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Developing Cloud Computing Infrastructures in Developing Countries in Asia

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This is to certify that the doctoral study by

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Walden University
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Abstract

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MS, Sharif University, 2005

BS, Civil Aviation Higher Education Complex, 1985

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Adoption and development of cloud computing in developing countries can be different from other countries, but it can provide more benefits. The purpose of this multiple case study, guided by diffusion of innovations theory, was to explore strategies that IT directors use to develop cloud computing infrastructures in Iran. Five IT directors from 5 cloud computing companies with at least 5 years experiences in deploying the cloud computing infrastructures, developing strategic plans, and management cloud hosting services in Iran, shared strategies through semistructured, face-to-face interviews. Additionally, company documents were reviewed for triangulation. Member checking ensured the accuracy and reliability of the findings, then thematic analysis was performed using software for coding and helped organize themes as they emerged during the process. Four main themes emerged from the data: focus on customer solutions as a strategy, management as a strategy, implementation and support as a strategy, and paradigm as a strategy to develop cloud computing infrastructures in developing countries in Asia. Therefore, the findings from this study showed that cloud computing continues to play an important role in adopting new technologies, especially in responding to the needs of developing countries in Asia. These findings contribute to positive social change by providing insights to IT directors in companies on best business practices, heightening awareness of different cultures, and some of the social developments in developing countries in Asia. The result may be improved living standards in society and greater social balance to reduce discrimination.

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Table of Contents

List of Tables

Section 1: Foundation of the Study

Background of the Problem

Information technology (IT) is shifting into a new era where cloud computing is becoming widespread (Riungu-kalliosaari, Taipale, Smolander, & Richardson, 2016). To address these changes, a strong leadership in IT management initiatives improves IT success and enhances IT with strategies, business processes, stakeholder expectations and organizational mechanisms to ensure investment sustainability over time (Marabissi, Mucchi, Fantacci, Spada, & Massimiani, 2019; Santos & dos Santos, 2017). As one of the most important human resources, IT leaders are responsible for using the full potential of IT as well as overcoming resistance to change (Shao, Wang, & Feng, 2016). IT leaders and decision makers affect IT responsiveness, making their experience important in their field of work (Pick, 2015). For instance, the role of IT has evolved into a strategic tool that can lead to the success or failure of a company due to the cloud, Internet, and network (Bhattacharya & Roy, 2017). Thus, the role of IT directors for organization projects is not limited to technical aspects but also addresses more complex tasks such as policy planning, budget management, IT investment, and risk assessment (Nguyen, 2016).

Cloud services have led to many changes in culture, society, economics, and industry. The underlying causes of this change can be found in the rich and broad nature of the cloud, under strong leadership and the development of appropriate strategies. The adoption of the cloud is based on various processes. The final decision on cloud migration, usually based on the development and implementation of a coherent cloud

strategy, depends on three elements: (a) estimated total cost of ownership, (b) capital expenditure and operating expenditure, and (c) return on investment (Mangiuc, 2017). In addition, there are three phases of cloud service adoption strategy: (a) companies pay attention to the accurate learning and analysis of their cloud services and applications, (b) users map applications and workloads to the associated cloud services, and (c) users determine the security profile for each workload (Attaran, 2017).

After adopting cloud technology, IT-driven competitive advantages are manifested by new IT-led products and services, efficient business processes, new business models, innovative revenue streams, improved partners' and suppliers' collaboration, and improved customers' experiences (Karanja & Rosso, 2017). However, IT innovation can both create and destroy value when it is not well managed (Lu & Ramamurthy, 2010). Stakeholder diversity, the complexity of hierarchical structures, economic and policy commitments, difficulty of resources management and performance measurement, especially in a developing country, will affect the decision making of IT governance practices (Nakabi, Tadili, & Semaa, 2017). In adopting the cloud and developing a coherent cloud strategy, leadership and IT director need to include knowledge in the economic estimation of cloud computing, analysis of services, effective factors in the competitiveness, proper management of IT innovation, and environmental recognition, especially in developing countries (DCs).

Problem Statement

Cloud computing is a growing technology and a central component of innovation that combines with an efficient computational model as a new paradigm (Durao,

Carvalho, Fonseka, & Garcia, 2014). According to Society for Information Management's survey from IT executives of 2,552 organizations in the world, a total of 75% of the surveyed organizations conveyed that in the future their IT infrastructure will be based on cloud services, which will involve cloud expertise, technical support, and service skills as the significant factors for selecting service providers (Luftman et al., 2015). The general IT problem was that developing countries have insufficient cloud expertise, technical support, and service skills among cloud service providers to develop cloud computing infrastructures. The specific IT problem was that some IT directors of companies offering cloud services in developing countries in Asia lack strategies to develop cloud computing infrastructures.

Purpose Statement

The purpose of this qualitative multiple case study was to explore strategies to develop cloud computing infrastructures used by IT directors of companies offering cloud services in DCs in Asia. The targeted population was five IT directors of five companies that have experience developing cloud computing infrastructures in Iran. The results of the study may contribute to IT practice by helping to develop cloud computing infrastructures in DCs. The implications for positive social change are that social evolutions can occur by developing cloud infrastructures in DCs in Asia, which may lead to more balanced social benefits and reduce discrimination. Moreover, developing cloud infrastructures can cause technology growth in commercial avenues, medical care, agriculture, education, and other social fields in DCs.

Nature of the Study

I used a qualitative, multiple case study design. Description and interpretation of qualitative research are based on a detailed review of phenomena relating to expected or unexpected situations (Hakkinen, 2013; Lai, Tam, & Chan, 2012). I chose the qualitative method for this study to focus on details while attempting to address relevant situations in the research questions. Moreover, the qualitative method involves making inductive arguments (by supplying strong evidence for the truth of the conclusion) and a developed foundation to answer research questions (Venkatesh, Brown, & Bala, 2013), which provided a comprehensive approach to explore the required strategies for developing the cloud infrastructures in DCs in Asia. In contrast, the quantitative method involves testing hypotheses and analyzing quantitative numeric data using statistics and experimental methods (Di Donato, Palmeri, Sorbello, Isernia, & Crocco, 2015; Hanson, Balmer, & Giardino, 2011). Because my research question was not based on hypothesis testing, the quantitative method was not appropriate for my study. Additionally, every study with a mixed-methods approach needs to provide greater confidence in testing of the hypotheses (Abowitz & Toole, 2010), and applying a hypothesis testing in mixed-methods approach was not desirable for my study.

Using a standard case study involves developing criteria and analyzing the case to refine the criteria (Suleiman & Svetinovic, 2013). The case study design in this study helped improve and refine the criteria regarding developing cloud computing infrastructure in DCs. There were two other qualitative designs considered but not chosen for this study. The structure of personal and social experience as two dependent

phenomena is discussed in phenomenology to understand the meaning of another's mind (Mentis, Laaksolahti, & Hook, 2014). However, the purpose of my study was to explore required criteria and strategies through the existing phenomenon. Thus, I was not focusing on the philosophy of recognition and seeking the underlying structure of lived experiences of people regarding a phenomenon. Further, ethnography continuously emphasizes the broad patterns of everyday life of people in the field (Baskerville & Myers, 2015). But I did not intent to repeatedly engage those in the field, so choosing ethnography was not appropriate for my study.

Research Questions

What strategies are used by IT directors of companies offering cloud services in DCs in Asia to develop cloud computing infrastructures?

Interview Questions

1. What were the strategies you have used in your company to develop cloud computing infrastructure and why?
2. How did you implement these strategies to develop cloud computing infrastructure in your company?
3. What was your role in managing and implementing these strategies and why?
4. What were changes in overall productivity of customers while developing cloud computing infrastructures?
5. What challenges did you face with the development of cloud infrastructure strategies? Why?

6. What strategy and method of successful cloud infrastructure have you been used to respond to current competition? And Why?
7. What were your main concerns in your approach to cloud computing and how did you address these concerns?
8. What other information would you like to add regarding developing cloud computing infrastructure strategies?

Conceptual Framework

I used the diffusion of innovations (DOI) theory by Rogers (1995) as a conceptual framework. Rogers developed a theory of how, why, and at what rate of innovation is involved in technology adoption. These elements are further divided into four categories regarding the innovation, time, communication channels, and social system. The DOI theory shows the required process for innovation to communicate through a social system in the particular channels and time (Backer & Rogers, 1998). Thus, this theory aids the researcher in evaluating cloud computing as an innovation, including five influential factors to identify the innovation's rate of adoption: (a) relative advantage, (b) compatibility, (c) complexity, (d) trialability, and (e) observability.

I used the time element of the DOI theory to analyze the rate of acceptance and adoption of cloud regarding preparing required strategy to develop cloud infrastructure in DCs. The communication channels in DOI assess entire communication channels that receive the information. This information is obtained from scientific theories, experimented peers who have adopted the innovation, and collected data that came from participants in the study. In addition, DOI helped me to investigate the members of the

social system, their structures, and the related boundaries while DCs in Asia are affecting by a new adoption.

Operational Definitions

Developing countries: Developing countries often refer to countries with low levels of economic and industrial development and lower social development such as education, health, and life expectancy (Rahnama, Fawazm, & Gittings, 2017).

National institute of standards and technology (NIST): NIST refers to an standard institute that has identified the standard cloud computing model as five key characteristics, three service models (software as a service [SaaS], platform as a service [PaaS], and infrastructure as a service [IaaS]), and four deployment models (private, public, hybrid, and community) for cloud computing (Gutierrez, Boukrami, & Lumsden, 2015).

Technology adoption: Technology adoption refers the first use or acceptance of a new technology or new product (Shaikh & Gandhi, 2016).

Technology acceptance model (TAM): TAM refers to how an individual's decision to use technology depends on two behavioral beliefs: perceived ease of use and perceived usefulness (Hajiyev & Chang, 2017).

Perceived ease of use (PEOU): PEOU refers to the degree to which a person believes that using a particular system will not involve physical and mental effort (Hajiyev & Chang, 2017).

Perceived usefulness: Perceived usefulness is defined as the degree to which a person believes that the use of a particular system improves its performance (Enakrire & Ocholla, 2017).

Technology-organization-environment (TOE): TOE is used to examine technology adoption to understand how to adapt to what the organization wants and what the technology can provide to the organization (Ray, 2016).

Unified theory of acceptance and use of technology (UTAUT): UTAUT refers to performance expectancy, effort expectancy, and social influence that determines the direct intent and behavior of the use, while facilitating the conditions determines user behavior (Venkatesh, Thong, & Xu, 2016b).

Diffusion of innovations (DOI) theory: DOI is a model that includes information on how to exchange and distribute information about new scientific ideas and innovations (Rogers, 1995).

Assumptions

To answer the research questions, assumptions such as high communication skills, a high level of creativity, and analytical ability are required (Wroblowska, 2016). A research assumption is a perspective where researchers attempt to determine the relevant value factors in an experimental setup (Davcik & Sharma, 2015). The assumptions that were considered without proper evidence in this research are (a) the response of participants to interview questions were conducted in an impartial and honest manner; (b) IT directors have the required expertise and knowledge using IT strategies and improving their international competitiveness within the company; and (c) that assurance would be

given regarding data protection that would allow for data collection on company strategies.

Limitations

Limitations are circumstances that may affect the research method and analysis that researchers are unable to control (Leedy & Ormrod, 2013). During interviews, participants may provide socially desirable responses instead of honest ones (Waller, Hockin, & Smith, 2017). For instance, recording interviews may have caused some participants to withhold information for privacy reasons. In this qualitative multiple case study, there were other limitations that were beyond my control. The findings of this study were from the perspective of IT directors and not the whole organization. In addition to using a limited population size, the use of findings was narrowed to active companies offering cloud hosting services in Iran.

Delimitations

The boundaries of this research included the type of study, which was focused on the strategies proposed by the companies that took part in the study. The selected companies for case studies were in Iran with a select population size. Additionally, the population of the study included IT directors of companies that offer cloud host services. Finally, participants were selected based on specific criteria such as successful experiences in developing cloud infrastructures.

Significance of the Study

The aims of the study were to provide new scholarly criteria, analysis, and processes that IT directors need to develop cloud infrastructure in developing countries.

Thus, the results may provide scholarly strategies to improve IT directories' performances on deploying cloud computing and increase cloud computing adoption in DCs. Moreover, the findings may also provide appropriate opportunities for growing small medium enterprises that do not invest too much.

Implications for positive social change also include entrepreneurship and demand for new opportunities for DCs affected by cloud computing adoption. This adoption and development of cloud infrastructure may reduce the environmental consequences and makes DCs more reliable and stable. As the cloud infrastructures eliminate barriers to what DCs can do, society tends to balance social aspects such as reduction of social inequality.

A Review of the Professional and Academic Literature

The aim of this study was to explore the strategies used by IT directors in Iran in Asia to develop cloud computing infrastructure. The literature review involved reviewing technology adoption and related models, cloud computing and standard cloud computing models, and how technology development will facilitate organizational growth and competitiveness in DCs in Asia. Initially, the focus of this study was to review the conditions under which technology adoption and development of cloud infrastructure in the environment, especially in DCs, occur. This review is divided into two perspectives: (a) DOI theory as a conceptual framework to help evaluate cloud computing as an innovation and measure the acceptance of the cloud and (b) other types of conceptual frameworks in comparison with DOI theory related to how cloud computing can help with the development of technology in DCs and Iran.

The literature review consisted of several strategies. The primary strategy emphasized the development of a list of key words and basic concepts related to general ideas about the research: *DOI conceptual framework*, *diffusion and innovation, technology adoption, technology adoption theories*, *cloud computing, standard cloud computing model, cloud computing strategy, developing countries,* and *the development of technology and cloud in Iran*. The information in the review is derived from previous knowledge and experience and the synthesis of scientific and well-known review of the latest available resources for study. I used peer-reviewed Google Scholar, EBSCOhost, and ProQuest articles as the second strategy in this study. In addition, I strived to review some of the titles and abstracts that were most relevant to my topic and attempt to provide documentation of bibliographic data using the literature review from the Walden University. The number of items examined in the literature review is shown in Table 1

Table 1

Items Reviewed for the Literature Review

	References (2014-2018)	References (older than 5 years)	Total
Books	2	2	4
Dissertations	1	0	1
Peer-reviewed articles	267	18	285
Webpages	3	0	3
Reports	5	1	6
Other resources	3	0	3
Total	281	21	302

Conceptual Framework

I used the DOI theory by Rogers (1995) as a conceptual framework. Rogers developed a theory based on elements that are divided into four categories regarding the innovation, time, communication channels, and social system. DOI theory shows the process required for innovation to communicate through a social system on channels and time (Backer & Rogers, 1998). DOI theory can still influence the research in various fields, such as accounting, economics, sociology, and psychology (Fallan, 2017). I used this method to evaluate cloud computing as an innovation.

The definition of diffusion of innovations. DOI explains how an idea, product, or service is adopted through a system over time (Woodside, Augustine, & Giberson, 2017). Researchers use DOI to explore how to spread a new idea in organizations, social networks, and culture. DOI is a spatial process, and space and time are considered the main elements that influence the spread of the innovation process (Lee, Agrawal, & Rao, 2015). The theory of innovation was first proposed by Tarde, who sought to explain social change through expanding inventions by changing the accents (Rogers, 2003). Rogers then presented DOI as the theory of diffusion, explaining how new ideas/technologies spread (Rogers, 1995). Rogers identified diffusion as the process by which an innovation is communicated through certain channels over time among the members of a social system (Benevides, Vause-Earland, & Walsh, 2015). The modern theory of DOI includes information on how to exchange and circulate information about new scientific ideas and innovations. Rogers identified the social component in the adoption of technologies and ideas in addition to the cognitive aspects of adoption

(Bresciani & Eppler, 2015). Most technology theories focus on the tool, interface, or cognitive aspects of engagement.

Role of innovation in diffusion of innovations. Each innovation has unique characteristics. Many scholars focus on the innovation itself: the idea, practice, or object that is perceived as new by an individual or another unit of adoption (Ekdale, Singer, Tully, & Harmsen, 2015). But DOI can be used to explain the attitude and acceptance of new technology, which often matches the features of innovation (Dash, Bhusan, & Samal, 2014; Mkhize, Mtsweni, & Buthelezi, 2016). DOI has five innovation features that can influence decision making in accepting or rejecting innovation (Han & Han, 2014). According to Rogers (2003), five characteristics affect self-confidence in accepting individual innovation: (a) relative advantage, which compares innovation with previous options in the individual's mind; (b) compatibility, with shared values, past experiences, and user needs; (c) complexity or difficulty learning; (d) trialability, which indicates the ability to test innovation; and (e) observability, which is the rate of innovation that is understandable to others. Thus, Rogers' s theory can provide an assessment of the terms of innovation and acceptance that can match innovation characteristics.

The diffusion of innovation. In DOI, intellectual leaders and their followers are similar in many respects. Interacting pairs of people with the same personality and different features may affect the type of research data management over its size (Borgman et al., 2015). In DOI, there is a difference between some of the characteristics of the couples of people that are interacting due to difference between developed thought

and recipient (Rogers, 2003). Additionally, DOI is an innovation-based social system that can be classified into five degrees: (a) innovators who are more interested in experimenting with new thoughts; (b) early adopters who adapt quickly and consciously; (c) the majority of people who have a point of view, but do not have the position of intellectual leaders; (d) the late majority who are skeptical people and innovate after the majority; and (e) laggards who are traditional people and more dependent on the parameters of their residence (Bresciani & Eppler, 2015). Therefore, in the DOI, individuals with varying degrees of innovation gradually follow the ideas of their intellectual leaders and followers.

Acceptance of innovation in diffusion of innovations. Innovation is an idea, action, purpose, device, or passage to a variable situation that people think is new and different (Rogers, 2003), so a new initiative initially creates uncertainty because may involve uncommon methods and ideas. Various factors are involved in accepting innovation and developing a new idea such as time and ability (Blumberg, 2016). Individuals can take advantage of the time factor and ability based on inherent characteristics to accept innovation such as focusing on pivot learning. Leaders can use the DOI theory to help developers and stakeholders of innovation who focus on pivot learning because it provides a broader perspective for the dissemination and acceptance of innovation in social groups and organizations (Van-Rossum, Scheele, Albert, Sluiter, & Heyligers, 2016). The factors influencing the development of a new idea include self-innovation, communication channels, time, and social system. There are also four factors that can affect innovation in organizations: the relative benefits of innovation, system

readiness, user readiness, and resource readiness. Rogers suggested that new ideas spread from one person to another person over time, and dissemination occurs in the process of innovation or intervention among members of a social system over a period (Jamshidi, Hussin, & Lai, 2015).

The way people decide on accepting a new phenomenon and innovation is to follow a process. The decision-making process of innovation in a model includes a person's choice to accept or reject technology or services. The DOI theory is based on technology acceptance and how new services are accepted by individuals (Jamshidi et al., 2015). According to DOI, this decision is based on the type of communication and decision making in any innovation (McCoy, Koebel, Sanderford, Franck, & Keefe, 2015). Compared to other types of innovation, a new technology is more acceptable with higher connectivity, visibility, adaptability, and complexity. DOI is also categorized in five accepting innovation steps that could affect the innovation process: (a) how an individual is exposed to innovation the first time; (b) persuasion to show positive or negative beliefs or attitudes; (c) decision to accept or refuse the innovation; (d) implementing the innovation in practice; and (e) confirmation for decision making (Min & O'Rourke, 2017). The decision-making process begins with evaluating and accepting innovation from people when the product is more consistent, with palpable complexity and low relative costs. As a result, the innovation characteristics of its interaction with individuals, the environment, and the audience will be the main criteria for decision making and accepting innovation.

Extension of technological innovations by diffusion of innovations. Due to the different characteristics of individuals, the diffusion of technological innovations will be different in each society. The diffusion of technological innovations generally refers to the spread of the use of new methods, processes, or production systems, which in a company depends on several factors such as intensity of competition, strategic behavior of the company, new product features, standards, regulatory regime, cultural issues, and company capabilities (Shin & Koh, 2016). Individuals also have different levels of willingness to adopt innovations (Oinas-Kukkonen, 2015). DOI offers a conceptual framework for discussing technology adoption at a global level (Weerakkody, Irani, Kapoor, Sivarajah, & Dwivedi, 2017). In diffusion of technological innovation, DOI can expand technological innovations in the environment, with its inclusive, comprehensive, and competitive nature, and can contribute to the adoption of new technology. This ability is consistent with the objectives of this study in analyzing the cloud and developing its infrastructure in developing countries.

Technology Adoption

Through the lens of DOI model, I used technology adoption to find the strategies needed to develop cloud computing infrastructures in Iran. Technology adoption is the first use or acceptance of a new technology or new product (Shaikh & Gandhi, 2016). Technology adoption factors are divided into three categories: producer characteristics, factors associated with the attributes of the technology, and organizational factors (Asante, Villano, Patrick, & Battese, 2017). Most studies have been conducted on technology adoption in developed countries, and there are fewer studies on technology

adoption in developing than in developed countries (Dajani & Yaseen, 2016). However, studying technology adoption to understand the factors affecting the deployment of new technologies such as cloud computing is essential to determine how developing countries use new technology.

Technology adoption is applied in a variety of fields such as social, cultural, industrial, and scientific fields. Technology adoption in medicine, especially in the health care sector, leads to faster time operation, reduced testing and exams, and improved patient care (Abdekhoda & Salih, 2017). People who use online banking and technology adoption have a better understanding of the use of the banking system (Bashir & Madhavaiah, 2014). Adoption of the technology can also be linked to the ethnic identity, culture, and social aspects of an individual (Williams, Gavino, & Jacobson, 2017). An adoption rate helps to assess the impact of new technology in the industry, which could lead to increased production in adopting new technology over time (Busdieker-Jesse, Nogueira, Onal, & Bullock, 2016). Thus, the study of technology adoption can lead to the optimal use of new technology in various fields.

Further, technology adoption can be influenced by the perceived self-efficacy of the use of technology. The decision to use technology is influenced by the positive perceptions that users derive from using technology (Williams et al., 2017). User perception is one of the main factors of optimal management, and it should be addressed by managers and policymakers (Abdekhoda & Salih, 2017). In addition, self-efficient people have higher personal innovation, and they are better prepared to use a new system (Aharony , 2014; Bashir & Madhavaiah, 2014). Therefore, self-efficacy, the belief in the

individual's ability to perform an action, may be the key to accelerate the adoption of technological change (Coeurderoy, Guilmot, & Vas, 2014). People who have high self-efficacy engage in more challenging tasks than those with low self-efficacy (Aharony, 2015). The decision of users to adopt new technology can be influenced by their perception (self-efficacy) of the use of technology. As companies adopt new technologies, self-efficacy is an important organizational development factor that management can consider because it is a perceived ability to implement the initiative. This concept of self-efficacy applied to this study's focus on developing cloud computing infrastructure.

Technology adoption theories. Technology adoption is explained by various theories and models, which are important for organizations (Baishya, Samalia, & Joshi, 2017). These theories and models aid in evaluating cloud computing as an innovation. In choosing a successful adoption model, I reviewed several technology adoption theories and models for the appropriate conceptual framework for this study such as (a) the theory of rational action (TRA) developed by Fishbein and Ajzen in 1975, (b) the theory of planned behavior (TPB) developed by Ajzen in 1991, (c) the TAM developed by Davis in 1989, (d) the TOE developed by Tornatzky and Fleischer in 1990, (e) the UTAUT developed by Venkatesh et al. (2013), and (f) the DOI theory developed by Rogers in 1995.

One theory of technology adoption is the TRA, which explains individual behavior based on behavioral intention. According to the TRA, human behaviors are influenced by individual attitudes (Xu et al., 2015). TRA is limited by the inability to

compromise in circumstances where the individual attitudes are not selected or when the actual behavior and individual's intentions are high (Rahayu & Day, 2015). In addition, TRA is a general model, not designed for a specific behavior or technology, which has allowed it to be applied to countless fields (Rondan-Cataluna, Arenas-Gaitan, & Ramírez-Correa, 2015). The TRA includes the impact of uncontrollable environmental variables and controllable intentions that affect user behavior.

The TPB can also be used in technology adoption. TPB is an extension of TRA, and it is used to predict behavior and understand its causes (Akulume & Kiwanuka, 2016). Proponents of TPB emphasize the measures of intention to use technology (Yeh, 2015). TPB theorists identified three factors that affect behavioral intent: attitude, subjective norms, and perceived behavioral control (Rich, Brandes, Mullan, & Hagger, 2015). The TPB is mostly used to study the adoption of different information security, computer resource centers, and negotiation support systems (Zolait, 2014). Despite the use of TRA and TPB in technology adoption, there are significant limitations, especially when there is a high correlation between purpose and behavior (Rahayu & Day, 2015).

The TAM is a model for explaining and predicting behavior in decision making and accepting the use of a particular technology. In TAM, an individual's successful introduction into IT depends on his or her willingness to use the technology (Hajiyev & Chang, 2017). Hajiyev and Chang argued that in TAM, the individual's decision to use technology depends on two behavioral beliefs: PEOU and perceived usefulness. PEOU refers to the degree to which a person believes that using a particular system will not involve physical and mental effort; the perceived usefulness is defined as the degree to

which a person believes that the use of a particular system improves its performance (Enakrire & Ocholla, 2017; Hajiyev & Chang, 2017). TAM includes the factors that affect or influence the acceptance and use of computer technology in organizations (Enakrire & Ocholla, 2017; Shih, Lu, Liu, & Wu, 2017). TAM theorists explain the phenomenon of the users' acceptance of a system, such as information management fields. Scholars have used TAM in IS studies to examine the goals of individuals in the adoption of technology (Li & Wang, 2017; Niemand & Chauke, 2017; Suresh, Prabhakar, Santhanalakshmi, & Maran, 2016). According to Hajiyev and Chang, although implementation in the TAM is extensive, decisions about consumer behavior are not fully understood, and there is a need to use other methods along with TAM. The TAM can be used to explain and predict behavior in the decision making and acceptance of the use of technology, especially with Perceived ease of use and perceived usefulness for evaluating and accepting the concepts of innovation and IT. However, it is not known in some consumer behavioral decisions and should be consistent with other models. Consequently, despite the unique characteristics of the TAM, due to and limitations like IS and the specific fields of information management, it is not appropriate for this study.

The TOE framework developed by Tornatzky and Fleisher is used to describe the factors that affect technology adoption and probability. According to the TOE framework, adoption is influenced by technology development, organizational conditions, business and organizational reconfiguration, and industry environment. Technological innovations include three areas of technology, organizational, and environmental context (Ahmed, Ammar, & Ali, 2016; LI, Zhao, & Yu, 2015). These

three elements represent opportunities for technological innovation (Alomar & Visscher, 2017). Scholars use the TOE framework to analyze the diversity of IT adoption, such as e-commerce, enterprise resource planning, open systems, electronic data interchange, and knowledge management systems (Olutoyin & Flowerday, 2016). The TOE is used to examine technology adoption to understand how to adapt to what the organization wants and what the technology can provide to the organization (Ray, 2016). TOE includes Rogers's (1995) three groups of adoption predicators: leader characteristics relating to change, internal characteristics (e.g., centralization, complexity, formalization, interconnectedness, organizational slack, and size), and external characteristics (e.g., openness of the system; Awa, Ojiabo, & Emecheta, 2015; Thi, Lim, & Al-Zoubi, 2014). However, TOE does not provide an integrated conceptual model or a comprehensive theory to understand factors that influence adoption (Praditya, Janssen, & Sulastri, 2017). TOE might not include all of the factors that could affect the adoption of technology by the organization (Alomar & Visscher, 2017; Olutoyin & Flowerday, 2016). This model operates in the three dimensions of the environment, organization, and technology, and it can be used to evaluate the opportunities for technological innovation. This model, especially at organizational levels with significant operational limitations, may be an inadequate assessment of the characteristics of innovation in the organization.

UTAUT is another technology acceptance model that developed by Venkatesh. Venkatesh, Morris, and Davis synthesized the TAM and TPB models into the UTAUT model (Venkatesh et al., 2016b). There are four key constructs in UTAUT: performance expectancy, effort expectancy, social influence, and facilitating conditions (Huang, Jin, &

Liu, 2016; Wang, Chen, & Chen, 2017). The four factors impact the four key constructs: gender, age, experience, and voluntariness of use. In UTAUT, performance expectancy, effort expectancy, and social influence are direct determinants of usage intention and behavior, while facilitating conditions determine user behavior (Venkatesh et al., 2016b). UTAUT has been validated using data from workplaces at multiple time periods. However, the focus of UTAUT is mainly on the acceptance of information security at the workplace, and some common predictions emerging from the new technology literature have not been studied using this method (Lua, Liub, & Weic, 2016). The Venkatesh also found that advancement in the theory of barriers to theoretical development was enhanced in research into the acceptance and use of technology. UTAUT includes a combination of several models for technology acceptance in a way that can create an integrated approach to the acceptance of IT users. Although UTAUT is advanced, the focus of this model is mainly on the acceptance of IS in the workplace; therefore, due to the characteristics of UTAUT, the UTAUT model is not in line with the objectives of this study.

I used DOI as a technology adoption model for exploring the cloud computing infrastructures in developing countries. Adoption is classified into three levels: individual, group/team, and organization (Liu, Luo, & Niu, 2017). DOI is a technology adoption model that allows researchers to gain a broad perspective on the dissemination and acceptance of innovation in individuals, social groups, and organizations (Van-Rossum et al., 2016). The TRA, TPB, and UTAUT models were originally designed to predict individual adoption and only lower organizational studies (F. Liu et al., 2017).

While TAM and TOE are widely used in the study of technology adoption at an organizational level. The TPB and the UTAUT pertain to an individual's adoption (Ahmed et al., 2016). Rogers developed DOI and focused on individual views and broad psychological and sociological theory, explaining how innovation can be accepted and scattered among people in trend-oriented perspectives (Rahayu & Day, 2015). DOI is applicable at micro levels of social systems (individual level) and macro levels of organization (Jere & Maharaj, 2017). I chose the DOI as the conceptual framework for this study to support the development of innovation and adoption of individuals and organizational and social groups.

Cloud Computing Architectures

Scope of performance. Cloud computing is a technology that offers new models for delivering, consuming, and providing computational services through the network. Cloud computing is a combination of distributed, parallel, multitenant computing models based on different technologies like virtualization, grid, utility, and autonomic computing (Kaur, Kaur, & Singh, 2017). In services, cloud computing provides elastic, on-demand, and robust services (Kumar, Sharma, & Singh, 2017; F. Liu et al., 2017). The NIST classified five features of cloud computing: (a) broadband access that identifies services provided on a network; (b) on-demand self-service, which refers to the provision of unilateral resources without human interaction with the provider; (c) resource collection that collects resources such as memory, bandwidth, storage, and processing for multiple clients; (d) fast elasticity, which indicates that resources are dynamically scalable and reduced with demand; and (e) the measured service, which refers to automatic control

and resource optimization through pay-per-use metering capabilities (Tripathi & Nasina, 2017). Cloud is a combination of computing technologies and services offered across the network. In addition to the technical features of the system, the cloud operates according to NIST standards that require the use of the cloud, with principles such as broadband bandwidth, automatic delivery, use of maximum resources and customer, high flexibility, and measurement and control of cost.

One of the most common reasons for companies to migrate to cloud computing is cost saving. The attractive aspect of cloud computing is its pay-as-you-go payment model as a computational program without the need for a large investment in IT infrastructure (Singh & Singh, 2017). Cloud computing resources are delivered in the form of web services, which improves use and reduces administration and infrastructure costs (Wang, 2016). In addition, the cloud can decrease costs with unified factors of peer to peer, autonomic, grid, mainframe, client-server, and utility computing. Cloud computing has been proposed as a solution for data outsourcing and on-demand computing to control the rising cost of IT setups and management in enterprises (Imran et al., 2017). Outsourcing computing for low-cost cloud computing such as Amazon Elastic, Azure, Google Cloud, which offer the ability to allocate massive compute power and storage on demand, provides a convenient and cost-effective solution (Popic & Batzoglou, 2017). Cloud computing could reduce operating costs and improve work efficiency (Dong & Zhou, 2019; Zhao, Li, Liang, Liu, & Shong, 2016). These cost reductions are due to the reduction of operational and administrative infrastructure costs.

Many companies have accepted cloud computing as a top technology. Companies such as Google compute engine, IBM's blue cloud computing platform, and Amazon elastic computing cloud have focused on mutual collaboration to explore unified and open cloud computing standards to facilitate users' use of the cloud environment (Cao, Cui, & Xu, 2016). Public companies such as Google, Yahoo, Microsoft, and Amazon are already invested in cloud computing services (Abujassar & Jazzar, 2017). The network bandwidth and developing hardware are leading to new technologies related to cloud computing. Amazon web services have pioneered the provisioning of cloud computing services similar to Microsoft Azure and Rackspace (Elshazly, Souilmi, Tonellato, Wall, & Abouelhoda, 2017).

The cloud is gradually growing in various fields. One of the key elements of business success in the economic, political and social fields is the entrepreneurial challenge that can be derived from a hybrid approach based on the business information system structure, a service-oriented solution and the call of a dedicated business architecture (Stoica, Mircea, & Ghilic-Micu, 2017). Stoica, Mircea, and Ghilic-Micu argued that, cement between these paradigms is based on the automated workflow and the infrastructure of the cloud. Cloud computing has been a major contributor to the development of medical information by entering medical information. In the health information industry, cloud computing has been able to serve as an ideal tool (Zhao et al., 2016). For instance, customers in medical and financial sectors can potentially save money and business processes by outsourcing and computing their data into public storage clouds (Cetin et al., 2017). In recent years, with the development of computer

technology, cloud computing has rapidly become a hot topic for industry. For example, in the transportation industry, in urban services and traffic control, the decision analysis method is based on the cloud computing model. (Cao et al., 2016). The evolution of clouds in various dimensions, including the economic, political, social, industrial, medical and other fields, represents the unique role of this new technology in the future of human life.

Type of cloud services. In a variety of cloud services, different development strategies are designed to meet the needs of multiple cloud users. With the rapid development of the cloud computing market, the type of services offered by cloud providers often change, which changes the strategy even in cloud users (F. Liu et al., 2017). There is no agreement on the definition of the cloud (Peihani, 2017). Howover, the NIST stated,

> Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. (p. 80)

The standard cloud computing model has five key characteristics, three service models (SaaS, PaaS, and IaaS), and four deployment models (private, public, community, and cloud computing) for cloud computing (Aborujilah & Shahrulniza, 2017; Gutierrez et al., 2015; Schneider & Sunyaev, 2015). Through various models and development strategies

that are designed to meet the needs of different cloud users, NIST is able to define a complete and standard way among the key features, service, and deployment models.

Software as a service. SaaS is a new and alternative way to access software running on the servers. SaaS is a software delivery model that delivers on-demand services over the Internet and displays the concept of cloud with separate software ownership (Anjum & Budgen, 2017). SaaS cloud core includes flexible and usable metrics that can be used to communicate with different devices (Machado, Rita, & Santos, 2017). Most of the time, the SaaS model supplies businesses with applications that are saved and operate in the cloud on virtual servers (Althagafy & M Rizwan, 2017). SaaS provides a software and uses many business applications such as; customer relationship management, office and messaging software, enterprise resource planning, human resource management, and payroll processing (Batra, 2017). SaaS is a new way of accessing numerous software resources in all fields, such as commercial and financial management software via the Internet and the cloud network. These features are due to the individual ownership of the software, flexible software, with numerous resources, including communication with servers, especially virtual servers and various devices.

Platform as a service. PaaS provides developers with the right platform and environment and allows applications and services to be created through the Internet. PaaS model can get a core hosting operating system and optional building block services that allow to run its applications or third-party applications (e.g., Amazon web services elastic beanstalk, Windows Azure, Heroku, Force.com, Google App engine, Apache Stratos) (Singh & Singh, 2017). PaaS offers a complete computing platform in the cloud and

enables users to develop, test, deploy, update and host services in the cloud landscape (Yuvaraj, 2015). PaaS provides a development and implementation environment for application developers; the provider usually uses a development tool that is accessible through an application program interface (Celesti, Celesti, Fazio, Bramanti, & Villari, 2017). PaaS is a comprehensive suite of application infrastructure services such as application platform, integration, business process management, and database services over the internet. In addition to the need to provide the environment and infrastructure, this capability enables the user an appropriate environment for implementing various applications.

Infrastructure as a service. IaaS includes highly automated and scalable computing resources measured by cloud storage and network capabilities. IaaS is capable of providing consumers with processing, storage, networking and other computational resources that consumers can set up and run custom software that includes operating systems and applications (Hu, Mason, Williams, & Found, 2015). IaaS provides the customer with virtual server instances and storage as well as the application program interface that allows users to access and configure their virtual servers and storage (Abujassar & Jazzar, 2017). IaaS is a form of cloud computing that provides virtualized computing resources over the Internet (Dumitru, Eftimie, & Racuciu, 2017). Amazon Web Services, Microsoft, Google or Rackspace can be found amongst the main companies that provide IaaS business plans. As the cloud computing price reduces, most of the enterprises will dump their data centers and move to the public cloud, thus saving money (Zia Ullah, Hassan, & Khan, 2017). IaaS is able to provide a rich host of

equipment, such as a variety of servers and storage (especially servers and virtual storage), and various processors and highly automated computing resources, using cloud features and network capabilities without requiring ownership of the equipment. In addition, access and configuration of equipment can be done by consumers in a budget-friendly manner, preferably at a low cost.

Deployment Models

Deployment models present a specific type of cloud environment, which is mainly characterized by ownership, size, and access. The common types of implementation models for cloud computing are the private, public and hybrid clouds that act as key factors in creating different cloud service strategies (Althagafy & M Rizwan, 2017).

Public clouds. In the public clouds, resources such as virtual machines, applications, or storage are accessible to the public by the internet service provider. Public cloud may be managed, owned, and operated by an academic, business, or government organization (Tripathi & Nasina, 2017). Public clouds can limit the configuration, security and features of the SLA; thus, the service is less compatible with services that use sensitive information. For example, some of public clouds are Amazon Elastic Compute Cloud (EC2), IBM's Blue Cloud, Sun Cloud, Google AppEngine and Windows Azure Services Platform (Singh & Singh, 2017). Customers in medical and financial sectors can potentially save money and business processes by outsourcing and computing their data into public storage clouds (Cetin et al., 2017). Public clouds are a place for providing Internet services to the public, such as virtual machines resources, applications, or storage. In addition, due to resource sharing, it can be used in other

applications such as various management systems, medical, and financial sectors that will lead to general savings.

Private clouds. Private cloud is a specific model of cloud computing that provides a distinct and secure cloud environment for a specific customer. A private cloud is run exclusively for a single organization and can be handled within the organization or by a third-party and hosted either externally or internally (Althagafy & M Rizwan, 2017; Peihani, 2017). Private clouds provide more control and a variety of data security capabilities that usually lack it in a general cloud (D. Kumar et al., 2017). Private cloud is a model of cloud computing that can be provided in an organization, or a third party and hosted either internally or internally. Unlike other clouds, according to its specific nature, it can provide more control and security features.

Hybrid clouds. Hybrid clouds combine private space, private cloud and public cloud services to perform distinct functions within the same organization. Hybrid cloud is a mixture of two or more private clouds and public clouds and provides the advantages of several implementation models (Tripathi & Nasina, 2017). Novel architecture integrating the Amazon web service Remote Cloud, Eucalyptus, and Hadoop architecture are composed of hybrid infrastructure elements to minimize problems related to big data improving performance and quality of service (Althagafy & M Rizwan, 2017). Designers use the hybrid cloud architecture in which access control policies run by a private cloud, while the public cloud is responsible for protecting outsourcing data (Pervez, Mahmood, Asad, Ramzan, & Wajahat, 2017). An important factor in avoiding significant costs in investing in cloud infrastructure is the use of a private cloud-based solution or a hybrid

cloud solution (Mangiuc, 2017). Hybrid clouds with the combination of public cloud and private cloud not only help to eliminate the disadvantages of each cloud individually, but also increase overall benefits. This architecture provides better control and improves data performance and service quality at a lower cost.

Others. Due to different cloud applications, there are other types of clouds. Federal clouds can be a hybrid cloud solution that combines cloud (private) and third-party (public) services (Molnar-Gabor, Lueck, Yakneen, & Korbel, 2017). As reported by Molnar-Gabor et al., the federal cloud can include the use of a combination of locally managed data centers resources (to store valuable and sensitive datasets and provide cloud computing for limited communities) and global cloud computing resources (to provide vast scalability, tailored to demand, and facilitate research applications, especially in intensive computing). Community cloud is a kind of cloud where cloud infrastructure for a specific community of users (such as a group of organizations) that has shared interests or concerns (e.g., security, compliance, jurisdiction, etc.) (Peihani, 2017). The next step in the development of cloud computing will be distributed / multicloud computing among three evolutionary stages: (a) monolithic, to provide a single provider in the integrated stage; (b) vertical supply chain, to offer whole services by multiple providers; and (c) horizontal federation, which provides create a federation to share resources among themselves (Bobak, 2017). Different cloud and cloud providers in cloud computing and cloud services meet the needs of a specific group of users and cloud organizations, increase strengths and reduce common concerns.

Characteristic of Cloud Computing

According to NIST, every cloud service must have five essential characteristics of the cloud computing. The NIST classified five important features for cloud computing: (a) on-demand self-service, in which a customer can self-provision compute, storage, etc., without human interaction; (b) broadband access, where services are delivered over a network; (c) resource pooling, which collects resources such as memory, bandwidth, storage and processing for multiple clients using a multi-tenant mode; (d) rapid elasticity, which indicates that resources are dynamically scalable and reduced with demand; (e) measured service, which refers to automatic control and resource optimization through pay-per-use metering capabilities (Schneider & Sunyaev, 2015; Tripathi & Nasina, 2017). Cloud service features are remarkable in terms of use, in accordance with the needs and availability of appropriate resources, equipment, bandwidth and controlled services, and can be distinguished from other technologies.

Cloud benefits. Cloud computing can now utilize all kinds of industrial and corporate systems in all shapes and sizes. Cloud computing is expected to impact the global economy, especially the ICT industry and other industries, in terms of the benefits of cloud computing through re-energized productivity, efficiency, and competitiveness (Habjan & Pucihar, 2017). According to European union communications, the potential benefits of cloud computing suggest an increase of 2.5 million new jobs in Europe in 2020 (Rhythm-Wadhwa, 2017). The cost benefit of using cloud is one of the main reasons for migrating all industrial settings to the cloud (D. Kumar et al., 2017). The advantages cloud computing used as an infrastructure brings on board for an enterprise,

like; (a) low capital expenses, to pay only for the used cloud resources, (b) economies of scale, because of usage from hundreds of thousands of customers is aggregated in the cloud, (c) no capacity guesses, no need to guess about capacity requirements, (d), agility, new IT resources can be made quickly available as compared to traditional, (e) reliability, because data can be mirrored at multiple redundant sites, (f) security, the enterprise data, both at rest and in motion, can be secured using various encryption strategies provided by the cloud provider, and etc. (Deb, 2017). Cloud is a great choice for many companies' due to numerous benefits such as increased IT infrastructure flexibility, computational power, the use of existing infrastructure on a pay-per-use as well as leverage on big data analytics, better information visibility, and cost effectiveness of a disaster recovery (Attaran, 2017). The benefits of Cloud are numerous and diverse because of the wide range of services such as industrial, commercial and scientific systems. The specific nature of the cloud, which can be fed from endless sources and latest technology, is one of the reasons for cloud excellence, which makes it possible to achieve a leap forward and a comprehensive application. Therefore, choosing the appropriate strategy in this study can play an important role in increasing the cloud productivity, which is being thoroughly developed.

Cloud disadvantages. The most important disadvantages of cloud are the debate about data security and privacy, especially in sensitive information management. Security and privacy are major challenges that prevent the cloud from becoming accepted in practice (Kang, Wang, & Shao, 2017). As reported by the RightScale in 2016 State of Cloud Report, the biggest challenges for rapid adoption of technology are lack of

expertise, security, and compliance (Attaran, 2017). Although cloud computing offers various advantages to both users and the cloud service provider however, it suffers from several threats, which target its confidentiality, integrity, and availability (Aborujilah & Shahrulniza, 2017). Some disadvantages that exist in the cloud include: (a) difficulty in cloud service contracts with the legal or service requirements of the organization; (b) the problem with local information in some public clouds; (c) problems in assigning responsibility between data controllers and data processors; (d) the problem of setting data protection standards, especially from different ranges; (e) problems in matching the level of cloud services or performance; and (f) lack of specialized skills (Molnar-Gabor et al., 2017). Study on the security of data and sensitive information, privacy, lack of expert, and cloud compatibility has long been studied. Existing statistics and the RightScale report for 2016 have shown that progress has been made to reduce existing challenges.

Required Strategy for Cloud Adoption

Due to the high demand in the expertise and wide application of the cloud, various cloud adoption strategies are used. The strategy required for cloud adoption needs to provide three stages: (a) resources and expertise (such as adequate investment and expertise, and cost estimates); (b) security, such as protection in cloud operating system, infrastructure, hosted applications and data, much higher-level cloud security management and centralized; and (c) compliance with corporate policies, the information security development environment, and business needs (Attaran, 2017). There is a significant difference between the prevailing cloud and the new cloud services model, which can be used to redesign or innovate business models and to exploit more cloud

computing and business opportunities (Habjan & Pucihar, 2017). In this case, this model should consider the impact of environmental factors such as competition, business partnerships, legislation, and the economic situation, in order to have a good impact on cloud adoption. Economic professionals should consider cloud-based technologies as a way to respond rapidly and effectively to the challenges of the economic environment (Mangiuc, 2017). Using clouds allows the organization to reduce the overall duration of business cycles, to increase the level of innovation, to react faster as a general trend, and increases the chances of success in the market. Migration to cloud computing is a strategic decision that is complex, dynamic, and highly non-structural. The cloud environment is still evolving; therefore, decision makers must carefully evaluate the capabilities of cloud computing services to determine whether this computing technique will help them achieve their goals (Alkhalil, Sahandi, & John, 2017). In adopting the cloud and developing a cloud strategy, there are several factors, such as competition and innovation, business partnerships, laws, and the economic and security situation. While complying with corporate policies, development environment, especially in developing countries and other needs should also be considered.

Strategic management plays a large role in the adoption of cloud computing. Some organizations have realized that strategic management is widely able to make fundamental changes to how IT capabilities are offered (Battleson, West, Kim, Ramesh, & Robinson, 2016). This strategy gives companies the ability and operational capabilities that can be used to integrate, build, and reconfigure internal and external responses in a rapidly changing environment. In addition, based on Gartner's long-term research,

companies use three stages of cloud service strategy in cloud management strategies: (a) the stage in which companies begin to learn and accurately analyze their applications and services in cloud technology; (b) when users need to document and analyze the internal processes that will be affected and evaluated by cloud services; and (c) the stage at which users should map applications and workloads on their cloud services (Attaran, 2017). Some researchers have proposed cloud adoption strategies be considered in a wide range of purposes (Riungu-kalliosaari et al., 2016). They provided five techniques for supporting cloud migration decisions and analyzing the suitability of cloud computing for an organization. These techniques include, appropriate technology analysis, energy consumption analysis, stakeholder impact analysis, responsibility modelling, and cost modelling. Strategic management plays a major role in the adoption of cloud computing, dynamic capability (through the maturity of IT infrastructure, employee empowerment, and governance of information security) and development. Strategic management enables managers to develop evaluation strategies, and organizational infrastructures to manage their resources in turbulent environments.

One of the key factors in developing a cloud-based infrastructure strategy can be e-government performance in the region. Many countries have attempted to implement e-government based on the performance provided by cloud computing, some of them have achieved remarkable success and others have faced difficulties (Tadili & Semma, 2015). Success factors such as elasticity, flexibility, cost-effectiveness and integration, which leads to minimizing costs and opportunity to maximizing the profits of the cloud in business, especially small businesses (Basahel, Yaminand, & Drijan, 2016). In addition,

barriers like poor management, lack of resources, lack of awareness, legal barriers and lack of ICT infrastructure can be considered as major problems for countries, especially developing countries (Mohammed, Ibrahim, & Ithnin, 2016). Therefore, in providing a cloud-based infrastructure strategy, it is essential to evaluate the performance of e-government, technology level, ICT infrastructure and human resources to determine the capacity of a country's willingness to adopt e-government, because government policy decisions can boost and change the cloud market in the country.

In the process of adopting and transferring to cloud technology by companies, infrastructures and cloud services follow a particular strategy. As the cloud evolves to enterprise information, companies must be able to manage their organization to adapt to a future with the standardization of IT (Maqueira-Marin, Bruque-Camara, & Minguela-Rata, 2017). Infrastructure and services in this transfer, companies will act depending on the role played by external agents, such as technology providers, research and development institutions, and government departments. The future behavior of each of these factors is also influenced by their role in accepting. To success of cloud service providers in the transfer, development of cloud infrastructure and services, results and analyzes should be presented as follows: (a) cloud service providers highlight observations and prove the results to enhance customer perceptions; (b) cloud service providers continuously improve the benefits and security of cloud services; (c) the impact of company size on admission should be taken into account; and (d) finally, to compare perceived benefits between companies in admission, refer to the type of company activity (Hsu & Lin, 2016),. For example, financial and service companies accept cloud

computing on the size and cost of their finances, and cloud service companies accept security concerns and intensity of competition. As a result, to determine the most appropriate strategies for a particular type of industry, cloud service providers should consider a significant relationship between these factors and the intention of approval.

Management systems are a powerful tool in formulating strategies and carefully controlling the sources of the cloud providers. Management systems are used by cloud providers and sometimes cloud users to provide reporting and command and control interfaces used by human resource managers. These systems are active in the following areas: Global planning, local planning, demand segmentation, estimating usage, pricing, scaling, load management, cloud management, and measuring studies (Jennings & Stadler, 2015). Customers always benefit from cloud services to complete internal resources. This is especially true if cloud service price is lower than domestic price (Henneberger, 2016). In fact, prices often make big use of cloud services. However, even if cloud-based prices is significantly higher or the service level is significantly lower, customers can use cloud services to cover courier needs. Customers can save their costs by choosing the right combination of internal capacity and cloud. Even though cloud computing is more and more accepted in practice, there is still no research on its economic aspects. Cloud providers often use management systems in planning, monitoring, and pricing resources, including financial and human resources, and other resources. The existence of management systems can be aligned with the standard cloud services in comparison with other cloud services in different parts of the world.

Developing Countries

Technology development plays an effective role in developing and cooperation in developing countries. In developing countries, information and communication technology have the potential to increase collaboration in global health research and capacity building (W. Wang et al., 2017). Over the next ten years, technological innovation plans that have been suddenly designed will have important implications for the nations of the world (Risling, 2017). As the international telecommunication union noted, an expansion from 400 million users in year 2000 to 3.5 billion users by the end of year 2016, with 2 billion of those in developing countries. The existence of a cooperative approach between societies, community leaders, governments and nongovernmental organizations is valuable to developing countries (Robinson et al. (2017). Innovation programs are developing in developing countries. With the increasing tendency of people to use IT, new advances in these countries are gradually expanding in the field of communication and cooperation between different classes of society. Therefore, based on the establishment of international relations with other cultures, new developments can also contribute to the cultural and social progress of developing countries.

The reduction of technological distance between developing countries and other countries is possible. One of the most important recommendations that can narrow the gaps between countries and developing countries is focusing on university management of emerging technologies, which can be through (a) encouraging universities to access resources and research into new technologies; (b) support for effective technology; and (c) establish units for entrepreneurship management for R&D and innovation for

developing countries (Eliana, Edgar, Valencia-Arias, & Claudia, 2017). Developing countries differ in their stages of development, per capita income, socio-economic, financial, and political characteristics. For this reason, the World Bank in 2012 broadly classifies the developing countries into two categories: low income developing countries and high income developing countries based on per capita income (Rahnama et al., 2017). Rahnama, Fawazm, and Gittings investigated that, foreign aid has beneficial effects in high-income developing countries which are at latter stages of development. Therefore, countries need to gain some "traction" before foreign aid can help. Development models, especially in economic development in South Korea and Taiwan, show four important lessons for other developing countries: (a) using the government in development; (b) increasing human capital through education; (c) promotion of industrial development policies and business policies; and (d) modification of the development model based on the political and economic conditions of each country (Kim & Heo, 2017). Despite the differences in the social, economic, financial and political characteristics of each country, there are several ways to reduce distances, especially technological gaps, with other developing countries and even with other developed world countries. Factors such as the use of government resources, cultural and educational resources of universities, and the alignment of industrial development policies and business policies within the country and the attraction of international assistance abroad will be opposed.

The potential of cloud services has not been fully realized in developing countries. Cloud computing basically entails the provision of IT as a service rather than

as a product (Senyo, Effah, & Addae, (2016). Cloud computing has been adopted in private, public and non-profit sectors in both industrialized and developing countries. However, the developed economies are far ahead of the developing world in terms of adoption and use. In spite of the multitudinous benefits associated with the cloud technology, its potential is yet to be realized in developing countries. Businesses becoming global coupled with the rise of numerous multi-national firms in developing countries, it is imperative for companies in emerging countries to move from their dominant strategy of "good-enough" innovation to the "augmented" innovation philosophy (Srivastava, 2015). With a view to sustain their competitiveness and simultaneously increase their market share, firms from developing countries should now strive to move toward innovating and building augmented products/services focused at addressing the latent needs of the potential users. It is a universal imperative for firms around the globe to plan their innovation strategy with a view to address the missing quadrants in their global strategy framework. Srivastava also argued that, the four principles suggested for the developing country firms to further their innovation agenda with a view to becoming global in their approach are: invest in research; learn to fail; be patient; and alliance and acquire. Customer satisfaction and commitment are constantly researched in the extant literature for their enormous significance to organizations, as well as for the information they contain on a diverse range of interrelated relationships with other constructs of interest such as trust, service quality and relational benefits (Fatima, Razzaque, & Di Mascio, 2016). Thus, there is a need to explore possible alternative service relationships in a developing country context within an intense

competitive industry sector. Good opportunities for developing countries are available to maintain global competition in innovation, research and identification of needs with the help of IT and cloud computing services and can help to increase market share and reduce gaps in advanced countries. Therefore, the preparation of an accurate and effective strategy in this study can help to realize and accelerate the described facilities in developing countries.

The Development of Technology and Cloud in Iran

Due to the vast technology needs in Iran, the cloud has played an important role in the development of technology for Iranians. Cloud computing in Iran has a major impact on cost reduction, the motivation to use modern technologies and productivity growth, as well as a moderate influence on information security threats and the professional growth of IT professionals (Stukalova & Guskov, 2016). Internet Word State in 2014 has reported that the population of Iran in year 2012 was about 78.8 million from which 53.3 % used Internet. According to the reports of Statistical Center of Iran, more than 70 % of the population was under 40 years old in year 2011. The latest report of Statistical Center of Iran in 2011, shows that among the literate urban population aged more than 17, more than 55 % have at least a diploma degree. In addition, data from the Iranian Statistics Center in 2014 stated that the proportion of literate students was over 13%. City of Tehran as the capital has several major universities which accept more than 16 % of the students in the country (Barkhordari, Nourollah, Mashayekhi, Mashayekhi, & Ahangar, 2017). Due to this fact, the culture of using ICT in Iran is new and the future curriculum should be based on global change, cultural diversity, quality of life, technology

upgrading, lifelong learning, the global economy and interaction with the national environment, therefore, fundamental training in the field of ICT literacy is more essential for Iranian teachers and students in the education system (Pourkarimi & Javad, 2016). The presence of young people in higher education, which is constantly being conducted by major universities in Iran, is a good infrastructure for the growth of IT and technologies such as the cloud in Iran, which is promising to further implement these technologies in Iran.

Despite the limitations, the use of IT and e-learning in Iran is increasingly developing. In the educational system of Iran, the use of ICT to increase the access to learning is one of the changes that is slowly being created (Saadi, Mirzayi, & Movahedi, 2016). Nowadays, despite many problems, e- learning is increasingly growing in Iran, and every year more and more universities are taking advantage of these methods in education and teaching. Saadi, Mirzayi, and Movahedi pointed out seven factors of e-learning restrictions in developing countries, especially in Iran, are: (1) deficiency of executive in rules, a specific organization, and lack of adequate support for holding; (2) the lack of motivation of learners; (3) credit constraints, because the development of e-learning requires sufficient funds; (4) infrastructure constraints that need to be developed and updated; (5) technical barriers; (6) human barriers; and (7) software and hardware limitations. To improve the skills and experience of employees and provide innovative staff as well as empower people to create new ideas and improve the level of education, higher education institutions in Iran since 1998, as their size and shape, mission, ethics, background, values and situations have changed dramatically (Hasani & Sheikhesmaeili,

2016). The latest statistics from Iranian users of the Internet shows that the Internet penetration rate in Iran reached 49.13 percent (Ebrahimpour et al., 2016), There are various limitations in most developing countries, including Iran, and changing the educational system and the implementation of e-learning has been an important step in reducing the limitations and growth of modern technology in Iran.

Establishment of an electronic health record system in the national network for health information and health information security assessment by the IT organizations have been another step in networking in Iran. The ministry of health in Iran in 2007 approved the national project as electronic health records system in order to create a national network of health information and implement the health information records and since then, the management center of statistics and IT of this ministry has taken the responsibility to perform it (Asadi, Moghaddasi, Rabiei, Rahimi, & Mirshekarlou, 2015). According to higher health council resolution in 2008, the ministry of health in Iran should develop the operational plan and administrative regulations for implementation and development of electronic health records (citizens health information system) within a year. As to attain Iran's Vision 2025, the ministry of health and medical education may consider the outcome of the tested comprehensive information security model. Through this study's findings, it is highly recommended that hospitals nation-wide should consciously be aware that health information security user could be the weak link in achieving information security effectiveness. Towards the same effort, Iran's statistic and IT management department conducts assessment on health information security annually, hence should attempt to include mandatory security program to cultivate of health

information security users' self- efficacy in information security (Shahri, Ismail, & Mohanna, 2016). The presence of IT management in the national network of health information and the extensive planning the ministry of health and medical education in assessing the health information security by IT departments provides a broad perspective on the implementation of IT in Iran's health affairs. The existence of IT management and the establishment of an electronic health record system in Iran's national network promise to set up a strategy that is consistent with the strong implementation of the cloud.

Transition and Summary

In section 1, I studied the main topics of the research and review the strategies that IT directors need to develop cloud computing infrastructures in DCs in Asia. Subjects such as the problem statement related to general and specific IT problems of research, the purpose of the research, and justification of selected methods based on the nature of the study. the importance of the study and DOI is proposed as the conceptual framework of research. Finally, I reviewed the latest literature related my topic and research questions. In section 2, I strived to see the details of section 1and identify selection criteria, interviewing participants, and collecting data. In Section 3, I analyzed the data and findings of this study and the implications of social change in the research.

Section 2: The Project

Purpose Statement

The purpose of this qualitative multiple case study was to explore strategies to develop cloud computing infrastructures used by IT directors of companies offering cloud services in DCs in Asia like Iran. The results of the study may contribute to IT practice by providing strategies that might facilitate the development of cloud computing in Iran. The implications for positive social change are social evolutions that occur by developing cloud infrastructures in DCs in Asia. These evolutions may lead to more balanced social benefits that can reduce social inequality, especially in knowledge-based society, where knowledge is the driving force behind technology development, economic growth, and the knowledge works (Gebremeskel, Kebede, & Chai, 2016). Moreover, facilitating development of cloud infrastructures can cause technology growth in commercial avenues, medical care, agriculture, education, and other social fields in DCs.

Role of the Researcher

Researchers undertaking qualitative multiple case studies play a significant role in the research process. In a qualitative study, researchers are deeply intertwined, collaborating with participants and becoming an instrument for collecting data (Houghton, Casey, Shaw, & Murphy, 2013). As a primary data collecting instrument, I collected the data directly from interviews. Additionally, case study researchers collect data from a variety of sources such as interviews, records, documentation, and artifacts (Yin, 2014). In addition to interviewing, I chose document analysis as a data collection method. In addition, in a qualitative study, the researcher needs to be in a position to

provide trust, open discussion, or access to in-depth information (Sorsa, Kiikkala, & Astedt-Kurki, 2015). I sought to gain trust with participants by conducting face-to-face interviews according to the culture of participants (Iranian culture), which may require a deeper connection to receive information.

I was an IT professional in the aviation industry and have many years of experience working on various IT projects at airports. My experience in the field as an IT supervisor included overseeing the IT activities (e.g., the network, system administration, and infrastructure management) at the airport. My role was to manage the flow of information and use new technologies such as cloud computing. One of my experiences was to collaborate on Microsoft Azure projects, which included offering cloud computing services for deploying and managing applications and providing a cloud host in my company to serve some of my company's subcontractors. In addition, I interviewed airport experts and other skilled people in organizations about collecting comments and improving the IT services at airports. I also had some experience with conducting feasible studies and designing and implementing IT and cloud projects at national and international airports.

Another part of my role as the researcher involved addressing ethical conduct, which encompasses obtaining informed consent from research participants. It is important for researchers to act respectfully and ethically during every step of the data collection process (Sorsa et al., 2015). Thus, with respect to ethical principles, especially in research interviews and data collection, I was responsible for respecting people and observing ethical and professional principles. Further, according to the Belmont Report,

three basic principles of ethics in human research are respect for people, utility, and justice (Wilson et al., 2015), which I followed when conducting my study to protect my participants. Additionally, researchers are expected to evaluate the risks and benefits of research projects (Ogundele, Ajose, Kuyinu, & Odusanya, 2014). The result of this study may help IT practitioners develop cloud computing in DCs in Asia; therefore, this project is more likely to be beneficial than a risk. Moreover, based on the institutional review board (IRB) rules, the participants and related individuals acted as independent agents in this study, and they were protected and supported from harm. Thus, the benefit was increased because the risk was decreased.

As the researcher, I also protected against bias and did not allow my cloud computing background to affect the research design and interpretation of my data. To reduce research bias, self-doubt and personal perceptions must be discarded (McDonnell & Sikander, 2017). When collecting data for this study, I tried not to allow my prior experiences and knowledge of the study topic influence my decisions. My past experiences were only a personal lens for analyzing participants' attitudes and views during the data collection process. In addition, triangulation of data and participant member checking during data analysis can be useful in reducing research bias (Hadi & Jose, 2016). I used triangulation (various resources) and participant member checking (reviewed by the member after the end of the data collection) methods in this study to minimize research bias. The nature of qualitative research is also subjective, and the findings are completely dependent on the characteristics of the researcher (Rudnick,

2014). Therefore, the evidence from interviews, documents, and the field of research were the main criteria for data collection in this study.

Finally, an interview protocol contains a set of rules and guidelines for researchers to follow in conducting interviews. In addition to helping researchers overcome language barriers with participants, they provide tools for analyzing qualitative data (Hussain, Muhammad, & Shahzad, 2015). I used an interview protocol in this study because I wanted to collect in-depth information, easily connect with participants (especially in their native language of Persian), and analyze the data. The interview in this study was conducted by a standardized, semistructured interview format with open-ended questions. Semistructured and open-ended interviews allow the interviewer to develop and sequence questions and make decisions regarding managing the information obtained in interviews (Bredart, Marrel, Abetz-Webb, Lasch, & Acquadro, 2014). These features in the interview led to the emergence of views and experiences of individuals.

Participants

The criteria for participation in this study were that individuals be IT directors of companies in Iran with a minimum of 5 years of experience in deploying cloud computing infrastructures, developing strategic plans, and managing for cloud hosting services. IT directors are well versed in their companies' organizational capabilities and its strategic management approaches (Chen et al., 2014). The utilization of cloud computing, networking, storage, and power resources is managed by cloud providers via global and local planning processes (Jennings & Stadler, 2015). Therefore, the ability to use appropriate strategies and utilization in different infrastructures and processes was a

criterion for study participation; this ability can help boost the skills of cloud providers in developing cloud infrastructure in Iranian companies. In addition, some of the reasons why companies decide to use cloud computing technology are reducing costs, improving capabilities, and enhancing flexibility (Chen, Chuang, & Nakatani, 2016). Therefore, study participants needed to be aware of the benefits and costs of deploying cloud computing.

The strategy I used to access participants was based on developing an effective relationship with them, which was an essential part of the research (Karjalainen, Niemisto, & Hearn, 2015). Due to the importance of gaining access, communication was also based on the participants' culture. Strengthening communication with organizations, maintaining honest and open communication, and demonstrating the suitability of the profession are essential tactics for researchers to access participants (Opollo, Opollo, Gray, & Spies, 2014). Additionally, there are three ways of gaining access to participants: (a) identifying potential participants by reviewing organizational databases and business listings, (b) contacting participants to inform them of the research purpose, and (c) convincing participants on the necessity of their entry to complete the project (Maramwidze-Merrison, 2016). In this study, I identified potential participants by reviewing organizations' performance and business listings on the Internet and using information from professional colleagues in some Iranian companies. I informed the companies and selected participants about the research goals and how they could contribute to the study. After obtaining signed consent forms, I scheduled participants for an interview.

I strived to reduce interview challenges to establish a working relationship with the participants. Most interviewees' challenges include their readiness to respond and their reluctance to participate in difficult situations (Garg, Shukla, & Kendall, 2015). I informed the participants about their roles in my study and performed member checking to finalize the results. In addition, formal communication, cultural norms, and valid interactions with proprietary languages and dialects can facilitate transparency (Bamu, Schauwer, & Hove, 2016). My strategy was based on the transparency and trust of the participants and interaction under their culture. Further, researchers can have advantages in understanding the culture, social recognition, or physical recognition of the research site for access and viewing. In this study, being Iranian allowed me to adapt myself to the culture needed for the interviews and gather information.

As part of the interview process, I asked the participants to respond to the interview questions. Additionally, the interview questions can be followed when clarifications are needed; these descriptions help to complete the interview questions Dugartsyrenova & Sardegna, 2017). The interview questions should also be appropriate to answer the research question (Castillo-Montoya, 2016; Nelson, 2016; Siddiqui & Fitzgerald, 2014). Therefore, in this study, I interviewed IT directors as participants in accordance with the research question to review the strategies needed to develop cloud infrastructure in Iran.

Research Method

In this study, I used a qualitative research method due to nature of the problem being explored. In a qualitative method, most of the investigations are performed in a

natural setting because the researcher observes the participants and their environment (Kruth, 2015). The purpose of the qualitative method is to gain deeper insight into the *why* and *how* of various research phenomena as it is experienced (Christensen, Robinson, & Simons, 2016; Neuman, 2014). Additionally, design thinking, qualitative theoretical orientation, and analytical skills create transparency and increase the credibility (Salmona, Kaczynski, & Smith, 2015). In addition, the qualitative method involves making inductive arguments (i.e., providing evidence for the conclusion) and an extended foundation for answering research questions (Venkatesh et al., 2013). The presence of evidence and more space for analysis, comparison, and conclusion made the qualitative method appropriate because it may lead to deeper solutions to explore the strategies to develop cloud infrastructure in DCs in Asia.

In a quantitative study, researchers strive to provide an objective study of a phenomenon in the controlled laboratory environment (Kruth, 2015). The quantitative method also uses only numerical measurements (Iruskieta, Da Cunha, & Taboada, 2015). In addition, in a quantitative method, the researcher tests hypotheses and analyzes quantitative data using statistics and experimental methods (Di Donato et al., 2015; Kasdan, 2016; Walsh, 2015). Because my research question was not based on numerical measurements and hypothesis testing, the quantitative method was not appropriate for my study.

Further, each study with a mixed-methods approach needs to provide a higher degree of confidence in the hypothesis test (Abro, Khurshid, & Aamir, 2015). Mixed methods does not replace either a quantitative or a qualitative approach but rather draws

from the strengths and minimizes the weaknesses of both methods (Venkatesh et al., 2016b). In addition, by analyzing data with mixed methods, experience with future replays is generalized for other issues (Fonseca, Redondo, & Villagrasa, 2015). Similarly, the use of testing hypotheses in a mixed-methods, combination with the properties of the quantitative method, and the generalization of the analyzed data for other issues was not desirable for my study.

Research Design

I selected a multiple case study design to explore cases. Case studies illustrate knowledge with sophisticated, insightful, reasoned, and creative abilities (Henry & Foss, 2015). A case study includes methodological flexibility in different paradigmatic positions and methods (Yin, 2014; Yusuf, Adams, & Dingley, 2016). Therefore, I was free to use the various material for project planning, strategies, or other organizational and political factors. Additionally, by using a standard case study, selection criteria are developed and analyzed (Korst, Fridman, Estarziau, Gregory, & Mitchell, 2015; Suleiman & Svetinovic, 2013). I documented cases for the standardization and development of criteria. A qualitative case study may provide information for developing cloud computing infrastructure in Iran.

I considered but did not choose other designs for this study. For instance, I did not intend to study the structure of experience and knowledge of phenomena. Personal and social experience are also two related phenomena in phenomenology to understand the meaning of others' minds (Mentis et al., 2014). In addition, in a phenomenological method, human consciousness and foundations of philosophy and science are considered

as the main goals of attitude (Matua, 2015; Tuohy, Cooney, Dowling, Murphy, & Sixsmith, 2013). The purpose of my study was to explore the strategies needed for existing phenomena, therefore, I did not explore the internal structure of people's life experiences about a particular phenomenon. Another design was ethnography, which is rooted in anthropology and involves insights made through intensive work in a specific research environment (Ravishankar, 2015). However, the focus of this study was not on the principles of anthropology. In addition, ethnographic scholars emphasize the broad patterns of everyday life of people in the field (Baskerville & Myers, 2015; Case, Todd, & Kral, 2014; Draper, 2015). Because I did not wish to engage individuals in the field, ethnography was not appropriate for my study.

Data saturation in qualitative research occurs when the information from the interviews becomes repetitive, and no new data and analysis are obtained (Houghton et al., 2013; Kline, 2017; McGuire et al., 2013). Data saturation happens by repeatedly adding new threads (Salatino, Osborne, & Motta, 2017). Thus, data saturation should lead to sufficient data collection and adequate response to research questions. When the saturation data is received, the data collection stops and no new themes appear (Thomas & Briggs, 2016). In this study, to ensure data saturation, I continued the interview so that the same concepts in the data are repeated. Any failure to reach data saturation negatively impacts the validity in a qualitative study (Fusch & Ness, 2015). Data saturation in qualitative research is a criterion for identifying the accuracy and validity of data.

Population and Sampling

In this multiple case study, I selected study units that represent a range of population changes and sampling. Based on the scope of this study and considering only one IT director per company, the total population of the participants was five, which included all IT directors of the five companies that offer cloud computing in Iran. Census sampling applied to cover the population (Taheri et al., 2015). By selecting census sampling method for this study, I was able to reach data saturation. Thus, due to the qualitative aspects of this study and the unique IT director in each selected company, a sample size with five IT directors was justified in this study.

I used a census sampling method because all potential or respondents who meet criteria information are invited to participate under this strategy (Jacobson, Hanson, & Zhou, 2015). In this study, the total population included five IT directors who met the inclusion criteria described in the Participants section. When populations are small, census sampling is preferable (Gichohi, 2014; Shang, 2014). Therefore, with the nature of this study, the census method was acceptable.

IT directors with a minimum 5 years experiences in deploying cloud computing infrastructures, developing strategic plans, and managing for cloud hosting services in Iran were eligible to participate in interviews in this study. Eligible participants were contacted by e-mail or phone, and after receiving the response, the consent form was sent in both English and Persian for signing. The participants were then scheduled to interviews for 45 to 60 minutes at the time and place that they are comfortable with.

Two types of data collection methods, including semistructured interviews and archival documents, were used in this study. Semistructured, open-ended interviews in a qualitative study allowed the participants to share their experiences with the topic's content (Mitchell, 2015). I conducted semistructured, open-ended, face-to-face interviews, and I did audio record the interview. Unlike U.S. executives, in the Middle East, managers are more comfortable with face-to-face work than online work. In addition, face-to-face interviews provide a human contact that enables the researcher to record nonverbal communication (Ratislavova & Ratislav, 2014; Trompenaars & Woolliams, 2016). Because of the small sample size used in this study, I carried out the open and face-to-face interviews to focus more on information details and qualitative meanings. Moreover, the main logic of interviews was based on the matching of interview questions with research questions (Nelson, 2016; Siddiqui & Fitzgerald, 2014). However, the other goals of the study were to create a query-based dialogue and receive feedback based on interview protocols.

Ethical Research

I informed the participants about their rights and purpose of the study. When participants are competent to decide to participate in the study, aware of the research procedure, and come to the decision to participate voluntarily, they are considered as informed consent (Bates, Seedat, & Lester, 2014). The participants were become familiar with the informed consent process and the relevant information package. The information package included the purpose and method of study, the risks and potential benefits of the study, confidentiality and the right of participants to withdraw, and the right of the

participants to obtain the results of the study. The interviews were conducted in Iran. Therefore, I provided the informed consent in English and Persian for Iranian participants. When the participants gave their informed consent, they were acknowledging that they were aware of the social and psychological risks inherent to the research (Egalite, Groisman, & Godard, 2014). I increased the informed consent of the participants by maintaining confidentiality, sharing the views of the topic of study, and ensuring that sensitive information is not included.

Participants were free to participate in this study. Participants were excluded from the study without being required to explain and give any response (Mason & Ide, 2014). I informed the participants about their right to withdraw from the study whenever they like. However, before the interview, I shared the e-mail instructions with the participants to clarify any questions they have about the study (see Appendix B- Interview protocol). Scholars must present the risks and benefits of participating in the study and offer the right to withdraw at each stage of the process (McDermid, Peters, Jackson, & Daly, 2014). Therefore, the participants in this study were free to withdraw from the study at any time.

Participants in this qualitative study were not benefited from monetary compensation or financial incentives. In qualitative research, financial incentives can influence the participants' behaviors (Giles et al., 2016). The participants were encouraged to participate voluntarily to play a role in the developments of cloud services in Iran. In addition, the participants were provided with a summary report of the research findings. Respectful practices are required in interviewing the participants and collecting

information (Sorsa et al., 2015). Therefore, ethical support through this study was an indispensable tool to be taken with care.

The standard of ethics and behavior was the main criterion for dealing with participants in this study. Ethical considerations are a central concern of researchers to ensure data integrity, protection of participants, and the confidentiality of the research (Duong, 2015). Therefore, the moral consciousness of the researcher strengthened ethical attitude with the participants. In addition, according to the Belmont Report protocol, researchers are expected to conduct a study on the risk/benefit ratio of research and participants (Ogundele et al., 2014). This commitment emphasized the support of the participants and helps to increase their ethical rights. This study aligned with the Belmont Report protocol and the ethical protection of participants.

All relevant documents and collected data in this study were recorded and secured. Collected data includes audio-recorded interviews, transcriptions, and other relevant information stored in password-protected files for at least 5 years after the investigation (Nelson, 2016). All participants' responses should be anonymous and, 5 years after collecting surveys, data should be eliminated (Joly, Dalpe, So, & Birko, 2015). Therefore, I secured all identifiable information from the interviews and the collection process on the encrypted hard disk of a computer, and then for the dual protection, I copied all data to a password protected USB storage device. Finally, I will destroy both devices in 5 years.

In a qualitative study, ethics is considered as a standard value, which may also be considered as a key aspect. The researchers' view follows a general model of ethical

decision because of the different situational factors (Agag, El-masry, Alharbi, & Ahmed (2016). Therefore, the need for high standards of ethics in common behaviors was essential. Study approval was first obtained from the sponsoring IRB (Mcknight & Franko, 2016; Vishwanath, 2015). I got approval from Walden IRB prior to conducting this research. IRB approval should be granted prior to data collection (Bhatnagar, Madden, & Levy, 2016). Ethical criteria for interviewing and collecting data in this study was based on the IRB's recommendations. In addition, approval to conduct the study will be granted by the appropriate IRB that includes informed consent (Juanes, Alonso, Hernandez, Ruisoto, & Muriel, 2016). The informed consent includes all factors for the complete discretion of participants to withdraw from the study at any time.

Additional protection is needed to support the participants' and organizations' confidentiality and to ensure that the identity of individuals was secured. Field notes and transcripts should be kept anonymized to prevent the identification of participants and relevant organizations (Duong, 2015). I kept the identities of the participants anonymous with the coding system in this study to protect participants' privacy in the data collection and data from analysis stages.

Data Collection Instruments

Data collection in this study included semistructured, face-to-face interviews and documents. The researcher plays a key role in collecting and analyzing data in a qualitative study (Malagon-Maldonado, 2014). I was the instrument in this study. Primary data in qualitative research are based on interviews and observations (Stiller & Joehnk, 2014). As the primary data collecting instrument, I gathered data directly from an

interview and by monitoring what is being observed, heard or behaved during the data collection process. Semistructured interviews play a main role in collecting data (Mitchell, 2015). Due to the use of preplanned and open-ended questions, I chose the semistructured, face-to-face interviews for this study. semistructured interviews give the interviewee an opportunity to express their views using rich descriptions (Nguyen, 2015; Ostenfeld-Rosenthal & Johannessen, 2014). Based on the nature of the study, the semistructured interview provided an opportunity to collect information from IT directors about necessary strategies for developing the cloud infrastructures in Iran.

Through the interviews in this study, various processes and protocols were conducted. Written consents are obtained from all participants in the semistructured interviews and case note review (Vallely et al., 2014). Before collecting data in this study, a written consent was sent to participants in accordance with IRB guidelines in English languages. Once the consent form has been signed, the participants then were contacted by e-mail or phone to schedule the interview at a time that is convenient for them. The interviews were face-to-face with a choice of English, open-ended, and audio-recorded. In addition, initially, the participants were assured of their confidentiality. The relationship between the interviewer and the participants in the data collection process can improve the voice of the participants (Clark & Bower, 2016). Because I conducted the interview in the English language, I was aware of Iranians' culture and literature, and I could develop appropriate relationships with the participants. The criteria for providing a systematic, developed, and refined interview protocol are: (a) aligning interview questions with research questions, (b) piloting the interview protocol with clearly defined

coding, (c) constructing an inquiry-based conversation, (d) receiving feedback on interview protocol by transparency of process, and (e) member checking of participants (Castillo-Montoya, 2016). Therefore, the interview protocol in this study was based on interview questions that were established by cultural norms of the research, formal communications with participants, and acceptable data collection with desirable descriptive and interpretive quality (see Appendix B). Then, I informed the participants about the data collection process and thank them for their participation in the study.

I considered validity and reliability in this study when developing the data collection process. The data collection process is developed by two aspects:(a) validity, to analyze the developed content, and (b) reliability, to analyze the process goals (Jusoh, Amatea, & Daniels, 2015; Wong-Riff et al., 2017). One of the goals of this study was to show the accuracy of the findings in the research, which increases the validity of the study. Although reliability relied on the implementation of a technique from different sources to the same participants and with similar outcomes. Data triangulation techniques are used to ensure the validity and reliability of the research (Cai et al., 2015; Dube & Uys, 2015). I triangulated the data from various evidence in this study: semistructured interviews and data sources documentation. In addition, I conducted member checking with the participants after the interview, which improved the validity of the study.

During member checking, I gathered the participants' perspective to ensure that the study results were appropriate. Member checking is used in the interview so that participants can directly confirm the results of the findings (Wu, Wang, Kropczynski, & Carroll, 2017). Therefore, I used the participants' comments through the data collection

process. Member checking is a quality control process that ensures the accuracy, credibility, and validity of the recorded interviews (Nelson, 2016). The main motive for using the triangulation approach in other areas and fields is an important step in its validity (Gerpheide, Schiffelers, & Serebrenik, 2016). The triangulation and member checking processes in this study enhanced the reliability and validity of the data collection, which means the results of the study could be generalized. The interview questions were used to answer the research question to explore the application strategies of IT directors in the development of cloud infrastructure in Iran. The interview questions is described in detail in Appendix A.

Data Collection Technique

I chose a semistructured interview and archival documents as the main sources of data collection. There are many methods for collecting data and analytical techniques in a qualitative study (Sayago, 2014). In this study, I conducted semistructured, face-to-face interviews using open-ended questions. After receiving the participants' consent, I did audio record the interviews. Data collected in qualitative interviews are often informal (Neuman, 2014). In addition, I encouraged participants to express their cloud experiences. I analyzed the company's document by reviewing its official materials received from IT directors and the Internet. Document technique is completed in five steps: (a) access to documents, (b) control authenticity, (c) understanding of the documents, (d) data analysis, (e) and the use of the data. Document review in this study was based on validation, content awareness, and adequate data analysis (Yildiz, 2015). Additionally, when there are proper assessments of data collection that can be done

through accurate documentation, which ultimately leads to a better understanding and a more acceptable result (Aleke & Nhamo, 2016; Kozica, Lombard, Ilic, Harrison, & Teede, 2015; Long**,** Barnett, & Rogers, 2015). In order to obtain accurate information and a better evaluation of this study, I obtained information from the data that was preferably available in the company and internet. However, the data may be inapplicable, incomplete, or inaccurate

The two methods of data collection complement each other. When combining the methods, the weakness of a method is replaced by the strengths of the other method. For instance, in the documentary procedure, the initial evidence is collected by the researcher without any developments. Then, the related and interesting findings are developed by the interview technique. The main advantage of collecting data is to maximize the amount of information available to researchers, increase the credibility of the data, and provide the necessary resources for triangulation approach (Agyemang & Castellini, 2015). I used these benefits to the research using rich content interviews, multiple sources, and member checking in this study**.** Qualitative interviews are beneficial in many ways. The qualitative interview allows participants to express their ideas freely, which leads to rich content in data collection (Pipa & Slrbu, 2016). However, the information provided in this method is filtered by the respondent's memory and the social context of the interview, which could lead to interviewee bias (MacKinnon et al., 2015). Compared to other data collection methods, other factors in this method, such as time and cost, are still considered as weaknesses.

I conducted a semistructured interview and a content analysis of archival documents in this study. A combination of methods of research, such as interviewing, document analysis, and historical archival research, enhanced the data analysis methods (Borgman et al., 2015). Putting two methods in the collected files enhanced the analysis in this study. Documents analysis provides historical backgrounds for companies (Agyemang & Castellini, 2015). An advantage of using documents includes the rich and accurate content of the information; a disadvantage includes incorrect information. Interviewing and document analysis should be combined to provide a comprehensive set of data (Gultekin, Anumba, & Leicht, 2014). Therefore, documents analysis was worthwhile using other methods such as the interview method.

I used member checking in this study. Scholars conduct member checking to ensure the accuracy, credibility, and validity of the recorded interviews in data collection (Nelson, 2016). After conducting an interview, I conducted member checking to improve the applicability and internal validity of the findings. Based on the member checking, the transcript of the participants' interview should be sent to the participants and ask them to review the accuracy and feedback (Kao, 2015). The final report of the findings went back the participants to determine the accuracy of the themes. In a member check interview, participants can elaborate on the findings from the interview (Ntinda, Ntinda, & Mpofu, 2017). The participants received the result of the study.

Data Organization Techniques

I used two programs to organize my data: (a) Microsoft Office products, such as Word and Excel, transcribing data collected from interviews and documents reviews; and

(b) NVivo software to analyze data, identify themes, and adapt codes. NVivo is a qualitative data analysis computer software package produced by QSR international that reduces manual tasks and gives the researcher more time to discover tendencies, recognize themes, and derive conclusions (Adetoro-Adewunmi & Damilola-Ajayi, 2016). NVivo is used to identify the main factors (NVivo themes) that participants feel are important for promoting engagement with the content and resources (McCarthy, Lewis, Bourke, & Grenyer, 2016). The analysis of the themes by Nvivo could showed the positive impact of participants in the study, which was one of the main goals of the research. In addition, NVivo provides researchers with the opportunity to code patterns that emerge from the data in a transparent fashion (Gabriel, 2015; Moghaddam, 2015). At the end of the data collection process, I gathered and compare all of the transcription data with the corresponding audio recording and document review, and then I organized the results into codes and themes using NVivo (the latest version).

Participants provide rich data if data collection is anonymous (Gustarini, Wac, & Dey, 2016). I used codes to replace the name of the participants or organization to ensure that the participants are kept confidential. Scholars should maintain a chain of evidence to increase reliability in the study (Yin, 2014). In the data structure, I kept P1 through P(5) for participants, and company A through E to register organizations. To ensure privacy, the data should be properly secured to protect the privacy of the participants (Yong, Zhiyuan, & Chuiwei, 2017). To protect the privacy of participants, I stored all data on an external hard disk with a password-protected and encrypted data privacy, and then I will destroy all data after 5 years.

Data Analysis

In this qualitative, case study, I used a triangulation method to analyze the data. Four types of triangulation have been identified: methodology, data, theories, and researchers (Carter, Bryant-Lukosius, DiCenso, Blythe, & Neville, 2014). These types of analyzes are used when multiple research methods, data sources, theories, or researchers are required for a similar phenomenon. Through these four types of analysis, I used data analysis. In qualitative research, triangulation includes a variety of methods or data sources to better understand phenomena (Carter et al., 2014; Creamer & Tendhar, 2015). I used two methods of data collection in this study: interviews and documentation. The triangulation protocol increases the validity of the findings and determines whether the data are in agreement, completed, or inconsistent (Tonkin-Crine et al., 2016). Triangulation provided value added through the validity checking and creating knowledge in the data analysis process.

In this study, I used different type of data analysis. Data analysis in the qualitative multiple case study involves analyzing individual case descriptions, developing themes within the cases, and exploring the cross-case themes that apply to several similar cases (Kruth, 2015). This type of data analysis was appropriate for the purposes of the study. The collected data be prepared by fully understanding the entire database and organizing them as the data transcripts (Feldhaus & Bentrem, 2015). All data were analyzed to obtain more completes result. The process of data analysis and interpretation has to be explained (Grieb, Eder, Smith, Calhoun, & Tandon, 2015; Hu, 2014). I described, classified, and interpreted the data into codes and themes. Triangulation was investigated

using several coders in the analysis of the qualitative data (Krishnan, Richards, & Simpson, 2016). The various results were presented in the comparative matrix tables as the completion of the analysis. The results of this analysis included the themes in a narrative passage or table text.

I used coding and NVivo software to analyze data in this qualitative study. Before data analysis, the collected data stored in electronic folders on my computer. Qualitative analysis is defined by coding, and coding determines how should be worked on data to answer the research question (Evers, 2016). Coding involved reducing the data in meaningful segments and combining the codes into broader categories or themes. Coding is an interface between data collection and the explanation of meaning data in the research (Theron, 2015). Therefore, in qualitative research, data collection and coding were synchronous processes. The analytical method used for the conceptual plan in this study was the use of NVivo software for data analysis, themes identification, and codes matching. NVivo is a qualitative data analysis that enables researchers to accurately identify themes and code patterns (Gabriel, 2015). I used NVivo to identify the main factors (NVivo Theme). In addition, NVivo has helped support other methods such as document review through notes and reflections.

The conceptual framework covers all aspects of the research, such as the development of research questions, the selection of the methods for data collection, and analysis and interpretation of research findings (Kumar & Antonenko, 2014). I used the DOI conceptual framework in this study to present the meaningful data analysis in data collection and interpretation of data. For the meaningful data analysis, I compared the

similarity between participant statements and the DOI conceptual framework. Therefore, the focus of the study on the key themes were correlated with the DOI conceptual framework. In addition, DOI conceptual framework for research is to determine the factors that influence the adoption process (Hsu, Lin, & Wang, 2015). One of the main ways to find the appropriate strategy in this study was to determine the factors influencing the adoption process. In this qualitative study, I also used open coding. Open coding in qualitative research contains the coder reading through an interview and recording from the participant discussions (Marks, 2015; Webster, 2016). The data was analyzed in an open coding format by going through the interviews and transcript documents and breaking them into segments and categories for defining concepts.

Reliability and Validity

Reliability indicates that there are several ways to collect facts. Reliability or dependability in qualitative research is the ability to produce the results for similar processes over time and across researchers (Cuthbert & Moules, 2014; Pompeii, 2015). Dependability identifies the reliability and emphasizes the same results when different methods are used. To ensure that the results of the study are dependable, I used different methods of collecting information, member checking for data interpretation, and reviewing the transcripts. The research process should be logical, traceable, and documented throughout the study (Cuthbert & Moules, 2014). The similar result in this process increased the reliability and reliability of the research findings. Dependability indicates the stability of the data over the time and conditions of the research (Connelly, 2016). In this qualitative study, procedures for dependability included a rich and detailed

descriptive document that outlines the interviews and documentation methods, member checking of data interpretation, and transcript review.

The credibility of this study referred to the believability and trustworthiness of the results. Credibility ensures the congruency of the research findings with the purpose of the study and indicates the participants are the main representatives in the study (Nelson, 2016). Therefore, the results of this qualitative research were credible from the perspective of the participants. Credibility is gained through data collection methods that are well defined and qualified by the researcher (Sarma, 2015). The rich content in data collection increased the level of credibility in a qualitative study. In a qualitative study, descriptive features and credit assessments increase when (a) the rich descriptions of data are interpreted, (b) the truth of other practitioners or researchers are founded, (c) a comprehensive account is provided, (d) triangulation strategies are used, (e) negative evidence is searched, and (f) a theoretical framework is linked (Colorafi & Evans, 2016). Therefore, the purpose of credibility in this qualitative study was to measure the content of data interpretation and evaluate the other procedures and resources used in the study. To improve the credibility of this study, I conducted various methods including triangulation, member checking, and using different sources of data collection.

I used procedures in this study to ensure the transferability of the results of the research to other settings. Transferability is the ability of researchers to demonstrate and transfer the result to other contexts of setting (El Hussein, Jakubec, & Osuji, 2016). In this qualitative study, describing the research context of the research was a way of transferring the meaning to others in similar situations and settings. In a qualitative study,

researchers can enhance transferability with rich content and accurate descriptions, locations, and studied people, if they are transparent about analysis and trustworthiness (Connelly, 2016). To increase transferability in this study, I documented and detailed the data collection process and analysis, member check of participants, and transcript review and triangulation. Factors that facilitate the transferability in research include the clear and distinct description of the culture and context, participants' choices and characteristics, data collection, and analytical process (Jouhari, Haghani, & Changiz, 2015). I focused on maximum variation in sampling (e.g., multiple cases), rich content and data collection (e.g., qualitative and documentation methods), and participants collaboration (e.g., member check).

I used confirmability to confirm the results of the study by others. In qualitative research, confirmability occurs when the results of the different data sources, analysis, and perspectives in the research are verified or corroborated by others (Lasater**,** Johnson, Ravert, & Rink, 2014). Confirmability in this study referd to obtaining a unique perspective for the study from different reviewers (such as member checking). To enhance confirmability, all themes should be reviewed by several members of the research team (Boellaard, Brandt, Johnson, & Zorn, 2014; Morar et al., 2016). Several members' checks ensure that an accurate process is carried out during the study. In addition, confirmability ensures the trustworthiness of the process, methods, and procedures of the research (Lin, Han, & Pan, 2015). Trustworthiness in this study was obtained by increasing the confirmability in using several techniques such as member

checking interviews, questioning from different perspectives, and triangulation in collecting and analyzing data.

The completion of data in qualitative research is expressed by data saturation. In a qualitative study, data saturation affects the validity of data collection (Fusch & Ness, 2015), Therefore, to improve the validity of data collection, I achieved saturation data in this study. In a qualitative research, data saturation occurs when the information from interviews are repeated and new data and themes are not created (Kline, 2017; Seth, Mustonen-ollila, Taipale, & Smolander, 2015). In this study, to ensure data saturation, I continued the interview so that the same concepts in the data are repeated. When the theoretical saturation is obtained, there is no need for further development of the category (Riungu-kalliosaari et al., 2016). Data saturation should lead to sufficient data collection and enhance the reliability and validity.

Transition and Summary

In section 2, many parts of section 1 are explained in detail. In this section, I designed the research method and research strategy for this study. I selected a qualitative approach and a multiple case study design for better analysis and a deep interview with the participants. Participants in this study included five IT directors selected from five companies that had successful experiences in deploying the cloud computing in Iran. I also used DOI as a theory of study to evaluate cloud computing as an innovation and measure the acceptance of the cloud computing in Iran. Through this section, various items in the study, including criteria for selection, access, and how to interview participants, are fully determined. In addition, all data collection tools and techniques,

data analysis methods, reliability and validity required in this study are also described. In Section 3, I focused on analyzing the data and findings of this study, the linkage between applications for professional practices, and the implications of social change in the research.

Section 3: Application to Professional Practice and Implications for Social Change

Presentation of the Findings

I applied a census sample of five participants to collect data via semistructured, face-to face interviews to gain an understanding of strategies the IT directors used to develop cloud computing infrastructures in Iran. In addition, I also analyzed each company's documents by reviewing the official materials received from IT directors, the Internet, and other business records regarding the development of cloud computing infrastructure in Iran as my notes to triangulate and confirmation of data interview. I transcribed the collected data from semistructured interviews and the review of organizational documents and then imported the data into NVivo software version 12. Thematic analysis was carried out using the Nvivo software, which was used to code and organize themes as they emerged during the process (Cunningham & McGregor, 2019). I used the NVivo for qualitative data analysis, themes identification, and codes matching. I also used the NVivo to support other methods such as reviewing the documents through the notes and reflections.

Additionally, I used the DOI conceptual framework for this research to explore how to develop a new idea in organizations, social networks, and culture. DOI is used to predict decisions about technology-related factors such as technological features or technology users' perceptions. Rogers's DOI theory also attempts to explain which factors will influence the adoption of an innovation (Hsu & Lin, 2016). According to Rogers's DOI theory, the factors influencing the development of a new idea include self-innovation, communication channels, time, and social system. Meanwhile, the various

characteristics of individuals will vary the diffusion of innovation technology in each society. Therefore, the study of technology adoption in this research can lead to the optimal use of new technology in various fields.

In this study, the main research question was "What strategies are used by IT directors of companies offering cloud services in developing countries in Asia to develop cloud computing infrastructures?" All participants provided both common and somewhat different views to develop cloud computing infrastructure. Among the four main themes of this study, all IT directors considered focus on customer solutions, management, and implementation and support strategies to be the best for developing cloud computing infrastructure as well as the main foundation for implementing other strategies. For the fourth strategy, three of five participants emphasized the paradigm shift in Iran and in developing countries. The participants believed that the paradigm would increase group trust and motivate other companies that are still hesitant.

Theme 1: Focus on Customer Solutions as a Strategy to Develop Cloud Computing Infrastructures

Focus on customer solutions was the first main theme related to strategies to develop cloud computing infrastructures. Based on the interviewees' responses to choosing the best strategies for developing cloud computing infrastructure in Iran, all participants noted that focusing on customer solutions in developing countries such as Iran with less opportunities was one of the most important factors in adopting this system, and nine of 24 organizational documents supported the theme (see Table 2 for information source metrics).

Table 2

Metrics for Minors Themes Under Theme 1

	Participants		Documents	
Major/minor themes	Count	References	Count	References
Focus on customer solutions as a strategy	5	6	9	15
Security	5	40	13	237
Cost-effectiveness	5	23	13	111
Reliability and data availability	5	13	12	68
Proper maintenance	4	8	12	46

Focus on customer solutions means that IT directors, while using cloud computing features in developing cloud computing infrastructures, focus their efforts on providing solutions that can also meet customer needs. The findings of the study indicated that these activities include customer interactions, feasibility and environmental analysis, and customer needs to achieve the required confidence. These activities are important because presenting solutions solely, with systematic views of technology and independent of environmental requirements and parameters, creates problems in practice that are unpredictable and disrupt the performance of the system. In those situations, participants believed that the focus should be on providing a solution based on customer need and awareness that results in convincing.

In terms of customer orientation and based on participants' responses to identifying the main factors of customer concern in adopting and developing cloud computing, the most important factors that have a major impact on convincing customers to adopt and execute cloud computing successfully were: security, cost-effectiveness, reliability and availability of data, and proper maintenance. Additionally, all participants

mentioned that because of the focus of data, security is more complex than the past and requires deeper and more technical attention. Thirteen organizational documents supported these ideas. All five participants stated that cloud computing was inherently low cost because of the type of structure and sharing mechanisms. Thirteen organizational documents recommend that IT directors use the best practices to reduce costs and develop cloud computing infrastructures.

Similarly, in relation to other concerns about adoption and innovation, all participants believed that reliability and data availability would reduce customer concerns, increase reliability, and guarantee future development of cloud computing. Thirteen organizational documents supported these ideas. Four of the five participants stated that proper maintenance of system after delivery was one of the key elements of cloud users that encourages cloud adoption. Twelve organizational documents supported these ideas and showed that proper maintenance should be accompanied by new methods and processes. Findings showed that customer decision-making about cloud computing development and adoption had a variety of external and internal factors. For instance, the customer often strives to solve his or her concerns through the new technology, meaning that technology adoption is influenced by being able to reduce or resolve problems, as one participant emphasized. Trust in cloud computing may differ from trust in other systems (Khan & Malluhi, 2010); however, it is important for consumers and providers to change their mindsets to be convinced.

Focus on customer solutions is also based on customer analysis and analysis of the environment and factors influencing customer decision-making in innovation and

adoption. Two participants stated that customer satisfaction is a key factor in adoption and can be achieved based on technology capability and the extent to which the customer perceives technology performance. Findings showed that most of the time, these capabilities include factors such as data access and protection, cost levels, and current and future technology sustainability. This is supported by the literature such as Tripathi (2018), who suggested that there are features such as lack of initial investment and low cost, reduced business risks and maintenance costs, and rapid access to large-scale resources and services in cloud computing that are highly accepted by the customer. Guha, Shrivastava, and Shrivastava (2013) also stated that because organizations use cloud computing in confidential business applications, the vendor must ensure that the client is convinced of security issues. Overall, findings and literature pointed to similar factors in convincing customers to adopt and develop innovation.

The literature also suggested that DOI as a technology adoption model allows researchers to gain a broad perspective on the dissemination and acceptance of innovation in individuals, social groups, and organizations (Van-Rossum et al., 2016). Two participants believed that by sufficiently understanding innovation and convincing customers to adopt and develop cloud computing, the results could lead to the DOI to other people and even organizations. Rogers developed the DOI theory and focused on individual views and broad psychological and sociological theory, explaining how innovation can be accepted and scattered among people in trend-oriented perspectives (Rahayu & Day, 2015). DOI is applicable at micro levels of social systems (individual level) and macro levels of organization (Jere & Maharaj, 2017). Another participant

stated that customer engagement and environmental considerations, and confidence in the development and support of cloud computing, have dramatically increased the company's business. Another participant believed that persuading the customer to adopt and develop was gradually achieved through a specific process that included evaluating all internal and external customer characteristics. Therefore, the proposed strategy was an attempt to convince the customer to adopt and develop cloud computing to reconcile the positive potential that often exists in the decision maker in adopting new technology.

Security. Security was the first subtheme and foremost factor that can convince customers to accept cloud computing as the new and substituted technology. All participants in this study identified security as one of the key factors in the development of cloud computing infrastructure. All five participants mentioned that because of the focus of data, security is more complete than in the past. All participants emphasized that security is more complex than ever, and as a result, resources and mechanisms of protection have greatly improved and sixteen of 24 organizational documents supported the theme (see Table 3 for information source metrics).

Table 3

Minor Nodes of Security as a Subtheme with Supporting Metric

	Participants		Documents	
Minor node	Count	References	Count	References
Security is more complex than the past	5	46	16	272
Cloud infrastructure is maintained by third parties	5	43	15	354
International practices and standards in security	5	48	16	347

Three of five participants also emphasized the importance of security and confidence in cloud services due to the extent of corporate support around the world. Another participant believed that security provides a multilevel approach to the application layer and user authentication to physical security of buildings, plus policies and procedures that are integrated in the entire system. For instance, cloud security controls are deployed in the cloud computing environments and are almost classified as deterrent controls, preventive controls, detective controls, and corrective controls (Asir, Priyadharshini, & Leavline, 2018).

In addition, all participants mentioned that security has increased since the past because cloud infrastructure is maintained by third parties. Fifteen organizational documents supported these ideas. The participants also stated that quality and quantity security had increased significantly due to the application of international practices and standards. The existence of global standards and related laws can lead to increased confidence in cloud computing. Sixteen organizational documents also supported these ideas.

One participant also stated that security is a shared responsibility between cloud providers, network providers and customers. Another participant stated that cloud computing security is often greater than traditional systems because cloud computing providers have access to proprietary security resources that most customers cannot afford to buy. The idea of data ubiquity, flexibility of access, and resilience in cloud computing also enhances security, and the cloud provider may be able to invest in better and more up-to-date security technologies and practices than the customer, as the owner of

information (Kumar, Verma, & Kuber, 2017). Third participant stated that because the cloud infrastructure is maintained by third parties, external servers, and outside the organization with access to multiple resources, the reliability of the target data is guaranteed by most of these resources. Due to the use of a trusted third party, the cloud service provider ensures that customers do not face problems such as data loss or data theft (Garg, Goel, & Garg, 2017).

One participant believed that with increasing participation of Iranian companies in cloud computing, security and privacy have increased in recent years. In the literature also, industry reports attribute the exponential growth in cloud-based services to increase confidence in security and privacy solutions for the cloud computing environment (Kumar & Goyal, 2019; Tri, Fuhrmann, Fischer-Hellmann, & Furnell, 2019). In addition, consider paying attention to security and privacy as one of the important factors for cloud adoption (Kang et al., 2017). Another participant pointed to recent international practices and standards in the field of data security and cloud computing that have contributed to increased security, especially privacy. To ensure privacy and data security in cloud computing, a data security model comprises of authentication, data encryption and data integrity, data recovery, and user protection (Kaur and Kaur (2018).

The data collected supports the concept of DOI and its innovation ideas as security analysis. Rogers indicated that innovation has five significant attributes: relative advantage, complexity, compatibility, trialability and observability. One participant stated that in practice, companies are reluctant to adopt a security idea unless they want to modify their current practices (relative advantage) and equip them with higher

technology (complexity) and see that they meet the requirements of the organization and existing practices (compatibility). Even if companies cannot see the results of innovation in other organizations, they can view and test the results in a limited way by adopting security practices (trialability and observability).

Findings showed that environmental, political, and managerial factors were effective in adopting security. One participant believed that the challenge exists not in the security of the cloud itself, but in policies and technologies for security and control of the technology. The participant further added that while most companies are familiar with the cloud or at least the idea of the cloud, there is misunderstandings about what these policies can provide for security. The next participant also mentioned the role of security management and necessary protection and confirmed Attaran (2017), who has emphasized management and system security such as protection of cloud operating systems, infrastructures, applications and hosted data. On the other hand, the findings also showed that according to the RightScale cloud report, security and compliance are one of the key factors in the rapid adoption of technology. The findings of this study are in line with previous studies by researchers in the field of cloud computing security

Cost-effectiveness. Cost-effectiveness was the second subtheme that had the greatest impact on convincing customers to accept cloud computing as new technology. All participants stated that cloud computing is inherently low cost because of the type of structure and sharing mechanisms. One participant pointed to the high cost of storage in the past and believed that cloud computing implementation plays a significant role in increasing storage and reducing costs. By storing and accessing data with any type of

physical storage in the workplace, cloud computing will help organizations reduce storage infrastructure costs and is believed to be the future of storage belongs to technologies such as cloud computing (Matloob, 2017). Two of five participants emphasized reducing investment costs and operating costs because the organization does not need to build and provide infrastructure and is paid as much as consumption. This reduction helps the company store operational and maintenance budgets. In the literature, emphasized the cost-effectiveness of cloud computing with a focus on reducing IT investment (Chen et al., 2016).

Three participants believed that the type of structure and implementation of sharing and support mechanisms would reduce costs and could be considered as a relative advantage for cloud computing, and Sixteen of 24 organizational documents supported the theme (see Table 4 for information source metrics).

Table 4

Minor Nodes of Cost-effectiveness as a Subtheme with Supporting Metric

	Participants		Documents	
Minor node	Count	References	Count	References
Type of structure and sharing mechanisms	3	11	16	94
Reducing investment costs and operating costs	4	12	15	209
Cloud computing core is often a virtualization	5	44	12	68

Four of five participants stated that because of reducing investment costs and operating costs, the main cost is reduced and provides an opportunity to expand business at the lowest cost. Fifteen organizational documents supported these ideas. All Five

participants emphasized on cost-effectiveness because of cloud computing core is often a virtualization, which means decrease in hardware and even software and twelve organizational documents supported the idea.

One participant stated that cloud computing eliminates the cost of purchasing software, hardware, installation of data centers, or the need for IT experts to manage infrastructure, which speeds up enable to work. In the literature, one of the most important factors in accepting cloud computing is perceived technical competence and low cost (Maqueira-Marin et al., 2017). Another participant indicated that the cloud computing core is often a virtualization, which is cost effective to separate a physical layer of a machine into multiple virtual machines. With virtualization, a number of virtual machines can run on a physical computer that makes cost-effectiveness. Also, in the literature, by mapping multiple virtual machine on a physical machine, the service cost will be minimized (Adamuthe & Patil, 2018).

The findings also support the concept of DOI in terms of cost-effectiveness proportionate to the benefits of innovation. According to Rogers' theory, the acceptance rate of any innovation depends on the relative advantage of that innovation, which can be affected by the costs of innovation. The relative advantage is the degree to which users or consumers perceive innovation better than the former idea that has been replaced (Rogers, 1995). Both prior research and the participants of this study have considered the economic aspects of comparative advantage as one of the predictors of acceptance rate. Two of five participants emphasized on economic elements of cloud computing such as: pay as much as use, pay as much as growth, and without the need for a fixed asset value.

one participant indicated that the cost of using cloud services was convenient for users, and the purchase of equipment was very low. The reason is that these services are offered to many people, which will reduce costs. In the literature, researchers believe that cloud computing services now allow easier access and lower cost to customers or users of computing resources (Cearnau, 2018).

The findings of this study indicate that because of the wide variety of cloud computing services, their costs are affordable and balanced. According to the interviewees' views, one of the main criteria in choosing cloud computing has been to measure total cost (both capital, operational and administrative costs) relative to return on investment. This argument is consistent with the literature reviewed from this study. The final decision on cloud migration is based on the evaluation of three elements: estimated total cost of ownership, capital expenditure and operating expenditure, and return on investment (Mangiuc, 2017). Additionally, cloud computing could reduce operating costs and improve work efficiency due to the reduction of operational and administrative infrastructure costs (Zhao et al., 2016). These findings have been corroborated by other researchers in previous studies.

Reliability and data availability. Reliability and availability of data was the third subtheme that plays a key role in the adoption and development of cloud computing. Findings of this study suggested that persuading and understanding customers about cloud computing services were key factors in the confidence and development of cloud computing. The findings support theories Seok-Keun and Bo-Young (2018), that researchers have shown that the measurement indicators for achieving the cloud system

are derived from the relationship between trust, technical capabilities, management capability, and deployment.

All participants stated that due to the optimal reliability and level of user access, the customer is assured of receiving the required information and can increase confidence in the acceptance of cloud computing. Fifteen of 24 organizational documents supported the theme (see Table 5 for information source metrics).

Table 5

Minor Nodes of Reliability and Data Availability as a Subtheme with Supporting Metric

	Participants		Documents	
Minor node	Count	References	Count	References
Optimal reliability and level of user access	5	28	15	349
Reduce concern and guarantee future	5	15	15	78
Positive evidence in the customer's mind	4	18	16	136

Five participants also emphasized that due to access to huge data and resources, reliability and data availability are influenced and can reduce concern and provide a guarantee for future. Fifteen organizational documents supported these ideas. In addition, four participants stated that the long-term reliability and availability of data provide positive evidence in the mind of the customer to accept cloud computing. Sixteen organizational documents confirmed the participants' claims.

The findings of this study showed that reliability and data availability were important factors in convincing customers of the ability of IT directors to develop cloud computing. One participant stated that resource availability and service continuity

indicate optimal reliability and level of user access to cloud computing resources. This theory is consistent with Al-Rahayfeh, Saleh, Abuhussein, and Almiani (2019) that reliability of service in cloud computing is considered with three parameters, (a) the ability to access services whenever the customer needs the service, (b) the continuity of services (without interruption) within a specific time period, and (c) the performance to fully meet the customer's expectation of Service. Three of five participants believed that availability and reliability would reduce customer concerns, increase reliability and guarantee future development of cloud computing. In this regard, one participant stated that availability and reliability would reduce customer concerns and lead to a greater understanding of the goals of the cloud computing development process. As reported in the literature, reliability is used to analyze process goals in understanding (Jusoh et al., 2015; Wong-Riff et al., 2017). Another participant emphasized that focusing on customer needs is maintained as positive evidence in the customer's mind that can increase reliability. Researchers should maintain a chain of evidence to increase the reliability of the study (Yin, 2014). The third participant believed that reliability indicates the accuracy of information or data requested by the end user. This participant's view is consistent with Cai et al. (2015) and Dube and Uys (2015), who stated that information separation techniques can be used to ensure the validity and reliability of research**.**

Reliability and data availability are also consistent with the framework of this study. According to Rogers' theory, reliability at each stage plays an important role in the decision-making process of adopting innovation. Therefore, reliability and availability in adopting innovation across all five Rogers stages, including awareness, interest,

evaluation, testing and acceptance are essential. Rogers' theory has also shown that the degree of validation at each stage, especially in the process of adopting innovation in organizations, has been instrumental and has helped to link with other stages.

Based on findings of this study, reliability and data availability in Iran is very important and plays an important role in the development and implementation of cloud computing. Factors such as data storage and retrieval, strong records, and customer understanding are the most reliable in this country. Similarly, in the literature, executive results show that the availability and reliability of cloud computing systems has increased significantly (Chiba, Abghour, Moussaid, El Omri, & Rida, 2019).

Proper maintenance. Proper maintenance as a fourth subtheme has a significant impact on customer satisfaction in accepting innovation. Convincing the customer to accept cloud computing should be justified by the nature of the technology. The realization of this idea depends on the complete focus on the implementation process and especially on their continuity. Findings showed that proper maintenance ensures continuity and can guarantee the success of process. Two participants stated that proper maintenance using new methods and processes will ensure customer confidence and convince customers to accept cloud computing better. The two participants emphasized Shin and Koh (2016) theory that the diffusion of technological innovations generally refers to the expansion of the use of new methods, processes, or production systems. Using new methods and processes in maintenance was also consistent with the findings of the literature. There has been considerable progress recently in the large cloud computing maintenance process (Zhong, Xu, Wang, & Tang, 2018).

All participants believed that one of the most important factors that persuade the customer to accept cloud computing was continuity that was often maintained using new methods and processes and fourteen of 24 organizational documents supported the theme (see Table 6 for information source metrics). Five participants stated that due to the relative advantage and benefits of some new features in technology such as hardware and software reduction, cloud computing can improve efficiency with less maintenance, and 14 organizational documents supported the themes.

Table 6

Minor Nodes of Proper Maintenance as a Subtheme with Supporting Metric

	Participants		Documents	
Minor node	Count	References	Count	References
Maintenance using new methods and processes	5	26	14	284
Increase efficiency with less maintenance	5	23	14	114
Preventive, failure, and condition-based maintenance	4	8	13	57

In addition, four of five participants stated that due to providing preventive, failure, and condition-based maintenance, the cloud computing has improved the maintenance process. These features encourage customer to embrace innovation. Thirteen organizational documents supported the theme.

One of participant mentioned that cloud computing services greatly increase the functionality and efficiency of the data center by reducing the need for maintenance as well as improving efficiency. The participant's comment is consistent with Tripathi's (2018) view that cloud computing as an emerging technology meets the computing needs

of organizations with less effort to maintain. Another participant indicated that in today's data centers using cloud technology, cloud retention strategies are definitely a good way to deliver better quality services. The participant added that these maintenance strategies are consistent with prevention before failure and repair strategies after the failure. This approach is in line with the statements LaCasse, Otieno, and Maturana (2019) that researchers offer four different maintenance strategies by reviewing maintenance strategies: (a) run to failure, (b)preventive, (c) predictive, and (d) condition based. Similar to the findings of this study, due to the extensive research on maintenance strategies such as failure maintenance, preventive maintenance, and condition-based maintenance, new technologies are equipped with high quality maintenance (Wang, Zhang, Duan, & Gao, 2017).

Proper maintenance also aligns with DOI. Rogers at DOI believes that supporting and maintaining a fledgling innovation can increase innovation acceptance. Rogers also believes that the conditions for accepting innovation in different societies are not the same. Therefore, specific innovations for everyone in a social system do not have the same effects. Every social system has certain characteristics that must be taken into account and should not be eliminated when the innovation is adopted. In addition, any innovation needs an appropriate time to adapt to the environment and culture in question. When maintained properly, it is often attempted to gradually maintain the appropriate adaptation needed by the organization, which can have a positive impact on the adoption and ultimately development of the innovation.

Two of participants stated that ultimately, without a successful security, control, and flexibility support strategy, there is no chance of a successful maintenance strategy. Research findings in this study showed that in adopting and developing cloud computing, formulating a maintenance strategy based on complete control from beginning to end, customer interaction and competitiveness is significantly effective in Iran. Ultimately, these results can lead to convincing the customer and the successful development of cloud computing.

Participants and organizational documents showed that customers are convinced of cloud computing services when they are satisfied with features such as: innovating, maintaining business value, focusing on growth and competitiveness, identifying problems and solutions, and selecting new tools to implement. The organizations using the new technology to implement business operations get remarkable advantages and numerous opportunities for profit growth, compared to potential competitors who do not adopt new technologies to promote information and communication with customers (Stanescu, 2018). In this regard, one participant stated that having a strategy of maintaining competitive advantage, marketing control, and successful customer flexibility often leads to the adoption and development of cloud computing and increased organization credibility. IT-driven competitive advantage is demonstrated by IT leadership with efficient business models, revenue-generating innovations, and customer collaboration and improvement (Karanja & Rosso, 2017). On the other hand, the two participants considered customer perception and interaction another factor in convincing the customer and accepting cloud computing. This idea aligns with the literature. It is

important to understand what the customer needs? What are their requirements? What do they prefer? Or refuse? And what are their fears of adopting cloud computing? (Habjan & Pucihar, 2017)

Overall, according to the findings, the organizational documents and literature of this study, the most important factors that have focused on customer solutions and played an important role in convincing customers to adopt and develop cloud computing were: (a) security, because of the ubiquity of data and the need to protect it, (b) cost-effectiveness, due to its low cost in the broad and competitive dimensions of technology, (c) reliability and data availability, to insure technical capabilities, management capability, and easy access, and (d) proper maintenance, to ensure continuity and preservation of technology in the future. Similarly, the research results show that there is a direct relationship between cost-effectiveness, the need for services, reliability, and security and effectiveness with cloud computing acceptance (Habjan & Pucihar, 2017). Also, the findings were consistent with the views of J. Wang et al. (2017), who believed that factors such as cost, security comparisons, reliability, availability and reliability future with regard to trustworthiness can convince the person to make the right decision.

Theme 2: Management as a Strategy to Develop Cloud Computing Infrastructures

Management as a strategy was the second main theme to develop the cloud computing infrastructures, Cloud computing management is a management concept that allows organizations to manage technology principles to create competitive advantage and innovate within the organization. Findings showed that cloud computing management is about identifying and communicating with strategic priorities and project

management to achieve timely results and effectively utilize internal and external corporate communication. This emphasis was expressed by the participants on the need to establish strategic management within the organization with appropriate interactions to increase the likelihood of project success. Internal management communications are often with the client, service providers, and project stakeholders. In addition, external communications can help management identify new opportunities and be in the midst of competitive surprises. The findings in this study also indicated that one of the most important strategies of cloud computing management is to maximize productivity by investing in technology development that can contribute to the value of the organization. Otherwise, if the organization fails to plan for its technology, there is a risk of data loss or the misuse of new technology by the agents involved. However, with proper management and planning, the efficiency of the organization increases. Participants believed that cloud computing managers help companies identify the short-term and long-term needs of technologies, leveraging the potential of new technologies. Management can also contribute to the development and improvement of business performance of organizations by monitoring and advising on technology updates and consulting with senior executives on how to use innovations.

All participants emphasized the critical role of management and its intervention in the successful implementation of the project as a necessary strategy and Sixteen of 24 organizational documents supported the theme (see Table 7 for information source metrics). Also, four of five participants mentioned that the knowledge of managements in relation to cloud computing and the ability of managers to use new technology. Seven

organizational documents supported these ideas. Four of five participants stated that the leadership skills as an important factor that were beneficial in their adoption and develop of cloud computing infrastructures. Five organizational documents recommend that leadership can make management successful in cloud computing acceptance and development.

Table 7

Minor Themes of Management as a Strategy with Supporting Metric

	Participants		Documents	
Major/minor theme	Count	References	Count	References
Management as a strategy	5	6	16	193
Knowledge of managements	4	14	7	8
Leadership skills	4	8	5	16
Integrate new technology	3	13	7	23

Similarly, three participants emphasized that ability of managers to integrate new technology with the organization's business is important. Seven organizational documents supported these ideas. Based on research question and collected data from cooperate interviews and documentation, the IT directors need to consider the cloud computing knowledge and leadership skills as key criteria in determining strategies for developing cloud computing infrastructures. According to the findings of this study, the emergence of management capabilities is realized through excellence in marketing and demonstrating the capabilities of the companies. These findings align with previous research.

One participant believed that an organization is very important for the strategic management of its technology, because lack of management and planning precisely

reduces the likelihood of project success and can even lead to losses at different levels of the company and resources. In this regard, strategic management is widely able to make fundamental changes to how IT capabilities are offered (Battleson et al., 2016). Obstacles such as poor management, and the lack of ICT infrastructure as major problems for countries, especially developing countries (Mohammed et al., 2016). Another participant stated that the success of any cloud management strategy depends on the correct use of tools and automation, tools that can help management build, purchase, monitor, monitor and track cloud services and lead to a cloud workload balance. The participant added that by automating, securing, configuring and managing the cloud-based infrastructure provided by management, it can automatically update system components apart from routine maintenance, thereby saving time and more resource allocation. However, management merely determines the performance thresholds and rules required to manage the automation process.

Management knowledge was one of the factors that four of five participants cited as a powerful tool in the use of new technology. One participant argued that the advent of cloud computing has opened up numerous ways that some methods, such as the knowledge of management in cloud computing, have not been exploited in the best way. For this reason, existing technologies or methods have not helped the organization grow. The participant added, “Because of lack of management knowledge and its inherent potentials, the intellectual capital used is not even properly considered.” Another participant stated that in some cases, inefficiencies in management knowledge occur when the large amount of running and maintenance costs on a large-scale lead to

unacceptable techniques. In order to implement cloud computing successfully, a wide range of knowledge and its simultaneous dexterous management is also a prerequisite (Dave, Dave, & Shishodia, 2013). Therefore, different levels of organizations need to formulate strategies, guidelines and executive structures in appropriate ways. Companies plan and implement cloud computing by consulting with managers who have knowledge and experience in cloud computing, and these managers can analyze not only the benefits but also the challenges and impacts of cloud computing adoption (Tripathi, 2018). The third participant noted that management knowledge is often used to create, transfer, and disseminate knowledge to employees within the organization, and that knowledge can be used to manage data and information using various tools to create effective knowledge. All three participants emphasized management knowledge as a way to promote and focus on innovation. Similarly, in knowledge management and has identified cloud computing and innovation as one of the ways to evaluate knowledge management (Maqueira-Marin et al., 2017).

Four of five participants mentioned the leadership skills as an important factor that were beneficial in their adoption and develop of cloud computing infrastructures. One participant stated that because of new innovation perspectives, leadership skills for managing cloud computing have been defined differently in organizations, which is different from IT management and leadership in the past. In practice, cloud computing allows the leader to focus more on the efficiency of the applications needed by the organization rather than supporting those applications. In this regard, leadership considers values, visions and politics (Kowch, 2013). In addition, leadership in any organization,

intergrade knowledge and resources, reinforces collective rather than individual, and continuous focus on customer retention (Ennis-Cole, Cullum, & Chukwuka, 2018). Another participant stated that new leadership skills created opportunities that could reduce the costs of IT infrastructure and make the situation a competitive advantage. For example, leadership skills allow managers to make timely decisions to reduce capital costs and increase operating costs using cloud services rather than purchasing infrastructure. The third participant believed that the most important leadership skills that can make management successful in cloud computing in recent years include: high understanding of new technology and broad vision of business development, sufficient flexibility to embrace change, collaboration and tolerance of competitors, and full understanding of all the economic outcomes and the power to integrate with new conditions.

Another participant also indicated that the ability of managers to integrate new technology with the organization's business is important. One participant stated that the integration of new technology with the organization's jobs is subject to specific policies that are often in line with technologies such as cloud computing. The participant added that the cloud manager is able to integrate into the organization's businesses through awareness of IT and cloud tools and cloud management goals. Another participant stated that management can adapt to the full benefit of organizational innovation, trained human capital, and social institutions such as infrastructure and regulation, new technologies. Technology integration requires organizations to shape new technology, and the more systems and people acquire the ability to adapt to changing markets, the more aspects of

business are accountable. In cloud computing, it is the task of managing to balance the responsibilities of identifying and responding to opportunities that may be of benefit to the organization (Willett, 2017).

The findings are also consistent with the conceptual framework of this study. According to the DOI, leadership attributes play a prominent role in organizational initiatives (Rogers, 2003). One participant showed that the manager needs to do marketing (identify customer needs and their problems), provide the required specialist, plan time for the project, plan for possible problems, segmentation of customers, and customize each particular group. The findings are also consistent with the conceptual framework of this study. According to Roger's DOI theory, the first decision-making process of innovation is knowledge. The amount of this knowledge can be commensurate with the degree of acceptance of innovation. The level of knowledge at all times signifies all the information about innovations in the system. Therefore, when such a level of information is very low, adoption of innovation becomes very difficult (Rogers, 2003). The existence of management knowledge in cloud computing has a significant impact on the upgrading the system knowledge that Rogers has mentioned. One participant believed that the manager needed to communicate with customers and analyze their awareness and could tailor services base on customer feedback. Customer feedback is often based on user knowledge. Therefore, Rogers agrees that users' knowhow of a service tends to dictate their perception of the level of effort involved in using that service. The less complex a service is to use/operate, the more easily it is accepted. In accepting innovation, Rogers believes that acceptance begins at different levels and at the first

level, respectively. Early adopters have the highest rate of thought leadership in most social systems than subsequent adopters. These recipients are often exposed to more mass media channels and interpersonal communication channels and have more innovation knowledge. At the same time, in a system with favorable norms for change, these leaders are also likely innovators (Rogers, 2003).

Participants and organizational documents indicated that managers play a key role in decision making and development of cloud computing. One participant believed that managers should be able to define decision-making frameworks and be an effective factor in using cloud computing and technology. This decision-making framework can be based on the recognition and analysis of innovations and standards that are often created by technology providers and authorities such as large technology corporations. Another participant referred to the manager's scientific and empirical reference, which can have a significant impact on the attitude, decision making, and adoption of corporate strategies. The idea has also been agreed by Brandis, Dzombeta, Colomo-Palacios, and Stantchev (2019), and they have stated that the manager should be able to share corporate governance models, corporate strategies and business divisions based on cloud computing knowledge and power of company. Another participant believed that, with the advent of cloud computing technology, factors such as easy access, data storage and information retrieval and information security were essential to be fully controlled by management. A review of organizational documents and literature also showed that the degree of acceptance of innovation depends directly on the ability to maintain, protect, and access data easily. Therefore, by comparing similar technologies, the presence of

these features can be a superiority factor. Managers should focus on developing cloud-based solutions for security, availability, and storage (Marchisotti, Joia, & DeCarvalho, 2019). Therefore, they must align cloud computing with new business models and business strategies. One of the participants stated that after a decade of cloud it may come as a surprise that the role of managers in cloud computing is still significant.

Theme 3: Implementation and Support as a Strategy to Develop Cloud Computing Infrastructures

According to participants in this study, companies and organizations need to have consistent implementation and support strategies in order to continue and develop cloud computing. Findings showed that these strategies often have higher levels of service and support, based on reducing infrastructure costs, managing capital costs and integrating and using existing resources. Most participants believed that implementation and support strategies can include services such as governance, process and policy formulation, and the use of automation tools to produce optimal services. Interviewees stated that these services focused on support and how the implementation process was implemented, focusing on customer needs and applications in cloud computing. Therefore, factors such as ability, concentration, and control must be used to provide accurate planning for implementation and support. The findings also showed that the most important factor, was the use of cloud management in cloud computing which can be very effective in implementation and support. Managers should provide comprehensive solutions while providing flexible, efficient and automated solutions to end-user services, ensuring continuity, reliability, and cost savings.

All participants believed that implementation and support as a strategy is one of the important strategies for the development of the cloud computing infrastructure and fifteen of 24 organizational documents supported the theme (see Table 8 for information source metrics). More than 80% participants stated that strategic implementation is the most important components of an implement strategy for developing cloud computing infrastructure. Ten organizational documents supported these ideas. Also, five of five participants mentioned that because of identifying the resources needed in each project, providing the strategic goals of the project as a strategy is essential. Eight organizational documents supported these ideas.

Table 8

Minor Themes of Implementation and support as a strategy with Supporting Metric

	Participants		Documents	
Major/minor themes	Count	References	Count	References
Implementation and support as a strategy	5	29	15	166
Strategic implementation	4	9	10	85
Strategic goals of project	5	12	8	43
Support in policy, standards, and resources	4	36	15	323
Cultural factors and the degree of adoption	3	19	9	96

Similarly, four of five participants emphasized on support in policy, standards, and resources as a main strategy and fifteen organizational documents supported the theme. In addition, 60% participants realized that cultural factors and the degree of adoption is the most important strategy for developing cloud computing infrastructure. Nine organizational documents supported these ideas. The strategic implementation,

strategic goals of the project, and support in policy, standards, and resources strategies align with previous research (Al-Ruithe, Benkhelifa, & Hameed, 2018; Willett, 2017). However, in relation to cultural factors, other research has been less cited because of the specificity of the research location that refers to developing countries in Asia.

Implementation and support as a strategy was the third major issue for the development of the cloud computing infrastructure. Most participants emphasized the best performance of cloud computing and believed that a careful evaluation of the operating environment, capabilities of the company, and available resources would enable it to perform correctly under current standards. Also, supporting is seen as an important strategy in the development of cloud computing and is one of the key factors in completing and ensuring the implementation of the project. Three of participants stated that in the development of cloud computing, the support of public and private organizations is very important and can be effective in implementing more successful cloud computing, especially in small and medium-sized enterprises. One of the participants agreed with Maqueira-Marin et al. (2017) that medium and large firms are looking for not just technological suppliers but for actual technological partners able to provide support and valuable know-how.

One participant stated that cloud implementation was more successful with strategic implementation and careful evaluation of performance and cost. This participant identified the strategic implementation as a set of activities that utilized tools and resources appropriate to each project. The participant also believed that presenting a clear strategic plan would be reasonable to establish a customer relationship without the need

for final approval. In the literature as well, Shao et al. (2016), have made the use of the full potential of IT strategically necessary for IT leaders.

Similarly, another participant pointed to resource identification and believed that the determination of the resources needed in each project also depends on the strategic goals of the project. A review of organizational literature and documents showed that the goals of the strategy are influenced by the financial, human and social resources of each organization and are determined by the core criteria of each organization. The true ability to deliver low-cost services strongly depends on the efficiency of cloud resources utilization (Aaqif & Jin, 2018). Therefore, the goals strategy should be realistic and outlined in the range of capabilities of the companies. Another participant believed that the implementation plan should be carefully designed and that issues such as budget, human resources, participation rates, managerial interaction, and timing should be considered. Next participant confirmed the statements of Diagha Chen et al. (2016) that cloud computing implementation can be carried out together with the next service models such as SaaS, PaaS, and IaaS where the consumer is able to deploy and run software.

According to the findings of this study, the existence of government standards, regulations, and facilities play an important role in supporting and developing cloud computing. One participant indicated that public and private support can be applied in various policy areas, the formulation of specific rules, and the establishment and supply of equipment at appropriate government rates and the provision of financial and human resources. Another participant emphasized that IT policies should be defined by IT companies and agreed with Brandis et al. (2019) that IT compliance should be in

accordance with the policies, procedures, standards, guidelines, specifications and rules that are pre-determined by IT companies. Third participant also indicated that the supporting and migration of government agencies to the cloud computing environment can increase flexibility, agility and cost savings.

Three participants stated that in addition to the technical and scientific ability to implement cloud computing in countries, especially in developing countries, other parameters such as cultural factors and the degree of technology adoption are also important. In the literature, the adoption of any new technology could be related to the ethnic identity, culture, and social aspects of an individual (Williams et al., 2017). Cultural understanding, social recognition, or environmental cognition are rooted in the essence infrastructures (Petkov & Kaoullas, 2015). Also, the development of all cultural, social and economic domains is in the capacity of IT professionals (Cearnau, 2018).

Focusing on implementation and support consistent with customer satisfaction is aligned with the chosen conceptual framework. According to Rogers' innovation theory at DOI, innovations that have advantages such as convenience, satisfaction and compatibility are better accepted than current products. This means that if the goals of implementation and support match those goals, the acceptance and progress of innovation will increase. Therefore, this study proposes implementation and support within the framework of the Rogers theory.

On the other hand, based on Rogers' theory of innovation (1995), implementation, is one of the important stages in innovation and adoption in organizations. According to DOI, organizational characteristics are one of the factors influencing the development of

an innovation from the moment it starts, which include communication strategies, social and organizational systems (norms, interconnections) (Rogers, 2003). Therefore, in the implementation and support strategy, IT compliance should be in accordance with the policies, procedures, standards, guidelines, specifications and rules that are pre-determined by IT companies.

Overall, support for implementing and using cloud services made available by cloud services providers is likely to motivate enterprises to adopt cloud computing (Hsu & Lin, 2016). The results of this study also showed that in the development of cloud computing infrastructure, mastery of data such as control, storage and retrieval and data security were important factors to which the customer is fully dependent and strongly seeks to implement. In the meantime, data governance will bring more customer acceptance to the company. Accordingly, in the literature, some researchers such as Al-Ruithe et al. (2018), showed that if organizations who do not implement an effective data governance, can quickly lose any competitive advantage. These parameters are one of the most important factors influencing the development of cloud computing infrastructure. However, in practice, cloud implementation is not just about the cloud-oriented tendency factor, but the implementation based on customer-oriented or a combination of both models. In the literature, companies need to choose the best core services through the customer-oriented, cloud-oriented, and combination of both models (Chen et al., 2016).

Theme 4: Paradigm as a Strategy to Develop Cloud Computing Infrastructures

Paradigm as a strategy and theme was considered by some of the participants in this study. According to three of five participants: The paradigm is a set of new

assumptions, concepts, values, and experiences that help individuals understand and measure the reality of their community. One participant mentioned that, in changing the paradigm, every society must break with tradition and get out of the tight shell of its old ideas and open the way to a free world. The participant further added: Changing the paradigm does not necessarily lead to advancements in science and attitudes, and basically happens when one's basic assumptions change. Participants' views support the idea of Agarwal and Gur (2017) that the paradigm as a subjective factor plays a fundamental role in proving the existence and theory of individuals. Therefore, in practice, people need some kind of paradigm to consolidate the existence of the mind in order to have a strong belief in the existence of any innovation phenomenon. The findings also indicated that the paradigm in business refers to a change in the perception of how things are done, constructed, or thought about, and business success occurs when key paradigm shifts are considered. In Iran, the cloud computing paradigm is in line with the cultural context of the country and seems to be used in other developing countries because of its tendency to follow a new and successful model.

Three or five participants emphasized that following a new paradigm, such as the cloud computing model, provides potential strategic opportunities for individuals and companies, sometimes leading to improved conditions, especially in developing countries. In addition, seven of 24 organizational documents supported the theme (see Table 9 for information source metrics).

Table 9

Minor Themes of Paradigm as a Strategy with Supporting Metric

	Participants		Documents	
Major/minor themes	Count	References	Count	References
Paradigm as a strategy	3	11	7	13
Change in model, method, or perception of innovation	5	12	14	223
Computing and environmental potential	5	80	13	173
Existence of a paradigm in Iran	5	30	10	20

Similarly, all participants also mentioned that change in model, method, or perception of innovation as a paradigm is the most important components of a paradigm strategy for developing cloud computing infrastructure. Fourteen organizational documents supported these ideas. All five participants stated that computing and environmental potential as a paradigm is the important strategy that helps to flourish country's talents. Thirteen organizational documents recommend that these potentials to be sufficient to become a new paradigm. Additionally, five participants also mentioned that existence of a paradigm in Iran is an appropriate strategy for developing cloud computing infrastructure and ten organizational documents supported the theme.

The findings of this study indicated that the technology paradigm often occurs when there is a profound change in the model, method, or perception of innovation. One participant stated that the defining a strategy based on cloud computing paradigm can change the concepts and practices of technology implementation or realization of technology projects, which will accelerate the adoption and adoption of innovation. In the literature, cloud computing is a growing technology and a central component of innovation that combines with an efficient computational model as a new paradigm (Durao et al., 2014). Another participant believed that as technology progressed in the

future, we would see wider changes and, consequently, more paradigms. The emergence of any paradigm in cloud computing will often be synonymous with a radical change in the process of processes and technology services. In addition, paradigms can provide a more comprehensive definition of the facts by showing the limitations and distortions of their social nature. In the cloud computing paradigm, the evolution of organizations is determined by a detailed description of structures, subsystems composition, and systems relationships with the inside and outside (Stoica et al., 2017).

Due to the widespread features of cloud computing, all participants in this study emphasized strategy based on cloud computing and environmental potentials and considered these potentials to be sufficient to become a new paradigm. In the literature, cloud computing is one of the most complex computing paradigms existing today (De Donno, Giaretta, Dragoni, Bucchiarone, & Mazzara, 2019). Cloud computing is a computing paradigm which many believe will continue to have a marked impact on environment (Willett, 2017). Willett's theory was also endorsed by some of the participants in the study. One participant stated that adherence to the cloud computing paradigm provides opportunities that provide organizations with other potential strategic opportunities. These opportunities can lead to positive economic, social, and scientific impacts on the environment and promote community growth. In this regard, another participant pointed to the role of the cloud computing paradigm in upgrading the country's educational and cultural infrastructures and believed that one of the major goals of this technology is to produce content based on indigenous knowledge, which should

lead to the promotion of successful paradigm of education and culture in the organizations.

Findings confirmed that in the development of cloud computing, the existence of a paradigm in Iran is very important. The existence of pilot companies and successful personalities in implementing cloud computing is a strong point for other startup companies that want to work on cloud computing. Paradigm is one of the items that is in Iranian culture, and its existence can lead to the development of cloud computing. One of participants believed that there were not enough paradigms in the country and that most of the paradigms were destroyed by others. In general, according to the participants of this study, the existence of a cloud computing paradigm in Iran can provide motivation and competitiveness and thus quality of service. Compared to other strategies, the paradigm strategy and its components have been more about environmental and cultural factors. Therefore, because of the specificity of the research site that points to one of the developing countries in Asia, less research has been cited than other research.

The findings emphasized the role of the paradigm as an important strategy in the adoption and development of cloud computing. Accordingly, this conclusion is consistent with the conceptual framework proposed in this study. As Rogers has stated at DOI, the diffusion paradigm and adoption of new technology depends not only on economic conditions but also on cultural characteristics. Rogers added that each culture has its own set of norms, values, beliefs, and attitudes. This culture may seem strange and inappropriate to an outside observer and may not be effective. Therefore, it is important to consider cultural factors in adopting the right strategy for the adoption and

development of any innovation. One participant also endorsed Rogers's view that every culture must be judged according to its own circumstances and needs, and no culture is absolutely the best.

Research findings also showed that there is a culture of modeling and adherence to the paradigm, especially in innovation, in Iran, and often try to use these patterns in structural and selective fields such as awareness, confidence, and decision making. Rogers believed that the sequence of knowledge, decision making, and persuasion for innovation in some areas is influenced by social cultural factors. Another participant believed that, in terms of innovation, companies often tend to adhere to paradigms rather than to innovate. In the face of any risk or innovation, one of the prominent features of societies is that they tend to imitate rather than innovate (Petridis, Digkas, & Anastasakis, 2018; Rogers, 2003). In Rogers' hierarchical innovation acceptance theory, Rogers also referred to the majority who consistently imitate a particular group as a paradigm. Overall, the findings of this study showed that the cloud computing paradigm has received widespread attention by most organizations. In the literature, cloud computing paradigm is now growing many times faster than the rest of IT industry (Mora, Mora Gimeno, Signes-Pont, & Volckaert, 2019).

The findings of this study showed that paradigm as a strategy is stimulating society, and cloud computing as a new paradigm has attracted everyone's attention. It's generally accepted that cloud computing refers to a new IT paradigm for users (Voas & Zhang, 2009). The cloud computing as a new paradigm offers an array of benefits and advantages over the previous computing paradigms and many organizations are migrating

and adopting it (Pallavi, 2014). One participant indicated that the paradigm as a driver of progress has always existed in innovative societies. In these societies, technology infrastructures are constantly changing, causing worldviews to change as well, leading to new realities. Another participant believed that manufacturers help adapt and create paradigms by building efficiency in existing infrastructure. Third participant believed that the nature of the paradigm would lead to economic downturns and over time, a more competitive advantage would emerge. The emergence of the paradigm is fundamentally rooted in thinking and infrastructure change.

Based on the organizational documents and findings of this study, the development and adoption of cloud computing is highly welcomed when the paradigm is discussed with the ability to make new changes and innovations, especially when these developments are aimed at controlling, accessing and protecting more information. These features assure the customer that they are pioneering because of the paradigmatic nature of the technology and are able to compete because of the different structural mix that includes the latest technology changes. In general, cloud computing, with its unprecedented benefits, has created a fundamental paradigm shift in how cloud computing is deployed and delivered. In addition, with its advanced facilities, more and more organizations have been attracted. In the literature, the cloud computing paradigm is now growing many times faster than the rest of IT industry (Mora et al., 2019).

Application to Professional Practice

According to the findings of this research, cloud computing continues to play an important role in adopting new technologies and despite the barriers to wider adoption,

cloud technology is a crucial driver for growth in markets and in particular the impact on IT practices. According to the findings, these impacts are due to the ability of cloud computing, such as rapid and continuous access to the latest developments, cost savings, and time reduction that lead to improved decision making and better product and service outcomes. The findings of this study showed that resource efficiency can be achieved by reducing capital costs, reducing maintenance and operation costs, and by deploying and retrieving computational resources. Therefore, this research supports the work of Aaqif and Jin (2018), where the actual ability to provide cloud services at a low cost critically depends on the efficiency of the resource use in the cloud.

The findings also showed that due to capital and cost transformations in cloud computing, the performance and efficiency of cloud computing, especially in IT, has actually increased. According to participants, the shift from capital expenditure to operating expenditure has influenced IT practices and led IT departments to better classify cloud computing and development costs. These results are in line with the views of Chen et al. (2016) and Marchisotti et al. (2019), who stated that cloud computing has led to the investment of IT from capital expenditure to operational expenses, end-user experience improved, and companies focused on their core skills.

The findings of this study indicated that the development of cloud computing in companies requires infrastructure changes that need to be done based on their environmental conditions. Basically, IT adaptation should be in accordance with the policies, procedures, standards, guidelines, specifications and rules that are pre-determined by IT companies. As a result, cloud computing is changing the way

organizations and technology infrastructure companies. Therefore, participants supported the views of Brandis et al. (2019) that due to the nature of the intrinsic distribution of the cloud, and regulations and laws may vary, and cloud customers and providers must find a way to balance increasing compliance pressures with the benefits of cloud computing.

Most participants pointed to the extraordinary growth of cloud services and highlighted individual factors as one of the main features of cloud computing services. Awareness of the individual against the new technology is one of the themes mentioned in the theoretical framework of this study that also influences the improvement of IT practices. The world is witnessing exponential growth in the delivery of cloud-based services, which is expected to grow even further. This exponential growth shows that there is a positive tendency in the attitude and mood of the typical business user in relation to the adoption of cloud services (Kumar & Goyal, 2019). The finding in this study indicated that the tendency to accept existing applications requires significant changes to individual architectural components. These changes mean that people's views change when they are exposed to, compare and believe in new technology (individual architecture change). According to DOI, the implementation of existing programs requires radical changes in the individual thinking and environmental components.

According to the findings of this study, convincing and understanding the customer perception of cloud computing services were key factors in the confidence and development of cloud computing that can also influence IT practices. Similarly, research such as the findings showed that the measurement indicators for achieving the cloud system are derived from the relationship between trust, technical capabilities,

management capability, and deployment (Seok-Keun & Bo-Young, 2018). Participants also supported the views of Misra, Rahi, Bisui, and Singh (2019) that understanding these success factors and providing timely services, supporting top management, and helping partners work together helps reduce the risk of using cloud technologies. Based on these results, companies and IT managers, especially senior managers, should strive to enhance knowledge, experience and cultural benchmarks and try to provide a clear, understandable image of cloud computing to consumers.

Research findings suggested that cloud computing is one of the key drivers of technology and one of the benchmarks for the adoption and development of innovation. Cloud technologies are broadly perceived as a necessity for gaining and maintaining competitive advantage. In a cloud-based system as an influencer of IT practices, development is faster, software and hardware installation and support are less expensive, and advanced computation is often more easily facilitated. Cloud services can also provide better information sharing and improved visibility.

All participants emphasized having a coherent strategy with careful planning as a factor influencing IT practices. Having strategy and task scheduling is a key element in cloud computing, and currently focuses on all computing resources, Therefore, IT managers' strategies in companies can reasonably classify and analyze computational resources and reduce execution time and improve IT practices. Accurate adjustment of strategy and proper execution can lead to optimization of performance in companies. Optimizing the efficiency of the scheduling mechanism in a cloud environment can increase the performance of the server and associated resources, and maximize the

processes managing proficiency. Optimization can also play an important role in the economic adjustment of cloud computing companies. A growing number of organizations and industrial companies deploy their applications in cloud data centers due to the economy of scale provided by cloud computing.

Participants emphasized the effective role of cloud computing in better practices, especially technology, and supported Hsu and Lin (2016) idea that globalization and cloud computing are two sides of a coin. In addition, the participants agreed with Cearnau (2018) that cloud technology is not just for the present and belongs to the future and the concept of cloud computing is embodied as the next generation design for IT. Therefore, as a solution to improve IT practice, IT directors have proposed to equip country's infrastructures with cloud computing. In this regard, all participants stated that cloud computing in Iran is used in all cases of information processing. For IT managers, the investment, development and implementation of this technology is very cost-effective and will lead to infrastructure growth in the country. The findings also suggested that the reason for cloud computing's dominance is not simply due to its broad scope and attitude, but other factors are involved in its development. Based on the latest research, cloud computing has the potential and strategic benefits that include reduced IT investment, accessibility, business agility, scalability, cost-effectiveness.

Implications for Social Change

The implications for positive social change are some social evolutions that occur by developing cloud infrastructures in developing countries in Asia. The findings of this study indicated that the presence and development of cloud computing are essential in all

areas of life and play a positive role in the improvement and control of the community. The presence of IT and IT specialist experts is crucial for the development of all economic, social and cultural spheres (Cearnau, 2018). According to participants' views, the development of cloud infrastructure has led to technology growth in various areas of business, science, industry and other social domains in Iran.

On a large scale, cloud-based intelligent infrastructure can lead to widespread advancement in environmental monitoring, such as industry, e-health, education, intelligent transport systems, traffic and energy management, and improved utilities networks and social services (Stamatescu, Fagaraşan, & Sachenko, 2019). Participants in this study believed that most social impacts in developing countries are often influenced by environmental factors such as technical knowledge, support, and access to resources that, if realized, would lead to social and economic change. Similarly, the literature also suggested that balanced attention should be given to both technical and social aspects in organizations implementing new technologies for optimal results (Bakunzibake, Klein, & Islam, 2019).

According to most of participants in this study, cloud computing has always been associated with opportunities for community development and has had the positive impacts on society especially in promoting knowledge, culture, and IT services. Findings showed that these opportunities are impacted at different times in society. In the short term, cloud computing in Iran has led to factors such as improving business process efficiency, reducing costs and increasing IT flexibility. In the long run as a positive impact on society, the cloud services have led to factors such as accelerating innovation,

advancing science, research and education, empowering people, improving the competitive environment, stimulating product development, improving government effectiveness, and better urban services. Therefore, these evolutions may lead to more balanced social benefits.

Recommendations for Action

The key strategies adopted by IT directors in developing cloud computing infrastructures for developing countries in Asia, can be based on a review of the four main themes discussed in this study. As an essential strategy, IT managers need management knowledge in cloud computing and must be able to successfully intervene in cloud projects. This ability should be based on organizational knowledge, how to communicate with the client and motivate project stakeholders.

IT directors in organizations should also play a key role in developing cloud-based solutions for security, availability, and storage. Therefore, they must align cloud computing with new business models and business strategies (Marchisotti et al., 2019). On the other hand, IT directors should have a leading role in the cloud computing industry and seek to update their information. Managers' ability to use new technologies ahead of competitors, can improve service quality and guarantee success (Chen et al., 2016).

IT directors need to provide a balance between identifying and responding to opportunities that may be beneficial to the organization. This balance can also be seen in the environmental and cultural conditions. Therefore, looking at native culture by IT

directors is a positive advantage in formulating strategies for developing cloud computing infrastructure in DCs in Asia.

Researchers, governments, and public and private companies, especially the key elements of Asian developing companies operating in cloud computing, can use the results of this study. The key elements of these companies can be their business owners and stakeholders and managers, especially IT directors, service consumers, locally owned companies who customize the core corporate services for the customer. Due to the similarity of some of the cultural and indigenous structure of these countries with Iran, the motivation for using the results of this study can also be increased.

The results of the study and the strategies proposed can lead to the discovery of the strategies that IT leaders need to develop cloud computing infrastructures in developing countries. Using social media on the Internet, attending conferences, and distributing it in scientific journals and business journals can be a solution to disseminate research results. In addition, by providing training and seminars on social networks, I can improve the insights of companies and organizations as well as provide solutions for developing cloud computing infrastructure in Asia.

Recommendations for Further Research

The purpose of this study was to explore the strategies experienced by companies that have been developing cloud computing infrastructure in Iran. The results of the study are expected to indicate the relative importance of cloud computing services in responding to the needs of developing countries in Asia. Further research can be done to achieve better and more complete results. Therefore, the following is recommended:

1. The study is focused on developing countries in Asia. There is a need to study strategies adopted by IT leaders to develop cloud computing infrastructure in other countries.

2. The findings are from the perspective of IT managers. IT leaders, stakeholders, and elements that influence the implementation of cloud computing internally or externally, deserve additional exploration.

3. The exploration of the strategies that IT leaders in each of the small, medium and large governmental and private organizations to develop cloud computing can be somewhat different in terms of financial, human and political resources. Therefore, comparing and combining different types of organizations can lead to more comprehensive results.

4. Specific factors in developing countries, such as indigenous, cultural, political, and unexpected events, are sometimes effective and can overshadow the development of cloud computing. Therefore, it is more desirable to explore strategies appropriate to these factors.

5. Due to relative conditions of developing countries in Asia, the exploration of a strategy for developing cloud computing by companies providing cloud computing services in other developing countries can also lead to more comprehensive results.

In developing cloud computing infrastructure, discoveries of strategies that can be implemented based on the adoption of new technologies in cloud computing such as IoT, Fog computing and other technologies will be very useful.

Reflections

This study was an attempt to outline the strategies needed to develop cloud computing infrastructure in developing countries in Asia. In this research, I examined the strategies used by IT directors to effectively implement cloud computing projects. The goals of my study in the DIT program were to complete scientific research at the doctoral level, to collect scientific information and to finalize the data. In addition, I used other experiences in techniques, strategies and practices that can help me in data collection and data analysis.

I believe the most important point in this course was an opportunity to get to know IT leaders working with different cloud computing strategies and to participate in the mechanisms they adopt in developing cloud computing infrastructure. It was also a good time for me to track the process of corporate operations by reviewing their documents and their goals and perspectives to get more accurate results. In addition, cloud development in Iran and other developing countries often has specific parameters appropriate to the conditions of these countries, which is somewhat different from other countries. Therefore, awareness of these parameters was very important and could enhance my experience in this field.

One of my goals in this research was to protect against bias. Although I had previous experience in IT and cloud computing, during this study, especially when collecting and analyzing data, I have tried not to let my previous experience and knowledge of the subject influence my decisions. To reduce research bias, personal doubt and perception should be excluded (McDonnell & Sikander, 2017). I also tried to use past

experiences only to better understand and understand cloud computing technology. In addition, previous experiences have helped me to better understand corporate structure, interact more with study participants, and better understand other strategies used by IT managers.

At the start of the DIT program, I had a limited view of research and the importance of effective research methods and data processing. But in the process of my Doctoral in Information Technology, I was able to gain a deep understanding of the study methods and strategies that led to successful results. During this study, I found that the process of researching and gathering information was more complex than I had previously thought. This study gave me an opportunity to gain valuable insights into the complexities of the process of developing cloud computing in countries, especially in developing countries in Asia. However, I tried to study the opinions and experiences of the participants carefully and to present the findings and recommendations in a scientific, organized and practical way.

Conclusion

In this qualitative multiple case study, I explored the strategies IT directors used to develop cloud computing infrastructures in developing countries in Asia. I collected data from IT directors who have experience with designing and deploying cloud computing solutions at the organizations in Iran. I used data collected from semistructured interviews face to face and company document review. Four major themes emerged from the data analysis with four subthemes strategies that IT directors could use to develop cloud computing infrastructures. The four major themes included (a) focus on

customer solutions as a strategy; (b) management as a strategy; (c) implementation and support as a strategy; and (d) paradigm as a strategy to develop cloud computing infrastructures in DCs in Asia. The four subthemes that focused on customer solutions included (a) security, (b) cost-effectiveness, (c) reliability and data availability, and (d) proper maintenance. The findings of the study indicated that in addition to the themes stated in this study, which are frequently endorsed by other researchers, other factors such as indigenous and cultural factors, political conditions, and economic and human support are also strategies that can be used and affect the development of cloud computing in developing countries.

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Appendix A: Interview Questions

1. What were the strategies you have used in your company to develop cloud computing infrastructure and why?
2. How did you implement these strategies to develop cloud computing infrastructure in your company?
3. What was your role in managing and implementing these strategies and why?
4. What were changes in overall productivity of customers while developing cloud computing infrastructures?
5. What challenges did you face with the development of cloud infrastructure strategies? Why?
6. What strategy and method of successful cloud infrastructure have you been used to respond to current competition? And Why?
7. What were your main concerns in your approach to cloud computing and how did you address these concerns?
8. What other information would you like to add regarding developing cloud computing infrastructure strategies?

Appendix B: Interview Protocol

Date:
Time:
Participant ID:
Company ID:

Type of Interview: Qualitative-Multiple Case Study

Research Purpose: to explore strategies to develop cloud computing infrastructures.

Research Questions: What strategies are used by IT directors of companies offering cloud services in developing countries in Asia to develop cloud computing infrastructures?

Describe the project to participant, including:

- Purpose of the study
    - The purpose of this qualitative multiple case study is to explore strategies used by IT directors of companies offering cloud services in developing countries in Asia to develop cloud computing infrastructures.

- Multiple sources of data collection
    - Interviews (Semi structured, face-to-face, open ended)
    - Company Documents
- Data confidentiality
    - This is a completely voluntary session, and you are not bound to answer any question that you are not comfortable to provide the data.
    - You are free to stop participating or decline to answer any individual questions.
    - All information you supply will be treated as strictly confidential and will not be revealed to anyone, including your employer.
    - I request that you avoid using a company or individual names or any indicators that could be used to distinguish your organization or people in your answers.
    - I will take away any names or comments that are mentioned in the interview from the transcripts and will be left out of the final study.
    - I also request that you do not talk about your participation with anyone until the survey concludes.

- Any information offered in this session will only be used for this doctoral study, which will be merged with information from other participants that may subsequently be published. None of your answers will be presented in the individual form.
- I will keep researching records in an encrypted and password-protected format, locked in a safe for five years, after which time they will be destroyed and no longer unusable. I will be the only one that has access to this data during the five-year period.

- Ethics

  - To maintain ethical standards and respect your right to privacy, I will use your assigned participant ID and company ID instead of your name and company.
  - To get permission to record the audio of this conversation and keep notes on this entire session.
  - To introduce this session using your participant ID

Company Documentation:

- Request participant (IT director) to provide copies of any additional relevant company documentation he/she would like to share**.**

Consent Form:

- Received signed consent form of participants and to audio record the interview (provide copy if required).

Start audio recording with Interview Questions:

1. What were the strategies you have used in your company to develop cloud computing infrastructure and why?
2. How did you implement these strategies to develop cloud computing infrastructure in your company?
3. What was your role in managing and implementing these strategies and why?
4. What were changes in overall productivity of customers while developing cloud computing infrastructures?
5. What challenges did you face with the development of cloud infrastructure strategies? Why?
6. What strategy and method of successful cloud infrastructure have you been used to respond to current competition? And Why?
7. What were your main concerns in your approach to cloud computing and how did you address these concerns?

8. What other information would you like to add regarding developing cloud computing infrastructure strategies?

Conclusion and provide the participant with contact information:

Thank you for your time and your cooperation today. To ensure that my understanding and interpretation of your responses are correct, I would like to schedule a follow-up meeting with you in a few days. you may contact the researcher via phone at 1 (xxx) xxx-xxxx or email at daryoush.charmsazmoghaddam@waldenu.edu. Again, thank you.