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Exploring Firm-Level Cloud Adoption and Diffusion

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
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2019

Abstract

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BSCIS, Regents College, 1993

Doctoral Study Submitted in Partial Fulfillment

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Abstract

Cloud computing innovation adoption literature has primarily focused on individuals, small businesses, and nonprofit organizations. The functional linkage between cloud adoption and diffusion is instrumental toward understanding enterprise firm-level adoption. The purpose of this qualitative collective case study was to explore strategies used by information technology (IT) executives to make advantageous enterprise cloud adoption and diffusion decisions. This study was guided by an integrated diffusion of innovation and technology, organization, and environment conceptual framework to capture and model this complex, multifaceted problem. The study's population consisted of IT executives with cloud-centric roles in 3 large (revenues greater than $5 billion) telecom-related companies with a headquarters in the United States. Data collection included semistructured, individual interviews (n = 19) and the analysis of publicly available financial documents (n = 50) and organizational technical documents (n = 41). Data triangulation and interviewee member checking were used to increase study findings validity. Inter- and intracase analyses, using open and axial coding as well as constant comparative methods, were leveraged to identify 5 key themes namely top management support, information source bias, organizational change management, governance at scale, and service selection. An implication of this study for positive social change is that IT telecom executives might be able to optimize diffusion decisions to benefit downstream consumers in need of services.

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Dedication

I dedicate this work to my wife Carolyn, my daughter Margaret, and my father Robert, for their unconditional love, support, and motivation while I worked through this long but fulfilling process. I am extremely grateful that I have been able to complete this program while my father remains alive, so he too can celebrate with us. My roots are as a cranberry farmer in rural Massachusetts, so accomplishing this goal is truly a dream come true. Also, I am grateful that my daughter was able to see how perseverance and hard work can pay off and be rewarding. Persistence is critical in achieving this educational goal, and we as a family have had to work through and sacrifice many long nights and weekends to successfully complete this program. I am the first in our family to achieve a doctoral-level degree, and I hope it makes my father proud.

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Section 1: Foundation of the Study

The discipline of enterprise cloud computing is developing, and the lines between vendor claim hype and reality often blur, which affects discernment (Avram, 2014). Lee (2015) proclaimed that psychological factors, primarily self-efficacy, have become vital driving forces underpinning practitioners' cloud intention to adopt assessments. As such, Ho, Ocasio-Velazquez, and Booth (2017) pronounced that the practitioner's prior beliefs, individual outcomes, and trust directly influence their attitude toward technology. Moreover, Ho et al. specified that the relative strength of the resultant attitude might unduly influence a practitioner's rational decision-making processes and intention to adopt assessments. Finally, Ho et al. suggested that subsequent practitioner behavioral outcomes may not be sufficiently moderated by perceived risk or subjective norms, resulting in unanticipated negative consequences. Although a handful of large cloud service providers (CSPs) have rapidly gained market share, the overall model of enterprise cloud value lacks a full examination, which includes a comprehensive audit of cloud technology weakness and immaturity impact (Chou, 2015). Therefore, given the relative immaturity of cloud computing, the inadequacy of new product adoption critical thinking, and the potential impact of a negative consequence on an organization, a more thoughtful adoption approach is required to mitigate diffusion failures (Derbyshire & Giovannetti, 2017). Consequently, the successful implementation of cloud solutions often requires a variety of unplanned interventions adversely impacting organizational resources (Rai, Sahoo, & Mehfuz, 2015). I used a qualitative collective case study to explore and understand how several large telecom companies have addressed this

phenomenon, as well as to explore factors influencing firm-level cloud adoption and diffusion decisions.

Background of the Problem

Cloud computing emerges as a significant form factor for enterprises and the next evolutionary generation of virtualization (Kushida, Murray, & Zysman, 2015). Cloud computing fills a technical void by managing computing costs and simplifying IT operations (Avram, 2014). Advocates profess that cloud computing enables significant cost savings and competitive advantages while offering techniques to abstract and manage workloads in a less restrictive and higher scaling manner (Pakath, 2015). Authors of cloud computing adoption literature focused on the individual, small business, and nonprofit organizations from a technology-specific perspective (El-Gazzar, 2014). However, the functional linkage between cloud adoption and diffusion remains instrumental to understanding enterprise firm-level adoption (Choi, Nazareth, & Ngo-Ye, 2017). Therefore, because enterprise-centric cloud adoption and diffusion literature are still emerging, the lack of applied field data negatively affects organizational decision-making processes (Haag & Eckhardt, 2014). As a result, an organization's ability to realize the cloud's actual value is often impaired.

Problem Statement

Large enterprise IT executives are making cloud adoption and diffusion decisions based on flawed or incomplete information (Ray, 2016). According to Figliola and Fischer (2016), variances in local IT cost savings when adopting cloud services can range anywhere from 10% to 250% and often ascribed to a lack of understanding, uncertainty,

and incomplete requirements. The general IT problem is that IT executives make ill-informed enterprise cloud adoption and diffusion decisions based on emotion and self-efficacy rather than a critical assessment of enterprise cloud solutions. The specific IT problem is that some IT executives lack strategies to make advantageous enterprise cloud adoption and diffusion decisions.

Purpose Statement

The purpose of this qualitative collective case study was to explore strategies used by IT executives to make advantageous enterprise cloud adoption and diffusion decisions. The target population was IT telecom executives who influence or make firm-level cloud adoption and diffusion decisions in three large (revenues greater than $5 billion) telecom-related companies with a headquarters in the United States. An implication for positive social change is that, by using my study findings, IT telecom executives might be able to improve their ability to optimize cloud innovation adoption and diffusion decisions to greater benefit downstream consumers in need of telecommunications services.

Nature of the Study

I used the qualitative method for this study. Researchers use applied, experientially based qualitative exploration methods to capture critical aspects of a topic and address validity and reliability (Walther et al., 2017). Accordingly, I selected the qualitative method to explore strategies to make enterprise cloud adoption and diffusion decisions advantageously. Researchers use the quantitative method to focus on counted or aggregated data (Myers, 1997). I did not collect numerical or aggregated data about cloud computing, so I did not choose the quantitative method. Researchers use mixed methods

to combine quantitative and qualitative methods for complex data analysis and triangulation (Kamalodeen & Jameson-Charles, 2016). I did not use the quantitative method, so a mixed-method approach was not appropriate for this study.

I used a collective case study design for this exploration. Stake (1995) characterized case study research as the qualitative examination, analysis, and interpretation of a single or collective bounded case, intended to capture the particularity and complexity of an issue within one or more sites. Furthermore, Stake specified that an instrumental case study provides insight into a case where the issue is dominating, whereas a collective case study refers to a nested set of instrumental cases examined simultaneously. I used the collective case study design to explore the various applied aspects of enterprise cloud adoption and diffusion decisions and their results across a variety of telecom companies. Researchers use ethnographic design to document shared patterns of a cultural group, which requires extensive time in the field living with a cultural group (Myers, 1997). I did not examine a culture group, so an ethnographic design was not appropriate for this study. Researchers use phenomenological design to exhaustively analyze the meanings behind the lived experiences of study participants on a phenomenon (VanScoy & Evenstad, 2015). While I did consider a phenomenological study, the lack of definition of a specific phenomenon caused me to reject this design.

Research Question

What strategies do IT executives use to make advantageous enterprise cloud adoption and diffusion decisions?

Interview Questions

1. How do you contribute to IT cloud adoption and propagation decisions with steps, purposes, and time elements of each?

2. What are the key roles involved in the adoption and propagation of IT cloud within your organization, and how does your role relate to these other roles?

3. Please describe the nature, frequency, and structure of how you communicate IT cloud adoption and propagation decisions with other peer and subordinate IT organizational roles.

4. How do you gather information to formulate IT cloud adoption deliberations and facilitate propagation communications?

5. How do you adjudicate IT cloud adoption and propagation decisions with steps, rationale, and purposes of each?

6. What difficulties have you encountered in the IT cloud adoption and propagation process within your organization, and have these difficulties altered over time?

7. What additional strategy-related information would be worth sharing to help IT executives make advantageous enterprise cloud adoption and diffusion decisions?

Definition of Terms

Compute: A virtual or physical computer instance, able to access CPU and RAM to execute instructions (Jararweh et al., 2016).

Dynamic pricing: Auction-based pricing in which a dynamic amount of resource is contracted for a dynamic amount of time by the service consumer (Wu, Terpenny, & Gentzsch, 2015).

Pay per use: Service consumption is measured and billed *as you use* with a minimal upfront obligation (Ray, 2016). Pay per use incorporates *pay as you go* and *pay for what you think you will use* concepts.

Purposeful sampling: Patton (2015) suggested that purposive and purposeful are equivalent. Gentles, Charles, Ploeg, and McKibbon (2015) confirmed Patton and settled on using the term *purposeful*.

Senior IT leaders: Decision makers who focus on strategic rather than tactical IT issues (Milovich, 2015).

Conceptual Framework

Two conceptual frameworks were blended to capture and express the conceptual model to support this study. The diffusion of innovation (DOI) theory, the foundational lens for this study, was initially developed by Everett Rogers in 1962; he then published the fifth edition of the theory in 2003 (Rogers, 2003). Rocco DiPietro, Edith Wiarda, and Mitchell Fleischer developed the technology, organization, and environment (TOE) framework in 1990. Researching enterprise cloud adoption and diffusion is a complex, multifaceted problem, and an extensive array of sources exist that leverage composite model pairs when documenting this field of study (El-Gazzar, 2014). DOI and TOE are two of the primary conceptual models used to explore enterprise cloud adoption (Oredo

& Njihia, 2015). Therefore, based on the focus of my study, I used an integrated DOI-TOE conceptual model.

Rogers (2003) created DOI to describe the natural adoption curve of innovations across industries as a function of an individual organization's innovativeness. Innovativeness signifies the rate at which an innovation is adopted in comparison to others (Rogers, 2003). The four central concepts of DOI are (a) innovation, (b) communication channels, (c) time and (d) a social system; each has specific attributes and characteristics to inform an innovation's rate of adoption (Rogers, 2003). Additionally, Rogers established a five-step innovation decision-making process (i.e., knowledge, persuasion, decision, implementation, and confirmation) that models the stages taken in considering an innovation. Like the Gartner Hype Cycle, the DOI S curve delineates technological adoption over time. The five adopter categories established in Rogers are (a) innovators, (b) early adopters, (c) early majority, (c) late majority, and (d) laggards. Essential attributes modeled within DOI include the assertion of the characteristics and interpersonal communications (i.e., opinion leadership influence) that motivate individual and communal technology adoption and diffusion decisions (Rogers, 2003).

DiPietro et al. (1990) developed TOE to describe three dimensions that firms explore when seeking, adopting, and implementing new technologies. The technical context includes hardware, software, and processes (DiPietro et al., 1990). The organizational context addresses the structures, size, resources, and communications paradigms (DiPietro et al., 1990). The environmental context addresses the industry and external reporting requirements (DiPietro et al., 1990). Gangwar, Date, and Raoot (2014)

revealed that IT adoption researchers widely leverage TOE, which is well-supported by the community.

These two frameworks—DOI and TOE—as characterized by Oliveira, Thomas, and Espadanal (2014), overlap in some regards, but each model also embodies a unique set of complementary factors. Furthermore, as proposed by Oliveira et al., DOI focuses on technology adoption and diffusion from an innovation perspective, complemented by the TOE, which introduces an environmental aspect. Additionally, Oliveira et al. developed and leveraged a specific, integrated DOI-TOE enterprise cloud-adoption research model demonstrating how the two frameworks complement each other. Similarly, Alkhalil et al. (2017) developed an integrated DOI-TOE conceptual model explicitly designed to study complicated enterprise cloud adoption and application migration decisions. Based on my study focus and the specific DOI and TOE dimensions and factors incorporated, I selected Alkhalil et al.'s (2017) model as my integrated DOI-TOE conceptual model.

Assumptions, Limitations, and Delimitations

Assumptions, limitations, and delimitations are factors that influence research and outcomes. The discussion below outlines how I addressed these dynamics concerning managing overall study integrity as well as a foundational basis to collect and analyze the data of this qualitative collective case study.

Assumptions are interpretations or inferences accepted to be accurate, but that can unconsciously influence observation and perception bias (Walsh, 2015). The first assumption here was that participants understood the concepts during the interviews and

provided honest answers. Additionally, the participants understood the technical nature of an innovation, which may consist of a single or cluster of technologies. Finally, the participants understood that cloud migration decisions are synonymous with cloud adoption decisions.

Regardless of the assumptions stated above, limitations exist. Busse, Kach, and Wagner (2016) defined a limitation as a theoretical or methodological imperfection that does not substantially impair the validity of a study's findings. The first limitation was the potential for recall bias issues. Recall bias refers to DOI's reliance on the ability of participants to recall and recreate past experiences over varying, sometimes long, periods (Rogers, 2003). I used a collective case study to cross-check data to mitigate this limitation. The second limitation was the lack of generalizability. Readers determine the degree of resonance or transferability for themselves (Gehman et al., 2017). I addressed the qualitative method's internal and external validity in Section 2.

I enforced data collection boundaries throughout the study. According to Snelson (2016), a delimitation refers to restricting the study scope to make it focused and feasible. I studied the IT-centric aspects of cloud adoption and diffusion with three large (revenues greater than $5 billion) telecom-related companies with a headquarters in the United States. Additionally, I focused on the initiation phase of adoption. Finally, I only focused on strategies that IT executives had within these organizations.

Significance of the Study

Contribution to Information Technology Practice

I intended to partially address an identified literature gap in the enterprise cloud adoption and diffusion space. While information technology practices exist for small businesses for cloud computing, El-Gazzar (2014); Hsu, Ray, and Li-Hsieh (2014); and Khanagha, Volberda, and Oshri (2014) confirmed a lack of information on strategies for enterprise cloud computing adoption and diffusion. This lack of strategies may inhibit global adoption within enterprise-level organizations.

Daylami (2015) established 2006 as a foundational breakout year for cloud computing. Additionally, Kushida et al. (2015) characterized cloud computing as being a new computing platform vice the rehashing of prior technologies based on its ability to concurrently be an innovation engine, entrepreneurial platform, and corporate efficiency driver. Thus, cloud-based technologies have been on the market for the past decade, albeit with varying levels of success (Avram, 2014). The strategies from the study may help the late majority, and laggard telecommunication firms successfully and productively integrate cloud technology into their infrastructures. The secondary contribution to information technology practice is raising awareness for the potential need of telecommunications firms to reexamine their IT cloud adoption and diffusion processes.

Implications for Social Change

An underlying social change driven goal of this research effort was to help improve the IT cloud adoption and innovation diffusion practices of telecommunication

firms related to the thoughtful consideration of critical socioeconomic factors of downstream information and communication technology (ICT) service consumers. Both Gallouj, Weber, Stare, and Rubalcaba (2015) and Ismail (2015) discussed the complexity of socioeconomic factors as they relate to ICT service innovation. Ismail characterized the telecommunications industries' approach to ICT service diffusion as being predominantly supply-side driven vice demand-side driven. Thus, according to Ismail, significant socioeconomic accessibility, affordability, and usability (i.e., from a consumer's context of usage), gaps exist when telecommunications firms make ICT service adoption and diffusion decisions. The telecommunications industry provides the underlying infrastructure and exerts control over an extensive assortment of digital content and capabilities, such as cable TV, satellite communications, and mobile devices (Frieden, 2017). Gallouj et al. (2015) stressed just how pervasive and far-reaching ICT service innovations are relative to addressing future societal and business challenges. Thus, Khanagha et al. (2014) warned of the potential impact of these looming business, technological, and service model changes to telecommunications firms as they transition from selling hardware to cloud-enabled ICT services. Given the internal pressures and risks telecommunications firms face, it is highly likely that many senior IT leaders may be inward, vice externally, focused during IT cloud adoption and diffusion decision processes, especially as they relate to externally facing ICT services. Highlighting the thoughtful consideration of critical socioeconomic factors of downstream ICT service consumers is essential in helping telecommunications firms efficiently adopt and successfully diffuse ICT services.

A Review of the Professional and Academic Literature

The purpose of this qualitative collective case study was to explore strategies used by IT executives to make advantageous enterprise cloud adoption and diffusion decisions. The focus of the literature review was the research question: What strategies do IT executives use to make advantageous enterprise cloud adoption and diffusion decisions? Successful literature reviews contain a constructive and critical analysis of current literature, which helps synthesize new knowledge, discusses the theoretical reasoning used to integrate the concepts, and presents recommendations for future research (Torraco, 2016). Therefore, my literature review included in-depth information related to my central research question, along with a critical analysis and synthesis of journal articles concerning cloud computing, DOI, and TOE. Additionally, I provide overviews of relevant cloud computing as well as innovation adoption and diffusion constructs, consider arguments about enterprise cloud adoption and diffusion in the telecommunications industry, and discuss how an integrated DOI-TOE conceptual model bound them together.

This literature review consisted of 154 journal articles on the *cloud*, *cloud adoption*, *innovation adoption*, *diffusion theory*, *IT technology adoption,* and *composite conceptual model frameworks*. I used Ulrich's periodicals directory to verify that 131 (85%) of the 154 references were peer-reviewed. Additionally, of the 154 journal articles, 136 (88%) were published within five years of expected 2019 CAO approval. Journal articles for this literature review were primarily retrieved from the following research databases: ACM Digital Library, ProQuest Central, SpringerLink, ScienceDirect,

Thoreau, and Google Scholar. When searching for candidate sources, I primarily used 2015 to 2019 as the start and end years to meet the greater than 85% 5-year-old period requirements. Older sources were located to address highly relevant or seminal topics.

I focused the literature review on four key themes: (a) individual and organizational IT-centric innovation adoption and diffusion decision processes, (b) cloud-centric innovation adoption and diffusion conceptual models, (c) current maturity level and industry trends of cloud computing, and (d) the applicability of a composite cloud-adoption and diffusion conceptual model to facilitate enterprise cloud adoption and diffusion decision processes. My research on IT innovation adoption and diffusion focused on foundational individual psychological, organizational, and environmental elements from both a framework and process perspective. On cloud computing, the focus was on the history, current maturity levels, and factors impacting enterprise cloud adoption decisions. To unify the concepts toward the study with cloud-centric adoption and conceptual diffusion models, the focus was on identification and authentication of firm-level, enterprise IT-centric, innovation adoption and diffusion, conceptual models that had been successfully extended to address cloud constructs.

Recent diffusion related research has focused on adopter and innovation-related factors (or attributes) that impact innovation specific diffusion (Papazoglou & Spanos, 2018). As a result, both the work of Rogers (2003) and DiPietro et al. (1990) need further study against today's agile organizational constructs. The literature review begins by discussing DOI.

Diffusion of Innovation

Rogers (2003) published the original *Diffusion of Innovations* in 1962 and published revised editions in 1971, 1983, 1995, and 2003, to describe the natural adoption curve of innovations across industries, as a function of an individual organization's innovativeness. Rogers characterized diffusion as the process by which innovations spread throughout an organization over time. The four central concepts of DOI are (a) innovation, (b) communication channels, (c) time and (d) a social system; each has specific attributes and characteristics to inform an innovation's rate of adoption (Rogers, 2003). Rogers described innovation as an idea, practice, or technology that potential adopters perceive as new. Rogers proposed that communication and the exchanging of information within a social system facilitate new concept awareness and address uncertainty. Newness is a crucial distinguishing feature (Oredo & Njihia, 2015).

Adoption and diffusion decisions are not straightforward. In support of DOI and its complexities, diffusion is a social process triggered by innovation discoveries, whereas innovation adoption stimulates social state changes and disrupts behavior (Dearing & Cox, 2018). Despite adoption, implementation, and use challenges, innovative technologies surge if perceived to solve business problems (Ray, 2016). Both Bowman (2018) and Tarhini, Arachchilage, Masa'deh, and Abbasi (2015) warned that individual behavior impact adoption decisions. Self-efficacy, based on learned beliefs and a presumed level of individual skill, was one such individual behavior named by Tarhini et al. (2015), which can impact adoption decisions. Therefore, innovation adoption and

diffusion evaluation processes include a great deal of individual internal thought rationalization and deliberation.

Framing the life cycle of innovation adoption and diffusion activities helps contextualize individual, firm, and industry-wide innovation decisions. Rogers (2003) established a five-step innovation decision-making process (i.e., knowledge, persuasion, decision, implementation, and confirmation) to capture and represent these data sets, which models the stages taken when an individual or organization considers adopting an innovation. Furthermore, Rogers identified five adopter categories: (a) innovators, (b) early adopters, (c) early majority, (d) late majority, and (e) laggards. Leveraging these adopter categories, Rogers described the plotting of such adoption decisions over time and the resultant S-curve shape, the slope of which depicts the collective rate of diffusion across an ecosystem. Building on this theme, Rogers portrayed diffusion, or a lack thereof, as an embodiment of three general sets of variables, which are (a) an innovation's set of characteristics, (b) the potential adopters set of characteristics, and (c) the specific context and timing of the innovation being assessed. This relative innovativeness signifies the rate of adoption for innovation compared to others (Rogers, 2003). Thus, leveraging DOI as an adoption and diffusion framework helps facilitate complex decisions and provides senior IT leaders with a context of how such decisions relate to other industry participants.

The notion of innovation. Central to DOI is the notion of innovation. Rogers (2003) described a technological innovation as a blueprint, capability, or method composed of hardware, software, or some combination of both, which implements a

concept resulting in an outcome. To address any composition ambiguity, Rogers established the concept of a technology cluster or bundle of one or more closely aligned innovations viewed as a single construct. He described the instantiation of an innovative concept as being linked to the perceived newness of innovation. An innovation concept also incorporates any preadoption awareness which may influence initial adopter opinion (Wisdom, Chor, Hoagwood, & Horwitz, 2014). Dearing and Cox (2018) stated that not all innovations are desirable, and Rogers explained that undesirability occurs when innovation remains insignificant for a specific population. Due to innovation characteristic differences, the best competitive performers are not reliably spread by diffusion processes, but they generally follow the same organizational progression (Wu & Chiu, 2015). Increased consideration of an innovation's base construct and potential impact scope help to facilitate adoption decision quality and outcomes.

Developing an in-depth understanding of innovation is critical. Interest in an innovation occurs when a stakeholder infers that some perceived benefit or essential consequence may exist (Dearing & Cox, 2018). A specific business case or issue may or may not exist, but the effort is expended to increase awareness (Wisdom et al., 2014). Rogers (2003) identified a crucial decision point in the adoption process is when to begin socializing an innovation within a social system. Rogers warned that the specific dissemination methods used to communicate information about innovation, within a social system, play an essential role in addressing potential bias and mitigating any undue influence that may be placed on stakeholders and their opinions. Bettiga and Lamberti (2017) discussed the potential impact individual influencers could have on adoption

decision deliberations. As such, continual information gathering about an innovation helps address individual uncertainty and informs ongoing analysis efforts (Rogers, 2003). As supplementary information is gathered and ongoing analysis results remain positive, additional iterations of learning and analyzing may occur to address unease (Dearing & Cox, 2018). These refinement efforts continue until some threshold is met, and an informed decision can be made (Rogers, 2003). Accordingly, iterative knowledge acquisition about an innovation helps address unease and combat conflict.

A set of innovation specific characteristics was developed to help facilitate innovation adoption decisions. Rogers (2003) established five innovation characteristics that influence a potential adopter's decision-making process: relative advantage, compatibility, complexity, trialability, and observability. To further facilitate innovation adoption decisions, he stressed that the concept of reinvention is highly germane. Reinvention, as characterized by Dearing and Cox (2018), signifies the degree to which adopters can modify an innovation to address their specific context better. Most innovations undergo some form of reinvention by adopters (Dearing & Cox, 2018). As a result, collecting the necessary information to gain insight into innovation, to include possible modifications, is an essential aspect of the innovation adoption decision process.

Relative advantage. Being able to determine relative advantage accurately is a vital part of an innovation adoption decision. Relative advantage signifies the degree to which an innovation is viewed to be better than an existing capability (Kee, 2017; Rogers, 2003). The derivation of this value is multidimensional and is comprised of contributions from the following aspects: economic, social prestige, convenience,

satisfaction, and risk (Rogers, 2003). As an innovation's relative advantage measures begin to emerge and stabilize, a clear and unambiguous advantage can inform evaluations and even possible adoption or rejection rates (Greenhalgh, Robert, MacFarlane, Bate, & Kyriadkidou, 2004). Hence, understanding how the different dimensions of relative advantage inform on each other is critical to accurately gauge just how much innovation may or may not, really be able to deliver impact.

Compatibility. The full importance of compatibility may not be fully appreciated. Compatibility signifies the degree to which an innovation aligns with existing values, needs, and expectations of an adopting organization (Kee, 2017; Rogers, 2003). Oliveira et al. (2014) found that incompatible innovations would not be adopted as readily as compatible ones, which supports Rogers' findings that these innovations require a forcing function to overcome any potential social system change management issues that may arise. Therefore, developing an accurate compatibility assessment can help determine cultural innovation fit as well as provide an early indication of how traumatic the change management impact would be.

Complexity. Enterprise IT system adoption is never trouble-free in today's economy. Complexity signifies the degree to which an innovation is deemed to be easily understood or used (Kee, 2017; Rogers, 2003). Complexity calculations are modified, up or down, by the impact severity of a social systems' skills availability and supplemental training requirements (Oliveira et al., 2014). Thus, complexity rating, e.g., from low to high, informs both the innovation adoption decision process as well as its potential adoption rate (Rogers, 2003). For that reason, developing a thorough understanding of an

innovation's complexity profile can help mitigate risk and define specific innovation adoption decision activities.

Trialability. The ability to prove an innovation helps increases the adoption decision process. Trialability signifies the degree to which an innovation can be experimented with (Kee, 2017; Rogers, 2003). The ability to prove a concept reduces uncertainty and directly affects its adoption decision process (Greenhalgh et al., 2004). Thus, being able to execute a proof of technology successfully can significantly reduce risk and help establish realistic expectations.

Observability. Being able to see innovation in action helps temper expectations. Observability signifies the degree to which others can scrutinize an innovation in action (Kee, 2017; Rogers, 2003). The ability to see the results of a concept, even if in someone else's setting, helps address uncertainty and could stimulate further information gathering activities (Greenhalgh et al., 2004). Accordingly, being able to see an innovation operating successfully can significantly reduce risk and help establish realistic expectations.

Characteristics of a communications channel. Innovation information collected by adopters is rarely held in isolation. A communications channel is how innovation information is shared within a social system (Rogers, 2003). Scott and McGuire (2017) also suggested that mass media is best suited to spread knowledge about innovation, while interpersonal interactions can be more persuasive. Most people prefer and are profoundly influenced by personal interactions with similarly minded peers to acquire knowledge vice consuming third-party, published reports or opinions (Rogers, 2003).

Broadcasting techniques can be specifically designed to blur the mass media and interpersonal communication divide (Cappella, 2017). The nature of these interpersonal interactions informs social norms and similarities within and across ecosystems and increases the potential introduction of a group-think bias (Rogers, 2003). For instance, Kee, Sparks, Struppa, Mannucci, and Damiano (2016) explored the use of social media, and its ramifications, as an information diffusion acceleration platform. The importance of monitoring and managing any potential sources of bias becomes increasingly essential when making adoption decisions.

How effectively individuals can share information is critical when collecting data. Interpersonal innovation communications are acutely influenced by the concepts of heterophily and homophily (Dean, Ellis, & Wells, 2017). Heterophily refers to the degree by which people with different trait tie characteristics interact while homophily refers to the degree by which people with similar trait tie characteristics interact (Rogers, 2003). Trait ties consist of geography, relative proximity, family ties, organizational ties, cultural, educational, colleagues, as well as other industries (Rogers, 2003). The combination of homophilous alignment and attraction, both physical and social, together, inform communication outcome success (Almendarez, 2018). Lastly, communications between homophilous people are considered more efficient due to perceived interaction ease as opposed to more strained heterophilic interactions (Rogers, 2003). Optimizing the communications medium, based on the individual characteristics (e.g., social anxiety level) of the people involved, can significantly increase instantaneous homophilous

alignment (Lundy & Drouin, 2016). Therefore, the timely discernment of homophilous alignment can help inform data gathering and communications effectiveness.

Assessing the relative strength of the homophilous alignment is pertinent to innovation-related data collection and knowledge acquisition activities. Rogers (2003) cautioned that diffusion communications that involve the broad sharing of information and knowledge must take potential heterophilous/homophilous bias impact into account. Due to the nature of interpersonal communication alignments, most individuals tend to seek out homophilous relationships (Ramazi, Riehl, & Cao, 2018). Homophilous influences, such as from opinion leaders, can unduly inform adoption attitudes and decisions, via imitation-based effects, because homophilous others may have already done so (Dearing & Cox, 2018). Sharing new information via highly homophilous interactions may be more comfortable, but if the alignment level is too high, the additive value and accuracy of the new information garnered may be impacted (Rauwolf, Mitchell, & Bryson, 2015). Consequently, Rogers suggested that some degree of heterophily, even if specifically innovation-centric, may be needed to introduce new perspectives. Hence, the timely discernment of the homophilous alignment level can help mitigate some potential bias.

Characteristics of a social system. Understanding the construct and role of a social system within DOI is essential. An organization, or social system in modern organization theory, is a collective having a formalized structure and norms, striving to achieve common goals and objectives (Rogers, 2003). Akindele, Afolabi, Pitan, and Gidado (2016) confirmed this definition but goes a bit further by characterizing an

organization as being a subordinate part of the broader concept of a social system. In either case, Rogers (2003) proposed that social system norms define the boundaries of acceptable behavior, as well as govern communication, decision making, and operational procedures. Thus, a social system encompasses organizations and is comprised of people, structured by hierarchies, all of whom work toward achieving common goals (Akindele et al., 2016). So establishing a foundational definition of a social system helps bound innovation adoption and diffusion decision processes and activities.

Characterizing social systems traits helps relate human behavior to structure. Consequently, as detailed in Rogers (2003), social system construction, informed by social norms, determines the relative efficiency of an organization according to five traits, namely: predetermined goals, prescribed roles, authority structure, rules and regulations, and informal practices. Short and long-term goals define the structure and function of an organization (Ahmady, Mehrpour, & Nikooravesh, 2016). Prescribed roles, within a hierarchy, define positions, their respective tasks, and duties as well as the authority and reporting structure between these positions (Akindele et al., 2016). Rules and regulations define governance and decision-making processes within an organization (Akindele et al., 2016). Informal practices, as characterized by Rogers, represent the nonnormal reality of social system human interactions and their associated effects. The ability to envision how people relate to others, and to the social system itself, helps clarify the definition of innovation adoption and diffusion decision processes and activities.

Organizations do not remain static. Though seemingly stable, Rogers (2003) declared that organizations frequently innovate through a social system’s culture. An

organization's culture can impact an organization's ability to absorb change as well as actively or passively inhibit growth (Wisdom et al., 2014). Furthermore, Wisdom et al. (2014) portrayed specific examples of cultural resistance to include lack of innovation awareness or impact, lack of innovation-decision process skill and clarity, and finally, lack of rigor in the execution of the innovation adoption decision process itself. Sriwannawit and Sandström (2015) highlighted three crucial, diffusion-related roles to help guide and accelerate organizations, namely opinion leaders, change agents, and gatekeepers. The ability to discern and mitigate social system cultural shifts helps streamline innovation adoption and diffusion decision processes and activities.

Culture and information sharing mechanisms play a critical role in DOI. Rogers (2003) considered opinion leaders, supported by Kee (2017), to be highly esteemed, internal social system individuals who are particularly sought out for advice and counsel. Opinion leaders are domain experts intended to influence and enlighten others (Dearing, 2015). Additionally, opinion leaders can, when desired, exert considerable influence over the innovation adoption and diffusion process by asserting specific positions and having others follow suit (Dearing & Cox, 2018). Conversely, change agents are individuals, either internal or external, to the social system, trying to influence the outcome of an innovation adoption decision (Haider & Kreps, 2004). Haider and Kreps (2004) warned that change agents are often driven by their own or someone else's agenda. Each role has its own set of drivers and communications paths when shaping and conducting social system interactions (Greenhalgh et al., 2004). Opinion leaders leverage peer networks to assist others in making adoption decisions while change agents petition the entire social

systems to achieve desired outcomes (Greenhalgh et al., 2004). The practical use of opinion leaders and change agents can help address a wide array of innovation adoption and diffusion decision processes and activity issues.

Converging different people toward a single decision is difficult. Organizational adoption decisions are far more complicated than individual ones (Sabi, Uzoka, Langmia, & Njeh, 2016). Most business and enterprise adoption decisions require some degree of consensus before a specific decision, in fact, a wide array of critical leadership roles and decision-makers may be involved in adjudicating a final position (Jantz, 2015). Rogers (2003) revealed three different organizational adoption types, namely: optional, collective, and authoritative. Optional decision processes allow social system members to make their own, individual adoption decisions while collective innovation adoption decisions are made via consensus (Rogers, 2003). Finally, authoritative innovation decisions are made by a select few, generally in isolation, and subsequently communicated down the organizational hierarchy to be executed (Rogers, 2003). Social system diffusion activities and their resource demands are influenced by a variety of factors such as hierarchy, norms, the urgency of need, guidance from opinion leaders, and the net effect of change agent influence efforts (Wisdom et al., 2014). Other factors inform innovation diffusion activities to include organizational innovativeness, available resources, and individual innovation knowledge gathering activities (Greenhalgh et al., 2004). As a result, asserting the type of innovation adoption decision early helps inform organizational derived requirements as well as streamline processes and activities.

Understanding the internal architecture of an organization is an essential aspect of diffusion. Rogers (2003), supported by Awa, Ojiabo, and Emecheta (2015) and Warui, Mukulu, and Karanja (2015), defined an organization's internal structure to be comprised of six characteristics, namely centralization, complexity, formalization, interconnectedness, organizational slack, and size. Centralization represents how much command and control of an organization are exerted by a select few (Rogers, 2003). Centralized organizations tend to be less innovative due to conflicting priorities and leadership's ability to manage the tension between operational pressures and strategic planning (Papachroni, Heracleous, & Paroutis, 2016). Insufficient knowledge may exist to facilitate thoughtful decisions resulting in increased uncertainty, risk, and negative consequences (Liu, Lv, Ying, Arndt, & Wei, 2018). Complexity represents how skilled an organization's staff is and their ability to understand, implement, and derive value from innovation while managing risk (Rogers, 2003). Formalization represents how strictly an organization enforces governance adherence (Rogers, 2003). Interconnectedness represents how tightly coupled members in a social system are and how freely they communicate (Rogers, 2003). Organizational slack represents how many available resources (e.g., money, people, equipment, space, and power) exist and can be leveraged by innovation activities (Rogers, 2003). Finally, the size represents the scale of an organization, its ability to resource, execute, and absorb change (Rogers, 2003). Therefore, having a clear understanding of internal organizational constraints and resource availability can help optimize innovation adoption and diffusion decision processes and activities.

Consequences of innovation. Innovation, of any kind, always involves risk. Rogers (2003) proposed that an innovation consequence represents some social system change introduced as a result of considering an innovation. Rogers identified three consequence themes relative to innovation adoption exploration. The first, desirable versus undesirable consequences, which is based on how functionally aligned an innovation is to the perceived need. Secondly, direct versus indirect consequences, which are based on the direct or second-order ripple effects accompanying social system innovation changes. Lastly, anticipated versus unanticipated consequences, which is based on the accuracy of early-stage assumptions versus the actual results. Gledson (2016) supported Rogers by practically demonstrating the outcomes and impact, both positive and negative, of each of the three consequences in a real-world setting. As a result, undertaking a thoughtful approach toward innovation activities can help mitigate risk and potentially attenuate negative consequence impact.

Understanding what motivations may drive thought leadership influence behavior is essential. While opinion leaders, who represent social system norms, tend to be conservative with their recommendations, change agents need not be (Kee, 2017). Rogers (2003) warned that change agents tend to espouse only the desirable, direct, and anticipated consequences of innovation to influence favorable decisions. Actual results vary significantly in change agent-led initiatives; thus, more up-front rigor is required to address knowledge gaps or uncertainty (Rogers, 2003). Unforeseen negative consequences are likely to occur; ongoing knowledge acquisition can help mitigate risk (Rogers, 2003). Thought and change leaders should exercise a considerable amount of

forethought before engaging in innovation activities to aggressively address any potential negative consequences (Kim, 2015). For that reason, having a clear understanding of potential thought leadership bias and a thoughtful plan of approach can help mitigate risk.

Characteristics of time. The end-to-end innovation adoption and diffusion process, for even a single innovation, can take a considerable amount of time. Accordingly, Rogers (2003) emphasized that time is a valuable diffusion process differentiator, in fact, a strength, but it can introduce certain biases that are discussed in more detail below. Compagni, Mele, and Ravasi (2015) demonstrated the value of time in the diffusion process via their longitudinal study of robotic surgery adoption over a twenty-one-year span in Italy. In diffusion, time affects a variety of processes to include the innovation-decision life cycle process itself, the innovativeness of the adopter relative to peers, and the rate an innovation takes to diffuse across a social system (Rogers, 2003). Dearing and Cox (2018) supported the importance of Rogers' assertions on the impact of time, by labeling time, more specifically, time to adoption, to be the dependent variable in diffusion research. They also found that innovativeness reflects an adopter's change threshold and their readiness to absorb change. Hence, having a clear understanding of the innovation process time and change management requirements can help optimize innovation adoption and diffusion decision processes and activities.

Following a well-crafted, end-to-end innovation adoption methodology is essential. As depicted in Rogers (2003) and demonstrated in Walitzer, Dermen, Barrick, and Shyhalla (2015), the innovation-decision process encapsulates the end-to-end innovation lifecycle steps potential adopter's take from initial identification through to

final disposition. To cover such a complex set of activities and deliberations, the innovation-decision process has five discrete steps, namely: knowledge, persuasion, decision, implementation, and confirmation (Rogers, 2003). Burgess and Paguio (2016) used the decision process lifecycle as an analysis lens by which they analyzed their ICT adoption data. Shin, Yuan, and Zhou (2016) reported that sensemaking occurs throughout the entire innovation-decision process lifecycle by design. Thus, information is continually sought to address uncertainty and evolve internal mental frameworks (Kjærgaard & Vendelø, 2015). The innovation-decision period represents the time required for an innovation instance to pass through the entire lifecycle (Rogers, 2003). Change agents, driven by their agendas, seek to influence decreasing lifecycle processing time, but these external pressures could result in poor leadership, insufficient critical thinking, increased uncertainty, and negative consequences (Alavi & Gill, 2016). Accordingly, developing and managing a comprehensive project plan can help optimize innovation adoption and diffusion decision processes and activities.

Knowledge phase. The initial phase of the innovation adoption lifecycle. The knowledge phase represents the initial awareness or exposure to innovation (Khan, 2017). Additionally, this stage helps define what precisely the base construct of innovation is and how it works (Değerli, Aytekin, & Değerli, 2015). As information is garnered, initial opinions are formed relative to an innovation's ability to address a perceived problem or need (Rogers, 2003). Rogers (2003) represented that mass media significantly dominates this phase due to its ability to disseminate high-level innovation information to seed broad awareness. Değerli et al. (2015) finitely supported this finding in their study of

social networking in the context of DOI. Developing and evolving a practical mental model and fundamental understanding of the innovation is necessary to help address uncertainty as well as begin building on an initial attitude.

Instantiation of the knowledge kicks off a formal process. Rogers (2003) suggested that awareness of a problem or needs is a precursor to initiating the knowledge phase. Though not every innovation requires a precursor, innovation awareness can be initiated via accident, peer network, change agent, opinion leader, or mass communication (Rogers, 2003). Haider and Kreps (2004) supported Roger's importance of awareness by finding that once initial, relevant awareness by a stakeholder exists, information-gathering activities are triggered. Rogers suggested that the information gathered in this phase can help temper expectations, but that not all innovations leave this phase due to insufficient perceived value. Thus, developing a better understanding of the innovation is critical during this phase to help mitigate risk and optimize innovation adoption and diffusion decision process activities.

Persuasion phase. Initial insights into an innovation need to mature. Haider and Kreps (2004) revealed that the persuasion phase represents the evolutionary evaluation efforts to gain insight into an innovation heading toward a decision. Rogers (2003) specified that this is a busy time for change agents trying to influence deliberations. Unlike the knowledge phase, this phase is based more on emotion than critical thinking as adopters actively seek information (El Shaban & Egbert, 2018). Rogers represented that specific communication channels and mediums, especially interpersonal ones, have more impact when evaluating information received. Similar to the knowledge phase,

Değerli et al. (2015) finitely supported this finding as well in their study of social networking in the context of DOI. During the persuasion phase, the role of near peers and nonvendor third parties become increasingly important, e.g., assessing information accuracy, semantics and use of words, and attenuating bias (Rogers, 2003). The initial formation of relative advantage, compatibility, complexity, and potential consequence diagnostic evaluations begin to take form in this phase (Rogers, 2003). Similar to the knowledge phase, developing a better understanding of the innovation is critical during this phase to help mitigate risk and optimize innovation adoption and diffusion decision process activities.

Decision phase. Innovation adoption decisions require careful consideration. The decision phase represents the activities leading toward an initial adoption or rejection decision (Haider & Kreps, 2004). Rogers (2003) stated, supported by Khan (2017), that during this phase, a proof or trial may be requested, as part of this deliberation process, to help address uncertainty. Rogers proposed that proofed innovations tend to be adopted quicker as are innovations trialed by trusted peers. Rogers also warned that change agents try to influence this stage by stressing social system or industry-wide proof points, which may or may not support an adopter's deliberation needs. Accordingly, Rogers cautioned that nonproofed innovations might be rejected during this phase unless a relevant, direct connection to an identified problem or need can be established. Rogers specified that an outright rejection, or even a discontinuance of an adopted innovation, can occur if the perceived value is too low or one of the attributes of the innovation does not align well enough. Dearing and Cox (2018) supported this concept by stating that very few

innovations diffuse that results in most innovation adoption lifecycle decisions ending in rejection. Just because innovation is seemingly new, does not necessarily mean potential adopters view new as being better (Dearing & Cox, 2018). A clear and thoughtful understanding of the innovation, which includes the impact of the final adoption decision, is critical to help mitigate risk.

Implementation phase. Innovation theory meets practice. The implementation phase represents the realization and the initial deployment of an innovation (Haider & Kreps, 2004). Also, as noted above, reinvention is typical during this phase to tailor and better align innovation to an adopter's context (Dearing & Cox, 2018). Rogers (2003) suggested, supported by Khan (2017), that this phase includes the physical activities required to deploy and operationalize an innovation. Both complexity and any potential reinvention efforts need to be addressed as part of the deployment effort (Rogers, 2003). More people, from a variety of different sources, are now engaged in project management and operational activities vastly increasing complexity and risk (Rogers, 2003). Few, if any, of the implementors, were involved in the innovation adoption decision process; thus, change and resistance management issues could arise as awareness of an innovation's characteristics increase, and ongoing operational activities efforts are conducted (Rogers, 2003). Once an innovation becomes institutionalized, the final phase of this process, the confirmation phase, begins (Rogers, 2003). Hence, planning for the operational ramp-up and developing a clear implementation plan can help mitigate risk and attenuate negative consequences.

Reinvention. Reinvention plays a critical role during the innovation-decision process. Reinvention is the degree to which an innovation is changed or modified during the innovation-decision process (Kee, 2017; Rogers, 2003). Reinvention is a common practice during the implementation phase, though it can occur during any phase, primarily to tailor and align innovation to an adopter's business or technological context (Rogers, 2003). Greenhalgh et al. (2004) found that the adoption of an innovation, in its original state, could occur, but the possibility of reinventing an innovation assists in addressing knowledge gaps, incompatibility, complexity, or uncertainty issues. Thus, potential reinvention reasons include: too complicated, lack of detailed knowledge, innovation scope, too generic, international localization requirements, local pride/not invented here, and cosmetic changes in nature (Rogers, 2003). Accordingly, the net innovation output of this localized reinvention process has an increased likelihood of adoption (Dearing & Cox, 2018). Having a clear and thoughtful understanding of innovation is critical to help determine possible reinvention requirements.

Confirmation phase. Implementation has occurred; operationalization is underway. The confirmation phase represents the validation activities required to quantify whether an innovation, in their environment, is achieving results or value relative to a defined problem or need (Haider & Kreps, 2004). As previously stated, sensemaking activities continue (Shin et al., 2016). Information gathering activities expand to include the leveraging of peer networks to assess whether to continue the operational activities of an innovation (Rogers, 2003). Rogers (2003) warned, supported by Khan (2017), that general unease about an innovation's implementation, at this point

in the lifecycle, if unaddressed, could lead to the discontinuance of an innovation. Similar to the persuasion phase, developing a better understanding of the innovation is critical during this phase to help mitigate risk, process possible reinvention options, and optimize innovation adoption and diffusion decision process activities.

Implementations can go awry. Rogers (2003) warned that, in this phase, one possible negative impact is that change agents or other relevant third parties may or may not be present to assist in addressing potential consequences and disagreement issues. As a result, three forms of discontinuance exist, which are replacement, underutilization, and dissatisfaction (Parthasarathy & Forlani, 2016). The first form is the replacement of one innovation with another (Parthasarathy & Forlani, 2016; Rogers, 2003), which tends to cause laggards to discontinue, more than early adopters, due to disenchantment (Cho, 2015). The second form is underutilization or stopping the use of innovation due to requirement changes or loss of relevance (Parthasarathy & Forlani, 2016). The third and final form, dissatisfaction, is the outright rejection of innovation based on specific performance (Parthasarathy & Forlani, 2016; Rogers, 2003). For that reason, planning and working with third parties to remain engaged during this phase can help mitigate risk.

The rate of adoption. How quickly, or not, innovation is being adopted is relevant. The rate of adoption refers to the comparison of innovation adoption speeds by members within the same social system and is represented by the S-curve plot previously discussed (Rogers, 2003). The rate of adoption is an aggregate representation (e.g., dependent variable) of five different dimensions (e.g., independent variables) namely the perceived attributes of an innovation, type of innovation-decision, communications

channels, nature of the social system, and lastly, the extent of a change agent's efforts (Rogers, 2003). Specific attribute characteristics, for each dimension, are discussed above. Rogers warned, supported by Chandler and Hwang (2015), that internal social system pressure could unduly influence deciders toward a decision even if they remain uncertain. This latent pressure not only significantly affects the adoption rate but grows more significant as more decision-makers arrive at their conclusions (Chandler & Hwang, 2015; Rogers, 2003). Other aspects, such as the nature of the innovation (e.g., a new regulatory or policy), as mentioned in Dearing and Cox (2018), have been found to influence the adoption rate as well. Similarly, Haider and Kreps (2004) suggested leveraging the identified dimensional factors as a means of capturing and modeling innovation performance data. As a result, developing and maintaining innovation adoption metrics can help address uncertainty and inform ongoing information-gathering efforts.

Innovations and adopter categories. A more detailed, innovativeness discussion is relevant. Innovators actively seek out new ideas, are amenable to high levels of uncertainty, can afford to take risks and suffer losses, and are somewhat social systems isolated from their peers (Kee, 2017; Rogers, 2003). Early adopters share a similar profile as innovators but can take advantage of insights gained and shared by the innovator community (Rogers, 2003). Accordingly, early adopters are highly respected in their social systems and are regarded as judicious (Kee, 2017; Rogers, 2003). However, early majority adopters move more deliberately in their innovation adoption activities (Kee, 2017; Rogers, 2003). Early majority participants wait to see how earlier adopters fare

before moving forward themselves and are considered to represent the average members of a social system (Rogers, 2003). Late majority adopters are driven more by pressure or inflection points than by market leadership (Kee, 2017; Rogers, 2003). Late majority adopters wait until most of the members of a social system have adopted an innovation before taking action themselves (Rogers, 2003). Lastly, laggards represent the last member of a social system to adopt an innovation (Kee, 2017; Rogers, 2003). Laggards are often multiple versions of technology and innovations behind their social network peers and often devoid of influential opinion leaders (Rogers, 2003). Organizational culture and resource constraints are two critical factors that impair a laggard's ability to entertain, or even take action, concerning any innovations (Rogers, 2003). Therefore, developing and maintaining a pragmatic view of relative innovativeness is essential for understanding the competitive innovation landscape.

Limitations of DOI. DOI is not without issues and detractors. Rogers (2003) identified four limitations to DOI, namely proinnovation bias, source bias, recall bias issue, and issues of equality. Proinnovation bias, discussed in more detail below, implies that most innovations should be adopted, diffused, and rapidly put to use despite the existence of uncertainty (Kee, 2017; Rogers, 2003). Source bias influences adopter's knowledge acquisition and adoption deliberations as a function of who promotes the specific innovation in question, e.g., an opinion leader, change agent, or some other person or communications medium (Rogers, 2003). The recall problem speaks to DOI's reliance on the ability of participants to recall and recreate past experiences over varying, sometimes long, periods (Rogers, 2003). Lastly, the issue of equality speaks to the socio-

economic issues that prevent lower segments of a social system from pursuing innovations; hence higher segments, who can innovate, are studied more frequently potentially introducing size bias and possibly skewing published literature in an unintended manner (Kee, 2017; Rogers, 2003). Dearing and Cox (2018), suggested that resource availability impact societal innovation diffusion equality as resource-rich communities can adopt innovations earlier. Thus, Dearing and Cox recommended that purposeful or designed diffusion strategies be used to mitigate this effect. Developing and maintaining a pragmatic view of DOI and proactively developing limitation mitigation strategies can help address uncertainty and risk.

Proinnovation bias needs to be directly addressed. As discussed in Rogers (2003), proinnovation bias, considered to be the most impactful DOI limitation, is a subtle form of influencing a stakeholder to be predisposed to having a favorable view of innovation despite the lack of specific knowledge or the existence of uncertainty. This lack of critical thinking has a direct impact on negative consequences as innovations are moved through the innovation adoption decision process too quickly (Kee, 2017; Rogers, 2003). Two potential causes of proinnovation bias include who is funding an innovation effort and how skewed traceability data is relative to innovation implementation successes (Rogers, 2003). The potential source of funding, e.g., a change agent or external party, can significantly influence stakeholders, especially if they are highly incentivized to make decisions quickly and circumvent proper knowledge acquisition and deliberations (Rogers, 2003). Also, if the documentation trail of an innovation depicts more successes than failures, yet the traceability of the documentation is suspect, then adopters may be

unduly influenced toward a decision based on inaccurate data (Rogers, 2003). Further, this documentation could be contaminated if the capturing and quantifying of reinvention activities is not adequately accounted for (Rogers, 2003). Developing and maintaining a pragmatic view of an innovation's horizontal, success and failure landscape can help address uncertainty and risk.

Similarly, DOI recall bias also needs to be directly addressed. As previously mentioned, and as addressed explicitly in Rogers (2003), time is a critical component of DOI. The existence of the recall problem within DOI introduces possible data inaccuracies that need to be addressed via a comprehensive cross-sectional data gathering effort (Rogers, 2003). The reconstruction of past events is difficult, especially if long periods have elapsed (Haider & Kreps, 2004). Because DOI is sequentially tracing innovations, across a life cycle, as a function of time, data gathering techniques, e.g., triangulating interviews via multiple respondents, use of panel discussions, use of archival data, etc., need to validity check each other to ensure raw data accuracy and adequately drive data analysis activities (Rogers, 2003). Also, the effective use of big data analysis techniques may help researchers examine and trace through large sets of disparate data to address the DOI recall problem (Kee, 2017). As a result, leveraging multiple different data sources is required to mitigate specific recall latency issues, cross-check data, and support data analysis and triangulation efforts.

Technology, Environment, and Organization

DiPietro et al. (1990) published TOE in 1990 to help enterprise end-users frame a technology adoption problem such that a proper gap-fit analysis effort could be

undertaken, and an appropriate approach selected. Like Rogers' *Diffusion of Innovation*, Tornatzky, and Fleischer's *The Process of Technological Innovation* illustrated the entire innovation lifecycle from initial concept inception through to its demise. The three dimensions of TOE established in DiPietro et al. include the technological context, organizational context, and environmental context. TOE was designed to help organizations and their perspective adopter's collect, organize, and analyze innovation data, from multiple perspectives, to drive innovation and implementation decisions (DiPietro et al., 1990). For that reason, TOE is a viable innovation adoption conceptual model.

TOE is a viable organizational-level conceptual model. Gupta and Saini (2017) found that the TOE analytical framework could support an array of IT innovation adoption investigations. Hoti (2015) characterized TOE's support for both subject matter experts (SME) as well as enterprise organizational innovation adoption decision processes. Furthermore, as summarized in Baker (2011) and confirmed in Gutierrez, Boukrami, and Lumsden (2015), TOE has been widely used to facilitate organization-level successful, IT system innovation adoption decisions across a wide array of systems, industries, countries, technical and developmental contexts. Additionally, Baker found that, via empirical studies, the main elements of the TOE are relevant, and more importantly, that there is variability into which factors of each element are leveraged in each case, based on the organization and the type of innovation involved. Thus, as confirmed in Baker, the leveraging of the TOE as a conceptual innovation adoption

framework is supported. Accordingly, TOE is a viable framework to support firm-level, IS innovation adoption and diffusion evaluation processes.

TOE technical context. Maintaining a technology roadmap is essential. DiPietro et al. (1990) represented that the technological context is comprised of the relevant internal and external technologies of a firm. Oliveira et al. (2014) expanded on this to include technologies available in the marketplace. Additionally, DiPietro et al. revealed that the technology context is purposely separated apart to highlight its influence on organizational level innovation adoption and diffusion process. The technical context of a firm significantly informs a firm's ability to explore and adopt innovations (Kurnia, Karnali, & Rahim, 2015). Diligently maintaining a technology roadmap can help mitigate risk and optimize innovation adoption and diffusion decision process activities.

Available technologies. Keeping abreast of emerging technologies is essential. Some firms may need, as a function of their industry or market conditions, to aggressively pursue innovations while others may not (Baker, Grinstein, & Harmancioglu, 2015; DiPietro et al., 1990). Thus, the volume of relevant innovations available to consider can help influence innovation initiation efforts (Baker, 2011). DiPietro et al. (1990) found, supported by Wu and Chiu (2015), that two conditions inform a firm's innovation adoption frequency, namely its industry and its organizational makeup. A broad assumption is that firms in the same industry have access to the same innovation pool, thus negating this condition as a primary differentiator (DiPietro et al., 1990; Fortin & Oliver, 2016). The second and most influential condition is a firm's organizational makeup and its ability to efficiently leverage or exploit its firm-specific

environmental market factors (Bello, Radulovich, Javalgi, Scherer, & Taylor, 2016). Of significance to all firms is the volume of information processing present in its technical environment before innovation can be adopted (Baker et al., 2015; DiPietro et al., 1990). Diligently maintaining specific market factor information can help accelerate innovation initiation.

Innovation adoption is disruptive. Three external, marketplace available innovation types or categories, to include their respective levels of organizational change management impact, are incremental changes, synthetic changes, and discontinuous changes (Harfoushi, Akhorshaideh, Aqqad, Janini, & Obiedat, 2016). Incremental changes are at lower risk and additive in nature (Harfoushi et al., 2016). Moderately risky, synthetic change consists of the recombination of existing technologies in new ways (Harfoushi et al., 2016). Discontinuous changes are high risk, significant departures from existing capabilities (Baker, 2011). Baker warned that firms adopting discontinuous innovations must be decisive and address risk quickly. Thus, movement from one category to the next increases uncertainty as well as the volume of organizational communications and information processing activities required to implement an adopted innovation (DiPietro et al., 1990). Hence, diligently maintaining IT risk-absorption rate factor information can help accelerate innovation initiation.

Current equipment and methods. Innovation adoption challenges existing IT infrastructure and operations. DiPietro et al. (1990) suggested, supported by Lau and Lo (2015), that an organization's internal technological context has a significant impact, and possibly constrains, a firm's ability to innovate and absorb change. Adoption ease, as

represented in DiPietro et al. (1990) and supported in Lin, Su, and Higgins (2016), is a function of environmental complexity that, in essence, affords less complicated competitors a chance to accelerate innovation adoption rates and potentially realize firm-specific, market factor impact faster. Large firms may have the slack resources to invest in innovation exploration and adoption activities generously, but this does not guarantee market impact (DiPietro et al., 1990; Georgallis & Durand, 2017). Therefore, efforts to incrementally reduce IT complexity, over time, can help mitigate risk and optimize innovation adoption and diffusion decision process activities.

TOE organizational context. Organizational architectures play a role in innovation. As established in DiPietro et al. (1990), the organizational context embodies the organizational structure of a firm and is comprised of the following descriptors: firm size, centralization, formalization, complexity of management structures, and slack resources available. Internal and external social system communication processes, and their associated formalities (e.g., informal or formal), are also considered part of this context (Jia, Guo, & Barnes, 2017). Furthermore, DiPietro et al. (1990) asserted, supported by Menz, Kunisch, and Collis (2015), the assumption that any person, entity, or process, managed by the firm, represents an internal organization. Thus, TOE, by design, assumes that large, sophisticated corporations, possibly nested within multiple divisions or lines of business, are all considered to be internal organizations (DiPietro et al., 1990). Understanding the specific organizational architecture of a firm can help mitigate risk and optimize innovation adoption and diffusion decision process activities.

Communication must occur to achieve results. A firm is comprised of a set of formal and informal structures and processes, which can leverage resources, to achieve its goals (Campbell & Dopico, 2016; DiPietro et al., 1990). Formal processes, as well as informal social norms, influence a firm's relative innovativeness (Kurnia et al., 2015). DiPietro et al. (1990) asserted that firms are not just stood up, but instead, they evolve as the impact of decisions and outcomes accrue over time. As a result, effective internal communications can help mitigate risk and optimize innovation adoption and diffusion decision process activities.

Firm size. Firm size has an impact on innovation activities. Larger firms are more likely to be active innovation adopters because firm size, as a typical finding, has been found to statistically significant (Baker, 2011; DiPietro et al., 1990). Size, as an aggregate index, is not a good indicator of a firm's relative innovativeness due to how the relative value of size is derived (e.g., gross revenue, number of employees, profit levels) (DiPietro et al., 1990). Both Baker (2011) and Jeng and Pak (2014) confirmed that size does not necessarily correlate to relative innovativeness. The characteristic of size also has technical and environmental factors that also inform its value (DiPietro et al., 1990). DiPietro et al. (1990) found, demonstrated in Titus, Parker, and Bass (2018) that despite the variances in its derivation size is a meaningful descriptor (irrespective of its measure) to differentiate classes of firms, relative to each other. Understanding and normalizing size factors within an industry may help provide some industry-specific innovation adoption insight.

Centralization, management structure complexity, and formalization. The internal dynamics of a firm are essential. The centralization descriptor addresses the complexities of centralized versus decentralized decision-making bodies, while the management structure complexity characteristic addresses the intricacies of a firm's management structure (DiPietro et al., 1990). DiPietro et al. (1990) represented, supported by Queen and Fasipe (2015), that the management structure complexity characteristic also embodies a firm's command and control structures (e.g., hierarchies and authority), social system influences, occupational specialties/expertise, and employee professionalism. The formalization characteristic addresses the degree to which firms adhere to established rules and procedures (DiPietro et al., 1990; Rhee, Seog, Bozorov, & Dedahanov, 2017). The aggregation of these characteristics collectively informs the innovation decision-making processes (DiPietro et al., 1990; Yudho, Utari, Nur Fitriah, Achmad, & Chahyati, 2016). For example, complexity aids adoption decisions but not implementation while formalization and centralization aid implementation efforts but not adoption decisions (DiPietro et al., 1990). Modeling and maintaining a clear understanding of organizational characteristics can help mitigate risk and optimize innovation adoption and diffusion decision process activities.

Social system communications. Communications are an essential component of innovation adoption. This characteristic, as depicted by DiPietro et al. (1990), embodies internal and external linkages and communications. External communication linkages exist to collaborate with third parties, collect information, and then make this information available to internal resources (DiPietro et al., 1990). Internally, DiPietro et al. (1990)

advised, supported by Kim (2015), that a variety of techniques and communication methods can be employed to laterally share information within a social system such as direct contact, use of liaison and integration roles, as well as the creation of task force teams. These methods help facilitate innovation adoption decisions and any subsequent diffusion activities, which helps firms absorb higher rates of information exchanges and adaptations (DiPietro et al., 1990). Top leadership, opinion leaders, and peer networks play central roles in facilitating lateral information exchange, innovation adoption decision, and diffusion activities (Baker, 2011). For that reason, establishing and maintaining open internal and external communications channels can help mitigate risk and optimize innovation adoption and diffusion decision process activities.

Slack. Resource availability affects innovation adoption. DiPietro et al. (1990) suggested, supported by Kiss, Fernhaber, and McDougall-Covin (2018), that slack resource availability does not necessarily drive innovation. Furthermore, DiPietro et al. proposed that other factors, such as lack of knowledge or low innovativeness levels, can influence innovation adoption resource allocations. The amount of required slack, by resource type (e.g., capital, skills, people), is a function of innovation complexity and availability (DiPietro et al., 1990). Thus, the ability of a firm to manage and dynamically reallocate high priority slack resources can help facilitate innovation adoption and diffusion decisions (DiPietro et al., 1990; Jissink, Schweitzer, & Rohrbeck, 2018; Monteiro, Mol, & Birkinshaw, 2017). Effective resource management can help mitigate risk and optimize innovation adoption and diffusion decision process activities.

TOE environmental context. Industry and market context impact innovation adoption. DiPietro et al. (1990) established that the environmental context embodies the business operations space of a firm and is comprised of industry characteristics, market structure, resource access, and government regulations. Social system communications, within this context, opportunistically influence, or constraint, knowledge sharing, transactions, and innovation (DiPietro et al., 1990). So, maintaining a clear understanding of a firm and its ecosystem can help identify market opportunities.

Competition and service-provider capability impact innovation adoption. External pressure can significantly inform a firm's desire to innovate (Chen, Wang, Nevo, Benitez-Amado, & Kou, 2015). Representative industry-related impact drivers include variations in customer demand, government regulations, change agent influence, and the availability of new technologies supported by an appropriately skilled labor force (DiPietro et al., 1990). Industry competitive characteristics and technology support infrastructure are two significant factors that inform a firm's innovation activities (DiPietro et al., 1990; Gutierrez et al., 2015). Diligently monitoring the competitive and technology supplier landscapes can help mitigate risk and identify market opportunities.

Industry characteristics and market structure. Market pressures impact innovation. Industry competitive characteristics embody the intensity of competition, customer relationship management, and market uncertainty (DiPietro et al., 1990; Kung & Kung, 2015). Competition intensity is the ratio of industry output to that of the four largest firms in that industry (DiPietro et al., 1990). DiPietro et al. (1990) proposed that the higher the ratio, the denser a market is, resulting in slower rates of innovation

adoption while the lower the competitive intensity ratio is, the more aggressive an industry is in pursuing innovation activities. Dominant firms can dictate market conditions (e.g., price, quality, and service) as well as an industry's competitive landscape; thus, forcing other market participants to respond accordingly (DiPietro et al., 1990; Zamuee, 2016). In some industries, dominant customers can significantly inform an industry's innovation rate by dictating supply chain engagement terms, conditions, technologies (DiPietro et al., 1990; Raja, Chakkol, Johnson, & Beltagui, 2018). DiPietro et al. suggested, supported by Jissink et al. (2018), that industries faced with cyclic demand models can find innovation adoption to be challenging especially in regards to slack resource management. Reserving enough resources to ride out downturns in the cycle can significantly impact innovation activities (DiPietro et al., 1990; Jissink et al., 2018). Thus, many firms invest in innovations during stable periods to better leverage existing resources, while finances and market conditions are more predictable (DiPietro et al., 1990). Hence, diligently maintaining market and industry-related data can help mitigate risk and identify market opportunities.

Technology support infrastructure. Innovation activities challenge organic firm resources. DiPietro et al. (1990) established, demonstrated in Yoo and Kim (2018), that technology support infrastructure embodies the quality and availability of technical information and capabilities as well as external resources. Furthermore, DiPietro et al. proposed that the innovativeness of a firm, to include its ability to develop and execute its technology acquisition strategy, is much informed by these characteristics as well as cost. The more complex a technology context is, the higher the labor rates, training, and cost

(Amini & Bakri, 2015; DiPietro et al., 1990). Consequently, it could be more cost-effective and efficient to leverage third-party suppliers to assist in innovation adoption activities based on the complexity, aggregate risk, or degree of social system change (DiPietro et al., 1990). Maintaining an understanding of technology supplier capabilities can help mitigate risk and optimize innovation adoption and diffusion decision process activities.

Government regulation. Law and regulation changes impact innovation. Classes of regulatory activities that significantly impact innovation adoption are economic, social, and institutional regulations (Blind, Petersen, & Riillo, 2017; DiPietro et al., 1990). Government regulatory activity, such as new constraints or levying new technology requirements, can significantly impact an entire industry and its innovation activities (Amini & Bakri, 2015; Baker, 2011). Economic regulations include antitrust, merger and acquisitions, price, monopolies, and compliance reporting (DiPietro et al., 1990). Social regulations include environmental protection, workers' health and safety, product, and consumer safety, and personal privacy (DiPietro et al., 1990). Institutional regulations include liability law, employment protection, immigration law, bankruptcy laws, and intellectual property rights (DiPietro et al., 1990). Maintaining an accurate understanding of relevant regulatory activity can help mitigate risk and optimize resource expenditures.

Limitations of the TOE. TOE is not without its issues. TOE, though exceedingly useful in supporting IT-related innovation adoption, has remained stagnant for quite some time with little additional synthesis (Baker, 2011). According to Baker (2011), the majority of TOE related theoretical work has focused on enumerating the different factors

and their relevance in different adoption contexts. TOE is viewed as a general theory requiring little adjustment due to its highly adaptable nature and the freedom to vary its factors and measures to support contexts (Baker, 2011). Integrating TOE with models that have explicit constructs strengthens TOE (Gangwar, Date, & Ramaswamy, 2015). Thus, TOE is viewed as being complementary to as opposed to competing with other innovation adoption theory (Baker, 2011). Accordingly, any perceived tension has already been addressed (Baker, 2011). Finally, Baker asserted that other innovation adoption theories exist that may be a better fit than TOE such as DOI, task-technology-fit theory, institutional theory, the theory of organizational design, and social contagion theory; thus, TOE may be best used supporting empirical research (Baker, 2011). Ibrahim and Jaafar (2016) confirmed this and added that combining TOE with other models helps develop more in-depth insights into underlying technological and innovation adoption behavior.

Integrated DOI-TOE Conceptual Model

DOI and TOE have similarities. These two frameworks, DOI and TOE, as characterized by Oliveira et al. (2014), do overlap in some regards, but each model also embodies a unique set of complementary factors. Furthermore, as proposed in Oliveira et al. (2014) and confirmed in Hoti (2015), DOI focuses on technology adoption and diffusion from an innovation perspective, complemented by TOE that introduces in an environmental aspect. Consequently, Oliveira et al. developed and leveraged a specific, integrated DOI-TOE enterprise cloud-adoption research model that demonstrated how the

two frameworks complement each other. Accordingly, though DOI and TOE overlap, the blending of the two offers potential informative value.

Explaining firm-level innovation adoption and diffusion decisions is difficult. Hoti (2015) revealed, and Phaphoom, Wang, Samuel, Helmer, and Abrahamsson (2015) confirmed that the majority of empirical technological innovation adoption studies refer to DOI or TOE. According to Hoti, DOI is perceived to identify characteristics that influence adopter's attitudes. Tarhini et al. (2015) asserted that DOI is the base behavioral acceptance model that other technology acceptance models should rely on. Hoti stressed, and Wang and Wang (2016) confirmed that DOI should be blended with other contexts or factors for a more holistic adoption approach. TOE has proven its ability to support a variety of different enterprise innovation adoption contexts (Chiu, Chen, & Chen, 2017). Ray (2016) characterized TOE as an extension of DOI. Lastly, Zhang, Zhao, Zhang, Meng, and Tan (2017) represented TOE as being highly generalized and added that extensions are required when instantiated to specific issues. Thus, the blending TOE with DOI makes explaining firm-level innovation adoption and diffusion decisions more complete (Hsu et al., 2014). Piaralal, Nair, Yahya, and Karim (2015) confirmed the utility of leveraging an integrated DOI-TOE framework when considering innovations. Leveraging an integrated DOI-TOE conceptual model can help explain firm-level innovation adoption and diffusion decision process activities.

Explaining firm-level cloud innovation adoption and diffusion decision process activities is difficult. El-Gazzar (2014) reported that researching enterprise cloud adoption and diffusion presents a multifaceted problem space requiring composite

theoretical models to be employed to explore properly. Additionally, El-Gazzar offered that there is plenty of technical literature analyzing cloud adoption, but a notable lack of literature that compares how enterprises react to the same internal and external factors. DOI and TOE are two primary theoretical perspectives used to explore enterprise cloud adoption (El-Gazzar, 2014). The research dominance of DOI and TOE is confirmed and expanded on in Oredo, and Njihia (2015) that acknowledged that dominant theoretical approaches, such as DOI and TOE, do work but warned that focusing on innovation-specific adoption factors do not adequately capture and model complex organizational innovation behaviors regarding when and how to innovate. Thus, leveraging an integrated DOI-TOE theoretical model can help explain firm-level cloud innovation adoption and diffusion decision process activities.

The leveraging of integrated theoretical models continue to develop amongst researchers. As reported by El-Gazzar (2014), an extensive array of sources exist that leverage composite model pairs, such as DOI and TOE, when documenting this field of study. Beyond Oliveira et al. (2014), Alkhalil et al. (2017) also developed and leveraged an integrated DOI-TOE conceptual model to study cloud adoption decisions. Other recent examples of integrated DOI-TOE based, cloud innovation and adoption studies include Gupta and Bhatia (2017), Wang and Wang (2016), Chiu et al. (2017), Martins, Oliveira, and Thomas (2016), Rohani and Hussin (2015), Hsu et al. (2014), and Safari, Safari, and Hasanzadeh (2015). The body of evidence supporting the successful use of integrated DOI-TOE models to drive cloud innovation adoption and diffusion decisions is expanding.

The factor selection of an integrated DOI-TOE enterprise cloud adoption conceptual model is essential. Cloud adoption conceptual model designs are driven by the desire to capture and express specific innovation adoption, attitude, and impact characteristics (Sabi et al., 2016). Explanatory power helps identify specific adoption decision conceptual model factor selections (Phaphoom et al., 2015). Even though enterprise cloud adoption literature is more technical than process-focused, a consistent set of primary factors (e.g., complexity, perceived benefits, cost-benefit) can be synthesized from literature (El-Gazzar, 2014). The span of potential impact or type of innovation (e.g., local to the IT organization, internal cross-organizational, or external cross-organizational) also informs cloud adoption decision-factor selection (Wu & Chiu, 2015). Therefore, factor selection and integrated DOI-TOE conceptual model design are context-based.

DOI and TOE, either alone or integrated, are viable enterprise innovation adoption and diffusion conceptual frameworks that can be used to explain firm-level decision processes. The majority of empirical technological innovation adoption studies refer to DOI or TOE (Hoti, 2015). The research dominance of DOI and TOE is confirmed in Oredo and Njihia (2015). According to Hoti (2015), DOI is perceived to identify characteristics that influence adopter's attitudes. Tarhini et al. (2015) asserted that DOI is the base behavioral acceptance model that other technology acceptance models should rely on.

Similarly, TOE has proven its ability to support a variety of different enterprise innovation adoption contexts (Chiu et al., 2017). TOE is highly generalized, and

extensions may be required when instantiated to specific, complex issues (Zhang et al., 2017). Ray (2016) characterized TOE as an extension of DOI; but, there are times DOI should be blended with other contexts or factors to form a more holistic adoption approach (Hoti, 2015). Consequently, DOI and TOE, as characterized by Oliveira et al. (2014), do overlap in some regards but each model also embodies a unique set of complementary factors. As proposed by Oliveira et al., DOI focuses on technology adoption and diffusion from an innovation perspective, complemented by TOE that introduces an environmental aspect. Thus, the blending TOE with DOI makes explaining firm-level innovation adoption and diffusion decisions more complete (Hsu et al., 2014). Piaralal et al. (2015) confirmed the utility of leveraging an integrated DOI-TOE framework when considering innovations. Thus, leveraging either DOI, TOE, or an integrated DOI-TOE conceptual framework can help explain firm-level innovation adoption and diffusion decision process activities.

Analysis of Rival Theories

Alternate adoption and diffusion theories.

Though an integrated DOI and TOE model was selected as the conceptual framework, others were considered. Oredo and Njihia (2015) revealed that DOI and TOE are the two dominant, organization-centric, theoretical innovation adoption, and diffusion frameworks. Hoti (2015), El-Gazzar (2014), and Puklavec, Oliveira, and Popovič (2018) all confirmed this. Additionally, Hameed and Arachchilage (2016) represented DOI, TOE, technology acceptance model (Davis, 1989), the theory of reasoned action (Fishbein & Ajzen, 1975), and theory of planned behavior (Ajzen, 1991) as the primary

IT innovation adoption and theoretical diffusion models. Hameed and Arachchilage, confirmed by Baker (2011), characterized DOI and TOE, collectively, as organization-centric, preadoption, and adoption decision theories while technology acceptance model (TAM), theory of reasoned action (TRA), and theory of planned behavior (TPB) were represented as being more individual, user-centric theories. As a result, TAM, TRA, and TPB are not suitable theories to support enterprise IT innovation adoption and diffusion decision studies.

Individual IT user acceptance is valid. Fishbein and Ajzen (1975) established TRA to evaluate individual acceptance behavior as a function of their attitude and subjected norms. Fishbein and Ajzen represented that attitude indicates individual baseline beliefs impacted by the results of behavior while subjected norms characterize perceived social system pressure to conform to specific behavioral standards. Davis (1989) published TAM, a modified version of TRA, to model user acceptance of IT innovations as a function of perceived usefulness and simplicity. Davis defined perceived usefulness as the degree of job performance is improved by employing an innovation, while simplicity is characterized as the degree of effortlessness. Accordingly, Davis presented that these two variables, in combination, drive user attitude leading toward an adoption decision. Lastly, Ajzen (1991) published TPB, also a modified version of TRA, which enhanced TRA via the addition of behavioral control moderating factor that characterizes behavioral intention, which in turn, leads toward an adoption decision. Therefore, foundational individual innovation adoption theories, which model human behaviors, can be useful if employed suitably.

While TRA, TAM, and TPB are a capable individual, user-centric frameworks for studying innovation adoption, they are not an appropriate fit for enterprise-level analysis. DOI has established itself as a robust foundational model that requires augmentation. Similarly, TOE has established itself as being complementary to other models and of requiring a foundation. Moreover, integrated DOI-TOE models have been successfully demonstrated to support complex, enterprise cloud adoption and diffusion decision research efforts. Accordingly, an integrated DOI-TOE model is the best fit for this study. In order to continue the DOI-TOE conceptual model theory discussion, a segue into cloud computing is required.

Cloud Computing

The evolution of cloud computing started in the early ’60s. El-Gazzar (2014) described cloud computing as a method to use remote resources to store data or execute processes without a significant investment of onsite IT assets. Kushida et al. (2015) added that cloud computing evolved into cloud stacks, which involves layers from a capability maturity/abstraction perspective. The impact of cloud computing’s commoditization of resource capacity has significantly disrupted the IT industry (Kushida et al., 2015). Given the quick maturation of cloud computing paradigms and service delivery methods, businesses are facing new questions regarding what functions should be retained in-house versus leveraged by a cloud-based service delivery model (Pakath, 2015). Thus, the importance of making successful, and timely, cloud adoption and diffusion decisions by IT executives become increasingly essential.

The foundational infrastructural perspectives of what constitutes a cloud and its realization are shifting rapidly. The cloud computing landscape has shifted significantly over the last decade away from traditional data centers and more toward multicloud (e.g., hybrid and federated cloud) models (Varghese & Buyya, 2018). This evolutionary path generated technical, security, and business issues, which IT professionals must continuously work to provide solutions (Varghese & Buyya, 2018). Müller, Holm, and Søndergaard (2015) supported this by advising businesses to carefully consider how best to leverage the cloud because of potential business-IT alignment impact from both cloud maturity and organizational maturity perspectives. Müller et al. found that integrating cloud offerings within the enterprise requires improvements in core competencies and operational processes due to complexity and adoption risk. IT executives must be discerning when evaluating IT cloud adoption and diffusion decisions due to the high rate of change and organizational impact associated with adopting cloud computing.

Cloud business models are also evolving quickly. Fixed and dynamic pricing are the two primary cloud pricing strategies (Chun & Choi, 2014). Chun and Choi (2014) suggested that fixed-fee pricing models, such as subscription and pay-per-use, are more typical even though dynamic pricing could be more economically efficient. Profitability pressures are forcing application owners to reexamine how they consume and pay for cloud resources (Ben-Yehuda, Ben-Yehuda, Schuster, & Tsafrir, 2014). Hence, a thorough understanding of cloud pricing models can help optimize resource investments.

Understanding dynamic pricing model subtleties can be beneficial. Cloud business models are evolving rapidly to keep pace with the high rate of cloud

technological change required to support supply-demand models (Ben-Yehuda, Agmon Ben-Yehuda, & Tsafrir, 2016). Ben-Yehuda et al. (2014) identified a trend of using dynamic arbitrage-based pricing models in which resource requirements are quickly met to facilitate rapid demand requests enabling businesses to optimize cloud investments and react sooner to evolving business needs. Pricing scheme changes are critical to cloud computing that allows providers to grow despite price variances on product demand and growth (Xu, Qin, Qiu, & Liu, 2015). Cost optimization is a principal cloud research theme (Ben-Yehuda et al., 2014). The lack of cloud business and organizational management centered literature prevents business and IT leaders from adopting cloud computing with complete data (Bayramusta & Nasir, 2016). Successful cloud strategy development and execution requires a rational understanding of cloud computing, pricing models, and literature to help drive cloud adoption and diffusion decision making processes.

Cloud computing formal definition. The standardization of cloud computing definition has been a difficult task. Mell and Grance (2011) described cloud computing as on-demand access to remote resources, which dynamically provision services with minimal effort and provider's intervention. Ruan, Chan, Zhu, Wang, and Yang (2016) confirmed Mell and Grance's contribution to the National Institute of Standards and Technology (NIST) as an industry standard. The high growth rate of cloud computing has triggered the proliferation of as-a-service (aaS) extensions, which deviate from the core NIST definitions (Duan, Sun, Longo, Lin, & Wan, 2016). As a result, the potential

communication breakdowns and semantic understandings (e.g., use of words) may leave senior IT leaders unable to appreciate the evolving cloud computing models adequately.

Cloud computing characteristics. Specific characteristics must exist for cloud computing to deliver. Mell and Grance (2011) designated on-demand self-service, broad network access, resource pooling, rapid elasticity, and measured services as essential characteristics of cloud computing. The on-demand self-service characteristic is intended to ensure that compute capability provisioning is fully automated (Singh & Singh, 2017). Customers expect instant access to resources (Wu, Garg, & Buyya, 2015), including the ability to provision their capabilities without requiring assistance (Oredo & Njihia, 2015). The broad network access characteristic is intended to facilitate service availability across networks to support remote consumption (Singh & Singh, 2017). The resource pooling characteristic, as portrayed by Singh and Singh (2017), is intended to support the dynamic sharing of pooled resources. Resources are allocated as a function of demand (Wu, Garg, et al., 2015). The rapid elasticity characteristic is intended to help facilitate dynamic scaling as a function of demand (Singh & Singh, 2017). Lastly, the characteristic of the measured service is intended to facilitate automated management and monitoring of cloud resources (Singh & Singh, 2017). Measured services also embody metering and billing functions (Vithayathil, 2017). Oredo and Njihia (2015) added that billing is analogous to electricity consumption. As a group, these essential cloud computing characteristics embody the underlying promise of cloud computing namely open, flexible, scalable, available, and responsive.

Cloud computing service models. Cloud computing has several service delivery models. Mell and Grance (2011) designated three service models within cloud computing: (a) software as a service (SaaS), (b) platform as a service (PaaS), and (c) infrastructure as a service (IaaS). Wu, Garg, et al. (2015) characterized SaaS as applications hosted as a service, which Iqbal et al. (2016) elaborated that it enables consumers to leverage cloud provider application capabilities via a lightweight, front-end device but prevents access to the underlying infrastructure. PaaS services include a virtualized hardware instance, OS, network, as well as other middleware capabilities to allow end-users to provide a service or perform a business function (Iqbal et al., 2016). In the case of PaaS, a platform is a discrete computer system instance that includes hardware, an operating system (OS), and some measure of appropriate end-user enabling tooling and interfaces (Iqbal et al., 2016). As a result, underlying hardware and software management costs are eliminated (Oredo & Njihia, 2015). IaaS offers its capabilities from the OS and down to include hardware and device-level virtualization that enable consumers to run their software (Mell & Grance, 2011). Oredo and Njihia (2015) characterized IaaS as being virtualized computing resources, e.g., processors and data servers provided as a service. These three foundational service models, viewed as building blocks, have been positioned by proponents, to fulfill a wide array of IT cloud requirements readily.

Cloud computing deployment models. Cloud computing has several deployment models. Mell and Grance (2011) designated private cloud, community cloud, public cloud, and hybrid cloud as cloud deployment models. As described by Puthal,

Sahoo, Mishra, and Swain (2015), a private cloud is an internal cloud implementation that provides exclusive, infrastructure support to an organizational entity. A community cloud, as portrayed by Puthal et al., is a cloud implementation that provides support to a distinct group of potentially disparate users, who share a standard set of interests or goals. A public cloud, allocated for general public consumption, leverages abstracted infrastructure capabilities provisioned by and housed within the facilities of a CSP (Mell & Grance, 2011). Lastly, a hybrid cloud is comprised of two or more distinct cloud infrastructures, which remain autonomous but are integrated to provide business functionality to a consuming entity (Mell & Grance, 2011). Given the array of possible cloud computing deployment models and their unique deployment and operational profiles, careful consideration is required during the IT cloud adoption planning and diffusion process.

Cloud computing anything-as-a-service (XaaS). Cloud success has led to a services marketing barrage. Botta, de Donato, Persico, and Pescapé (2016) referred to XaaS as everything as a service, which X can associate to a vast array of capabilities. However, Duan, Duan, et al., (2016) revealed that different sources broadly use the term XaaS, which creates confusion when communicating the service to clients. Conversely, Duan, Sun, et al. (2016) found that a semantically aligned XaaS paradigm offers a promising approach to encapsulating infrastructure resources and developing federated, service-oriented architecture (SOA)-like facades to hide the underlying implementation details. Botta et al. considered XaaS metaphors to be part of a strategic mesh of cloud internet of things (IoT) as a service and internet of everything (IoE) things-as-a-service

offerings. Consequently, the potential overuse of XaaS nomenclature may leave senior IT leaders unable to understand the evolving cloud computing service models effectively.

Infrastructural impact on cloud adoption decisions. The IT industry is being impacted by cloud computing. Early cloud implementations used mainframes and virtual machines to provide standalone service instances with intra/inter-instance isolation (Shinder, 2016). Shinder (2016) also reported that the use of lower-cost open systems platforms drove down the cost of raw computing over the last three decades. Kushida et al. (2015) described the commoditization of cloud computing as a disruptive technology to the IT industry. Thus, a significant paradigm shift is occurring for businesses as IT capabilities change from capital assets to metered services (Pakath, 2015). Organizations require thoughtful planning to consume cloud-based services at scale.

Another consideration in cloud computing is data center energy efficiency. Previous data center models required vast floor space, redundant power, cooling, network trunks, and other forms of extensive power requirements (Schlichting, 2015). Cloud computing-centric data center redesign is enabling resource savings and real-estate footprint consolidations due to increased energy efficiency gains and floor space utilization optimization (Mills et al., 2015). These changes allow data centers to surpass legacy designs at a fraction of the energy cost (Schlichting, 2015). Porter and Heppelmann (2015) suggested that this cloud-based efficiency, coupled with the emergence of smart devices, allows maintenance of an organic capability, such as a data center, to be a strategic or compliance-related decision rather than a tactical one. Despite these successes, Shuja et al. (2017) voiced concern that green computing requires further

research to understand how to design sustainable data centers better. As a result, cloud adoption decision processes must not only consider architectural and topological requirements, but they must also consider infrastructural housing requirements as well.

Cloud computing architecture. Performance remains a critical success factor for large enterprises. Although high performance traditionally relates to expensive coupled systems, cloud computing's cost-efficient aggregation of an array of loosely coupled systems is gaining traction (Kushida et al., 2015). Hwang et al. (2016) suggested that practitioners evaluate 18 distinct performance metrics, such as elasticity, latency, recoverability, quality of service, and availability when considering high-performance cloud systems. Garrison, Wakefield, and Kim (2015) directly linked the relative success of IT capabilities and service composition selection efforts to outcomes such as IT economies of scale, cost reductions, and skills development. Though performance also has a role in measuring whether an implementation is meeting business needs and end-user expectations (Sharma, Javadi, Si, & Sun, 2016). Careful consideration must be afforded to IT cloud-service composition selection activities as part of the IT cloud adoption and diffusion decision process.

Virtual machine (VM) sizing optimization is also a critical success factor for large enterprises. Ristov, Mathá, Kimovski, Prodan, and Gusev (2018) revealed that challenges to understanding cloud architecture include VM heterogeneity, dynamic load management, capacity planning, and VM configuration optimization. To begin to address cloud computing linear scalability performance concerns, Ristov et al. presented a comprehensive approach to model, capture, and evaluate cloud performance

characteristics based on variable architectural scenarios. Despite the recent progress made, a considerable amount of work remains to mature cloud resource management techniques and further enable automated cloud workload optimization capabilities (Weingärtner, Bräscher, & Westphall, 2015). Given the current maturity state of cloud performance modeling and its direct linkage to appropriately sizing resource configurations and their consumption, careful consideration must be afforded to IT cloud service capacity planning activities as part of the IT cloud adoption and diffusion decision process.

Availability is also a critical success factor for large enterprises. Fault tolerance, or reliability, is the ability to absorb interruptions and process transactions despite any failure (Cheraghlou, Khadem-Zadeh, & Haghparast, 2016). Fault tolerance focuses on responding to VM faults and improving system recovery time to reduce downtime impact (Mohammed, Kiran, Awan, & Maiyama, 2016). Cloud computing differs from traditional fault tolerance by focusing on load balancing and elasticity schemes to address faults (Cheraghlou et al., 2016). Coady, Hohlfeld, Kempf, McGeer, and Schmid (2015) confirmed that this method increases the capacity and reliability of services. Thus, cloud computing remains available even if a few systems become unavailable.

Security impact of cloud adoption decisions. Adopting and integrating cloud computing capabilities within a large enterprise creates security concerns. Liu, Sun, Ryoo, Rizvi, and Vasilakos (2015) developed the enterprise cloud-security landscape point of view that categorizes cloud computing security factors, existing solutions, and the subsequent gap analysis of the existing solutions mapped against the challenges.

Consequently, Liu et al. suggested that the inability to develop defensive security solutions at the same pace as cloud technology hinders adoption. Similarly, Alassafi, Alharthi, Alenezi, Walters, and Wills (2016) analyzed a wide array of potential and perceived enterprise-centric, cloud computing security factors that inform organizational adoption of cloud computing. As a result, Alassafi et al. created a comprehensive, enterprise-centric, cloud adoption security framework to address social factors, cloud security risk factors, and perceived cloud security benefits. In their model, Alassafi et al. included concerns such as API issues, hijacking, compliance, data ownership, service interruption, data leakage, trust, privacy, security auditing, resource concentration, and innovation. Lastly, Chang, Kuo, and Ramachandran (2016) developed an enterprise, infrastructural level cloud-security adoption framework, which focuses on the firewall, identity management, and encryption factors. Although the capturing, modeling, and evaluation of cloud security factors are occurring, the practical reality of cloud computing security capabilities must be considered as part of the IT cloud adoption and diffusion decision process.

The impact of both cloud security and reliability have far-reaching implications on the IT community. Organizations need to iteratively evolve their defense strategy against evolving criminal and nation-state actors (Rid & Buchanan, 2014). A reference security framework should incorporate a wide array of devices to address ever-increasing cloud computing complexity (Fernandez, Monge, & Hashizume, 2015). Fernandez et al. (2015) emphasized the development of security or misuse mitigation strategies to address cloud vulnerability use cases such as leveraging software-defined networking as a means

of addressing device security issues and dynamically reconfiguring cloud networks. Accordingly, device-level security capabilities must be considered as part of the IT cloud adoption and diffusion decision process.

Different dimensions of a cloud security strategy require addressing. Rid and Buchanan (2014) described criminal actors as individuals who seek credit cards, financial transaction, or other personally identifiable information through rudimentary forms of cyberattacks. Breaches caused by nation-state actors, who use corporate or defense espionage to attack cloud systems within a wide variety of industries, is rapidly rising (Rid & Buchanan, 2014). The use of proper controls, transparency, incident response, and compliance audits to monitor and govern cloud security activities needs to be stressed (Jaatun, Pearson, Gittler, Leenes, & Niezen, 2016). These security concerns need to be mapped to factors included in a significant security framework (Alassafi et al., 2016). As a result, security is a considerable driver in cloud adoption decisions.

Alternate pricing models are impacting cloud adoption. As previously stated**,** two primary cloud pricing models exist to consume cloud services, a pay-per-use model, and a subscription model. More pricing options exist, such as dynamic, value-based, auction-based, and prenegotiated rates (Chun & Choi, 2014). Arbitrage marketplace supply/demand pricing models are rapidly emerging to address the rising cost and excess capacity in cloud service provider environments (Ben-Yehuda et al., 2014). Other licensing fee structures exist for SaaS providers, internal organizations via chargeback models, or enterprise vendors whose cloud-based services are consumed as part of fulfilling a business or infrastructure requirement (Chun & Choi, 2014). From an expanse

perspective, Mazrekaj, Shabani, and Sejdiu (2016) presented over a dozen different cloud pricing schemes that vary along with a wide array of dimensions. More directly, Kar and Rakshit (2015) described a decision support-based, cloud pricing model that focuses on pricing based on factors that include trust, cost, value, and flexibility. Also, De and Mukherjee (2015) provided a detailed, healthcare industry-specific, cloud pricing analysis of a mobile cloud-based solution to address home health care and epidemic monitoring issues. Consequently, cloud-computing pricing model evaluation efforts require additional investigation.

Not all cloud pricing models are simplistic. Chun and Choi (2014) described pay-per-use models as paying for only the resources consumed. Several factors affect this model, such as equipment depreciation state, agreement term, QoS required, I/O volume, data storage consumed, breadth of services consumed, and CSP maintenance costs (Chun & Choi, 2014). As part of the sophisticated cloud pricing analysis conducted in Chun and Choi, the authors established that a perpetual or subscription-based model is sometimes leveraged where a consumer requires or prefers some predictability in their billing cycles or would like to pay in advance. For example, if a consumer would like to monetize what would be an operating expense (OPEX) cost and convert it to capital expenditure (CAPEX) cost for depreciation purposes (Chun & Choi, 2014). For that reason, a clear set of financial requirements should be developed and validated as part of the cloud adoption decision and diffusion process.

Current cloud economic models are heavily skewed in the provider's favor. Chun and Choi (2014), Ben-Yehuda et al. (2016), and Ben-Yehuda et al. (2014) all emphasized

that providers want to maximize revenue vice entertain revised pricing models that may impact their bottom line. Current cloud pricing models are primarily driven by unit consumption-based derivations rather than service composition, a distinct disadvantage to consumers (Wu, Nadjaran Toosi, Buyya, & Ramamohanarao, 2018). Pricing is driven by resource granularity, e.g., vastly expanding on Amazon's EC2 spot pricing, help drive down costs to consumers (Ben-Yehuda et al., 2016). The contemporary problem, as presented in Ben-Yehuda et al. (2014), is that time increment minimums currently charged by CSPs are on a multi-minute basis. Furthermore, Ben-Yehuda et al. (2014) speculated that the time shortening trend would continue until per second, or Resource as a Service (RaaS), pricing is realized. Cloud infrastructure resources must be monetized and carry varying costs based on performance, scale, availability, and geographic concerns (Chun & Choi, 2014). Specific resources such as CPU, memory, storage, network, quality of service (QoS), input/output (I/O), security, privacy/isolation, and support are representative assets or services that aggregate together for billing purposes (Ben-Yehuda et al., 2016). Thus, to optimize cloud resource consumption, cloud service consumers must evaluate workload characteristics to understand potential economic impacts better.

RaaS based pricing models may offer a unique competitive advantage. An alternate set enabling capabilities are required to help capture and curate service catalog meta-data, monitor and capture ecosystem participant interactions, and facilitate the execution of multi-cloud service requests (Ben-Yehuda et al., 2014). Due to the high rate of change involved and potential technical complexities, automated resource management

tooling would be required to successfully operate and orchestrate the policy-driven environment (Ben-Yehuda et al., 2014). Fowley, Pahl, Jamshidi, Fang, and Liu (2018) provided a broad-spectrum, end-to-end overview of multi-cloud to include managing complex, enterprise-scale, multi-cloud environments via broker services. Consequently, Wang, Cao, and Xiang (2015) presented a comprehensive broker service selection model designed to dynamically facilitate real-time, multi-cloud service selection negotiation and service management functions. The derived requirements of a broker service capability to address the geographic, data, security, authentication, nonfunctional requirements and more, significantly raise the bar on large-scale, multi-cloud implementations (Fowley et al., 2018). The need for improved performance is especially real if enterprise-class applications, workloads, and services, as suggested in Ben-Yehuda et al., are meant to be dynamically reallocated at a per second rate. Subsequently, Kablan, Joe-Won, Ha, Jamjoom, and Keller (2015) developed a reputation-based system that could be leveraged to manage and prioritize resource allocations as well as moderate ecosystem participant behaviors as required. Based on this research, to take sufficient advantage of short-interval time slice pricing, cloud service consumers must evaluate workload characteristics to understand the potential technical and economic effects better.

Industry participation is required to stimulate a RaaS marketplace. As an extension to the broker service discussion, Wang et al. (2015) proposed an automated brokerage clearinghouse, like a marketplace exchange, to be established that preallocates capacity and dynamically matches consumers with providers and instantiates the agreed-on service on behalf of both. Lin, Squicciarini, Dondapati, and Sundareswaran (2016)

suggested an approach to leverage real-time, transactional metadata to cross-correlate service requests with provider capabilities. Though Lin, Squicciarini, et al. (2016) proposed that significant price reductions could be achieved via this approach, active CSP participation and investments would be required as would a ready set of consumers ready and legally able to leverage this kind of marketplace metaphor. Moon, Kim, Kim, and Lee (2015) suggested implementing a reverse auction approach to help stimulate the RaaS, multi-cloud exchange ecosystem to take sufficient advantage of short-interval time slice pricing, cloud service consumers must evaluate organizational and industry innovativeness and maturity readiness to understand the potential economic impact better.

Enterprise cloud adoption decisions. Recent, peer-reviewed, enterprise-centric cloud-adoption process literature is challenging to find. Ray (2016) suggested that enterprise cloud adoption decisions should be viewed across multiple levels. El-Gazzar, Hustad, and Olsen (2016) characterized cloud computing as an emerging form of IT outsourcing. Accordingly, Schneider and Sunyaev (2016) highlighted the lack and technology-centric focus of enterprise cloud sourcing literature relative to prior, far more comprehensive sourcing knowledge bases. Alkhater, Walters, and Wills (2018) confirmed the enterprise cloud-adoption literature gap existence while El-Gazzar, Wahid, and Stendal (2018) confirmed the tactical vice strategic literature focus and De Vries, Bekkers, and Tummers (2015) confirmed deficient theoretical underpinnings.

Business and academia do not characterize nor look into enterprise cloud adoption decisions the same way, further intensifying the literature gap issue (Ray, 2016). Thus,

El-Gazzar (2014) represented the nature and extent of the enterprise cloud adoption literature gap. Accordingly, El-Gazzar et al. highlighted the relative importance and impact such literature gap issues create when enterprises make cloud adoption decisions. Thus, Alkhater et al. (2018) revealed and leveraged a multidimensional, enterprise cloud adoption theoretical model intended to help quantify and contribute some baseline literature to include high-lighting the factorial differences between small, medium, and extensive enterprise adoption decisions. More interpretative case studies are required to better understand enterprise cloud adoption factors, processes, and strategies (El-Gazzar, 2014). The execution of more qualitative case studies by practitioners would help augment literature and inform IT senior leaders are making enterprise cloud adoption decisions.

A Conceptual Model as an Enterprise Cloud Adoption Decision Aid

Making enterprise cloud-innovation adoption decisions are difficult (Bildosola, Río-Belver, Cilleruelo, & Garechana, 2015). Cloud migration is the transition of some or all legacy IT resources (e.g., hardware, software, data, business processes) to a third party CSP (Alkhalil et al., 2017; El-Gazzar et al., 2016). The organizational cloud adoption decision phenomenon is relatively immature (Alkhalil et al., 2017; El-Gazzar et al., 2016; Sharma, Gupta, & Acharya, 2017). Meanwhile, integrating DOI with TOE makes DOI firm-level explanations more complete (Hsu et al., 2014). As a result, senior IT executives need decision aids to help facilitate enterprise cloud innovation adoption processes.

Decision aids provide frameworks to guide cloud innovation adoption decisions. Accordingly, Alkhalil et al. (2017) leveraged the innovation adoption characteristics, of an integrated DOI-TOE model, to gain further understanding of complicated, enterprise cloud adoption and application migration decisions. The Alkhalil et al. (2017) approach and model have been reinforced by Giacumo, Villachica, and Breman (2018). Alkhalil et al. employed and tested their integrated DOI-TOE model, using exploratory and confirmatory factor analysis techniques. Alkhalil et al.'s research design approach were to conduct a qualitative study to collect case data, refine factor criteria, and validate hypothesis statements to seed a follow-on quantitative analysis research effort intended to clarify the identified factors and their relative effects. Alkhalil et al. examined the underlying factors that increased the difficulty of organizational cloud adoption decisions. Thus, Alkhalil et al. took a wide array of enterprise attributes into account to characterize and quantify their impact on a potential innovation adopter's decision process. Alkhalil et al.'s stated goal was to explore the under-appreciated complexity of making organizational cloud adoption and migration decisions. Thus, the Alkhalil et al. model, as a framework, is a decision aid that can help facilitate cloud innovation adoption decisions.

Alkhalil et al. (2017), leveraged their literature review to develop a preliminary set of factors intended to address cloud adoption decisions and their complexity related research questions. A two-stage approach, a qualitative effort followed by a quantitative effort, was used to help gather and validate the appropriate data (Alkhalil et al., 2017). Alkhalil et al. revealed that stage one, the qualitative study, leveraged semistructured

Skype-based or face-to-face interviews of subject matter experts to collect applied data from experienced practitioners. The analysis results from stage one, in conjunction with data collected during the literature review, helped Alkhalil et al. refine their stage two research approach and hypotheses. Resultant stage one data was thematically analyzed, in six phases, to determine factors influencing cloud adoption decisions, to include the application of the DOI and TOE frameworks to the data (Alkhalil et al., 2017; Giacumo et al., 2018).

Alkhalil et al. (2017) employed, reinforced by Giacumo et al. (2018), an integrated model, in their view, to better capture and represent the complexity and impact of each context and factor on enterprise cloud adoption decisions. Alkhalil et al. recognized the overlaps between DOI and TOE (e.g., technology and organizational contexts), but they also recognized the deltas (e.g., DOI has no environmental context, and TOE does not address individuals or some innovation attributes). Alkhalil et al. viewed TOE as providing the general contextual framework and DOI as providing many of the individual factors within each context. Alkhalil et al. noted that each selected factor was tailored to a cloud adoption context.

Four different contexts, each containing two or more factors, were established in the Alkhalil et al. (2017) model namely innovation characteristics, technology context, organizational context, and environmental context. The Alkhalil et al. model innovation characteristic context was comprised of four DOI derived factors specifically relative advantage, complexity, trialability, and risk. The technology context included both compatibility (DOI) and size (TOE) factors. The organizational context contained

organization readiness (TOE), internal social (TOE), external social (DOI), and top management support (DOI) factors. Finally, the environmental context encompassed of three TOE derived factors namely information sources, regulation, and selection of cloud provider factors.

Transition and Summary

The literature review presented 1) an overview of organizational IT-centric innovation adoption and diffusion processes and issues, 2) an overview of cloud computing and relevant trends, 3) cloud-centric extensions to IT-centric theory, and finally, 4) demonstrated the applicability of an integrated DOI-TOE conceptual model, to this study, to facilitate complex, enterprise cloud adoption and diffusion decision processes.

The cloud computing overview was geared toward large-scale enterprises and their unique computing needs. The purpose of this qualitative collective case study was to explore strategies used by IT executives to make advantageous enterprise cloud adoption and diffusion decisions.

The review of DOI, TOE, and the integrated DOI-TOE models were essential to establishing organizational and environmental perspectives, beyond just the technical, when considering cloud innovation adoption decisions. The analysis results of this literature review have demonstrated the immaturity of enterprise cloud computing, the complexity of enterprise cloud computing adoption decisions, as well as revealed a number of gaps in large enterprise and firm-centric, cloud innovation adoption and diffusion literature. Finally, the application of an integrated DOI-TOE conceptual model

may help address a portion of these perceived gaps as well potentially reveal some insights relative to successful enterprise cloud adoption and diffusion strategies.

Section 2 expanded on the study with sections dedicated to the role of the researcher, participants, qualitative method justification, population and sampling methods, ethical study conduct, data collection, and analysis techniques, as well as study reliability and validity issues.

Section 2: The Project

Section 2 contains a comprehensive discussion of the study. I discuss and address researcher ethics to include active mitigation factors. Additionally, the discussion includes justification for participants, sampling methods, methodology and design, and other decisions made for this study. I also present the data source, collection, storage, and analysis techniques and decisions made for this study. Lastly, I discuss and address qualitative collective case study reliability and validity issues.

Purpose Statement

The purpose of this qualitative collective case study was to explore strategies used by IT executives to make advantageous enterprise cloud adoption and diffusion decisions. The target population was IT telecom executives who influence or make firm-level cloud adoption and diffusion decisions in three large (revenues greater than $5 billion) telecom-related companies with a headquarters in the United States. An implication for positive social change is that, by using my study findings, IT telecom executives might be able to improve their ability to optimize cloud innovation adoption and diffusion decisions to greater benefit downstream consumers in need of telecommunications services.

Role of the Researcher

My role as the researcher included serving as the primary instrument in collecting and analyzing data for this study. Baillie (2015) stated that qualitative researchers are the primary instruments because of their influence on how data are collected and analyzed. In addition to collecting data, I proactively reduced bias to safeguard the academic rigor of the data and the analysis. Despite mitigation efforts, bias exists in every qualitative study

(Roulston & Shelton, 2015), which can include issues with anticipation bias, sampling technique, participant bias, subconscious research design, and data analysis techniques that do not correctly address equivalency (Morse, 2015). During data collection, I used the purposeful sampling method to incorporate relevant data while taking proactive measures to mitigate potential sources of personal and other bias.

I have over 30 years of professional IT experience in enterprise compute-centric positions, which include industry chief technology officer and Fortune 500 IT executive management roles. The first focal points were complex systems management, software systems engineering, and software architecture focused primarily on developing and deploying complex, object-oriented, real-time weapons and communications platforms. The second focal point was enterprise architecture, which includes the development of complex solutions for internet-based organizations. The current focal point is managing a large-scale technology provider with enterprise architecture, artificial intelligence, and cloud subject matter experts related to complex global product development. Additionally, I have an extensive background in telecommunications including commercial markets, public sector markets, and nine years of service in the U.S. Navy. My awareness of my background on the topic helped prepare me to deal with this liability.

A series of targeted open-ended questions were developed to help facilitate participant interviews and collect relevant phenomena data. Additionally, I used follow-up questions, based on initial answers, to elicit additional information from participants. During each interview, I used an interview protocol to ensure consistency and to

formalize the verbal data collection effort. Interview protocols help guide novice researchers with procedural, interpersonal, and reflexivity issues, such as scheduling, recording, question sequencing, bias mitigation, and overall flow (Hoover, Strapp, Ito, Foster, & Roth, 2018). A copy of the interview protocol is in Appendix.

I remained mindful of bracketing during the investigation due to my professional background that includes over 25 years of senior IT leadership experience. Bracketing is the ability of a researcher to set aside prior knowledge and act nonjudgmentally toward a topic (Sorsa, Kiikkala, & Åstedt-Kurki, 2015). Researchers may use bracketing to isolate and highlight participant responses from their topic-related knowledge base (Sorsa et al., 2015). I adhered to the interview protocol and actively endeavored to relate ad hoc follow-up questions directly back to participant responses rather than steer or lead participants down unintended paths. Fusch, Fusch, and Ness (2017) suggested that interview protocols, member checking, data saturation, and triangulation can help mitigate bias. Specific to bracketing, I leveraged member checking to authenticate contributor responses and voice. The incorporation of multiple points of view (e.g., data sources) beyond interview transcripts helped address not only bias, data saturation, and triangulation issues but also DOI recall bias issues previously mentioned.

I reviewed the Belmont Report (Department of Health and Human Services, 1979) concerning the ethical treatment of research participants. I completed the "protecting human research participants training" certification. I endeavored to both communicate and demonstrate the fundamental principles outlined in the Belmont Report—namely, respect for the person, beneficence, and justice. Relative to the three

Belmont Report principles, Miracle (2016) stated that people are self-governing beings with the right to determine their study participation levels. Miracle further stated that researchers should do participants no harm while attempting to increase potential benefits and decreasing any potential adverse effects. Lastly, Miracle addressed the concept of fairness and trust between researchers and participants. As the researcher, I actively pursued the applied application of these principles in my study not only to protect the participants but also to help address study reliability and validity.

In an ongoing fashion, I communicated my plans and activities with my chair and fellow doctoral students to gain feedback and advice. This approach served as a precautionary measure to ensure that sufficient mitigation strategies were in place to address bias issues that might arise. I did have a personal or professional history with one target company but not their respective participants.

As discussed in more detail below, the primary rationale behind employing a purposeful sampling technique was to select the best possible candidates to interview. Morse (2015) highlighted the potential bias that directed sampling schemes can introduce concerning a small population study and a study's ability to be accurately reproduced with other participants whose ability to address the phenomena at hand might not be equivalent. Therefore, the capture, analysis, and reflexive documentation of participant insights and experiences were critical to the success and ultimate value of this study and its findings.

Participants

Study participants were comprised of IT telecom executives who influence or make firm-level cloud adoption and diffusion decisions in three large (revenues greater than $5 billion) telecom-related companies with a headquarters in the United States. Study participant selections were based on individual IT executive selection criteria, how well they mapped to one of the six roles, and their ability to provide detailed descriptions of their firm-level cloud adoption and diffusion experiences. The six organizational roles (or their respective functional equivalents) examined per case were chief information officer, chief technology officer, chief cloud architect, vice president/director of cloud development, vice president/director of cloud operations, and vice president/director of enterprise applications.

Developing a strategy to identify, review, and gain access to participants is essential for researchers (Høyland, Hollund, & Olsen, 2015). For this study, I used personal and business relationships to identify and approach potential candidate companies. Peticca-Harris, deGama, and Elias (2016) stressed, as confirmed in McFadyen and Rankin (2016), the importance of leveraging relationship managers (e.g., gatekeepers) to gain participant access to conduct research. I worked with my personal network and with the telecom industry leaders within my firm to generate a shortlist of candidate companies and their respective gatekeepers. Once I obtained the appropriate institutional review board (IRB) approval (#02-08-19-0525494), each candidate company gatekeeper was contacted to ascertain corporate-level study participation interest and process Walden University-based cooperation letters or corporate nondisclosure

agreements (NDAs) with Walden University. Thus, once a corporation was selected, and an executed cooperation letter or NDA was obtained, and appropriate IRB partner-level approval was received, the identified corporate gatekeepers were leveraged to facilitate communications and gain access to participants. These principal gatekeepers helped facilitate role-mapping efforts and the identification and preliminary qualification of potential study participants. Participant selection criteria, for each case, were comprised of senior IT executives who had at least one year in their current role and at least ten years of IT leadership experience and who had successfully experienced procuring and deploying an enterprise-class cloud solution based on case-specific organizational role-mapping requirement needs.

To improve the reliability and validity of a study, researchers need to establish, nurture, and document participant relationships (Peticca-Harris et al., 2016). Carter et al. (2017) suggested developing and employing participant-centric approaches to increase recruitment success rates. According to Kornbluh (2015), the perceived quality and satisfaction levels of participant and researcher interactions can significantly inform data collection efforts. Thus, gatekeepers were able to facilitate initial introductions, establish preliminary working relationships, share study particulars, present interview parameters, and address any confidentiality concerns. Collegial interviewers solve procedural problems and are dynamically reflexive during an interview while building rapport with participants (Hoover et al., 2018). Given the seniority level of the participants, quickly assessing and managing the interviewer-interviewee relationship was important.

Dixon (2015) suggested that establishing participant inclusion boundaries is essential. Documenting the eligibility criteria of qualitative case study participants is even more critical given the possible population pool size (Morar et al., 2015). When the number of cases in a collective case study is small, purposeful sampling is a viable means of selecting eligible participants (Etikan, Musa, & Alkassim, 2016). Participant selection criteria, for each case, were comprised of senior IT executives having at least one year in their current role, at least ten years of IT leadership experience, and who had successfully experienced procuring and deploying an enterprise-class cloud solution by case-specific, organizational role-mapping requirement needs. Thus, senior IT executives who staff the six identified IT executive positions, who meet the participant selection criteria, and who take part in firm-level cloud innovation adoption and diffusion strategy development and execution, were eligible to participate in the study. Equivalent position titles, based on role responsibilities, experience, tenure, and skill, were considered, as appropriate, to make sure each role, across all the cases, had participants identified. In that way, each case was comprised of at least six interviews, at least one from each stated organizational IT role, to assist individuals and collective case data analysis efforts. Those IT executives who did not meet the eligibility criteria or had job descriptions and titles that did not correctly align with the identified roles were excluded. Once a specific role participant was identified and positively engaged, no other candidates were considered for that specific interview role unless a participant withdrew or the gatekeeper specifically recommended withdrawal. In either case, designated participants, as a function of being selected and sharing from their vast array of relevant experience, aligned with the

overarching research question—namely, identifying strategies to make advantageous enterprise cloud adoption and diffusion decisions.

Tasked with protecting human research subjects' welfare and ethical rights, an IRB provides overarching research process governance and oversight (Liberale & Kovach, 2017). IRB approval should be gained before engaging any potential corporate gatekeepers or prospective downstream individual participants (Ciolfi & Kasen, 2017**;** O'Brien & Steele, 2017). Once I obtained appropriate IRB approval (#02-08-19-0525494), identification of candidate companies occurred, the appropriate gatekeepers were engaged, and letters of cooperation were sought. An IRB exists to protect human research participants at the project level by providing oversight and governance of the research process by U.S. federal law (Hom, Podlogar, Stanley, & Joiner, 2017). As part of the participant engagement process and in compliance with IRB partner-level approval requirements, executed individual consent forms were obtained and archived. Specific data storage processes and practices are detailed below.

Research Method and Design

Qualitative research and a collective case study were the chosen method and design for exploring strategies used by IT executives to make advantageous enterprise cloud adoption and diffusion decisions. The integrated DOI-TOE conceptual framework adopted to examine this topic helped characterize firm-level enterprise-centric IT decision strategies. El-Gazzar (2014) highlighted the literature gap for this topic and suggested that more qualitative studies were needed. Therefore, I conducted a qualitative

collective case study to understand enterprise IT adoption and diffusion issues in more depth.

Research Method

Qualitative research lends itself well to exploring new concepts in great depth (Boddy, 2016; Imran & Yusoff, 2015). Because the qualitative method empowers researchers to explore practitioners' experiences expressively, it was far more relevant to this study than pursuing a numerically based quantitative method. As highlighted in Section 1, the lack of cloud adoption field data has exacerbated researching organizational level decision processes in favor of more individual technology adoption decision research. A wide array of quantitative cloud adoption literature exists, yet the identified gap in high quality qualitative firm-level cloud adoption and diffusion literature offers a tremendous opportunity for researchers in the future (El-Gazzar, 2014). Firm-level cloud adoption and diffusion literature require a more in-depth analysis of anecdotal and experientially based data vice the analysis of discrete data sets (El-Gazzar, 2014).

To that end, qualitative data collection and analysis techniques afford researchers the ability to capture and share rich insights that might not otherwise be exposed (Renz, Carrington, & Badger, 2018). The qualitative process, by design, enables the investigation, aggregation, and analysis, via triangulation, of vibrant content (Fusch & Ness, 2015). Exploration is especially central in the enterprise cloud adoption and diffusion space because literature is limited for large enterprises, and existing literature has focused on cloud technical rather than a broad spectrum, executive IT-related issues of import to senior IT executives (El-Gazzar, 2014). The focus of this study was applied

not theory-driven. Thus, for this study, the qualitative method was more appropriate than the quantitative method.

The quantitative method was once considered but subsequently deselected. Quantitative studies examine, frame, and report on numerical factors associated with the hypothesis that conforms with an identified theory to be explored (Park & Park, 2016). Nassaji (2015) suggested that the quantitative method, being more descriptive, is well suited to analyze numerically coded qualitative data. Chan (2000) revealed that an identified an ever-widening schism between the qualitative and quantitative methods primarily related to organizational level analysis efforts that tend to favor quantitative approaches. Park and Park (2016) reconfirmed that researchers still favor the quantitative method. This unintended bias (Park & Park, 2016) has created a gap in the literature, as identified by El-Gazzar (2014). Thus, as the data for this study was comprised of semistructured and unstructured textual data, I did not select the quantitative method.

The mixed-method was not considered. Like quantitative studies, mixed-method researches combine the aspects of quantitative studies with exploratory textual qualitative data within a single study instance (Venkatesh, Brown, & Sullivan, 2016). Frequently, qualitative studies, which are used to explore a topic, are followed up with quantitative studies used to test hypotheses (Palinkas et al., 2015). Abdalla, Oliveira, Azevedo, and Gonzalez (2018) cautioned that mixed-method studies require more thought than just merging the two other methods. That said, double scope, mixed-method studies, can explore and reveal a great deal of valuable information and insight but can be costly and time-consuming (Fusch et al., 2017). Fusch et al. (2017) went on to suggest that novice

researchers chose a design that is straightforward to address, can readily reach data saturation, can be completed in a reasonable timeframe, and can be completed for a reasonable cost. Lastly, as the data for this study was not empirical but rather semi and unstructured text, the mixed method was not selected.

Research Design

Due to the IT strategy exploration emphasis of the research question, a collective case study design was chosen over an ethnographic or phenomenological approach. Collective case study, including a discrete number of companies and participants, can explore rich information and generate some interesting compare and contrast findings (Baxter & Jack, 2008). Case-level similarities and differences are of value both to the inquiry as well as to understanding the phenomena (Shaban, Considine, Fry, & Curtis, 2017). Thus, given the need to explore topics in more depth, the ability to openly explore the topic is far more befitting the nature of the data required to analyze and report on the topic correctly (Lewis, 2015). Furthermore, case study designs allow researchers to uncover rich information that may not be otherwise captured via other design methods (Yazan, 2015). Lastly, collective case studies seek to explore and describe vice assess a phenomenon (Arghode, Wang, & Lathan, 2017). Therefore, a collective case study design was appropriate to capture, analyze, and report on an enterprise level, senior telecommunications IT executive experiences with making, communication, and executing firm-level, cloud adoption, and diffusion decisions.

A phenomenological design was seriously considered, but it became too difficult to isolate and accurately articulate the concept of the cloud adoption phenomena that

were meant to be explored. Also, given the nature of phenomenological data collection requirements, a far more extensive set of study participants would be necessary to achieve data saturation (Fusch & Ness, 2015). Willis, Sullivan-Bolyai, Knafl, and Cohen (2016) presented phenomenological research as humans relating their perceptions of lived experiences concerning a descriptively defined phenomenon; hence, the results of this form of study focus on the essence of the phenomena itself. Ghaffari and Lagzian (2018) revealed that phenomenological methods had not been applied to cloud computing adoption. Enterprise cloud adoption is an organizational centric construct vice a phenomenological one; thus, a phenomenological design would not readily support the research goals. Accordingly, phenomenological design was not selected.

Ethnography was not considered. Ethnography focuses on analyzing cultural phenomena with a social group (Sirek, 2016). While an organization is a cultural group, the data collection aspects of an ethnographic study require observation while living amongst the cultural group over a period (Sharp, Dittrich, & de Souza, 2016). Given the nature of the research topic, these data collection limitations would not correctly serve to unearth the depth and breadth of data required to address the research question in an acceptable timeframe. Eventually, over many months of observation, sufficient data may be captured to drive data analysis efforts, but the risk associated with potential data detail specificity risk concerning the research question could seriously impair both study trustworthiness and results. Granted formal and informal interviews can take place within the construct of an ethnographic design; they are not the primary data collection means (Jowsey, 2016). Jowsey (2016) lamented that observation still receives preferential

treatment concerning being ethnography's primary data collection medium. Thus, given the nature of the research question, an ethnographic design was not selected.

Data saturation, or the point at which additional data provides no new information, can always be addressed via collecting data from an array of different sources (Hagaman & Wutich, 2016; Nelson, 2016). For this study, three different data sources were selected. Beyond the baseline interview data, each participant was asked to provide additional relevant, textually-based artifacts. These secondary data sources consisted of architectural and other business documents that could be ingested and analyzed. A third data source, publicly available reports such as 10-k's and annual reports, were ingested and analyzed as well. Because each of the candidate companies is publicly accountable, the submission of financial and compliance reports is required for shareholder, public, and analyst consumption. Financial and compliance reports are rich with various degrees of the company, IT cloud strategy, and innovation intention content (Du, Deng, & Qian, 2018). Hennink, Kaiser, and Marconi (2016) provided qualitative study saturation assessment guidance to help gauge when saturation is achieved. My qualitative study saturation attainment strategy is discussed in more detail below.

Population and Sampling

Identifying, accessing, selecting, recruiting, and interviewing the appropriate study participants is a challenging endeavor. Gentles et al. (2015) suggested that careful thought should be applied when framing the research population, sampling method, and participant selection criteria. With this counsel in mind, for this qualitative collective case study, the population consisted of IT telecom executives who influence or make firm-

level cloud adoption and diffusion decisions within three large (revenues greater than $5 billion) telecom-related companies with a headquarters in the United States. Participant selection criteria, for each case, was comprised of senior IT executives having at least one year in their current role, at least ten years of IT leadership experience, and who had successfully experienced procuring and deploying an enterprise-class cloud solution were selected by case-specific, organizational role mapping requirement needs.

For this qualitative collective case study, the bounded sample consisted of at least six participants per company from three selected companies. I worked with my personal network as well as the telecom industry leaders within my firm to generate a short-list of candidate publicly accountable companies based on headquarters locations, willingness to engage, and their top-line revenue. Once identified, each candidate company gatekeeper was contacted to ascertain corporate-level study participation interest and, once agreed on, process inter-corporate cooperation letters. The selection of three similar instrumental cases can help identify what is potentially familiar or different within and across each case (Veinot, Lin, Woods, & Ng, 2017). For each company, six organizational roles (or their respective functional equivalents) were examined and was comprised of a chief information officer, chief technology officer, chief cloud architect, vice president/director of cloud development, vice president/director of cloud operations, and vice president/director of enterprise applications. Most candidate organizations had at least one viable candidate per role. For this study, a purposeful sampling technique (discussed below) was employed. Thus, in the case where two or more viable and interested

participants exists, the most senior, by internal company standards, the available participant were selected with the other candidates being held in reserve.

Guetterman (2015) reported that sample size considerations are two dimensional, namely the size of the sample versus appropriateness or relevance. Accordingly, Guetterman suggested that researchers should identify and document their rationale as well as remain aggressively reflexive throughout the research process. The six different roles per organization were selected to obtain a cross-section of cloud adoption and diffusion data from across the cloud leadership spectrum ranging from executive management, architecture, development, enterprise applications, and finally, operations. Each role provided a slightly different view of the phenomena yet also converged with the other roles with little new data being added as the interviews progressed, thus addressing data saturation requirements. When examining what value could be obtained by adding additional roles to the interview list, the incorporation of a seventh or even eighth role did not appear, on reflection, to bring any additional value. Thus, the six roles identified and selected were deemed the most relevant. Therefore, for case-centric consistency purposes, the same role groups were selected for each company so that inter and intra case analysis can occur to help triangulate the data, achieve data saturation, and tease out more relevant themes.

Stake (1995) stated that sources drive case study sampling that best helps researchers understand the case at hand. Thus, for this study, a purposeful sampling technique was employed. Etikan et al. (2016) defined purposeful sampling as a nonrandom technique that supports the deliberate choice of a data source or a participant

as a function of its participant's qualities. Furthermore, Etikan et al. suggested that purposeful sampling is desirable when the phenomena universe is small and will be studied intensively. Homogeneous purposeful sampling is used when greater emphasis is placed on the depth and similarity of a sub-group to reduce variation and simplify analysis (Palinkas et al., 2015). Thus, a homogeneous purposeful sampling technique was used for this study. Gentles et al. (2015) suggested that researchers must describe what purposeful means in their context else, in neglecting to do so, readers would not be able to judge the rigor of the study due to the lack of precision.

Moreover, Gentles et al. warned that differentiating purposeful from convenience sampling should be incorporated into this discussion. For this study, purposeful sampling was used to identify high-value participants whose skills and experience best mapped to the six organizational roles identified above. Convenience sampling would have worked, but the relative fit of a potential participant to each role may have introduced too much risk.

Ethical Research

Each study participant was offered an informed consent form to review and execute. The informed consent form was intended to communicate the purpose of the study, the handling of privacy and data, risk, and rewards, as well as overall study participant rights (Barnard, 2016). Participants may elect to execute consent forms before the scheduling of any interviews (Santos et al., 2017). Walden University IRB partner-level approval was required before any participants could be contacted at all.

Once IRB approval (number 02-08-19-0525494) had been received, candidate companies were engaged, and the appropriate cooperation letter or NDA was executed. With gatekeeper provided contact information, once the partner-level IRB approval was received, I reached out to individual participants via telephone, in-person, or e-mail as appropriate. Once initial contact with prospective participants had been made, three things occurred, namely the detailed explanation of the study purpose, individual participation requests, and as appropriate, and the sharing of the informed consent forms. Brière, Proulx, Flores, and Laporte (2015) cautioned about the potential issues regarding participant remuneration. Thus, each potential participant taking part in this study did not receive any remuneration. Participation was solely to satisfy academic and professional giveback purposes. Lastly, I adhered to each participant's right to refuse and withdraw from the study at any time without penalties or repercussions. This right included any time during the interview, as well. The participants did not need to inform me of their refusal or withdrawal, which also extended to the partner letters of cooperation or NDA.

Wilson, Kenny, and Dickson-Swift (2017) suggested that participant and relationship protection are essential characteristics in conducting ethical research. Close looping research process activities with the IRB is not only mandatory but is also a great way to help assess both risk and benefits for all relevant study stakeholders (Ferreira, Buttell, & Ferreira, 2015). Accordingly, all electronic materials reside on an encrypted external drive and documents were appropriately marked and handled. All personal and corporate-specific data, even if not sensitive, has been locked away in an appropriately secured safe in my home office for the next five years. After five years, all retained

original copies should no longer be necessary and can be destroyed (Ferreira et al., 2015). I will destroy any original data by physically destroying the USB and SD storage devices and shredding and burning all physical documentation. No need-to-know exists beyond me for the source data. Therefore, no personal or corporate-specific information will be divulged at any point. A transcription service for interviews was used, under an IRB approved nondisclosure agreement. The transcription service has not retained any source audio data provided to them. This transcription process was incorporated into the IRB submission package and was included in the privacy and data handling review discussion.

Data Collection

Thoughtful, well-documented execution of data collection and analysis processes are essential aspects toward establishing rigor (Hays, Wood, Dahl, & Kirk-Jenkins, 2016). Ivey (2017) cautioned that data collection methods must align with the study question and aims of the study to address the potential validity impact. I used open-ended, semistructured interview questions as the primary data collection means. The semistructured interview process was used to help facilitate eliciting productive enterprise level, cloud adoption and diffusion experience, and strategy data that can be coded, analyzed, and triangulated further. I used the interview protocol (Appendix) to help conduct the data capturing activities for each interview.

In addition to the interviews, I collected corporate enterprise architectural documents, provided by participants, for secondary analysis, while publicly available corporate financial reporting documents and annual reports, many of which contain IT strategy and implementation details, served as the third data source. Enterprise

architecture artifacts, or boundary objects, help facilitate organizational communications and concept understanding between various stakeholder communities (Abraham, Aier, & Winter, 2015). One example of a relevant U.S. Security and Exchange Commission (SEC) filing is the 10-k report, which presents a comprehensive analysis of the company to include research and development activities (Du et al., 2018). Furthermore, I captured relevant study participant interview metadata and detailed field notes in addition to interactive participant responses. Twining, Heller, Nussbaum, and Tsai (2017) stressed the importance of a researcher documenting the entire qualitative study data collection lifecycle.

Instruments

I, as the researcher, was the primary data collection instrument. As such, I used semistructured interviews to help elicit participant experiences relative to the questions depicted in the interview protocol document (Appendix). The breadth and depth of information participants are willing to disclose during the interview process significantly influences both a study's contents as well as its eventual findings (Saunders & Townsend, 2016). I used both reflexive journals and comprehensive field notes to capture additional information during and after the interview. Researchers use reflexive journals to document data collection decisions and interview metadata to facilitate later data collection integrity determinations (Lincoln & Guba, 1985). Furthermore, Fusch et al. (2017) stated that extensive note-taking during the interview process helps capture participant body language and semantic context of their responses. Ad hoc questions were sparingly used to mitigate researcher bias to the extents possible, but as appropriate,

I asked appropriate follow-up questions. Follow-up questions are meant to explore specific content further as well as to demonstrate to participants that their answers have been both captured as well as understood by the researcher (Kallio, Pietilä, Johnson, & Kangasniemi, 2016). The overall integrity of these processes is essential in establishing individual trustworthiness attribute strategies (Lincoln & Guba, 1985).

When practical, I traveled to the participant's worksite and coordinated with the gatekeepers to schedule conference rooms, refreshments, audio equipment, and validate availability for conducting in-person or Skype-based interviews. The goal for each partner company was to conduct the interviews over a 2 to 3-day span, allowing me to take notes and update journals accordingly. I used a transcription service for timely results and review data to ensure accuracy with the audio. On completion, I member checked the transcribed data with the participants, preferably in-person with Skype and email being alternatives, to ensure the contextual meaning of the answer were accurate. I also coordinated with gatekeepers to set additional dates if participants were unable to meet the appointment for reasons outside the right to refuse and withdraw. These processes were intended to help address the reliability and validity issues of the data collection process.

Data Collection Techniques

No data collection activities occurred until partner-specific Walden University IRB approval had been obtained. Once IRB approval (number 02-08-19-0525494) was granted, I contacted the gatekeepers of multiple large telecommunications companies, with headquarters in the United States, to present cooperation letters for their review and

execution. Once an executed cooperation letter or NDA had been received and the appropriate partner-level IRB approval granted, with gatekeeper provided contact information, I worked to explain the study and its participant requirement needs. An initial list of potential eligible candidates was created, in collaboration with gatekeepers, and the process of participant recruitment began. The process for onboarding each participant has been explained above. Brinkmann (2016) suggested that interviews are an appropriate data collection technique for qualitative studies examining strategies. Malli and Sackl-Sharif (2015) confirmed this and goes on further to highlight how interaction dynamics can significantly inform data quality. Once the roster of interviews per company or case were completed, data collection activities were planned onsite, if pragmatically possible, to maximize face to face time and conduct the interviews. Face to face was preferred as this was a complex phenomenon to examine. According to Fusch et al. (2017), direct observation is foundational to conducting qualitative case study data collection, but warned that novice researchers need to manage bias proactively. The notes taken during this process significantly helped establish context, mitigate researcher bias, and ensure that the participant’s voice was more accurately heard. Lastly, two audio recorders were used, a primary and a secondary. This redundancy was intended to address any device or operator failure issues out of respect of the participants' time. The backup recording was only used if the original recording was damaged or unusable for any reason.

Research study participant convenience and comfort are essential (Dikko, 2016). When possible, interviews were conducted in-person, onsite. Member checking sessions

were conducted with Skype and email being secondary means. When possible, I traveled to the participants and worked with the respective gatekeepers to schedule conference rooms, water, audio equipment, and validate availability. The goal was to conduct at least six interviews over a 2 to 3-day span allowing me to take notes and update journals accordingly. Because a transcription company was used under NDA, I was able to have the transcripts returned to me quickly, and the ability to member check content with each participant occurred promptly after my review and validation of the transcripts. The transcription company was not 100% accurate; thus, the need arose to review and correct contextual and industry-specific terms personally. Member checking and triangulation, according to James (2017), help strengthen data authenticity. Makeup dates were scheduled if a participant was unable to attend follow up appointment times.

When possible, I conducted member checking in-person and, as needed, via Skype and email. For each participant, I shared and requested edits to the interview summary material to ensure I appropriately captured the participant's perspective. As needed, I followed up verbally via Skype to address any questions and, if participants were willing, pose additional follow up and qualifying questions. Member checking not only facilitates validating that the contents of a transcribed interview are correct but also allows researchers to ask additional follow up questions (Harvey, 2015). Member checking is considered crucial toward establishing credibility (Lincoln & Guba, 1985). Member checking also enables researchers to address any potential data collection misunderstandings that may impact the precision of any findings (Caretta, 2016). Varpio, Ajjawi, Monrouxe, O'Brien, and Rees (2017) suggested that qualitative researchers, like

full disclosure, should comprehensively report participant participation data (e.g., invited, responded, withdrew) as well as any changes in interpretations that occurred as a result of member checking.

Gatekeepers and participants were asked to contribute relevant architectural and business documentation relevant to the research questions. Participants were sufficiently skilled and senior enough to recognize what related artifacts they could supply to help assist the study. The derived value to their organization helped trigger another level of cooperation and data sharing openness. The collection of publicly available compliance reporting data and annual reports, which contain IT strategy and implementation discussions, was found in the investor portion of the corporate websites. By collecting data from three different sources, data saturation and triangulation issues were addressed, but additionally, also helped address DOI recall bias issues that were introduced in Section 1.

Data Organization Techniques

The ability to capture participant contributed data in a well-documented, accurate manner, considerably helped facilitate external reader trustworthiness evaluations and perceptions. Information submitted by and/ about particular participants were named accordingly, for example, C1 P1 EADOC, C2 P3 Notes, C3 Reflexive_Journal. Excel spreadsheets were used to maintain a simple document management system. Broman and Woo (2018) suggested that spreadsheets are valid multi-purpose tools that help organize and stage data for additional downstream digital analysis capabilities. Collected data's attributes were manually organized in Excel to enable other data processing tools. Atlas.ti

is a comprehensive qualitative data analysis platform (Paulus & Bennett, 2017). Furthermore, as noted in Denneson et al. (2017), Atlas.ti can be used to organize and support transcript analysis. Accordingly, I leveraged Atlas.ti to conduct thematic language processing analysis of my digital data. This data will be retained in a locked container for five years and then discarded.

Data Analysis Technique

Fusch and Ness (2015) stressed the need to focus on achieving data saturation. Iterative data processing techniques, involving multiple different data sources, enhance study analysis procedures and stimulates triangulation analysis efforts (Van Dongen, Habets, Beurskens, & van Bokhoven, 2016). Thus, a continuous analysis modeling technique, leveraging Atlas.ti, was used to fold in and analyze new data after it had been captured and its source and handling metadata accurately documented. Recursive data analysis enables incremental, actionable, value-added insight to be teased out promptly (Kerwin-Boudreau & Butler-Kisber, 2016). As such, contextually-based theme development techniques were used to identify themes from the semistructured data being collected. Natural language processing (NLP) techniques can also be used to isolate verb-noun pairs to isolate specific semantically-based themes (Renz et al., 2018). Code and meaning saturation, as defined in Hennink et al. (2016), represents a method of assessing code and theme organization. These iterative approaches, collectively, helped drive analysis efforts toward successfully identifying and achieving data saturation and a finalized thematic model.

Triangulation

Triangulation helped validate study-specific data collection processes and practices and encompassed the use of a variety of complementary analysis techniques geared toward gaining topical insights (Yazan, 2015). Barnham (2015) suggested that triangulation helps empower greater faith in qualitative findings. Mayer (2015) named data, theoretical, methodological, and investigator as the four forms of triangulation. Furthermore, Mayer described data triangulation as the use of different data or sources, theoretical triangulation as the use of multiple theoretical positions, methodological triangulation as the use of a mixed-mode research method, and lastly, investigator triangulation as the usage of a second researcher to collect and analyze data. Based on the defined study parameters and design, I used data triangulation for the analysis.

Data triangulation means collecting data at different periods, from different sources, to obtain a much more detailed description of the phenomena being examined (Abdalla et al., 2018). Hence, data triangulation, to support study validation processes, is often used to analyze multiple sources of data in the same study (El Hussein, Jakubec, & Osuji, 2016). Beyond the interview transcripts, source enterprise architecture documents provided by participants as well as publicly available annual report data was ingested, parsed, and coded.

Varpio et al. (2017) warned researchers against just describing what they will triangulate, but to also document how. Furthermore, Tonkin-Crine et al. (2015) advised caution when triangulating due to its complex nature. As previously stated, the Alkhalil et al. (2017) integrated DOI-TOE model was selected as my foundational model to capture

better and characterize complicated enterprise innovation adoption and diffusion decisions. Thus, for this study, because the source data comes from similar contexts, a consistent style of interpretation and coding was employed across the different cases and data sources. Because I was the sole coder, the ability to maintain cross data interpretation and coding consistency was higher. Data triangulation was used to analyze different data sources collected from different actors, primarily via interviews, through a consistent lens. As represented in Varpio et al. (2017), supported by Jentoft and Olsen (2017), not only are different perspectives expected, they help in developing a richer understanding of the phenomena under study.

Themes

I conducted inter and intra case analysis using open and axial coding as well as constant comparative methods. Mohajan (2018) characterized open coding as the process of identifying and labeling essential words, or groups of words, in a sequential process. Mohajan also characterized axial coding techniques as a means of enabling researchers to analyze major categories and flesh out and link sub-categories. Zhang and Wildemuth (2016) portrayed the constant comparative method as a means of managing coding categories via analyzing phrase to category mappings to make sure each category is well understood and documented.

In addition to the open and axial coding methods, NLP techniques were leveraged to conduct study coding and theme analysis. NLP assists researchers in identifying relevant insights that might not otherwise be found (Renz et al., 2018). Researchers recognize Atlas.ti as one of a select few higher-end, qualitative data analysis software

(QDAS) tools (Paulus, Woods, Atkins, & Macklin, 2017). Researchers use QDAS to support a variety of research designs, especially the analysis of textual data collected via interviews, focus groups, documents, and field notes (Woods, Paulus, Atkins, & Macklin, 2016). Woods et al. (2016) found that the more significant majority of QDAS usage (greater than 95%) was to support qualitative research studies. Atlas.ti, as a data analysis and data management tool, supports complex data visualization, critical theme concept matching, and coding (Jarvis, Wachowiak, Walters, & Kovacs, 2017; Woods et al., 2016). Atlas.ti facilitates code assignment and analysis (Woods et al., 2016). Additionally, Paulus and Bennett (2017) suggested the use of Atlas.ti as a project management tool as well due to its ability to document decisions thus aiding transparency. Paulus and Lester (2015) argued that Atlas.ti offers superior analysis support than what is possible by hand. Therefore, intercase analysis of attributed codes, supported by Atlas.ti, was used to solidify specific themes. Intracase analysis efforts focused on evaluating and determining the commonality or uniqueness of each case.

Reliability and Validity

Adhering to disciplined research processes is an essential aspect of developing and demonstrating reliability and validity. Additionally, demonstrating both consistency and integrity with study participants helped facilitate both the gathering as well as follow-on validation of the input data. Member checking is an essential aspect of ensuring the participant's voice, and not the researcher's bias is appropriately captured and articulated. Dikko (2016) defined reliability as the consistent measurement of a concept attenuating bias, while Zamanzadeh et al. (2015) stated validity was the proper representation and

utilization of measurement instruments to execute a study. Dikko would affirm a study as being reliable if the same participants were reinterviewed, using the same questions at different times with similar data being collected. Leung (2015) stressed, relative to the issue being explored, the appropriate end-to-end design alignment and researcher choices are crucial qualitative study validity drivers. Thus, concerning the validity, the same protocols, instruments, and sources of data (e.g., interviews, strategy documents, and publicly available annual reports) were leveraged, for each case, to ensure consistency, facilitate triangulation, and address data saturation.

Lincoln and Guba (1985) presented trustworthiness as defining the critical perspective of how qualitative research study rigor can be articulated and established. Lincoln and Guba defined and positioned trustworthiness as the aggregation of dependability, credibility, transferability, and confirmability that were equated to their quantitative counterparts' internal validity, external validity, reliability, and objectivity. Morse (2015) confirmed Lincoln and Guba. The strategies to achieve qualitative study rigor trustworthiness (e.g., persuade a reader that the findings of the study are worth considering), as defined by Lincoln and Guba, are discussed below.

Credibility

For qualitative studies, credibility is the measure of how well (e.g., accurately) the research represents the issue being examined (Noble & Smith, 2015). Techniques that can be used to address credibility issues include prolonged engagement, persistent observation, triangulation, negative case analysis, peer-reviews, and member checking (Lincoln & Guba, 1985). Ensuring that study participants are eligible/qualified is

essential in establishing initial study credibility (Liao & Hitchcock, 2018). Additionally, close-looping interview transcript contents with participants are vital in making sure collected data accurately capture their experiences (Birt, Scott, Cavers, Campbell, & Walter, 2016).

Additionally, member checking sessions create opportunities for the collection of supplementary content (Caretta, 2016). As interviews were the primary form of data for this study, meticulous care was required to plan, schedule, execute, reflect, document, and member check these sessions. Other forms of data were used to augment and triangulate the interview data. Beyond the interviewing process, the rigor, care, and quality of the capturing and reporting of the entire study lifecycle were of paramount importance. Thus, for this study, adherence to the tenets cited above were critical success factors. The methods and techniques outlined in this section provided the structural guidance required to safeguard compliance.

Transferability

For qualitative studies, transferability refers to the ability to cast or project study findings to another phenomena or population via the imposition of abstractions (Amankwaa, 2016). Guba and Lincoln (1989) suggested that this is the prerogative of a third party, while Morse (2015) suggested that this is the prerogative of the original researcher. Although Morse expressed that qualitative study finding transferability is left to the researcher to decide, Merriam (1995) asserted, confirmed by Twining et al. (2017), that qualitative study findings are not externally transferable. While Merriam suggested that no additional external transferability is assumed in qualitative studies, researchers

should provide sufficient information to enable individual opinion formation. Thus, for this study, individual and collective case transferability was left to the reader to determine.

Dependability

For qualitative studies, dependability refers to the ability to repeat the study and generate the same results (Constantinou, Georgiou, & Perdikogianni, 2017). Dependability establishment strategies, such as triangulation, reflexivity, analysis complexity, and providing a detailed description of the research process, assist readers in replicating a study (Hays et al., 2016). Additionally, the use of over-lapping data analysis methods (e.g., triangulation, stepwise replication) can assist in establishing dependability (Morse, 2015). To help manage consistency, an interview protocol, and member checking were used to help guide and document participant interactions. Triangulation, as described above, was used to help safeguard relying too heavily on any one data source.

Confirmability/Objectivity

For qualitative studies, confirmability refers to how well researchers can mitigate their own bias and ensure that data collected, to the extent possible, represent participant perspectives (Abdalla et al., 2018). Similar to dependability, the credibility techniques discussed above also convey to confirmability (Hays et al., 2016). Beyond member checking, the proactive use of comprehensive notes, audit trails, and reflexive logs assist in addressing researcher bias (Korstjens & Moser, 2017). Additionally, for this study, three different data sources were used to help address DOI recall bias issues previously

discussed, as well as to address any potential data saturation issues that might have arisen.

Transition and Summary

After restating the purpose of the study, Section 2 discussed researcher ethics and proposed active mitigation approaches. Section 2 also provided information and justifications on study participant, sampling, methodology, and design, to include any associated decisions made thus far. Section 2 also presented data source, collection, storage, and analysis techniques and decisions made thus far. Lastly, impactful reliability and validity issues were presented and discussed.

Section 3 presents my research study findings, describe practical, applied applications for professional practice, address relevant implications for social change, addresses call to action and further study recommendations, reflect on my efforts and valuable lessons learned, and, lastly, offer some concluding remarks.

Section 3: Application to Professional Practice and Implications for Change

Overview of Study

The purpose of this qualitative collective case study was to explore strategies used by IT executives to make advantageous enterprise cloud adoption and diffusion decisions. This study was guided by an integrated DOI and TOE conceptual framework to better capture and model this complex, multifaceted problem space. Table 1 depicts the Alkhalil et al. (2017) conceptual framework model that is based on the integration of the DOI and TOE conceptual models. Table 2 demonstrates how well-aggregated factors from each of the conceptual frameworks—DOI and TOE, respectively, contribute to the overall collected evidence. The study's population consisted of IT executives with cloud centric roles in three large (revenues greater than $5 billion) telecom-related companies with a headquarters in the United States. Data collection included semistructured individual interviews (n = 19) and the analysis of publicly available financial documents (n = 50) and organizational technical documents (n = 41). I used data triangulation and interviewee member checking to increase study findings validity. Intercase and intracase analysis using open and axial coding and constant comparative methods were leveraged to identify five major themes namely top management support, information source bias, organizational change management, governance at scale, and service selection. The findings showed techniques that the IT executives used to make advantageous enterprise cloud adoption and diffusion decisions.

Presentation of the Findings

The main research question of this study was: What strategies do IT executives use to make advantageous enterprise cloud adoption and diffusion decisions? The five main themes identified, and how executives find ways to address them, are discussed in detail below. Three cases were explored, totaling 19 participants. To improve readability, the following nomenclature will be used: C represents the case number, while P represents the participant number; thus, C2P4 would be the fourth participant from Case 2, and C3P5 would be the fifth participant from Case 3. The five themes exemplify strategies that IT executives could use to make advantageous IT cloud adoption and diffusion decisions. Each theme is introduced, synthesized, and tied back to the conceptual model with each contributing factor broken out into its paragraph.

Table 1

Alkhalil, Sahandi, and John (2017) Conceptual Framework Model

Context	Factor	Source	Description
Innovation characteristics	Relative advantage	DOI	Cost reduction, agility, back-up, higher performance
	Complexity	DOI	Lack of cloud environment knowledge, lack of cloud service management skills, cost management issues, risks management, cloud immaturity
	Trialability	DOI	Ease of testing
	Risks	DOI	Privacy and confidentiality concerns, vendor lock-in, loss of control
Technology	Compatibility	DOI	Organizational culture and staff impact, interpretability issues
	Size	TOE	Large data migration issues
Organization	Organization readiness	TOE	Levels of expertise
	Internal social	TOE	Need for adaptation, disruption of current business processes
	External social	DOI	Collaboration
	Top management support	DOI	Competitiveness, outsourcing culture, trust
Environment	Information sources	TOE	Difficult to access information, complexity
	Regulation	TOE	Legal implications concerns, data ownership, service level agreement
	CSP selection	TOE	Cloud provider and service selection difficulty, increasing number of cloud providers and their configuration

Table 2

Conceptual Model Frequency

	Participant		Document	
Conceptual model	Count	References	Count	References
DOI	19	383	66	138
TOE	19	367	33	81

Theme 1: Top Management Support

Undertaking a comprehensive enterprise-scale cloud transformation journey requires steadfast commitment, open communication, and superior strategic and tactical leadership business and technical skills. The top management support theme (e.g., executive leadership) exemplifies these management qualities targeting the facilitation and stewardship of a large enterprise IT cloud adoption and diffusion decision support ecosystem. Eight of the 13 conceptual framework factors (Table 1) contribute evidence toward this theme: (a) top management support, (b) relative advantage, (c) risks, (d) internal social, (e) compatibility, (f) regulation, (g) complexity, and (h) size. Table 3 and Table 4 depict the aggregated and relative evidentiary contributions of each of these attributes. All participants and 85 documents were leveraged to synthesize the following discussion. Study findings showed how top management support plays an indispensable role in formulating and executing enterprise IT cloud adoption and diffusion decision-making strategies.

Table 3

Conceptual Framework Frequency

	Participant		Document	
Conceptual framework	Count	References	Count	References
Compatibility	19	166	21	61
Complexity	19	90	11	24
CSP selection	17	67	7	9
External social	12	23		
Information sources	19	59	1	1
Internal social	19	148	21	66
Organization readiness	18	86	2	3
Regulation	2	2	1	1
Relative advantage	9	19	14	27
Risks	12	30	6	7
Size	3	5	1	1
Top management support	17	47	10	15
Trialability	3	8	4	4

Table 4

Frequency of First Major Theme

	Participant		Document	
Major theme	Count	References	Count	References
Top management support	19	507	85	202

Organizational architectures play a role in innovation. An unsupportive organizational structure can be a substantial enterprise innovation barrier (Das, Verburg, Verbraeck, & Bonebakker, 2018). As established in DiPietro et al. (1990), the organizational context embodies the organizational structure of a firm. Internal and external social system communication processes and their associated formalities (e.g., informal or formal) are also considered part of this context (Jia et al., 2017). DiPietro et al. asserted the assumption that any person, entity, or process, managed by the firm,

represents an internal organization. Thus, large, sophisticated corporations, possibly nested within multiple divisions or lines of business, are all considered internal organizations (DiPietro et al., 1990).

The internal dynamics of a firm are essential. The management structure complexity characteristic addresses the intricacies of a firm's management structure (DiPietro et al., 1990). DiPietro et al. (1990) represented that the management structure complexity characteristic also embodies a firm's command and control structures (e.g., hierarchies and authority), social system influences, occupational specialties/expertise, and employee professionalism. Firms are comprised of a set of formal and informal structures and processes that can leverage resources to achieve their goals (Campbell & Dopico, 2016; DiPietro et al., 1990). DiPietro et al. asserted that firms do not just stand, but instead, they evolve as the impact of decisions and outcomes accrue over time. As a result, strong leadership is essential. An aspect of strong leadership is excellent communication, which entails ensuring that organizational goals are repeatedly stressed, teams are motivated, and employees are kept up to date on progress and changes (Schermerhorn et al., 2019). Effective and sympathetic leadership, from vision through to institutionalization, is critical toward successful IT cloud innovation adoption (Carreiro & Oliveira, 2019).

Fourteen participants agreed that establishing and communicating a clear direction (e.g., vision, mandate) to include well-defined goals is essential. The establishment, adoption, and nurturing of a market-leading mindset and culture means cloud needs to be viewed as more than just another data center, according to three

participants (C2P2, C2P4, and C3P1). Additionally, C2P2 cautioned that the IT leader managing the IT infrastructure not having the right cloud innovation-centric mindset could represent a significant organizational barrier. C2P2, backed by C3P6, went further and suggested that, even though the cloud has data center-like characteristics, it is far more efficient and flexible, enabling businesses to reimagine their processes in manners not previously envisioned and opening up an entirely new world of possibility. Nonetheless, C2P2 warned that, in some organizations, it might take the retirement of a generation of cloud-adverse executives to stimulate and achieve. Some roles, not even believing change is necessary, can represent some of the most significant organizational barriers, cautioned C2P4. C2P1 suggested that IT become an innovation center and solution-centric business partner vice remaining to be a traditional sunk-cost, cost center.

In many instances, IaaS-based workloads, when moved to the cloud, can end up costing more from a total cost of ownership perspective, than current on-premise solutions (Fisher, 2018). C2P4 suggested that merely viewing cloud as another compute solution dramatically limits its potential. Additionally, ten participants stressed the critical nature of being creative and open to innovative concepts, such as business models (especially finance), transformational activities, sourcing strategies, architectural approaches, compute composition, process reengineering, and automation, among others. C1P2 cautioned that the inability to adapt to new paradigms contributes to inertia, further exacerbating existing internal change management difficulties. Failure to successfully do so, according to C3P2, could impact overall firm valuation and cash flow.

As such, the top management team must understand, capture, and communicate desired outcomes (Yigitbasioglu, 2015). Six participants agreed that wholesale, all-in commitment to the cloud is required to help motivate organizations to follow through on commitments effectively. Hence, the need for both near and long-term roadmap planning and prioritization was discussed by seven participants. Further, four participants (C1P2, C2P2, C2P5, and C3P3) stated that the development of both greenfield and brownfield strategies is required. According to eight participants, competitive differentiation, agility, and the ability to reallocate resources are essential toward enabling successful IT cloud adoption and diffusion decisions.

Agility matters according to five participants who agreed that strategy perfection is not required. They cautioned that too much time is often spent planning and bogging down vice just adopting a do it attitude and moving out. In some cases, though, based on two participant's (C1P2, C2P4) experience, an executive decree may be required to help jump-start initiatives. Four participants (C1P1, C1P6, C2P2, and C2P4) viewed their organizations as being market leaders that significantly alters how they engage with both their own and other organizations. According to C2P2, once a certain level of cloud maturity is reached, looking over the horizon to see what is next is both invigorating and challenging at the same time. Hence, being able to drive service provider requirements helps position both current and future IT cloud innovation adoption successes. Dominant firms can dictate market conditions (e.g., price, quality, and service) as well as an industry's competitive landscape; thus, forcing other market participants to respond accordingly (DiPietro et al., 1990; Zamuee, 2016). In some industries, dominant

customers can significantly inform an industry's innovation rate by dictating supply chain engagement terms, conditions, technologies (DiPietro et al., 1990; Raja et al., 2018).

At the individual factor level, top management support (Table 1) represents how leadership helps establish and drive an organization’s posture. Competitiveness, in this study’s construct, represents how aggressively cloud-based paradigms are going to be considered and ultimately implemented and an outsourcing sensitive culture adopted. Trading partner support and relationship management is an essential aspect of cloud competitiveness (Gangwar et al., 2015). Lastly, trust is both organizational as well as personal. Trusting a third-party service provider to take on and run a significant piece of functionality, for a corporation, is not a trivial matter nor is establishing trust between individuals both internally and externally (Rahi, Bisui, & Misra, 2017). The absorptive capacity of top management leadership affects IT cloud adoption decisions (Ratten, 2015). Ultimately, how mature, or not, an organization can become is a function of how vested and engaged senior leaders are in the technologies, processes, and people (Heavin & Power, 2018).

Relative advantage signifies the degree to which an innovation is viewed to be better than an existing capability (Kee, 2017; Rogers, 2003). From DOI, the derivation of this value is multidimensional and is comprised of contributions from the following aspects: economic, social prestige, convenience, satisfaction, and risk (Rogers, 2003). Whether a vast cost reduction is being sought, increased organizational bandwidth, or improved technical performance, the perceived relative advantage of an innovation, especially cloud, matters from an initial identification, concept consideration, and

leadership decisioning perspective. Shuaib, Samad, Alam, and Siddiqui (2019) asserted that relative advantage is a crucial cloud adoption determinant. Nonetheless, for this study, relative advantage, per Table 3, was not discussed much during the data collection process though it was often stipulated. Cost management discussed further below, seemed to dominate financial evidentiary thoughts considerably more than cost reduction. From a clear relative advantage characteristic perspective, agility-based comments were far more frequent than any of the others. The ability to quickly (and easily) do something, especially from continuous integration, continuous delivery (CICD) development operations perspective, was stressed to be of critical importance. As leaders evolve their understanding of the cloud's relative advantages, their ability to better manage policies and management structures improves (Gangwar et al., 2015). As an innovation's relative advantage measures begin to emerge and stabilize, a clear and unambiguous advantage can inform evaluations and even possible adoption or rejection rates (Greenhalgh et al., 2004).

Risks, as defined in Table 1, were not a primary driver (Table 3) and came up infrequently during data collection. Though, as attributes of risks per Table 1, privacy and loss of control concerns existed, vendor lock-in seemed to dominate this factor's contribution to the evidence. Al-Badi, Tarhini, and Al-Qirim (2018) presented a comprehensive cloud computing adoption risk-centric, a conceptual model that considers three dimensions, namely legal (privacy and confidentiality), technical (security and vendor lock-in), and operational (loss of control). In this study, security, in the large, was discussed broadly as a top management issue by all the participants, with many stressing

that security incorporation into a cloud strategy realization plan is a mandatory requirement. That said, much of the security and nonvendor lock-in discussion was attributed to other factors such as compatibility and complexity as these were more appropriate to the content's context than risks were. Concerning vendor lock-in, a comprehensive multi-cloud strategy, discussed in more detail below, was broadly recommended as a means of mitigating this concern.

The need for organizational adaptation and current business process change, referred to as internal social in Table 1, were dominant topics (Table 3) during the data collection process. A firm is comprised of a set of formal and informal structures and processes (Campbell & Dopico, 2016; DiPietro et al., 1990). Formal processes, as well as informal social norms, influence a firm's relative innovativeness (Kurnia et al., 2015). DiPietro et al. (1990) asserted that firms are not just stood up, but instead, they evolve as the impact of decisions and outcomes accrue over time. Accordingly, business transformation is a traumatic event for an organization across multiple dimensions. Rogers warned, supported by Chandler and Hwang (2015), that internal social system pressure could unduly influence deciders toward a decision even if they remain uncertain. This latent pressure not only significantly affects the adoption rate but grows more significant as more decision-makers arrive at their conclusions (Chandler & Hwang, 2015; Rogers, 2003). Unplanned personnel issues could arise leading to organizational architecture and leadership adjustments. According to participants, many well-established business processes needed to be reengineered or retired, while an array of new processes needed to be instantiated. Internally, DiPietro et al. (1990) advised that a variety of

techniques and communication methods can be employed to share information laterally. These methods help facilitate innovation adoption decisions and any subsequent diffusion activities as well as help firms absorb higher rates of information exchanges and adaptations (DiPietro et al., 1990). For the three cases, the enterprise-level impact of this factor was considerable requiring great top management focus.

Per Table 3, compatibility, or the impact on organizational culture and staff as well as interpretability issues (Table 1), was a dominant factor. From DOI, compatibility signifies the degree to which an innovation aligns with existing values, needs, and expectations of an adopting organization (Kee, 2017; Rogers, 2003). The adoption and diffusion of IT cloud capabilities within the three case organizations introduced significant amounts of trauma requiring that each organization, and their top management, mature and persist through the institutionalization efforts. Comparing and contrasting internal social and compatibility is a meaningful discussion. The need to make a change vice the impact of a change are obviously two different things, but they are equally dominant concerning large-enterprise IT cloud adoption and diffusion data collection and analysis deliberations. Organizational inertia does not subjectively change just because an environmental or technological change has been introduced (Wang, Liu, Liang, & He, 2017). Overcoming organizational inertia was identified by many of the participants as one of the significant leadership hurdles they needed to address as part of their cloud journey. The net result, especially to staff, was substantial consisting primarily of organizational impact more so than interpretability issues. Consequently,

capable leadership has a positive effect on successful cloud innovation adoption (Ratten, 2015).

Law and regulation changes impact innovation adoption. Classes of regulatory activities that significantly impact innovation adoption are economic, social, and institutional regulations (Blind et al., 2017; DiPietro et al., 1990). Government regulatory activity, such as new constraints or levying new technology requirements, can significantly impact an entire industry and its innovation activities (Amini & Bakri, 2015; Baker, 2011). Economic regulations include antitrust, merger and acquisitions, price, monopolies, and compliance reporting (DiPietro et al., 1990). Social regulations include environmental protection, workers' health and safety, product, and consumer safety, and personal privacy (DiPietro et al., 1990). Institutional regulations include liability law, employment protection, immigration law, bankruptcy laws, and intellectual property rights (DiPietro et al., 1990). For this study, legal implication concerns, data ownership issues, and service level agreements, referred to as regulation in Table 1, were not a major contributing factor (Table 3) though when discussed, this factor was linked to activities holding severe long-term repercussions and top management support concerns. The data ownership and service level agreement characteristics of regulation did not play a significant role in evidence analysis activities.

Complexity, as a significant factor (Table 3), is comprised of several attributes (Table 1). Complexity, or cumulatively, the lack of cloud environment knowledge, cloud cost management problems, lack of cloud service management skills, immaturity of the cloud, and base risk management played a considerable role in each participant's dialog.

From DOI, complexity signifies the degree to which an innovation is deemed to be easily understood or used (Kee, 2017; Rogers, 2003). Complexity calculations are modified, up or down, by the impact severity of a social systems' skills availability and supplemental training requirements (Oliveira et al., 2014). Thus, complexity rating, e.g., from low to high, informs both the innovation adoption decision process as well as its potential adoption rate (Rogers, 2003).

Consequently, the cost management discussion alone was quite significant, as were conversations regarding the lack of skills and knowledge issues. Despite being in the market for quite a few years, cloud services are still a relatively new endeavor that many feel are more complex than their current solutions (Wang et al., 2017). Thus, at the enterprise-scale, levels of complexity increase exponentially, requiring top management to oversee IT resource management diligently (Wang et al., 2017). The amount of time invested by each of the case organizations is considerable. Entire departments have been allocated to prosecuting issues that arise from this factor.

Firm size has an impact on innovation activities. Larger firms are more likely to be active innovation adopters (Baker, 2011; DiPietro et al., 1990). From TOE, size, as an aggregate index, is not a good indicator of a firm's relative innovativeness based on how the relative value of size is derived (e.g., gross revenue, number of employees, profit levels) (DiPietro et al., 1990). Both Baker (2011) and Jeng and Pak (2014) confirmed that size does not necessarily correlate to relative innovativeness. DiPietro et al. (1990) found that despite the variances in its derivation, size is a meaningful descriptor (irrespective of its measure) to differentiate classes of firms, relative to each other. Understanding and

normalizing size factors within an industry may help provide some industry-specific innovation adoption insight. In this case, all three of the case organizations have revenues above $5 billion. Each possesses vast arrays of transactional and historical data. Size, according to Table 1, refers to the difficulties associated with migrating large volumes of data. As demonstrated in Table 3, size is not a major contributing factor but is a constraint. As a derived requirement, size needs to be considered with every planning and service decision. The ability to even adopt a service is constrained by that service's ability to operate at the scale necessary to address size-related issues.

Theme 2: Information Source Bias

Information source bias refers to the individual and cumulative prejudicial impact that different content creation entities may have on IT cloud innovation adoption and diffusion decisions. Three of the 13 conceptual framework factors (Table 1) contribute evidence toward this theme, namely CSP selection, information sources, and external social. Tables 3 and 5 depict the aggregated and relative evidentiary contributions of each of these attributes. All participants and eight documents were leveraged to synthesize the following discussion. Study findings showed how information source bias plays a crucial role in formulating and executing enterprise IT cloud adoption and diffusion decision-making strategies.

Table 5

Frequency of Second Major Theme

	Participant		Document	
Major theme	Count	References	Count	References
Information source bias	19	149	8	10

Recognizing bias requires some skill, insight, and diligence (Ryan, 2018). Content bias influences adopter's knowledge acquisition and adoption deliberations based contextually on who or what they are, e.g., an opinion leader, change agent, or some other industry-recognized source (Rogers, 2003). Specific dissemination methods used to communicate information about an innovation play an essential role in addressing potential bias and mitigating any undue influence that may be placed on stakeholders and their opinions (Rogers, 2003). It is notable for bearing in mind that individual influencers can have a significant impact on adoption decision deliberations (Bettiga & Lamberti, 2017). As such, the continued gathering information about an innovation helps address individual uncertainty and inform ongoing analysis efforts (Rogers, 2003).

Making effective, risk mitigated IT cloud adoption decisions is made even more difficult when the underlying data is skewed. C1P4 strongly warned about buying into hype. Service provider, vendor, and pundit data often contain hype, unproven assertions, and bias (Albee, 2018). Despite this, eleven participants indicated that they rely heavily on service provider provided content that includes social media (e.g. blogs, marketing material, white papers) obtained material. Kee et al. (2016) explored the impact of social media can have as a target population guiding platform and information diffusion

acceleration instrument. In fact, both Albee (2018) and Mathewson and Moran (2016) exposed how product vendors are using sponsored content, disseminated via social media, particularly to romanticize their brand and influence clients. Further, many blogs and bloggers themselves are being strategically sponsored for favorable vendor product placement (Colliander & Erlandsson, 2015).

Rogers (2003) cautioned that people prefer homophilous personal interactions, to include their intrinsic bias, as an information source. Further, Ramazi et al. (2018) stated that people, in fact, purposely seek out homophilous relationships. Nevertheless, bear in mind that homophilous influences can unduly inform adoption attitudes and decisions (Dearing & Cox, 2018). With that in mind, 15 participants stated that service provider relationships are critical components of their information gathering and deliberation processes. Relationship driven interactions can include one on one discussions, tailored briefings, and vendor-sponsored executive briefings in their facilities. Congruently, third-party change agents are often driven by agendas, not necessarily in alignment with client organizations (Haider & Kreps, 2004). Most participants cited the value of the data they receive via these interpersonal interactions but also stressed that these dialogs provide opportunities for case organizations to provide practical feedback and product requirements to service providers.

As an example, from DOI, the persuasion phase represents the evolutionary evaluation efforts to gain insight into an innovation heading toward a decision (Haider & Kreps, 2004). This is a busy time for change agents trying to influence deliberations (Rogers, 2003). Unlike the knowledge phase, also from DOI, this phase is based more on

emotion than critical thinking as adopters actively seek information (El Shaban & Egbert, 2018). Rogers represented that specific communication channels and mediums, especially interpersonal ones, have more impact when evaluating information received. Thus, during the persuasion phase, the role of near peers and nonvendor third parties become increasingly important, e.g., assessing information accuracy, semantics and use of words, and attenuating bias (Rogers, 2003).

Two participants (C1P1 and C1P4) highlighted the fact that vendors seem to filter documentation stressing successes while limiting or not even reporting failures. This lack of visibility and forthrightness creates trust issues that can be challenging to overcome. Albee (2018) specifically addressed vendor content trust, reliability, and relevancy issues and observed that vendors must do a much better job to achieve better results. Moreover, Askalidis, Kim, and Malthouse (2017) explicitly highlighted techniques for overcoming online review bias. Ten participants stressed that they employ a trust but verify approach to service provider literature, using their organic resources, especially when it comes to service performance, cost, and service level agreement data. A great deal of hype is created when new services are brought to market, and at the enterprise level, it could be quite sometime before those services are mature enough to consume. Service-specific maturity issues are addressed in more detail below.

Beyond service providers, industry pundits are also heavily relied on as data sources, as stated by numerous participants with three (C1P2, C1P3, and C2P3) articulating specific bias concerns. The issue here is that pundits have mixed allegiances while trying to be viewed as being objective (Snapp, 2017a; Snapp, 2017b). Sponsored

content has the potential to introduce conflicts of interest and bias. Most pundits receive large streams of revenue from service providers and professional services vendors; thus, their content could be considered prejudiced (Snapp, 2017a; Snapp, 2017b). Correspondingly, four participants (C1P1, C1P2, C1P6, and C2P2) expressed concern about how pundit service provider-related agendas may negatively impact their organizations. Given the high rates of change in the enterprise cloud realm, two participants (C3P3 and C3P4) expressed how, as a result, their relative level of unease often increases. Two additional participants (C1P1 and C1P4) went further stressing that it is nearly impossible to stay on top of the steady stream of content and that they are often overwhelmed and unable to absorb it all. Bear in mind that a large volume of published content may need to be waded through due to it being too dated or no longer relevant. This entire situation is further compounded by the presence of AI or robot-based content tools being used to auto-generate news (Jung, Song, Kim, Im, & Oh, 2017).

CSP selection, from TOE, is a challenging endeavor, especially for large enterprises. As represented in Table 1, CSP selection characterizes the difficulty associated with how specific, cloud-centric services are chosen to include which vendor(s) to leverage in the process. Service selection, as a theme, is discussed in detail below. For macro-level CSP selection decisions, a density issue exists, to include the resultant cumulative bias, which is further compounded by the sheer frequency of new service offerings, coupled with the variability in their configurations, as well as the ever-increasing number of service providers entering the market. Accordingly, the volume of supporting content per service is daunting. Perception informs on mental models that can

be prejudiced by the unconscious ignoring of observed dissonant data (Thuraisingham, 2017).

Consequently, ingesting and making risk mitigated sense of this plethora of data requires a well-coordinated, highly communicative, enterprise-wide effort. DiPietro et al. (1990) acknowledged that social system communications could opportunistically influence or constraint knowledge sharing, transactions, and innovation. Top management must engage in guiding resources and guide decision deliberations.

Information sources, as depicted in Table 1, refers to the difficulty in accessing relevant service provider-related content as well as its relative complexity. Depending on the context of the decision to be made, specific information to help frame and adjudicate a decision could prove difficult both from access as well as technical interpretation perspectives. Other factors address expertise levels and organizational impact, but they are dependent on pertinent data. This relevancy issue is further compounded by potential bias impacting the sophisticated decision at hand. DiPietro et al. (1990) established, demonstrated in Yoo and Kim (2018), that technology support infrastructure embodies the quality and availability of technical information and capabilities as well as external resources. The more complex a technology context is, the higher the labor rates, training, and cost (Amini & Bakri, 2015; DiPietro et al., 1990). The resource cost associated with researching and evaluating the relative quality of cloud suppliers and services can be considerable. Thus, maintaining an understanding of technology supplier capabilities can help mitigate risk and optimize innovation adoption and diffusion decision process activities.

Though not mentioned frequently (Table 3), external social or collaboration, as depicted in Table 1, is nonetheless an essential factor. As revealed, both CSP selection and information sources are complex happenings. The ability to partner with third parties, whether they be a CSP, vendor, industry partner, competitor, or pundit, is critical to help weigh through the data and gain insight. External communication linkages exist to collaborate with third parties, collect information, and then make this information available to internal resources (DiPietro et al., 1990). Seven participants discussed how they leveraged service provider professional services as a means of piloting an offering or working through some information interpretation difficulties. For that reason, establishing and maintaining open internal and external communications channels can help mitigate risk and optimize innovation adoption and diffusion decision process activities.

Theme 3: Organizational Change Management

Organizational change management (OCM) concepts have been around for many years. OCM, as defined in Bögel, Pereverza, Upham, and Kordas (2019), can be represented as having three different views, namely the macro (system), meso (organization), and micro (individual) levels. Each level has its characteristics and organizational process implications (Bögel et al., 2019). For this study, the OCM theme focuses on the strategic transformational realm (e.g., macro and meso levels) rather than the more tactically focused project or micro level. More specifically, this study focuses on the enablement and operationalization of a complex, enterprise-centric IT cloud adoption and diffusion decision ecosystem. Seven of the thirteen conceptual framework

factors (Table 1) contribute evidence toward this theme, namely compatibility, internal social, complexity, organization readiness, top management support, risks, and size. Tables 3 and 6 depict the aggregated and relative evidentiary contributions of each of these attributes. All participants and 71 documents were leveraged to synthesize the following discussion. Study findings showed how organizational change management plays a vital role in formulating and executing enterprise; IT cloud adoption, and diffusion decision-making strategies.

Table 6

Frequency of Third Major Theme

	Participant		Document	
Major theme	Count	References	Count	References
Organizational change Management	19	572	72	177

Cameron and Green (2015) offered that leadership plays a critical role in facilitating large scale organizational change. As such, leadership needs to collectively address the following representative initiatives that could (and should) be contained within a comprehensive enterprise-class, IT cloud adoption and diffusion decision OCM program namely business case development, organizational design, talent and training management, operations management, agile adoption and propagation, software product line engineering, regulatory and compliance management, CICD process development, and governance establishment. Each of these initiatives has associated crucial enterprise-wide performance indicators that need to be tracked and reported on to help support internal alignment, evangelism, and resistance management efforts. In fast-moving

organizations, being able to effectively drive change while meeting ongoing revenue requirements requires leadership acumen, emphasis, and follow-through. Consequently, business and IT alignment are crucial in successfully enabling complicated organizational modernization efforts (Govindaraju, Akbar, & Suryadi, 2018).

Organizations do not remain static. Though seemingly stable, Rogers (2003) declared that organizations frequently innovate through a social system's culture. An organization's culture can negatively impact an organization's ability to absorb change and inhibit growth (Wisdom et al., 2014). Specific examples of cultural resistance include lack of innovation awareness or impact, lack of innovation-decision process skill and clarity, and finally, lack of rigor in the execution of the innovation adoption decision process itself (Wisdom et al., 2014). That said, 15 participants cited internal inertia as one of the most significant issues they needed to overcome for their cloud journeys to succeed. In some cases, the adoption of cloud was too disruptive to their roles and careers for some, so specific staff career-centric communications programs had to be developed to address the inertia offered C2P4. Organizational culture and resource constraints are two critical factors that impair a laggard's ability to innovate (Rogers, 2003).

Transforming an organization's culture is a tough thing to do. Not only is strong leadership and a well-defined future state required, but the appropriate resistance management strategy must also be employed. Sixteen participants stated that skill and role changes are required to combat legacy mental models, often leading to painful paradigm shifts. Dearing and Cox (2018) found that innovativeness reflects an adopter's change threshold and their readiness to absorb change. Trying to absorb too much change

at one time can lead to negative consequences. Thus, having a clear understanding of innovation process time and change management requirements can help optimize innovation adoption and diffusion decision processes and activities.

As previously mentioned, for an OCM program to be successful, ubiquitous metrics, or ways of measuring yourself, need to be defined and broadly socialized. To help facilitate collective OCM activities, emerging integrated reporting (IR) concepts may help quantify and socialize this data in a meaningful way (Perego, Kennedy, & Whiteman, 2016). Furthermore, leadership needs to engage to help evangelize and incentivize staff while expert process and business analysts undertake the day to day activities rolling out the new program. Individual leader acumen and personal presence can go a long way in influencing positive outcomes (Nohe & Michaelis, 2016). All participants except C2P5 and C3P6 commented on the net impact of OCM initiatives on an organization, especially its culture and staff. Six participants agreed that the development and institutionalization of a new organizational architecture are required. Advances in dynamic organizational alignment and role evolution can significantly impact positive change (Khan, Nicho, Takruri, Maamar, & Kamoun, 2019).

During this process, how the business and IT align is vital according to 14 of the participants. C1P6 took a thought-provoking position concerning IT alignment and customer service, stating that, in their opinion, the OCM issues being addressed in the large are so crucial that specific customer service performance does not matter. Govindaraju et al. (2018) stressed the importance of business and IT alignment as well as highlighted the need for strong intraorganizational relationships. All the participants

except for C1P3 agreed that indeed, the cumulative impact on IT cloud-adoption centric OCM efforts, of the internal social factor (Table 1), is exceptionally high. IT cloud adoption efforts will necessitate the reengineering of long-term enterprise processes, such as ITIL, demanding further commitments from leadership to persevere and work through difficulties. Two participants (C1P3 and C3P4) suggested that a productivity function be created to drive value realization activities and ensure that the organization truly benefits from OCM programmatic activities. C3P2 cautioned that new processes need to be of the appropriate weight and rigor to support large-scale, enterprise agile disciplines.

Per Table 3, compatibility, or the impact on organizational culture and staff as well as interpretability issues (Table 1), was a dominant factor. From DOI, compatibility signifies the degree to which an innovation aligns with existing values, needs, and expectations of an adopting organization (Kee, 2017; Rogers, 2003). The adoption and diffusion of IT cloud capabilities within the three case organizations introduced significant amounts of trauma, requiring that each organization mature and persist through the institutionalization efforts. Comparing and contrasting internal social and compatibility is a meaningful discussion. The need to make a change vice the impact of a change are two different things, but they are related in dominance concerning large-enterprise IT cloud adoption and diffusion data collection discussions. Organizational inertia does not subjectively change just because an environmental or technological change has been introduced (Wang et al., 2017). Overcoming organizational inertia was identified by many of the participants as one of the significant OCM hurdles they needed

to address as part of their cloud journey. The net result, mainly to staff, was considerably consisting primarily of organizational impact more so than interpretability issues.

The need for organizational adaptation and current business process change, referred to as internal social in Table 1, were dominant topics (Table 3) during the data collection process. A firm is comprised of a set of formal and informal structures and processes (Campbell & Dopico, 2016; DiPietro et al., 1990). Formal processes, as well as informal social norms, influence a firm's relative innovativeness (Kurnia et al., 2015). DiPietro et al. (1990) asserted that firms are not just stood up, but instead, they evolve as the impact of decisions and outcomes accrue over time. Accordingly, business transformation can be a traumatic event for an organization across multiple dimensions. Rogers warned, supported by Chandler and Hwang (2015), that internal social system pressure could unduly influence deciders toward a decision even if they remain uncertain. This latent pressure not only significantly affects the adoption rate but grows more significant as more decision-makers arrive at their conclusions (Chandler & Hwang, 2015; Rogers, 2003). Unplanned personnel issues could arise leading to organizational architecture adjustments.

Consequently, well-established business processes needed to be reengineered or retired while an array of new processes needed to be instantiated. Internally, DiPietro et al. (1990) advised, supported by Kim (2015), that a variety of techniques and communication methods can be employed to share information laterally. These methods help facilitate innovation adoption decisions and any subsequent diffusion activities as well as help firms absorb higher rates of information exchanges and adaptations (DiPietro

et al., 1990). For the three cases, the enterprise-level impact of this factor was considerable.

Complexity, as a significant factor (Table 3), is comprised of several attributes (Table 1). Complexity, or cumulatively, the lack of cloud environment knowledge, cloud cost management problems, lack of cloud service management skills, immaturity of the cloud, and base risk management played a considerable role in each participant's dialog. From DOI, complexity signifies the degree to which an innovation is deemed to be easily understood or used (Kee, 2017; Rogers, 2003). Complexity calculations are modified, up or down, by the impact severity of a social systems' skills availability and supplemental training requirements (Oliveira et al., 2014). Thus, complexity rating, e.g., from low to high, informs both the innovation adoption decision process as well as its potential adoption rate (Rogers, 2003). Despite being in the market for quite a few years, cloud services are still a relatively new endeavor, which many feel are more complex than their current solutions (Wang et al., 2017). Thus, at the enterprise-scale, levels of complexity increase exponentially. The amount of time invested by each of the case organizations is considerable, whereby entire departments have been allocated to prosecuting many of the issues that arise from this factor.

Organization readiness, as depicted in Table 1, refers to the level of expertise that may exist in an organization. Beyond just expertise, readiness could be considered to be a combination of top management support, organizational capability, and policy (Al-rawahna, Hung, & Chen, 2018). Organizational readiness could also be defined as resource availability, operational flexibility and maturity, and collective willingness and

propensity (Shahrasbi & Rohani, 2018). Accordingly, the internal dynamics of a firm are essential. DiPietro et al. (1990) represented, supported by Queen and Fasipe (2015), that the TOE management structure complexity characteristic also embodies a firm's command and control structures (e.g., hierarchies and authority), social system influences, occupational specialties/ expertise, and employee professionalism. Expertise in either acquired or grown. All three case organizations were highly committed to developing their talent vice outsourcing and losing the intellectual capital that could be gained through their IT cloud adoption and diffusion journeys. At the enterprise level, to operate at scale, breadth of talent is required to be is spread appropriately throughout the organization to achieve holistic successes. Pocket based successes may be excellent for small or medium-sized corporations, but operating at scale requires a broader base.

Much has already been said regarding top management support from a higher-order theme perspective. At the individual factor level, top management support (Table 1) represents how leadership helps define and establish an organization's posture. Competitiveness, in this study's construct, represents how aggressively cloud-based paradigms are going to be considered and ultimately implemented and an outsourcing sensitive culture adopted. Trust is both organizational as well as personal. Trusting a third party to take on and run a significant piece of functionality for a corporation is not a trivial matter, nor is establishing trust between individuals, both internally and externally. Top leadership, opinion leaders, and peer networks play central roles in facilitating lateral information exchange, innovation adoption decision, and diffusion activities (Baker, 2011). How mature, or not, an organization can become a function of how vested,

cognitive, and engaged senior leaders are in the technologies, processes, and people (Almubarak, 2017; Wang et al., 2017).

Vendor lock-in, data security, privacy, and data confidentiality are all serious cloud adoption concerns (Almubarak, 2017). Per Table 3, risks were not a primary driver and came up infrequently during data collection. Though, as attributes of risks per Table 1, privacy and loss of control concerns existed, vendor lock-in seemed to dominate this factor's contribution to the evidence. Security, in the large, was discussed broadly by all the participants, with many stressing that security incorporation into a cloud strategy realization plan is a mandatory requirement. That said, much of the security and nonvendor lock-in discussion was attributed to other factors such as compatibility and complexity as these were more appropriate to the content's context than risks were. Concerning vendor lock-in, a comprehensive multi-cloud strategy, discussed in more detail below, was broadly recommended as a means of mitigating this concern.

Firm size has an impact on innovation activities. Larger firms are more likely to be active innovation adopters (Baker, 2011; DiPietro et al., 1990). From TOE, size, as an aggregate index, is not a good indicator of a firm's relative innovativeness based on how the relative value of size is derived (e.g., gross revenue, number of employees, profit levels) (DiPietro et al., 1990). Both Baker (2011) and Jeng and Pak (2014) confirmed that size does not necessarily correlate to relative innovativeness. DiPietro et al. (1990) found that despite the variances in its derivation, size is a meaningful descriptor (irrespective of its measure) to differentiate classes of firms, relative to each other. Understanding and normalizing size factors within an industry may help provide some industry-specific

innovation adoption insight. In this case, all three of the case organizations have revenues above $5 billion. Each possesses vast arrays of transactional and historical data. Size, according to Table 1, refers to the difficulties associated with migrating large volumes of data. As demonstrated in Table 3, size is not a major contributing factor but is a constraint. As a derived requirement, size needs to be considered with every planning and service decision. The ability to even adopt a service is constrained by that service's ability to operate at the scale necessary to address size-related issues.

Theme 4: Governance at Scale

For this study, the governance at scale theme refers to the design, establishment, and operations of an enterprise-class corporate governance body capable of driving and administering a sophisticated IT cloud adoption and diffusion decision-making ecosystem. Enterprise cloud governance refers to the creation and realization of business value, derived from the use of cloud services while optimizing investment and risk (Karkošková & Feuerlicht, 2016). Seven of the thirteen conceptual framework factors (Table 1) contribute evidence toward this theme, namely top management support, organizational readiness, risks, internal social, compatibility, regulation, and complexity. Tables 3 and 7 depict the aggregated and relative evidentiary contributions of each of these attributes. All participants and 72 documents were leveraged to synthesize the following discussion. Study findings showed how governance at scale plays a critical role in formulating and executing enterprise IT cloud adoption and diffusion decision-making strategies.

Table 7

Frequency of Fourth Major Theme

	Participant		Document	
Major theme	Count	References	Count	References
Governance at scale	19	569	72	177

The centralization descriptor addresses the complexities of centralized versus decentralized decision-making bodies, while the management structure complexity characteristic addresses the intricacies of a firm's management structure (DiPietro et al., 1990). DiPietro et al. (1990) represented that the management structure complexity characteristic also embodies a firm's command and control structures (e.g., hierarchies and authority), social system influences, occupational specialties/expertise, and employee professionalism. The formalization characteristic addresses the degree to which firms adhere to established rules and procedures (DiPietro et al., 1990; Rhee et al., 2017). The aggregation of these characteristics collectively informs the innovation decision-making processes (DiPietro et al., 1990; Yudho et al., 2016).

A governance function is an essential component of leading an enterprise-centric IT cloud program, mainly by providing executive-level oversight and guidance (Schmidt, Wood, & Grabski, 2016). That said, eleven participants discussed the importance of developing a robust, principle-based cloud governance model that defines guardrails, metrics (standards and denominators for metrics and telemetry package definitions), and processes. Sixteen participants discussed the establishment of the governance program mainly focusing on its operations and its centrality. According to participants, in order to operate within an enterprise, at scale, some measure of centralization, even if merely to

set standards and establish principles, was required. C1P5 strongly suggested that business-IT alignment and joint prioritization needs to be established early in the process. Nonetheless, the governance model may execute in a federated manner, with various levels of autonomy to be granted as a function of individual group innovativeness and skill. A networked governance model may be viable for some large, federated organizations (Ojo & Mellouli, 2018).

While pockets of internal governance resistance may exist, 12 participants stressed how establishing guardrails were an essential aspect of agility enablement and that controls are required to address the chaos and strike a balanced posture. According to S3P3, based on the maturity level of the groups in question, explanations may be required to satisfy highly-skilled, opinionated thought leaders. The purpose of the governance program is to enable potentially thousands of developers while not bogging them down with needless process (Bass, 2015). Further, four participants (C1P2, C3P1, C3P2, and C3P4) stressed the importance of creating and enabling self-sufficient teams who are not inhibited by slow or nonrelevant processes. C3P3 backed this observation but further stated that this is a daily struggle. However, to operate at scale, individual trade spaces need to exist (Bass & Haxby, 2019).

Conversely, just spawning off discrete agile-based efforts and claiming victory was strongly advised against by two participants (C2P2 and C3P6) as the downstream cost of recombining all the snowflakes together could be both cost and organizational focus prohibitive. Examining enterprise characteristics are suggested to help address the complexities associated with implementing such a multifaceted program. More directly,

C2P2 stressed the importance of leveraging artificial intelligence and machine learning to derive better answers from data being collected. Additionally, ten participants stated that dealing with estate intricacies and size is critical when trying to stand up an extensive governance program successfully. Additionally, five participants cautioned that multi-cloud management constructs must be accounted for when designing an enterprise-class governance program.

Streamlining processes is essential to help facilitate adoption and adherence was suggested by three participants (C1P1, C1P2, and C1P4). Bass (2015) suggested that product owners play an important role in facilitating the overall governance process. Six participants acknowledged that the passage of time (and pacing) could have a significant impact on risk management and decisioning. Evidence suggested that being able to step back and understand the entire governance ecosystem, to include visualizing how the various parts relate and communicate with one another, is vital when designing and standing up an enterprise governance program.

At the individual factor level, top management support (Table 1) represents how leadership helps establish an organization's posture. Competitiveness, in this study's construct, represents how aggressively cloud-based paradigms are going to be considered and ultimately implemented and an outsourcing sensitive culture adopted. Trading partner support is an essential aspect of cloud competitiveness (Gangwar et al., 2015). Trust is both organizational as well as personal. Trusting a third-party service provider to take on and run a significant piece of functionality for a corporation is not a trivial matter, nor is establishing trust between individuals both internally and externally (Rahi et al.,

2017). How mature, or not, an organization can become is a function of how vested and engaged senior leaders are in the technologies, processes, and people (Heavin & Power, 2018). Deficient top management support will lead to significant negative consequences (Alreemy, Chang, Walters, & Wills, 2016).

Organization readiness, as depicted in Table 1, refers to the level of expertise that may exist in an organization. Beyond just expertise, readiness could be considered to be a combination of top management support, organizational capability, and policy (Al-rawahna et al., 2018). Organizational readiness could also be defined as resource availability, operational flexibility and maturity, and collective willingness and propensity (Shahrasbi & Rohani, 2018). Accordingly, the internal dynamics of a firm are essential. DiPietro et al. (1990) represented, supported by Queen and Fasipe (2015), that the TOE management structure complexity characteristic also embodies a firm's command and control structures (e.g., hierarchies and authority), social system influences, occupational specialties/ expertise, and employee professionalism. Expertise is either acquired or grown. All three case organizations were highly committed to developing their talent vice outsourcing and losing the intellectual capital that could be gained through their IT cloud adoption and diffusion journeys. At the enterprise level, to operate at scale, breadth of capability is required to ensure the talent is spread appropriately throughout the organization to achieve holistic successes. Pocket based successes may be excellent for small or medium-sized corporations, but operating at scale requires a broader base.

Vendor lock-in, data security, privacy, and data confidentiality are all serious cloud adoption concerns (Almubarak, 2017). Per Table 3, risks were not a primary driver and came up infrequently during data collection. Though, as attributes of risks per Table 1, privacy and loss of control concerns existed, vendor lock-in seemed to dominate this factor's contribution to the evidence. Security, in the large, was discussed broadly by all the participants, with many stressing that security incorporation into a cloud strategy realization plan is a mandatory requirement. That said, much of the security and nonvendor lock-in discussion was attributed to other factors such as compatibility and complexity as these were more appropriate to the content's context than risks were. Concerning vendor lock-in, a comprehensive multi-cloud strategy, discussed in more detail below, was broadly recommended as a means of mitigating this concern.

The need for organizational adaptation and current business process change, referred to as internal social in Table 1, were dominant topics (Table 3) during the data collection process. A firm is comprised of a set of formal and informal structures and processes (Campbell & Dopico, 2016; DiPietro et al., 1990). Formal processes, as well as informal social norms, influence a firm's relative innovativeness (Kurnia et al., 2015). DiPietro et al. (1990) asserted that firms are not just stood up, but instead, they evolve as the impact of decisions and outcomes accrue over time. Accordingly, business transformation is a traumatic event for an organization across multiple dimensions. Rogers warned, supported by Chandler and Hwang (2015), that internal social system pressure could unduly influence deciders toward a decision even if they remain uncertain. This latent pressure not only significantly affects the adoption rate but grows more

significant as more decision-makers arrive at their conclusions (Chandler & Hwang, 2015; Rogers, 2003). Unplanned personnel issues could arise leading to organizational architecture adjustments. Well established business processes needed to be reengineered or retired while an array of new processes needed to be instantiated. Internally, DiPietro et al. (1990) advised, supported by Kim (2015), that a variety of techniques and communication methods can be employed to share information laterally. These methods help facilitate innovation adoption decisions and any subsequent diffusion activities as well as help firms absorb higher rates of information exchanges and adaptations (DiPietro et al., 1990). For the three cases, the enterprise-level impact of this factor was considerable.

Per Table 3, compatibility, or the impact on organizational culture and staff as well as interpretability issues (Table 1), was a dominant factor. From DOI, compatibility signifies the degree to which an innovation aligns with existing values, needs, and expectations of an adopting organization (Kee, 2017; Rogers, 2003). The adoption and diffusion of IT cloud capabilities within the three case organizations introduced significant amounts of trauma, requiring that each organization mature and persist through the institutionalization efforts. Comparing and contrasting internal social and compatibility is a meaningful discussion. The need to make a change vice the impact of a change are two different things, but they are related in dominance concerning large-enterprise IT cloud adoption and diffusion data collection discussions. Organizational inertia does not subjectively change just because an environmental or technological change has been introduced (Wang et al., 2017). Overcoming organizational inertia was

identified by many of the participants as one of the significant OCM hurdles they needed to address as part of their cloud journey. The net result, mainly to staff, was considerably consisting primarily of organizational impact more so than interpretability issues.

Law and regulation changes impact innovation. Classes of regulatory activities that significantly impact innovation adoption are economic, social, and institutional regulations (Blind et al., 2017; DiPietro et al., 1990). Government regulatory activity, such as new constraints or levying new technology requirements, can significantly impact an entire industry and its innovation activities (Amini & Bakri, 2015; Baker, 2011). Economic regulations include antitrust, merger and acquisitions, price, monopolies, and compliance reporting (DiPietro et al., 1990). Social regulations include environmental protection, worker's health and safety, product and consumer safety, and personal privacy (DiPietro et al., 1990). Institutional regulations include liability law, employment protection, immigration law, bankruptcy laws, and intellectual property rights (DiPietro et al., 1990). Maintaining an accurate understanding of relevant regulatory activity can help mitigate risk and optimize resource expenditures.

Complexity, as a significant factor (Table 3), is comprised of several attributes (Table 1). Complexity, or cumulatively, the lack of cloud environment knowledge, cloud cost management problems, lack of cloud service management skills, immaturity of the cloud, and base risk management played a considerable role in each participant's dialog. From DOI, complexity signifies the degree to which an innovation is deemed to be easily understood or used (Kee, 2017; Rogers, 2003). Complexity calculations are modified, up or down, by the impact severity of a social systems' skills availability and supplemental

training requirements (Oliveira et al., 2014). Thus, complexity rating, e.g., from low to high, informs both the innovation adoption decision process as well as its potential adoption rate (Rogers, 2003).

Consequently, the cost management discussion alone was quite significant as were conversations regarding the lack of skills and knowledge issues. Despite being in the market for quite a few years, cloud services are still a relatively new endeavor that many feel are more complex than their current solutions (Wang et al., 2017). Thus, at the enterprise-scale, levels of complexity increase exponentially. The amount of time invested by each of the case organizations is considerable, whereby entire departments have been allocated to prosecuting many of the issues that arise from this factor.

Theme 5: Service Selection

Within this study, service selection refers to the organizational structure, enterprise processes, criteria, and heuristics required to make discrete service provider service selection or adoption decisions. Services consumed could range from very course-grained SaaS services, medium-grained on and off-premise PaaS and IaaS based services, all the way down to event-driven services that could include microservices as well as serverless capabilities. These fine-grained services are often referred to as Function as a Service (FaaS). More specifically, service selection refers to the act of deciding what service to consume, from whom, over what channels, following what service level agreements. A sourcing strategy, as a starting place, was recommended by 11 participants to help capture and articulate decision-making heuristics. All 13 of the conceptual framework factors (Table 1) contribute evidence toward this theme. Tables 3 and 8 depict

the aggregated and relative evidentiary contributions of each of these attributes. All participants and 89 documents were leveraged to synthesize the following discussion. Study findings showed how service selection plays a mandatory role in formulating and executing enterprise IT cloud adoption and diffusion decision-making strategies.

Table 8

Frequency of Fifth Major Theme

	Participant		Document	
Major theme	Count	References	Count	References
Service selection	19	750	99	219

However, what is a sourcing strategy? As represented in Schneider and Sunyaev (2016), a cloud sourcing strategy could be comprised of vendor characteristics and performance, decision process, scope, governance mode, asset ownership assumptions, multicloud topology mode (e.g., combination of what vendors or capabilities if more than one is involved), outsourcing degree, contractual mode, market environmental considerations, network access requirements, service level agreements, and resource management. Johansson and Muhic (2017) cautioned, based on the results of their cloud sourcing literature review, that this topic is still immature and in need of additional research. Thus, following the lead of those who have been successful can help mitigate a considerable amount of risk.

In the establishment of a baseline sourcing strategy, nine participants suggested adopting a multi-cloud strategy from the start. Multicloud, in this case, could be any combination of CSP providers, on-premise private cloud capabilities, hybrid cloud, as

well as SaaS consumption. Future multi-cloud deployment support dictates that enterprises must consider different architectures and their implications (Dhirani, Newe, & Nizamani, 2018). The rationale behind assuming such a stance is that most organizations have either proactively chosen such or have inadvertently backed into a multi-cloud stance, even if by accident, because of individual business unit level decisions.

Six participants stated that deciding whether to instantiate a service on-premise or go off-premise is already a difficult decision. To further exacerbate adoption decision complexity is the analysis of which CSP vendor to go with as well as what combination of services is required. As represented in Lang, Wiesche, and Krcmar (2016), specific CSP selection criteria could be comprised of certifications, contract terms, access control, deployment model, flexibility, functionality, service geolocation, integration, legal compliance, monitoring, support, solution testing, and transparency. Thus, the design, realization, and configuration of many service selection efforts are quite elaborate. This convolutedness is further exacerbated if financial models are the sole or at least primary basis driving service selection decisions. Intangibles such as agility, ease of use, supportability, operational overhead, possible innovation rates, and other such competitive differentiators could be left out of the equation entirely. Having staff with the right technical acumen engage is vital according to C2P1. While C1P4 cautioned further that making an actual selection is just the starting point, a considerable amount of work is required to operationalize a service once a contract is signed.

All but two participants (C1P2 and C2P3) highlighted the specific value of hands-on knowledge acquisition as part of the due diligence process. The ability to test and

proof out a capability, to include its possible configurations, are invaluable as firms consider if it even works, solves the problem, has measurable results, is secure, and can scale appropriately. This trialability construct is often a critical path for complex service deliberation, primarily if a lot of integrations, strategic interactions, or performance characteristics exist. Three participants (C1P4, C3P1, and C3P2) suggested that industry proof points should also be considered as part of the process. Synergy Research Group (2017) identified 24 hyperscalers or cloud service operators owning datacenters housing hundreds of thousands, or even millions, of servers such as Microsoft, Google, Amazon, and IBM. C3P1 went further suggesting not to write off smaller CSPs too readily; they may offer increased agility, flexibility, and value-add as the hyperscalers try to maintain broad applicability stances.

Concerning PaaS-based services, three participants (C2P1, C3P2, and C3P4) suggested that open source could be an attractive alternative because it is considered very agile and often has low licensing fees though supporting surround may be weaker requiring an investment in tooling and support. That said, four participants (C2P1, C2P2, C2P5, and C3P4), backed by C3P3, noted that too many choices exist at times and that standards and decision aids may be required to drive choices.

All participants except C1P5 discussed strategy formation tactics to include outlining specific decision heuristics. For instance: Who makes individual decisions against what criteria? How are the decisions vetted and by whom? What are the cost and security implications as well as geographic and compliance concerns? How about service level agreements? Fourteen participants discussed their own perspectives regarding

topology requirements, ease of use, agility, and deployment speed, as well as supportability and cost management concerns as suggested key criteria areas. More specifically, participants C2P1, C2P4, and C3P4 consider what effort can be shifted to CSPs vice retained organically as part of their deliberations so they can focus on business value add vice things they no longer consider within their area of concern. Conversely, 12 participants discussed constraints such as service immaturity and enterprise consumption readiness. Twelve participants consider the resultant output value to business. Twelve participants also consider what skills exist and the available capacity as delimiters. C1P4 noted that contracting maturity, e.g. terms and conditions, liability clauses and incident reporting requirements were also important constraints. An example of a fine-grained requirement is C3P4 who observed that striping applications across on and off-premise capabilities is required, on occasion, to mitigate risk and improve performance. Accordingly, different availability and performance characteristics exist that drive topology considerations. Having such criteria included in an enterprise sourcing strategy may be beneficial to future-proofing service selection decisions.

Relative advantage signifies the degree to which an innovation is viewed to be better than an existing capability (Kee, 2017; Rogers, 2003). From DOI, the derivation of this value is multidimensional and is comprised of contributions from the following aspects: economic, social prestige, convenience, satisfaction, and risk (Rogers, 2003). Whether a vast cost reduction is being sought, increased organizational bandwidth, or improved technical performance, the perceived relative advantage of an innovation, especially cloud, matters from an initial identification and concept consideration

perspective. Shuaib et al. (2019) asserted that relative advantage is a key cloud adoption determinant. But for this study, relative advantage, per Table 3, was not discussed much during the data collection process though it was stipulated often. Cost management discussed further below, seemed to dominate the relative advantage discourse considerably more than cost reduction. Agility discussions were far more frequent than any other relative advantage characteristic. The ability to quickly (and easily) do something, especially from a CICD perspective, was stressed to be of critical importance. As an innovation's relative advantage measures begin to emerge and stabilize, a clear and unambiguous advantage can inform evaluations and even possible adoption or rejection rates (Greenhalgh et al., 2004).

CSP selection, from TOE, is a challenging endeavor. As represented in Table 1, CSP selection is comprised of the difficulty associated with who chooses specific services to include which vendor to leverage in the process. This density issue is further compounded by the sheer rate of new service offerings, the variability in their configurations, and the ever-increasing number of service providers. Competition and service provider capability impact innovation adoption. DiPietro et al. (1990) acknowledged that social system communications could opportunistically influence or constraint knowledge sharing, transactions, and innovation. Further, external pressure can significantly inform a firm's desire to innovate (Chen et al., 2015).

Information sources, as depicted in Table 1, refers to the difficulty in accessing relevant service provider-related content as well as its relative complexity. Depending on the context of the decision to be made, specific information to help frame and adjudicate

a decision could prove difficult both from an access as well as technical interpretation perspectives. Other factors address expertise levels and organizational impact, but they are dependent on pertinent data. This relevancy issue is further compounded by potential bias impacting the sophistication level of the decision at hand. DiPietro et al. (1990) established, demonstrated in Yoo and Kim (2018), that technology support infrastructure embodies the quality and availability of technical information and capabilities as well as external resources. The more complex a technology context is, the higher the labor rates, training, and cost (Amini & Bakri, 2015; DiPietro et al., 1990). Thus, maintaining an understanding of technology supplier capabilities can help mitigate risk and optimize innovation adoption and diffusion decision process activities.

Organization readiness, as depicted in Table 1, refers to the level of expertise that may exist in an organization. The internal dynamics of a firm are essential. DiPietro et al. (1990) represented, supported by Queen and Fasipe (2015), that the TOE management structure complexity characteristic also embodies a firm's command and control structures (e.g., hierarchies and authority), social system influences, occupational specialties/ expertise, and employee professionalism. Expertise is either acquired or grown. All three case organizations were highly committed to developing their own talent vice outsourcing and losing the intellectual capital that could be gained through their IT cloud adoption and diffusion journeys. Beyond just expertise, readiness could be a combination of top management support, organizational capability, and policy (Al-rawahna et al., 2018). Organizational readiness could also be defined as resource availability, operational flexibility and maturity, and collective willingness and

propensity (Shahrasbi & Rohani, 2018). At the enterprise level, to operate at scale, a breadth of capability is required to ensure the talent is spread appropriately throughout the organization to achieve holistic successes. Pocket based successes may be fine for small or medium-sized corporations but operating at scale requires a broader base.

Being able to proof a technology or service is hugely beneficial to the innovation adoption decisions especially in the IT cloud space. Trialability signifies the degree to which an innovation can be experimented with (Kee, 2017; Rogers, 2003). The ability to prove a concept reduces uncertainty and directly affects its adoption decision process (Greenhalgh et al., 2004). Thus trialability (Table 1), helps organizations touch and feel a service up close and gain a deeper understanding of its operational characteristics. Observability signifies the degree to which others can scrutinize an innovation in action (Kee, 2017; Rogers, 2003). Further, the ability to see the results of a concept, even if in someone else's setting, helps address uncertainty (Greenhalgh et al., 2004). Thus, different from observability, trialability affords an organization the opportunity to test drive a capability with its own data, within its own context. This subtle difference is of paramount importance though and is a critical aspect of case 2's IT cloud journey.

Vendor lock-in, data security, privacy, and data confidentiality are all serious cloud adoption concerns (Almubarak, 2017). Per Table 3, risks were not a primary driver and came up infrequently during data collection. Though, as attributes of risks per Table 1, privacy and loss of control concerns existed, vendor lock-in seemed to dominate this factor's contribution to the evidence. Security, in the large, was discussed broadly by all the participants with many stressing that security incorporation into a cloud strategy

realization plan is a mandatory requirement. That said, much of the security and nonvendor lock-in discussion was attributed to other factors, such as compatibility and complexity, as these were more appropriate to the content's context than risks were. With respect to vendor lock-in, a comprehensive multicloud strategy, discussed in more detail below, was broadly recommended as a means of mitigating this concern.

The need for organizational adaptation and current business process change, referred to as internal social in Table 1, were dominant topics (Table 3) during the data collection process. A firm is comprised of a set of formal and informal structures and processes (Campbell & Dopico, 2016; DiPietro et al., 1990). Formal processes, as well as informal social norms, influence a firm's relative innovativeness (Kurnia et al., 2015). DiPietro et al. (1990) asserted that firms are not just stood up, but instead, they evolve as the impact of decisions and outcomes accrue over time. Accordingly, business transformation is a traumatic event for an organization across multiple dimensions. Rogers warned, supported by Chandler and Hwang (2015), that internal social system pressure could unduly influence deciders toward a decision even if they remain uncertain. This latent pressure not only significantly affects adoption rate but grows more significant as more decision-makers arrive at their own conclusions (Chandler & Hwang, 2015; Rogers, 2003). Unplanned personnel issues could arise leading to organizational architecture adjustments. Well established business processes needed to be reengineered or retired while an array of new processes needed to be instantiated. Internally, DiPietro et al. (1990) advised, supported by Kim (2015), that a variety of techniques and communication methods can be employed to laterally share information. These methods

help facilitate innovation adoption decisions and any subsequent diffusion activities as well as help firms absorb higher rates of information exchanges and adaptations (DiPietro et al., 1990). For the three cases, the enterprise-level impact of this factor was considerable.

Per Table 3, compatibility, or the impact on organizational culture and staff as well as interpretability issues (Table 1), was a dominant factor. From DOI, compatibility signifies the degree to which an innovation aligns with existing values, needs, and expectations of an adopting organization (Kee, 2017; Rogers, 2003). The adoption and diffusion of IT cloud capabilities within the three case organizations introduced significant amounts of trauma requiring that each organization mature and persist through the institutionalization efforts. Comparing and contrasting internal social and compatibility is a meaningful discussion. The need to make a change vice the impact of a change are obviously two different things, but they are related in dominance with respect to large-enterprise IT cloud adoption and diffusion data collection discussions. Organizational inertia does not subjectively change just because an environmental or technological change has been introduced (Wang et al., 2017). Overcoming organizational inertia was identified by many of the participants as one of the significant OCM hurdles they needed to address as part of their cloud journey. The net result, especially to staff, was considerably consisting primarily of organizational impact more so than interpretability issues.

Law and regulation changes impact innovation. Classes of regulatory activities that significantly impact innovation adoption are economic, social, and institutional

regulations (Blind et al., 2017; DiPietro et al., 1990). Government regulatory activity, such as new constraints or levying new technology requirements, can significantly impact an entire industry and its innovation activities (Amini & Bakri, 2015; Baker, 2011). Economic regulations include antitrust, merger and acquisitions, price, monopolies, and compliance reporting (DiPietro et al., 1990). Social regulations include environmental protection, workers' health and safety, product and consumer safety, and personal privacy (DiPietro et al., 1990). Institutional regulations include liability law, employment protection, immigration law, bankruptcy laws, and intellectual property rights (DiPietro et al., 1990). Maintaining an accurate understanding of relevant regulatory activity can help mitigate risk and optimize resource expenditures.

Complexity, as a significant factor (Table 3), is comprised of several attributes (Table 1). Complexity, or cumulatively, the lack of cloud environment knowledge, cloud cost management problems, lack of cloud service management skills, immaturity of the cloud, and base risk management played a considerable role in each participant's dialog. From DOI, complexity signifies the degree to which an innovation is deemed to be easily understood or used (Kee, 2017; Rogers, 2003). Complexity calculations are modified, up or down, by the impact severity of a social systems' skills availability and supplemental training requirements (Oliveira et al., 2014). Thus, complexity rating, e.g., from low to high, informs both the innovation adoption decision process as well as its potential adoption rate (Rogers, 2003).

Consequently, the cost management discussion alone was quite significant, as were conversations regarding the lack of skills and knowledge issues. Despite being in

the market for quite a few years, cloud services are still a relatively new endeavor that many feel are more complex than their current solutions (Wang et al., 2017). Thus, at the enterprise-scale, levels of complexity increase exponentially. The amount of time invested by each of the case organizations is considerable, whereby entire departments have been allocated to prosecuting many of the issues that arise from this factor.

Firm size has an impact on innovation activities. Larger firms are more likely to be active innovation adopters (Baker, 2011; DiPietro et al., 1990). From TOE, size, as an aggregate index, is not a good indicator of a firm's relative innovativeness based on how the relative value of size is derived (e.g., gross revenue, number of employees, profit levels) (DiPietro et al., 1990). Both Baker (2011) and Jeng and Pak (2014) confirmed that size does not necessarily correlate to relative innovativeness. DiPietro et al. (1990) found that despite the variances in its derivation, size is a meaningful descriptor (irrespective of its measure) to differentiate classes of firms, relative to each other. Understanding and normalizing size factors within an industry may help provide some industry-specific innovation adoption insight. In this case, all three of the case organizations have revenues above $5 billion. Each possesses vast arrays of transactional and historical data. Size, according to Table 1, refers to the difficulties associated with migrating large volumes of data. As demonstrated in Table 3, size is not a major contributing factor but is a constraint. As a derived requirement, size needs to be considered with every planning and service decision. The ability to even adopt a service is constrained by that service's ability to operate at the scale necessary to address size-related issues.

Though not mentioned frequently (Table 3), external social or collaboration as depicted in Table 1, is nonetheless an essential factor. As revealed, both CSP selection and information sources are complex happenings. The ability to partner with third parties, whether they be a CSP, vendor, industry partner, competitor, or pundit, is critical to help weigh through the data and gain insight. External communication linkages exist to collaborate with third parties, collect information, and then make this information available to internal resources (DiPietro et al., 1990). Seven participants discussed how they leveraged service provider professional services as a means of piloting an offering or working through some information interpretation difficulties. For that reason, establishing and maintaining open internal and external communications channels can help mitigate risk and optimize innovation adoption and diffusion decision process activities.

Much has already been said regarding top management support from a higher-order theme perspective. At the individual factor level, top management support (Table 1) represents how leadership helps define and establish an organization's posture. Competitiveness, in this study's construct, represents how aggressively cloud-based paradigms are going to be considered and ultimately implemented and an outsourcing sensitive culture adopted. Trust is both organizational as well as personal. Trusting a third party to take on and run a significant piece of functionality for a corporation is not a trivial matter, nor is establishing trust between individuals, both internally and externally. Top leadership, opinion leaders, and peer networks play central roles in facilitating lateral information exchange, innovation adoption decision, and diffusion activities (Baker,

2011). How mature, or not, an organization can become a function of how vested, cognitive, and engaged senior leaders are in the technologies, processes, and people (Almubarak, 2017; Wang et al., 2017).

The five findings, specifically top management support, information source bias, organizational change management, governance at scale, and service selection, are all indispensable components of how IT executives make advantageous enterprise cloud adoption and diffusion decisions. Each finding, in isolation, plays a vital role in the IT cloud adoption decision process, but jointly, they inform a comprehensive strategy that both strengthens and industrializes individual and collective decisions. Enterprise-scale operations command quick cycle times. Consequently, employing a rich set of efficient, risk-managed IT cloud adoption and diffusion decision processes is vital.

Applications to Professional Practice

The following discourse is meant to address the specific IT problem identified in the problem statement, namely that some IT executives lack strategies to make advantageous enterprise cloud adoption and diffusion decisions. Participants in the study provided strategies that IT executives could use to make advantageous enterprise cloud adoption and diffusion decisions.

Perhaps contrary to popular social media content, many of this study’s participants suggested the best way to start a cloud journey is by boldly committing wholly to the pursuit. The organizations being a unicorn mindset must go according to C2P1. Furthermore, C2P1 stated that software-defined everything is disrupting every industry, and that cloud is in every organization's future. Additionally, citing projects that

spanned many years, participants laid bare the expensive lessons learned associated with aiming too low, spread over too long a time. Not a single participant argued against taking bite-sized steps, but the need is great to start with something highly relevant to stakeholders to ensure complete commitment to its unbridled success. C2P5 certainly backed this suggestion.

Consequently, smaller, nonrelevant efforts may fail due to a lack of urgency and apathy. Likewise, participants recommended starting with a new cloud-native capability, not with the lifting and shifting of a legacy application. The net new capability will provide far more valuable insights quicker.

Of supreme importance, when making IT cloud adoption and diffusion decisions are the ability to fail quickly, adapt, and iterate. Exhibiting agility and persistence in this manner will help focus efforts and improve incremental success rates. By starting to anticipate failures, adjustment plans can be made ready to execute quickly. One of the sacrifices required to operate in this manner effectively is the willingness to declare something good enough to implement. The handwringing over what is complete or polished enough to deploy could negatively impact the more substantial opportunity that is to try new concepts to gauge their relative acceptance levels.

As part of deploying increments of functionality, as is the new development operations-driven manner, it is crucial to understand a capability's derived and nonfunctional requirements, especially availability and scalability. The proper deployment, security, network controls, and functionality is critical toward not only

enabling capabilities that can effectively scale, but that is also secure and compliant enough to protect your corporate assets.

Staff development is imperative toward achieving long-term, IT cloud innovation adoption successes. According to C3P2, large firms can undoubtedly engage consultants to address gaps, but leveraging organic personnel will help retain intellectual capital and achieve meaningful successes quicker. Resist the urge to outsource strategic decision-making capabilities, instead invest in training and continually develop organic assets. Organizational developers and other process participants could significantly enhance cloud journeys. Bottoms up innovations, created by these resources, can significantly impact operations enabling much higher and quicker returns. As a result, in developing employee skills, the likelihood of successful IT cloud innovation adoptions is increased. C1P6 offered that individual developers, with their intimate knowledge of the environment, can create new capabilities that can pointedly positively impact the business.

Broad organizational communications, at relatively high frequency, increase the probability of such an initiative's success, because the wide-ranging distribution of strategy, status, and metric performance data are significant, especially in trying to overcome internal inertia and solidify collective buy-in. Personnel who are experiencing unease will find the frequent communications of immense value while they continue to resolve newer cloud paradigms in their minds. Analytics-driven dashboards are one mechanism to communicate statistical data, especially financials, while blogging can be used to convey textual strategic and organizational messaging. Such techniques allow

individuals to employ their initiative and acquire information in forms conducive to their learning styles.

Large enterprises consume vast amounts of resource. It is unlikely that any one enterprise will be wholly dedicated to a single CSP. The assumption of a comprehensive multi-cloud strategy is required from the start to address organizational risk. Multicloud can be defined as any combination of on and off-premise compute capabilities and SaaS services. This includes all private, hybrid, hyperscalers, SaaS suppliers (e.g., SAP, Salesforce, Ariba, amongst many others) and smaller, industry-specific CSPs. Adopting a multicloud strategy is integral to your success as it affects much of your sourcing strategy as well as principle and architectural designs, processes, and implementation choices.

Further, the development of a mature shared services model will help facilitate sourcing and PaaS targeting decisions. Gaining a clear understanding of your portfolio estate is essential as data, analytics, and application clustering considerations must be factored into all your target topology assumptions and principles. At times the imposition of abstractions (e.g., monitoring, logging, alerting, and security) will be required to handle enterprise-level CSP operational management better.

Large enterprises, dependent on their cloud-first strategy decisions, will still retain some measure of on-premise capability whether it resides in an organic or collocated data center. This is not a negative. To the contrary, this affords a level of choice that better serves capability deployment targeting decision heuristics though the additional complexity must be accounted for. In capitalization-centric industries, this can help support CAPEX requirements while also enabling OPEX based operations. As related in

the service selection theme, beyond cost, how latency affects application topology decisions becomes a factor as do other intangible considerations such as ease of support, agility, potential rate of innovation, amongst others. Given how cloud cost is computed and potential sunk cost investments, moving every capability to the cloud may not make business sense. In such cases, both private and hybrid cloud solutions play an essential enablement role, especially as enterprise tooling (e.g., deployment, monitoring, logging, and capacity management tools) becomes increasingly ubiquitous.

Cost reduction is often centered on competitive differentiation while cost management is an operational necessity that happens to also provides for some competitive advantage. Each participant spoke to the need to understand, quantify, and forecast deployment cost scenarios as part of their adoption, and continued leveraging, of different capabilities. Cost management, from a complexity perspective, is quite involved and is a multidimensional problem. Only moving applications to the cloud is frequently cost-prohibitive. The nature by which cloud costs are incurred could overwhelm OPEX budgets unless cost optimization tactics are employed. Certainly, reserved instance (RI) arbitraging can be employed, but a series of other right-sizing, tuning, elasticity changes and configuration setting adjustments must be made to appropriately (and iteratively) optimize deployments. Managing cloud cost is a daily occurrence in large enterprises similar in construct to a day-trader, according to C1P3, whereby cloud workload can be moved around based on spot pricing. At scale, a comprehensive tagging and charge-back management system are required to close-loop and trace cloud resource consumption issues.

Multicloud strategies, especially within large enterprises, require that portfolio views of CSP and SaaS vendor capabilities be created and maintained. These points of view need to be updated regularly to keep pace with the high rates of change in the cloud product space. These portfolio views help supplement sourcing strategies and decisions as well as become a source of truth that documents an organizationally-centric perspective of different vendors' service roadmaps and their relative maturity. Without maintaining such perspectives, each decision would require an inordinate amount of due diligence and proofing that may increase decision risk significantly if not adequately prosecuted.

When operating at scale, both automation and artificial intelligence (AI) is indispensable. These concepts go well beyond merely reducing human touches, being able to process provisioning requests, error and configuration management as well as enabling real-time operational resource management is crucial. Numerous participants discussed how automated CICD processes were table stakes now from a product inception and deployment perspective. Enabling automated self-service both from a development as well as end-user perspectives is also considered a baseline capability. When thousands of developers and tens of thousands of users are involved, the scale is essential. Automation is required to achieve that scale. Indeed, this means that numerous job functions must change to include automation development skills and practices. As one participant stated, doing more with less is a requirement in a cloud-first, enterprise-scale environment.

Lastly, from an organizational perspective, aligning capabilities within the organization is essential. As evidenced, maintaining competing teams, e.g., one legacy versus one cloud, can be incredibly divisive. The level of competitiveness between the organizations can be remarkably defocusing in the large. It is better to merge legacy and cloud functions and update the organizational process rather than keep capabilities divided. If a sizeable private cloud capability exists, the choice of on and off-premise for a service is undoubtedly on the table. As such, each organization is now competing for that customer. Service selection bias can now be introduced based on the proclivities of the deciding person or entity. Thus, the level of infighting can be quite disruptive if left unaddressed.

Implications for Social Change

Given their prominence and vast resources, each case organization has entire departments solely dedicated to social change initiatives. Concerning this study, an implication for positive social change is that, by using this study's findings, IT telecom executives might be able to better optimize diffusion decisions to more significant benefit downstream consumers in need of their services. By adding to the existing body of knowledge, this study's findings may help enable higher cloud innovation implementation success rates. Further, this study may provide societal value by raising successful enterprise-scale, IT cloud adoption, and diffusion awareness. Many of the participants agree on some foundation forming findings that may help IT executives reevaluate their existing practices ultimately improving society's received telecom service value and enablement. Stakeholders for these telecom services include a broad

array of consumers to include many disadvantaged populations. By potentially increasing successful IT cloud adoption and diffusion decision rates, the material positive impact may be achieved.

Recommendations for Action

I explored strategies that IT executives use to make advantageous enterprise cloud innovation adoption and diffusion decisions. Study findings showed that successful enterprise-scale IT cloud adoption and diffusion decisions require significant organizational as well as technical investments of time, focus, and resources.

Top management support is required to effectively adopt and realize a successful IT cloud strategy in large enterprises. Furthermore, organizations and their leadership need to view cloud as being more than just another data center. As such, they need to define and articulate a clear vision that establishes strong end-goals and desired outcomes. Both brownfield and greenfield strategies need to be addressed to help expertly guide overarching, downstream decisions. Further, to be successful, organizations must be open to new business models, processes, technologies, and innovations. By making an all-in commitment, leaders can demonstrate their willingness to back decisions, even failures, and continue to persevere through challenges. Executive decrees may be required to help stimulate initial forays.

Information source bias exists and must be aggressively dealt with. Organizations must establish procedures for vetting service-based information and assumptions. Being sensitive to marketing hype, via organic corporate resources, adopting a trust but verify approach is essential to managing expectations and risk. Both short- and long-term

planning requires that accurate depictions of vendor services be maintained as living documents. Third-party agents, to include industry pundits, have agendas, taking time to assess the influence of these agendas of your organization is advised. Further, the procurement of different additional sources of vendor information can yield triangulation data that can be leveraged to help to mitigate potential vendor bias issues. Seeking other industry partners is recommended to address short-term strategy and decision risk.

A successful organizational change management program is essential, particularly to operate at scale. Overcoming internal IT cloud-adoption inertia is of primary concern. A systematic communications approach must be planned and executed, in addition to a steady resistance management regimen to address unease and facilitate buy-in. By proactively defining and communicating organizational architecture and job role changes, much of the culture and staff related impact can be dealt with aggressively. Leaving the communications to chance or under-appreciating the negative influence IT cloud adoption paradigm challenges can have on an organization increases uncertainty and stimulates chaos. The net importance of this issue was highly present during data collection and was often the primary organizational issue needing to be addressed. Steady leadership is required to help guide adoption and innovation decisions.

Successfully executing a sophisticated IT cloud adoption program at scale requires strong governance. The establishment of a principle-based governance body is crucial. Whether centrally or federally-based, being able to establish adequate guardrails and metrics, which can enable individual teams, is vital. Guardrail and controls design is an essential aspect of balanced, streamlined organizational agility enablement. To better

manage interaction complexities, taking a holistic view of the governance ecosystem, and its interdependencies are essential when designing and standing up an enterprise governance program.

Service selection is a complex, multidimensional problem within a large, multi-cloud-based enterprise. Development of a sourcing strategy, to include service selection decision and vetting heuristics, is a daunting, but required task. Determining what capabilities are deployed where, against what standards, service level agreements, and principles, is of paramount importance. Incorrectly targeting workloads can lead to a tremendous amount of rework, and lost time and resources. Organizations should ensure that an array of business and technical drivers, beyond cost alone, are considered as part of the capability selection process such as agility, availability, scalability, ease of use, supportability, possible innovation rate, and skills alignment. Trialability (and observability) of service should be considered as part of the service selection process.

This study should be relevant to enterprise-centric IT executives undertaking an IT cloud journey, especially those struggling to define and establish consistent innovation adoption efforts. As appropriate, I will disseminate results via literature, conferences, training, blogs, and my employment. Copies of the final study will be provided, via email, to all study stakeholders and participants.

Recommendations for Further Study

Multiple recommendations exist based on study limitations and findings. The limitations of this study include recall bias and the lack of qualitative research generalizability. During this qualitative collective case study, I examined three large

(revenues greater than $5 billion) telecom-related companies with a headquarters in the United States. The first set of recommendations is for researchers to conduct additional qualitative studies of similar study design, with other telecom organizations, of varying sizes, to compare findings. This will help address both potential recall bias issues as well as help address generalizability concerns. Researchers could also explore similarly size companies, in different industries, (e.g., finance, hospitality, and medical) to facilitate IT cloud adoption and diffusion decision strategy comparisons.

For this study, I interviewed 19 IT executives having IT cloud innovation adoption and diffusion decision responsibility. Researchers could conduct studies that expand the participant pool beyond IT executives with cloud areas of concern. This would help introduce additional perspectives not represented in this study. Insights gained from additional such studies would be invaluable toward creating baseline decision aids. Lastly, I leveraged an integrated DOI-TOE conceptual model to conduct this study. Researchers could conduct additional studies using either an individual DOI or TOE model or perhaps even another enterprise-centric diffusion model, to compare findings.

A second set of recommendations centers around exploring further the themes identified in this study. A more in-depth examination of each theme would help document the impact these themes have within enterprises and provide organizations with additional information to plan as well as mitigate negative consequences. Similar to the previous recommendation, the information garnered via these studies could help facilitate the development of additional IT cloud innovation adoption and diffusion decision aids.

Conversely, as a counter to the above, researches could explore enterprises who have failed in their early cloud adoption endeavors; furthermore, researchers could capture whether they used diffusion theory-based decision aids or not, and if so, what ones, and how they were employed.

Reflections

Having been an IT practitioner for multiple decades, I wrongly assumed that pursuing a doctoral degree would be an easy, straightforward endeavor. I quickly realized I was about to learn more about myself and my topic than I had ever imagined possible. At times, my forward progress was muted, but I was determined to push through and complete the program. Writing documents as a consultant has always been stress-free. Writing in an academic format, at first, was quite a challenge. It took me some time to develop the appropriate scholar-practitioner skills and acumen. During this process, I learned not only how to write but also to think academically. These skills have been an invaluable addition to my everyday professional career, having a positive impact far more significant than I envisioned. Diffusion theory is exceptionally relevant when making innovation or technology adoption decisions. Having no prior knowledge, the practical application of diffusion theory concepts in my work adds a tremendous amount of richness to my interactions and analyses.

Being an industry consultant, I may have unknowingly or unintentionally introduced some bias. I tried to be as attentive as possible to avoid introducing any personal predispositions into my data collection and analysis efforts. The findings presented are directly traceable to triangulated evidence, thus attempting to mitigate any

potential skewing of the data. During the study, I learned that consistently making advantageous IT cloud adoption and diffusion decisions is eminently possible.

Study Conclusions

An enterprise-scale cloud is complex. To help make advantageous enterprise-centric, cloud innovation adoption, and diffusion decisions, leveraging lessons learned from successful, market-leading organizations is required and improves the likelihood of positive outcomes. Undertake and nurture an innovation-centric, cloud-first mentality and clearly define future state goals to inform intermediate decisions. Leadership must be engaged and bought in to: Effectively prioritize and institutionalize foundational controls and a proactive program of change. Address internal mindset and culture aggressively to bring the organization along. Be persistent, pick something meaningful as a starting point, and fail quickly to iterate. Develop a multi-cloud sourcing strategy to drive service selection. Be mindful of sources of information that contain bias. Trust but verify.

To operate at scale, an effective principle-based governance model and guardrails must be established to guide choices. The development and use of diffusion theory, factor-based decision aids help enable and automate activities. Given the high rate of change, a comprehensive change management strategy is required to mitigate the negative organizational impact and facilitate necessary organizational architecture and process reengineering efforts.

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Appendix: Interview Protocol

Interview Title: Exploring Firm-Level, Cloud Adoption, and Diffusion

A. I will introduce myself to the participant and thank them for participating.

B. I will verify receipt of the consent form, answer any questions and concerns of the study participant.

C. I will orient the interview. 1) Ask open question 2) Long answer positive and negative.

D. I will remind the study participant that the interview will be recorded and the interview will remain strictly confidential.

E. I will turn on the recording device, announce the study participant's identifying code, as well as the date and time of the interview.

F. I will start the interview with the first question and continue through to the last question.

- How do you contribute to IT cloud adoption and propagation decisions with steps, purposes, and time elements of each?
- What are the key roles involved in the adoption and propagation of IT cloud within your organization and how does your role relate to these other roles?
- Please describe the nature, frequency, and structure of how you communicate IT cloud adoption and propagation decisions with other peer and subordinate IT organizational roles.
- How do you gather information to formulate IT cloud adoption deliberations and facilitate propagation communications?

- How do you adjudicate IT cloud adoption and propagation decisions with steps, rationale, and purposes of each?
- What difficulties have you encountered in the IT cloud adoption and propagation process within your organization and have these difficulties altered over time?
- What additional strategy-related information would be worth sharing to help IT executives make advantageous enterprise cloud adoption and diffusion decisions?

G. End interview questions and ask if there is any other information they would like to share.

H. Explain the concept of member checking and inform participant they will receive a transcript of the interview to verify the accuracy.

I. Thank the participant for partaking in the study. Confirm the participant has contact information for any follow-up questions and concerns. Offer copy of the study when completed.