation and we are save in the cloud. WE have a lot of old school mentality at our company and it wa very hard to convince them, but once they saw the outcome, they open the door for us to start moving more and more application to the cloud.

<Internals\\29TC> - § 1 reference coded [20.00% Coverage]

Reference 1 - 20.00% Coverage

We were not prepared to move all application to the cloud. At the begging it was very hard to deal with two different systems. It was very costly, but know we are seeing the benefit of the same. We are in the process now to move the rest of the application and we hope we don't have any major issues. All in all, it was a good move and we are saving ton of money, and our board is happy. We can't ask for anything else, we are very happy that we did move the application to the cloud.

<Internals\\5NTC> - § 1 reference coded [5.57% Coverage]

Reference 1 - 5.57% Coverage

Our CEOs now they see the financial benefit, they see that there is no risk to operate in the cloud and they are very comfortable with the new process. Now, they trust our opinion and know that we deliver, so everything is good. They have changed their attitude toward moving the application to the cloud.

<Internals\\7NTC> - § 1 reference coded [12.07% Coverage]

Reference 1 - 12.07% Coverage

With our decision to adopt CC, we saved the company from losing customs and facing delicate financial situation. Adopting CC was the best scenario of the company and most beneficial for the owners. If we have not adopted CC we may have lost the company because of the operation cost of the company. I think, If we did not deploy CC we may have no other choice but sell the company at very low price. The adoption was very beneficial and the customer were very happy and employees were satisfied with the operation and control of the hardware and applications.

<Internals\\9TC> - § 1 reference coded [20.00% Coverage]

Reference 1 - 20.00% Coverage

The consequences of decision were that I felt bad that I could not convince all the stakeholders at the beginning of the process, but the outcome was favorable and we adopted the Cloud and now we are saving money on services. We don't need to maintain hardware and develop software. We must tell every on in the organization, we are not in the hardware and software business, we should not be maintaining servers and develop new software for our organization this is not our mission nor our vision., So, the outcome of adopting the cloud was the best thing that can happen to us. Now we are concentrating on our business and letting other serve us and not be concerned with thing that doesn't belong to our organization nor it is part of our philosophy.

<Internals\\12NTC> - § 1 reference coded [17.81% Coverage]

Reference 1 - 17.81% Coverage

the system is faster, the features are better. The new systems, that is the Cloud has forced me to think more like a broker in introducing and finding the right services. We were focused more on the software side of integration, what date needs to be where, how the data needs to travel, It made the systems process more efficient and productive and making the data better in relation to the risks that I was talking about. Integrity risk is a key factor in my business. The net result I am spending more because the company is growing as I use more application in the Cloud. I can scale up or down in an agile way in comparison to these business that maintain their services on the premises. In general, I can scale faster with Cloud Computing.

<Internals\\17NTC> - § 1 reference coded [20.00% Coverage]

Reference 1 - 20.00% Coverage

Well, we know that the online administrative tools are not where we want them. So we know are a consequence of that, on the alternate side it is much easier to provide secure access to your data from any device from anywhere that in that case gets easier. I have less -- when I move one system to the Cloud, it does nothing for me as far as reduction in infrastructure management. As I mentioned we are running 350 virtual servers. So if I knock 10 servers out, there is no real delta there. But if I move HR out and I move financials out and I move email and collaboration, now you are seeing 350 servers go down to 200 servers, maybe even less. So now you can start seeing some efficiencies on the infrastructure and management side, that's a lot less servers to be patching every Tuesday night. So now I can start enjoying the consequences of adopting the approach. . And, so the consequence will be a more smaller data footprint for physical infrastructure, smaller amounts of server and database management. But overall we would like to think that our world would get a little easier but we are still totally at the beck-end call of those vendors to provide a secure and available and prevent data loss. The traditional IT approach, the consequences of our actions was if we had a catastrophe I had a good contingency, I had your data, it's all in one place, I can restore it, it's all good. Now we are turning that over to the fabric of the SaaS solutions and Internet connectivity to depend on our security availability and data retention.

<Internals\\21NTC> - § 1 reference coded [20.00% Coverage]

Reference 1 - 20.00% Coverage

There really haven't been any consequences, unless we consider improved collaboration, improved productivity, lowering overall cost of operations consequences

<Internals\\22TC> - § 1 reference coded [5.29% Coverage]

Reference 1 - 5.29% Coverage

The other and most important aspect is customer satisfaction. Our students and parents are much happy and they can access our system from any place. They can be on vacation, the can get into the systems at any time and in any place.

<Internals\\2TC> - § 2 references coded [8.98% Coverage]

Reference 1 - 1.94% Coverage

More CIOs are beginning to adopt the model but the resistance still there based on the risk of my information

Reference 2 - 7.04% Coverage

I will explain, the consequences of putting e-mail have been phenomenal, because it made it any time anywhere access is available dn it was extremely beneficial, make it just like a cell phone. The consequences of putting the learning management systems was extremely beneficial, why, because we now have online learning, so the ability to access my core material, professor, and other students on 24/7 basis on my time has changed how we view educations. So, those are great one.

<Internals\\3TC> - § 1 reference coded [20.00% Coverage]

Reference 1 - 20.00% Coverage

The outcome is that my people will be able to access our systems from anywhere on any kind of device. The adopted systems were very easy to use and was compatible with our existing systems. The new systems were publicly available for our people, they can access it without going through the virtual private network, and jumping through a lot of hoops. Because when you are on the road and doing a lot of sales you don't have the time to get on your computer and find the internet connection and find the v.p.n. When you think about Salesforce, you have everything you need over here. So, that is flexibility, best of breed, capabilities, because these people are very agile. In summer, it was efficiency, cost saving, most on premises software will go away over time. In other words it is minimum capital investment, and it does enable quick acceleration, implementation of big ERP 2 to 3 years, If you fail on ERP implementation you are done vs you can get something running in 30, 60 days, as far as SaaS.

<Internals\\7NTC> - § 1 reference coded [7.88% Coverage]

Reference 1 - 7.88% Coverage

The outcome was very beneficial. Our customers were very happy with our service and the response time. We were the only supplier that met the need of the customer on time every time and thanks to the decisions to adopt CC. we were very successful and management were very happy with the outcome and with the operation and comfortable with the control of the product

<Internals\\2TC> - § 1 reference coded [12.96% Coverage]

Reference 1 - 12.96% Coverage

The other challenges are Collaboration mean that an organization that normally will not share their data, now, it is being made available and that that can be challenging. Now, I am being challenging the Psychology of organization behavior, and now, I am taking something and put it in the cloud, any time and where access and that may disrupt

and may be a disrupter to the organization psychology and culture and behavior of how that data it has been shared and used prior to. So, two sides to that coin, A great example, that I have shared is the cost and risk. There is time, OK, where I am not buying hardware, but the subscription cost keeps going up by 4 to 5 %, so my operation cost is out of control. I have that happen when cloud has increased by 4 and 5 % a year, and 3 years later I am pay more to store that data. That is not a saving. Cost in an organization it everything.

Appendix H

Table 2. *For the Model of Cloud Computing (CC) Acceptance and Rejection Factors Based on Study Findings and Previous Research.*

Context	**Previous Research** **Factors**	**References**	**Present Study Factors Influencing adoption (A) Resistance (R.).**
Technological	Data Security; Complexity Compatibility; Cost Initiation; * Adoption; Implementation; IS maturity. Trial-ability; IT Infrastructure; Compatibility-IT; * Strength-Security Systems; Limited Technical Expertise. Relative Advantage; * Complexity; Scalability. Internet-Availability-Bandwidth; Interoperability Issues; Multi-Tenancy Vulnerability; Data Security;* Privacy; Lack of Trust.	(Lian et al., 2014). (Grover & Goslar, 1993). (Tehrani & Shirazi, 2014). (Al-Jabri, 2014); (Valier et al., 2008). (S. Salleh et al., 2013).	Economic Advantages/Disadvantages (A); Compatibility-IT (A); Increased Flexibility (A) Lack of CC flexibility (R) Financial risk/excessive cost/value depreciation [migration of costs from capital to operating expenses] (A) (R) Poor fit with organization (R) Security risk(s) loss of/loss of control of data, unauthorized access to data (R)
Organizational	Relative Advantage; Top manager's support; * Adequate resources; Benefits. Size; Centralization; Formalization. * Conformity-Work Culture; * Organizational Structure and Size. Top management support; * Company size; Ownership of Data; Organization Readiness. *	(Lian et al., 2014). (Grover & Goslar, 1993). (Tehrani & Shirazi, 2014). (Al-Jabri,	Amount of research invested in CC (A); Practice of assessing Organizational fit of CC (A); Practice of phased deployment of CC (A); Leadership approval gained for implementing CC (A) Lack of firm/leader knowledge about CC (R)

		2014). (S. Salleh et al., 2013).	Resistance to change (R)
Environmental	Government Policy. Perceived industry pressure. Environmental uncertainty. Technical Provider Support; Skilled Vendors; Influence of Market Scope; Nature of Industry; Government; Competitors. The level of Competition; Trading Partners; Rules & Regulation. Service Providers Sustainability/Integrity; Government Initiatives; Service Level Agreement (SLA)	(Grover & Goslar, 1993). (Tehrani & Shirazi, 2014). (Al-Jabri, 2014). (S. Salleh et al., 2013).	Leadership normative Pressure (A); Convention [investment in legacy systems]; External Threat to security (A)(R)

Factors identified in the present study are marked with an asterisk (*) and reiterated in column 4.

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