AN ADOPTION MODEL OF CLOUD ENTERPRISE RESOURCES PLANNING FOR MALAYSIAN SMALL AND MEDIUM ENTERPRISES

KHAMIS HAJI SALUM

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Faculty of Engineering
Universiti Teknologi Malaysia

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DEDICATION

I dedicate my PhD thesis to my family members, with a special feeling of gratitude to my lovely mother and my father together with my brothers and sisters. I also sincerely dedicate this thesis to my lovely wife, my daughter Salha and my son Salah for their prayers and unconditional love at all times during my PhD life. I will always appreciate all they have done for me. I really miss both of you.

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ABSTRACT

The Cloud Enterprise Resource Planning (ERP) system offers promising benefits for the development of Small and Medium Enterprises (SMEs). It helps to address many of the challenges faced by SMEs and significantly promotes them in terms of business operations and use of resource. Despite its benefits, the research on cloud ERP adoption among SMEs in developing countries has not been fully explored, leading to a low rate of cloud ERP adoption among SMEs. Furthermore, the factors which influence SMEs to adopt the cloud ERP system are still unclear. In an attempt to tackle the aforementioned situation, this research investigated the influencing factors that have determined and enhanced cloud ERP adoption rates. To identify factors and develop the model used in this research, the researcher conducted a Systematic Literature Review (SLR). The model was proposed based on three integrated Information System (IS) predominant theories, namely, Technology-Organization-Environment (TOE) framework and Fit-Viability Model (FVM) with extension of Diffusion of Innovation (DOI) theory to scrutinize the influential factors leading towards Cloud ERP Adoption. Thirteen hypotheses were developed to test and validate the model based on the decision to adopt cloud ERP. A positivism paradigm with quantitative approach was applied to conduct this research. Purposive sampling technique and a survey method were applied and data were collected from SMEs who have already adopted cloud ERP that provided 174 usable responses. The analysis was conducted by using Structural Equation Modeling (SEM) technique through Partial Least Squares (SmartPLS 3.2.7) software to determine the significant relationships of the independent factors to Cloud ERP Adoption. The results showed that Task-Technology Fit, Task Interdependence, Relative Advantage, Compatibility, System Trust, Security, Top Management Support, Employee Cloud ERP Knowledge, Cost Saving, and Competitive Pressure were significantly related to Cloud ERP Adoption. On the other hand, Security was found to have no relationship ($p > 0.05$) with Task-Technology Fit. Similarly, Government Support and Vendor Support were found to have no relationship ($p > 0.05$) with Cloud ERP Adoption. In line with this, the research model can be explained as 65.2% of variance from all the independent variables. This implies that the model has substantial predictive power to explain cloud ERP adoption. Finally, this model can be used to guide cloud ERP ecosystems to enhance their knowledge so as to successfully evaluate and adopt the cloud ERP system.

ABSTRAK

Sistem Perancangan Sumber Daya Perusahaan (ERP) menawarkan manfaat yang menjanjikan untuk pembangunan Industri Kecil dan Sederhana (IKS). Ini membantu untuk mengatasi banyak cabaran yang dihadapi oleh IKS dan sangat menggalakkan dari segi operasi perniagaan dan menggunakan sumber. Di samping faedahnya, kajian tentang guna pakai ERP awan dalam kalangan IKS di negara-negara membangun tidak sepenuhnya diterokai sehingga membawa kepada kadar yang rendah dalam guna pakai ERP dalam kalangan IKS. Selain itu, faktor-faktor yang mempengaruhi IKS untuk guna pakai sistem ERP awan masih tidak jelas. Dalam usaha untuk menangani keadaan tersebut, kajian ini mengkaji faktor-faktor yang mempengaruhi dan mempertingkatkan kadar guna pakai ERP awan. Untuk mengenal pasti faktor-faktor dan membangunkan model yang digunakan dalam kajian ini, Sorotan Kajian yang Sistematik (SLR) telah dijalankan. Model yang dicadangkan berdasarkan tiga teori Sistem Maklumat Bersepadu (IS), iaitu Kerangka Persekitaran Teknologi Organisasi (TOE) dan Model Sesuai-Maju (FVM) beserta Teori Penyebarluasan Pembaharuan (DOI) untuk meneliti faktor-faktor yang berpengaruh yang menuju ke arah penggunaan ERP awan. Tiga belas hipotesis telah dibangunkan untuk menguji dan mengesahkan model berdasarkan keputusan untuk guna pakai ERP awan. Paradigma positivisme dengan pendekatan kuantitatif telah diguna untuk menjalankan kajian ini. Teknik persampelan bertujuan dan kaedah tinjauan telah digunakan dan data daripada IKS yang telah mengguna pakai ERP awan telah dikumpulkan dan memberikan 174 maklum balas yang boleh digunakan. Analisis kajian ini menggunakan Teknik Pemodelan Persamaan Berstruktur (SEM) yang menggunakan perisian Kaedah Kuasa Dua Terkecil Separa (SmartPLS 3.2.7) untuk menentukan hubungan signifikan faktor-faktor bebas untuk guna pakai ERP awan. Dapatan kajian menunjukkan bahawa Tugas-Teknologi Sesuai, Ketergantungan Tugas, Kelebihan Relatif, Keserasian, Sistem Kepercayaan, Keselamatan, Sokongan Pengurusan Atasan, Pengetahuan Pekerja ERP awan, Penjimatan Kos dan Tekanan Persaingan mempunyai hubungan yang signifikan dengan guna pakai ERP awan. Selain itu, Keselamatan didapati tidak mempunyai hubungan ($p > 0.05$) dengan Tugas-Teknologi Sesuai. Begitu juga, Sokongan Kerajaan dan Sokongan Vendor didapati tidak mempunyai hubungan ($p > 0.05$) dengan guna pakai ERP awan. Selari dengan ini, model yang dicadangkan ini dapat menjelaskan 65.2% varians adalah daripada semua pemboleh ubah bebas. Ini menunjukkan bahawa model tersebut mempunyai kuasa ramalan besar yang boleh menerangkan tentang guna pakai ERP awan. Akhirnya, model ini boleh digunakan untuk menjadi panduan ekosistem ERP awan yang dapat meningkatkan pengetahuan serta untuk penilaian dan guna pakai sistem ERP awan.

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LIST OF ABBREVIATIONS

CC	-	Cloud Computing
CSFP	-	Commonwealth Scholarship and Fellowship Plan
Cloud ERP	-	Cloud Enterprise Resources Planning
CRM	-	Customer Relationship Management
DOI	-	Diffusion of Innovation
ERP	-	Enterprise Resources Planning
FVM	-	Fit Viability Model
HRM	-	Human Resource Management
HTMT	-	Heterotrait – Monotrait
ICT	-	Information and Communication Technology
IPMA	-	Importance Performance Matrix Analysis
KMO	-	Kaiser-Meyer-Olkin
MDeC	-	Malaysia Digital Economy Corporation
PLS	-	Partial Least Square
SEM	-	Structural Equation Modeling
SLR	-	Systematic Literature Review
SMEs	-	Small and Medium Enterprises
SPSS	-	Statistical Package for Social Science
TAM	-	Technology Acceptance Model
TOE	-	Technology Organization Environment
TPB	-	Theory of Planned Behavior
TRA	-	Theory of Reasoned Action
TTF	-	Task-Technology Fit
VIF	-	Variance Inflation Factor
ZIFA	-	Zanzibar Institute of Financial Administration

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Enterprise Resource Planning (ERP) systems are recognized as being an important application used within businesses, to build their competitive global advantage (Ramdani *et al.*, 2013). This is evident through the number of Small and Medium Enterprises (SMEs) which are interested in using these systems. ERP is an enterprise-wide information system package, which aims to support and integrate business processes across organizations, by using single data storage and management within an organization (Peng and Gala, 2015). This software has been the most popular enterprise software within the market since the 1990's (Robey, Ross and Boudreau, 2014). The success of the software has been attributed to its advantages in integrating organizational business processes, and in sharing information across operational areas through the use of a common database. Parallel to this, practical reality, researchers and practitioners have declared ERP systems as being a requirement for business success in the 21st century, and have also recognized enterprise software's usefulness in business operations (Kamhawi, 2008; Yeboah-Boateng and Essandoh, 2014). Today, this software is being used by Small and Medium Enterprises (SMEs). This shift of ERP system usage from large enterprises to SMEs has been attributed to market saturation for large-enterprises and emerging technology, such as cloud computing, Internet of Thing, and mobile technology. This enables ERP vendors to offer their software product to SMEs.

The emergence of Cloud Computing (CC) technology has changed the way that organizations manage and provide enterprise software. Cloud computing is the provision of computing resources as a service, rather than as a product (Kuada, Adanu and Olesen, 2013). This computing technology has become the most prominent and exciting technology within commercial enterprises, as well as academia. Its

characteristics include resource allocation, lower entry barriers, lease and release resources capabilities, and mobility features. These have all helped firms explore how cloud computing may benefit their businesses (Mæland, Haddara and Fagerstrom, 2014). The term 'cloud computing' has been differently defined, and subjected to varied interpretation, because no single meaning has gained sufficient attention. The most commonly used definition of CC is that provided by NIST (2011), being the U.S. National Institute of Standards and Technology. This definition refers to CC as being a computing model which enables users to remotely access configurable resources in a convenient and on-demand way. Such resources include: networks; servers; computer memory and applications with minimum management efforts; and interactions with service providers. These resources helped SMEs to overcome their challenges.

Small and Medium Enterprises play an important role in any nation and are regarded as being a backbone for national knowledge and industrial economies. However, these kinds of organizations place little emphasis on the use of information systems, and on enterprise software in particular (Shah and Noor, 2009). The use of information systems, such as enterprise software, has brought extensive advantages to SMEs. These include reduced internal operational costs (which is a result of easily established communication with users) and better distribution of their products or services. They help improve inventory control, and can raise income through establishing good rapport with customers (Amoako-Gyampah and Salam, 2004; Kannabiran and Dharmalingam, 2012; Shah, Ali and Jani, 2011; Thurasamy *et al.*, 2009). In addition, the major advantages of adopting enterprise systems are decreases in operational costs, improved production, improved system integration, process innovation and enhanced organization competitiveness (Alam, 2009; Alberto and Fernando, 2007; Lymer, 1997; Raymond and Bergeron, 2008).

The enterprise systems of today are based on cloud computing technology; such as cloud ERP. This provides functions that are similar to traditional ERP systems with enhanced features that are unique to cloud computing. Cloud ERP systems have gained popularity like never before, with firms of all categories and sizes adapting to this enterprise software, and causing traditional ERP systems to lose their market

shares. For example, Zhong and Rohde (2014) have reported that the 2014 first-quarter sales and earnings report of one leading enterprise software company (SAP AG) for 2014 went down due to the growth of cloud ERP systems in the market. Therefore, firms can adopt cloud ERP to generate new needs and create new markets. These can attract new customers and develop new revenue streams and have been projected to reduce organizational running costs by 15% when compared to on-premises ERP (AlBar and Hoque, 2017). Likewise, deployment time has been reduced by between 50% and 70% (AlBar and Hoque, 2017; Iyer and Henderson, 2012).

1.2 Problem Background and Research Motivation

Small and Medium Enterprises (SMEs) play an important role and are recognized as being the backbone of the national economy, development and employment growth. However, while the meaning of SMEs varies from one nation to another, the advantages of growth in SMEs are universally important. These business enterprises are extremely significant to many nations, and their contribution to a nation's employment, exports and economic growth cannot be overestimated (Lawrence, 2009). For example, 99.8% of established businesses in the United Kingdom (UK) are SMEs. It has also been reported that European SMEs employ more than 93 million people (European SMEs, 2016/2017). This indicates that SMEs lie at the heart of policy making and in promotion of economic growth. On the other hand, SMEs have faced a number of difficulties while seeking to uphold their significant positions in markets, and in meeting global competition. In addition, SMEs in developing countries in particular suffer from additional problems such as investment capital, technological know-how, and competent human resources (Wymer and Regan, 2005).

In Malaysia, SMEs have become a significant driver within the country's industrialization process. Further, they can be considered to be a very strong pillar in a country's industrial development (Ramayah *et al.*, 2016; Saleh and Ndubisi, 2006; Yeoh, 2014). SMEs involves up 97.3% of the total number of business ventures established in a country. They have contributed to 36.3% of the GDP, from slightly

below 30% in 2005, while providing 65.5% of job creation, and 19% of exports. These rates can be compared to the SMEs in Singapore and China, which contribute 49% and 38% respectively to the national GDPs. A significantly large number (about 87%) of SMEs are in the services sector, including ICT, while only 7% are in the manufacturing sector and 6% are in agriculture (SME Master Plan, 2012 – 2020). Accordingly, the Malaysian government has recognized SMEs as being a vital element of the country's economic growth, with a large number of businesses have been established in different sectors. SMEs have a role to play in regard to export, employment contributions, and economic growth. However, the businesses face a broad number of challenges and obstacles as identified in literature. Wan (2003), for example, pointed out several difficulties that SMEs face within the global market environment. These difficulties include: lack of capital; low production; a lack of management capacities; a lack of technology; and regulatory burdens.

Malaysian SMEs have consistently faced several issues, as reported on in initial studies (Musa and Chinniah, 2016; Saleh, Caputi and Harvie, 2008; Shah and Noor, 2009). For example, Saleh *et al.* (2008) identified five perspective challenges which affect Malaysian SMEs. These challenges include: government policies; human capital; the inability to adopt technology, business competition; and limited budgets. Similarly, Musa and Chinniah (2016) recognized three issues which prevent SMEs from expanding; these include high resource costs, investment costs, and limited skilled labor. There are also resource limitations related to; organizational structure, number of employees, the need for skilled manpower, and the expense of integrated technology, all of which can affect the expansion of the SMEs (Ramayah *et al.*, 2016). Despite these challenges, literature indicates that an appropriate use of an enterprises system by SMEs (for instance ERP), serves as an important factor that can facilitate business growth (Lawrence, 2009). However, in order to enhance efficiency in doing business, high software costs, high maintenance fees, and implementation difficulties, all result in a resistance to adopt ERP systems (Lawrence, 2009). Also, a lack of technology infrastructure and high-skilled human resources used to support implementation, along with the IT expenses faced by organizations, has further strengthened the decision to not opt for an ERP system (Hofmann, 2008).

Due to the important role played by SMEs, the Malaysian government has continued to transform the SMEs sector. This has been achieved through the development of several robust initiatives and strategies to ensure SMEs become a key economic development contributor. This has resulted to raise the GDP contribution to 41%, and the export contribution to 23% by 2020. The development of the SME sector is the number one priority in Malaysia (SMEs Master Plan 2012-2020). The Malaysian government, through its agencies, has encouraged SMEs growth by promoting cloud computing awareness programs (such as cloud Malaysia info center), and the SME cloud computing adoption programs. The Cloud Malaysia info center was created in order to: raise cloud awareness; convey a public message about cloud computing services available in Malaysia; educate SMEs about the benefits of adopting cloud computing; and share knowledge between government agencies and business.

Concurrently, the SME cloud computing adoption program provides an incentive of up to RM 1,500, as a way of accelerating cloud adoption among SMEs. This can help to raise the competitiveness and efficiency of SMEs in doing business. In addition, within the Malaysia Vision 2020 program, the government intends to transform Malaysia's economy to that of a developed country (high-income nation). This has been strategized through motivating SMEs, as being the basis for creating a strong and growing economy. Innovation and technology adoption has been advocated as the main pillar among the six forces mentioned within Malaysia's SMEs Master Plan (which influences SME performance). Other forces are the development of skilled peoples, their access to financial resources and markets, legal issues, and investments into organizational infrastructure.

The emergence of cloud computing has created a revolution in the way ICT has been used by individuals and organizations. In recent years, researchers have used cloud computing technology as a platform for encouraging SME's to adopt enterprise software. This has been achieved through describing unique features such as easy access to virtualized resources, reduced investment costs, easy payment models, and limited IT skills (Abolfazli *et al.*, 2015; Awad and Batta, 2014; Johansson *et al.*, 2014). This has led to cloud computing being rapidly adopted from different domains in both developed and developing countries (Trigueros-Preciado, Pérez-González and Solana-

González, 2013). The use of cloud computing has been projected as the future of ICT usage in organizations (Nguyen, Nguyen and Misra, 2014). Therefore, the advent of cloud computing technology has been recognized as a solution to critical challenges facing organizations like SMEs, in regards to on-premises ERP implementation and adoption.

Today, the use of cloud computing and internet-based technology for conducting business has helped improve business competitiveness, and has provided an avenue for SMEs to embrace enterprise software like ERP (Armbrust *et al.*, 2010). The ERP systems provided through cloud computing technology are referred to as cloud ERP. Cloud ERP is defined as "the commercial software packages that enable the integration of business processes and transaction-oriented data throughout an organization, using a model that enables ubiquitous, convenient, on-demand network access to minimal management effort or service provider reaction" (Salim *et al.*, 2015). This software provides several benefits to SMEs (Elmonem, Nasr and Geith, 2016; Haddara, Fagerstrøm and Mæland, 2015; Johansson *et al.*, 2014). The major benefits of cloud ERP for SMEs include decreased upfront costs, faster implementation, scalability, a reduced need for IT infrastructure, improved accessibility, better security standards, and greater cost transparency, all of which lead to IT personnel focusing more on their core business competencies (Elmonem *et al.*, 2016; Elragal and Kommos, 2012; Lenart, 2011; Salim, 2013).

The ERP Survey conducted by Aberden's Group (2011) has found that most organizations use a traditional ERP system. Only nine percent (9%) of current ERP deployments apply the SaaS model, compared to the 72% that use traditional ERP. While traditional ERP deployment is the consistent leader amongst all types and sizes of firms, SaaS implementation model has become more common as organizations get smaller. Seventeen percent of ERP implementations in small organizations have been deployed through the SaaS model. This has been reported to be more than 8% in the medium-sized organizations. Gartner (2014), in an analytical study of adopting the cloud ERP from 2013 to 2023, found that the cloud ERP system provides viable solutions to organizations, and to SMEs in particular.

Moreover, the existing literature has recognized and emphasized the importance of empirical research within the cloud ERP system domain. For example, Lechesa *et al.* (2012) have revealed that the adoption rate for cloud ERP systems, in comparison to other enterprise software such as CRM and HRM, remains relatively low. The study conducted by Faasen *et al.* (2013) in regard to SaaS ERP adoption intent among SMEs in South Africa indicated that, despite the benefits that ERP provides through cloud computing platforms, a slow rate of adoption from the SME perspective has been identified. Concurrently, the qualitative study conducted by Lewandowski *et al.* (2013) aims to understand the importance of the SaaS ERP system from the SMEs' viewpoint. The participants from the study confirmed the need to develop a conceptual framework which provides a better understanding of factors which could encourage cloud ERP adoption. Likewise, Johansson *et al.* (2014) conducted a study on cloud ERP adoption, comparing SMEs and large enterprises. In their reflections and their suggestions for future research, they suggested that, in order to enhance adoption, more research needs to be conducted from the SMEs' point of view.

This is further motivated by the small number of research studies which explain and test encouraging factors that influence SMEs to adopt cloud ERP systems. Most of the existing literatures about the cloud ERP system are conducted as conceptual studies, which serve to enhance understanding of the cloud ERP phenomenon. These contain case studies and qualitative studies (see Section 2.7.4.4), with a significant focus on descriptive studies (Caguiat, Rowena and Suarez, 2017). Usman *et al.* (2016), in their study of factors which influence cloud enterprise resource planning adoption in SMEs, stated that the influential factors SMEs apply when adopting a cloud ERP system are not clear. Therefore, it can be seen that previous studies have simply measured the intention of SMEs to use cloud ERP systems (Haddara *et al.*, 2015; Qian, Baharudin and Kanaan-Jebna, 2016; Salim *et al.*, 2015). Money and Tuner (2005) have argued that simply focusing on the mere intention to use technology does not lead to adoption or use of a particular technology.

The intensive systematic literature review conducted in this research has indicated a consistently increasing interest in cloud ERP studies among researchers

and practitioners. Research concerning cloud ERP has been broadly conducted through two organization categories, specifically, SMEs and large enterprises. The review indicated that few studies have been conducted through specific contexts or industries. These contexts include: education (Das and Dayal, 2016; Deshmukh, 2014; Goel, Kiran and Garg, 2011; Nguyen *et al.*, 2014); public organizations (AlBar and Hoque, 2015; Clohessy and Acton, 2013); banking (Parthasarathy, 2013); agriculture (Ahmad, Ahmad and Jamshed, 2015); and the ICT sector (Elragal and Kommos, 2012; Hota, 2012). Similarly, a large number of cloud ERP studies have examined the origin of cloud ERP systems, while also studying the drivers and barriers of the system, within different contexts (Johansson *et al.*, 2014; Lewandowski, Salako and Garcia-Perez, 2013; Zhong and Rohde, 2014). Likewise, a number of conceptual studies have also identified the determining factors of cloud ERP. These studies have mainly focused on identifying factors that determined cloud ERP adoption (AlBar and Hoque, 2015; Faasen, Seymour and Schuler, 2013; Usman *et al.*, 2016). In addition, a few studies have also examined the intentions of individual SMEs to adopt cloud ERP (Chang and Hsu, 2017; Kinuthia, 2015; Lee *et al.,* 2016; Qian *et al.*, 2016; Salim *et al.*, 2015).

Despite the importance of cloud ERP systems for organizations and particularly for SMEs having already been discussed in previous studies, there are still opportunities for additional research (Elmonem *et al.,* 2016; Haddara *et al.,* 2015; Suppiah and Hassan, 2016). There is a scarcity of studies investigating the factors that explain adoption of cloud ERP among SMEs from adopters' perspectives (AL-Shboul, 2018; AlBar and Hoque, 2017; Caguiat *et al.,* 2017; Faasen *et al.*, 2013; Lewandowski *et al.*, 2013; Qian *et al.*, 2016; Salim *et al.*, 2015). These studies examined cloud ERP from different perspectives and have different study backgrounds. However, these early studies did not consider the perception of cloud ERP adopters; instead they focused on expectations and assumptions means intention to adopt (Caguiat *et al.*, 2017). These show that there is a growing need to investigate cloud ERP adoption in Malaysia SMEs and to identify the factors that lead them to embrace the software from the adopters' viewpoint.

Accordingly, the present research aims to address this literature gap by measuring cloud ERP adoption. Likewise, according to Salim *et al.* (2015) in their

study involving moving from evaluation to trial of cloud ERP adoption, they suggested that future research should consider other stages within the adoption process. Based on the multi-stage adoption model of (Ettlie, 1980) technology adoption involves six stages, namely: awareness; interest; evaluation; trial; adoption; and implementation. Therefore, this study continued on the fifth stage detailed by Ettlie (1980), which is the adoption stage.

1.3 Problem Statement

The adoption of cloud ERP among SMEs in developing countries is an important issue to be considered, when compared to on-premises ERP. The importance can be attributed to its ability to: provide high flexibility in innovation; reduce costs; allow IT staff to focus on core business functions; allow for rapid updates and upgrades, along with faster implementation. Cloud ERP is scalable on demand and cloud ERP vendors can provide better support (Elmonem et al., 2016; Scholtz and Atukwase, 2016). SMEs in developing countries like Malaysia may face fundamental challenges which can be summarized as, namely: an imperfect capability to meet the market environment; limited capacity to adopt technology and management; knowledge acquisition; lack of skilled human resources as well as limited access to finance and capital (Alam, 2009; Lohana, Zabri and Ahmad, 2018; Musa and Chinniah, 2016; Ramayah et al., 2016b; Saleh et al., 2008; Saleh and Ndubisi, 2006). Hence, the emergence of cloud computing technology can reduce these challenges (Alshamaila, Papagiannidis and Li, 2013; Low, Chen and Wu, 2011) and would facilitate cloud ERP adoption by SMEs, but this area has not been fully explored (Elmonem et al., 2016; Suppiah and Hassan, 2016). Furthermore, there are few empirical studies on cloud ERP adoption in SMEs at an organizational level (Haddara et al., 2015; Salim et al., 2015) and this is an area which definitely deserves more attention (Caguiat et al., 2017).

The problem is that studies related to adoption of cloud ERP seem to have had limitations from which the research problem has been identified. No empirical study has been conducted as yet that clearly explains the adoption of cloud ERP regarding

SMEs' perception at the organizational level from adopter perspectives (Caguiat *et al.*, 2017; Salim *et al.*, 2015). Most of the initial studies reviewed were mainly focused on the exploration of the drivers and barriers of cloud ERP among diverse SME-related contexts (Elmonem *et al.*, 2016; Johansson *et al.*, 2014; Scholtz and Atukwase, 2016; Suppiah and Hassan, 2016; Zhong and Rohde, 2014). Despite the promised benefits of the cloud ERP system for SMEs, there is still a dearth of research focused on cloud ERP adoption. However, literature acknowledges the increasing number of studies that focus on the intention to adopt cloud ERP system among SMEs (Chang and Hsu, 2017; Kinuthia, 2015; Lee *et al.*, 2016; Qian *et al.*, 2016; Salim *et al.*, 2015). As cited by (Hassan *et al.*, 2017), Money and Turner (2005) argued that the intention to use the technology does not lead to adoption or use.

Consequently, adoption of cloud computing applications (e.g. cloud ERP) has been a national agenda item through the National Small and Medium Enterprise Development Council (NSDC) (SME Masterplan 2012 – 2020) for the development of SMEs in Malaysia. Malaysia began initiatives for cloud ERP adoption by implementing various programs; these include programs such as cloud Malaysia info center and SME computing adoption program (Tarmidi *et al.*, 2014).

Researchers consistently contacted selected Malaysian SMEs (five SMEs in Johor) and one SAP ERP expert as part of a preliminary investigation in order to gain better understanding on the real situation regarding cloud ERP adoption. Furthermore, researchers also contacted staff representatives from the Malaysia Digital Economy Corporation (MDeC), formerly known as Multimedia Development Corporation. This is a government-owned agency which is responsible for transforming Malaysia's digital economy into that of a fully-developed nation by 2025. The MDeC staff confirmed that cloud ERP adoption in Malaysia is still in the early stages. In addition, they claimed that most of the previous studies conducted simply discussed the intention to adopt this system. This argument was supported from previous literature (Caguiat *et al.*, 2017; Suppiah and Hassan, 2016).

However, due to the very limited number of literature studies regarding cloud ERP in Malaysia, (Qian *et al.*, 2016; Salim *et al.*, 2015; Suppiah and Hassan, 2016)

this may have contributed to the low rate of cloud ERP adoption. This is especially in the SMEs service sector (Qian *et al.*, 2016) in which cloud ERP practice is not well-represented and can be considered as being in the infancy stage (Salim *et al.*, 2015). Furthermore, the adoption rate among SMEs in developing countries is relatively low (AL-Shboul, 2018; Salim *et al.*, 2015). Consequently, there is a lack of research investigating factors that determine the cloud ERP adoption decision from the adopters' perspective (Caguiat *et al.*, 2017).

In the case of unit of analysis is that few researchers have used organization as the unit of analysis. The use of organization as a unit of analysis in the IS field was suggested by many previous scholars (Chong *et al.*, 2009; Nambisan and Wang, 2000; Nguyen, 2017). Their recommendations are expanding the view point that can manifest ways to fill identified knowledge gap. Several previous researches on cloud ERP domain have used individual as unit of analysis, which includes IT manager, sales officer and developing teams. Thus, less literature regarding organization as a unit of analysis (Lee *et al.*, 2016; Qian *et al.*, 2016; Salim *et al.*, 2015) has provided insufficient knowledge about cloud ERP adoption from adopters perspective.

Accordingly, this research has focused on identifying factors and developing a model that could explain cloud ERP adoption in the Malaysian context from Small and Medium Enterprises perspective. The study specifically focused on organization analysis and uses managerial level as respondents, because this group of respondents possess the most knowledge about organization and its activities (Fulton, 2016; Gupta *et al.*, 2000). The model intends to enhance understanding and explain the predictive power for SMEs to adopt the cloud ERP system. Such a study is important since cloud ERP is receiving increasing attention from the SMEs (AL-Shboul, 2018; Salim *et al.*, 2015). It is expected that the findings from this study will help to increase the adoption of cloud ERP among SMEs.

To address these limitations, the main research question of this study is as follows; "How the adoption of cloud ERP systems among SMEs can be enhanced in the Malaysia context?" The sub-research questions are:

a) What factors influence the adoption of cloud ERP among SMEs in Malaysia?

b) What are the relationship between these factors and cloud ERP adoption among SMEs in Malaysia?

c) How to develop and validate a research model that aims to foster the adoption of cloud ERP system among SMEs in Malaysia?

1.4 Research Objectives

In order to provide a solution to the identified research gaps, and to address the problem statement stated above, this study's main objective is; "To develop and empirically test an integrated research model regarding cloud ERP adoption among SMEs."

The specific objectives of this study are as follows:

a) To identify factors that influence the adoption of cloud ERP among SMEs in Malaysia.

b) To investigate the relationship between these factors and cloud ERP adoption among SMEs in Malaysia.

c) To develop and validate a research model that aims to foster the adoption of the cloud ERP system among SMEs in Malaysia.

1.5 Scope of the Study

This study area of focus is general technology adoption. Positivism approach is used as a research paradigm and the quantitative method has been applied. Specifically, this study focuses on factors that explain the adoption of the cloud ERP among SMEs within the Malaysian context. SMEs were selected as context for this

study, because these types of organizations can generally provide feedback over a shorter period of time, compared to large enterprises. The cloud ERP system was selected as the content of this study since this enterprise system was not bound with technology infrastructure, which made it convenient for SMEs to adopt. This group of organizations, referred to as "adopters", have been selected as a unit of analysis. The targeted populations are those SME managers whose organizations have already adopted cloud ERP systems into their businesses. These respondents include SME owners, owner-managers, and any other managers with decision-making responsibilities.

In addition, this group of respondents was purposely selected since they often have access to proprietary information. Moreover, they possess the most knowledge about organizational background and activities (Fulton, 2016; Gupta, Shaw and Delery, 2000). The ICT sector was selected as a focus, due to the fact that this sector was the first to embrace the new technology (Kramer, Jenkins and Katz, 2007) and act as a popular source of information on adoption of innovation (Dyerson, Harindranath and Barnes, 2009). Also, data was collected through a survey-based questionnaire, and was subsequently analyzed through Structural Equation Modeling (SEM) using SmartPLS 3.2.7.

1.6 Significance of the Study

The benefits promised by cloud computing have opened a space for ERP systems to be used by a wide range of organizations. There is also an opportunity to empower SMEs to adopt and use cloud ERP systems. This, in turn, improves their internal business operations, leading them to provide products and services of an acceptable quality. The present study collected, analyzed and synthesized existing literature regarding the cloud ERP system through a comprehensive literature review method which summarized and synthesized the knowledge. The study's outcome will be valuable to all cloud ERP ecosystems or stakeholders, such as SMEs, cloud ERP providers, government representatives and academicians based on their interests.

Generally, this research's significance has been categorized into two streams which comprise; theoretical and practical contributions.

With regard to theoretical contributions, this study mostly enhances the body of knowledge regarding the cloud ERP domain. The study conducted a systematic review as a means of empirically searching for factors that influence SME managers to adopt cloud ERP. Better understanding, as well as empirically validating these factors, will help contribute to knowledge regarding SME managers' perceptions of cloud ERP on adoption perspective. Furthermore, this study has developed and validated an integrated model of TOE and FVM with extension of DOI theory derived from the cloud ERP literature. This model fills the theoretical gap, whereby the need for a theoretical framework and the lack of unclear influential factors that push SMEs towards cloud ERP adoption, have been identified.

Furthermore, the study has contributed towards the applicability of the second order construct within the cloud ERP literature. This is the first study that includes the second order construct (system trust), into the model used to study cloud ERP adoption among SMEs. Further, the result of this study shows that system trust, as a second order construct, fulfils the characteristics that are the intervening factor between security and task-technology fit. Therefore, this thesis directly addresses the need for further studies that utilize system trust as a mediator in cloud ERP adoption, in order to enrich additional knowledge within this domain.

In terms of practical contributions, this research offers a new adoption model for SMEs. It is envisaged that this model can help cloud ERP ecosystems to obtain a wide understanding of what factors affect SMEs' ability to adopt cloud ERP. Moreover, it can be used as a lens for adopting cloud ERP within the SME industry. As postulated from the literature, early technology adopters have the opportunity to gain more advantages, as compared to later adopters (Rogers, 1995; Saedi and Iahad, 2013). Therefore, the model confirms Task-technology fit, Task interdependence, Relative advantage, Compatibility, System trust, Security, Top management support, Employee cloud ERP knowledge, Cost saving, and Competitive pressure are the factors that determine SMEs perceptions on cloud ERP adoption. This model

represents the industry perceptions of how SMEs view cloud ERP, as well as the knowledge regarding what factors SMEs perceive to be important. Understanding the factors that could potentially influence cloud ERP adoption can help SME managers to make sound decisions regarding cloud ERP adoption.

The adoption of cloud ERP provides a huge benefit to SMEs, helping them be sustainable within markets, as well as assisting them to provide better services and higher-quality products. The growth they experience as a result will encourage non-adopters to initiate the adoption process, and will ultimately increase the number of SMEs who have adopted cloud ERP. On the other hand, the cloud ERP vendor will be in a better position to understand how to convince SMEs to migrate to cloud ERP (Saya, Pee and Kankanhalli, 2010). This also help Malaysian government representatives to understand what extra efforts are required to boost awareness of cloud ERP adoption among SMEs and where that effort should be applied. As a final point, this research's findings can be useful in serving as a guideline for the academic community, and by providing opportunities for additional research within this domain. Lastly, this research study has enhanced understanding of related literature, through the systematic literature review presented in Chapter 2 (see Section 2.7).

1.7 Structure of the Thesis

This thesis has been organized and presented through sic interrelated chapters

Chapter 1 – Introduction: This chapter presents the research background of this work, and highlights the research gap, research questions, and study objectives. Furthermore, it describes the research scope and boundaries ending with the research's significance concerning theoretical and practical levels. Lastly, this chapter details the study's overall structure.

Chapter 2 – Literature Review: This chapter describes most of the previous related studies, divided into three main sections. The first section discusses the general and holistic view of ERP, SMEs, cloud computing and cloud ERP systems. The second

section provides more details about the cloud ERP domain, thoroughly conducting a systematic literature review. The third section includes a critical analysis of the appropriate theories and models that suit this study. In parallel to this, the potential factors contributing to cloud ERP adoption have also been identified, leading to the conceptual model's development.

Chapter 3 – Methodology: This chapter discusses the methodology adopted by this research. It begins with a discussion of the research paradigm, whereby the positivism paradigm is chosen. This is followed by a discussion of research approaches, wherein the quantitative approach is presented as a means for ensuring that research objectives are achieved. In greater detail, the chapter discusses the overall research design through five well-established phases. This chapter also discusses the data collection process, as well as the choice of the data analysis method.

Chapter 4 – Model Development and Instrument Validation: This chapter discusses in detail how the initial research model was developed, as a result of the systematic literature review (see Chapter 2). The model introduced is in line with existing literature on cloud ERP adoption, regarding the integrated TOE and FVM models, in addition to the extended DOI constructs of technological characteristics. Later on, hypotheses are proposed based on the existing studies. Furthermore, this chapter provides a detailed explanation of factors involved in the study content. Lastly, the pictorial representations of the initial model with the hypotheses are introduced. The results of the instrument validation (pilot study) are also presented.

Chapter 5 – Data Analysis and Discussion: This chapter of the study describes in detail the data analysis and consequent discussion. The SEM method is used for measurement and structural model assessment. The measurement model was assessed with regard to indicator reliability, internal consistency, convergent validity, and discriminant validity. The structural model was assessed by examining the path coefficient, determining the coefficient, the effect size and predictive relevance, and the extent of the importance-performance analysis. Lastly, this chapter provides an in-depth discussion of findings. The findings are compared with previous results, in order

to assist in identifying potential factors that may influence cloud ERP adoption among Malaysian SMEs.

Chapter 6 – Conclusion: This is the final chapter of the research, which presents a summary of the entire research and discusses its contributions, as covered in preceding chapters. It concurrently describes how the research objectives have been achieved, highlights the study's limitations, and provides some recommendations for further studies. Finally, the study's concluding remarks are presented.

1.8 Summary

This study starts with a brief overview of the research domain. This is followed by a detailed discussion of the research background and its motivation. Later on, the research problem was identified. After the research problem was identified, the researcher established research questions which were followed by research objectives. The chapter continues by presenting the research's scope and significance. Lastly, all the remaining chapters of this thesis have been introduced. The coming chapters will provide a rich understanding of the cloud ERP content, by reviewing related literatures.

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