

## PROPOSE A CONCEPTUAL FRAMEWORK FOR THE CLOUD ERP ADOPTION AMONG MALAYSIAN SMES

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### Abstract

The SMEs sector is undergoing a significant transition towards cloud enterprise resource planning systems. These systems have proved to be effective for organizations by providing advantages such as organizing and managing data remotely, accepting the pay-as-you-go approach, and enhancing relevant information via a cloud computing platform. It also offers more characteristics such as information technology agility and scalability, business processes enhancement and competitiveness enhancement. This makes the cloud ERP system essential to the sustainability of SMEs. However, the adoption rate of the ERP cloud between SMEs has been reported as a little low compared to other information systems such as ERP. To address this gap, we developed a conceptual framework for understanding the intentions of SMEs towards the adoption of the cloud ERP and investigating the comprehensive factors that impact or impede the adoption of the cloud ERP. A framework focused on the theories of technology, organization, environment framework (TOE), diffusion of innovation theory (DOI), Iacouvo model, critical mass theory (CMT). Therefore, this structure is intended to help SMEs managers understand and improve their predictive potential for cloud ERP adoption. The framework was built using three dimensions: technology, organization, and environment. The proposed framework would be a vital lens for decision-makers on the cloud ERP adoption and will be aware of their intentions.

Keywords: Cloud ERP, CMT, DOI, Iacouvo, TOE.

## 1. Introduction

Since of the value of big data, many organizations are attempting to implement improved information systems for the organization, collection, and storage of that information. The adoption of IS/IT has dominated the IS research culture to the point that the adoption of IS/IT and dissemination research is now considered to be among the most advanced exploration fields within the IS discipline [1, 2]. ERP software is one of the most critical and popular business IS introduced in the early 1990s [3]. Using cloud ERP in institutions has many advantages, as well as reducing significant financial expenditure [4]. These enterprises will not be forced into buying and install software licenses, servers, hardware, and many other devices inside the company as they used to when using traditional ERP. Besides to the other characteristics of cloud ERP, On-demand service allows clients to configure the available computing resources to suit their immediate requirements and access computing resources through the internet using (laptops, tablets, and mobiles), while allowing users to collect and share computing resources while at the same time increasing or reducing [5]. Since it can be used to give transparency on consumer use and statements, this solution's popularity is the shared database that can exchange information all over areas of operations and its usability for integrated data departments [6].

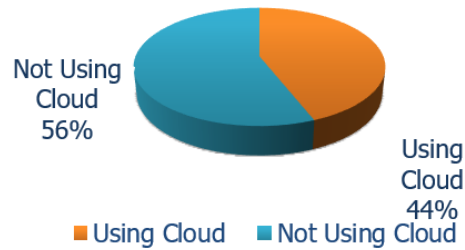
The business sector, which is dominated by small and medium enterprises (SMEs), is the most critical and influential counterpart of the global economy [7]. These businesses are essential enablers of socio-economic growth, job creation, poverty alleviation, entrepreneurship, and rural development. In recent years, the competitive climate for SMEs has changed dramatically in terms of customer loyalty and market versatility. Organizations take various steps to address these challenges, including business model innovation, better customer support, work automation, and the advancement of IT systems such as enterprise resource planning (ERP) [8, 9].

Enterprise resource planning systems can efficiently support SMEs' functionalities and business efficiency and can also help with organizational knowledge management [9]. The ERP considers the operational and financial structures of small businesses, which makes it secure for SMEs. It is an integrated framework known for improving processes and product quality, shortening manufacturing cycle times, and improving decision-making [7].

However, most SMEs cannot afford ERP systems to operate and handle their company and organizational details [8]. The evolution of cloud computing and ERP, respectively, have made it easier and less expensive for SMEs to afford their business processes and handling organizational knowledge. Cloud computing enables companies to use cutting-edge ICT without dealing with the difficult task of installing and maintaining those software [10]. Cloud technologies allowed ERP to be routed on a cloud platform at a lower cost, with greater scalability and resource sharing [11]. Organizations can reduce implementation and maintenance costs by renting the programme. They can also gain access to an ERP framework, enabling SMEs to concentrate more on their operational missions without having to commit significant resources to maintain ERP software [12].

Despite all the cloud ERP advantages such as reduced upfront and decrease implementation costs and duration resulting from the cloud ERP adoption. However, there seems to be apparent aversion in its adoption by many Malaysians' SME and still below expectations [14-16]. In 2018, Huawei's survey showed that 56% of SMEs in Malaysia do not use cloud computing as showing in Fig. 1 [17].

The fullness of the ERP global market in large organizations has made ERP providers seek to meet SME needs. Earlier studies have aimed mainly at ERP adoption in large companies, while studies on ERP adoption in SMEs still lack [18].



**Fig. 1. Summary of cloud computing used in Malaysia [ 17].**

Even ERP providers focused on implementing ERP in large organizations because SMEs cannot bear the costs of buying ERP systems and implement them. Due to the apparent lack of success stories, SMEs are not confident enough to adopt this innovation solution. Before deciding whether or not to adopt a cloud ERP solution, SMEs prefer to wait to monitor and evaluate other companies' feedback to adopt cloud ERP.

This research aims to fill this research gap and examine the determining factor and challenges of SMEs cloud ERP adoption. First, it will investigate the literature that explores the adoption of the ERP cloud, review cloud computing readiness, and SMEs in Malaysia. A conceptual research framework will then be developed to study the intentions of SMEs to adopt cloud ERP systems, identify factors that influence cloud ERP adoption in Malaysian SME, and what issues still impede the cloud ERP adoption in Malaysia.

## 2. Literature

### 2.1. SMEs and IT readiness in Malaysia

SMEs are recognized for the country's sustainable developments and initiatives and play a vital role in the country's economic growth [19]. It is the engine of the economic growth of any country, in particular developing countries. SMEs make up 97.3% of Malaysia's total number of companies, and 5,854,142 employees, or 57.4% of the whole employ in Malaysia; the percentage of (GDP) in SMEs is 38.3%, as indicated by Malaysia's Department of Statistics (DSM) [13]. In Malaysia, SMEs in two categories can be specified based on the overall sales turnover per year and the number of full-time employees [13] as shown in Fig. 2.

The Asia Cloud Computing Association (ACCA) readiness index (2020) assessed the readiness of 14 countries within the Asia Pacific region based on ten variables to learn about how the states are prepared to implement cloud computing. These variables include (infrastructures, security, regulation, and governance, etc.). For 2020, Malaysia rated 8th at the Asian level by evaluation (ACCA) in the same rank four consecutive times since 2014 [20]. This means that, compared with other countries like Singapore and Hong Kong, cloud adoption by Malaysian organizations is still not motivating for adoption. Over the years, it has made notable advancements in crucial readiness areas, but these have been accompanied

by equally sharp declines in other areas, as well as several instances of stagnation. This is the case for cloud readiness index 2020, which shows that sharp improvements made in some parameters (connectivity, energy sustainability, data centre risk, business sophistication, freedom of information) were met by equally pronounced tumbles in other parameters (privacy, regulatory environment, intellectual property protection).

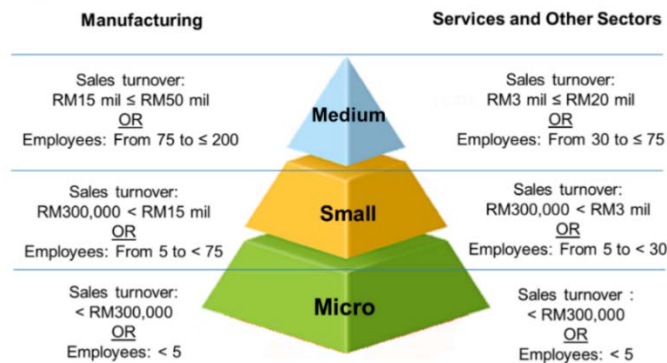


Fig. 2. SME categories [13].

A survey conducted by Huawei in 2018 found that 56% of SMEs does not use cloud computing, and 44% use storage-related cloud computing, for example (Dropbox and Google Drive) [17]. The government of Malaysia launched in 2017 the "Cloud First" initiative to provide cloud based public services and to enable the private sectors to use and accept the technology of cloud computing [21]. In addition, the Malaysia government worked to encourage the adoption of technology innovations in SMEs by establishing inspired and sponsored environmental and economic policies. SMEs in Malaysia are very careful and slow in adapting the ERP, and some risk issues are discussed which prevent SMEs from taking steps to incorporate these systems in their business flows [12].

## 2.2 IS/IT adoption theories

### 2.2.1. TOE

Tornatzky and Fleischer [22] developed the TOE framework in 1990. This framework mainly aims to analyse and predicate the technological innovations adoption in companies. TOE framework refers to evaluating how the organizational context influences the adoption of technological innovation, as the primary dependent factor in the analysis is technology adoption (this includes: possibility of adoption, intention of adoption, and adoption extent) [23]. The framework involves three primary independent contexts: technology, organization, and environment context [22]. The technological context refers to the technological aspects of innovative features such as accessibility, similarity, and predictability; All other characteristics affect the process of adopting innovation in organizations.

The organizational context refers to the characteristics of the company that drives or restrict the intentions of adopting technological innovation, such as the size of the organization, organizational structure, resources, communication, employee

knowledge. The third, environmental context, refers to competitive pressure, government regulation, and infrastructure. There are external factors that can influence adoption decisions in organizations, including the link between organizations, the relationship of partners, the pressure of competitors, and the role of government [23].

### **2.2.2. DOI**

DOI is a widespread model in research publishing and adopting innovations, whether at the individual or organizational level, which was developed by Rogers [24]. This theory consists of two important aspects, innovation, and publishing [25]. DOI innovation is the idea or practice of something that employees perceive as new. Publishing is the process by which innovations are spread across the organization over time. According to Amini and Bakri [26], innovation decision-making is an activity of information-seeking and information-processing, where a person is driven to minimize uncertainty about the benefits and drawbacks of innovation.

### **2.2.3. Iacovou**

Iacovou et al. [27] analysing the characteristics of inter-organizational systems (IOS) among organizations that have the ability to influence the adoption of technological innovations in the context of electronic data interchange EDI. This model is suitable to clarify and explain the adoption of IOS between organizations, which consists of three dimensions: the perceived benefits, organizational readiness, and external pressure. According to Iacovou et al. [27] the perceived benefits are a different dimension from the TOE framework, the organizational readiness that consists of technological resources and financial resources. It is a combination of technology and the organizational dimension of the TOE framework, as technological resources can be categorized on the technological dimension, and financial resources can be categorized on the organizational dimension.

### **2.2.4. Critical mass theory (CMT)**

In 1985 Oliver et al. [29] developed the theory of critical mass to integrate theories of teamwork and classify them as "the effects of disguise and strolling, the problem of a free passenger, and the tragedy of the public". The critical mass is the minimum number of users who adopted an innovation that represents the point where the adoption rate of new communications technology suddenly accelerates [30].

Researchers believe that an individual will adopt an innovation if innovation provides a net benefit. The benefits derived from innovation depend not only on the interaction of the individual but also the interaction of other prospective adopters and how they respond to the adoption of innovation [31]. The overall benefits derived from the network depend partly on the number of consumers who adopt compatible products in the future. The accreditation rate begins suddenly upon reaching the critical mass of users of the technology, and the cost of adoption will decrease, and its value will increase. On the other hand, failure to reach critical mass will make the sustainability of innovation a significant risk and could lead to its end [32].

## **3. Related Works**

Most of the studies conducted on cloud ERP have dealt with four aspects: review, drivers and barriers, tool development, and finally, the study of factors encouraging

adoption [9]. A few of these studies dealt with a study of the encouraging factors for cloud ERP adoption, especially with SMEs [33]. This is because previous studies dealt with ERP and cloud computing separately [12], which does not express the real effect of these factors when both innovations are combined. Pareek compared traditional ERP systems with cloud ERP structures, and he found that the cost of implementing cloud-based ERP is much lower than the cost of traditional ERP as well as provides more mature and more flexible system functions in the customization and integration of many different organizations and create competitive advantages for enterprises [34].

AL-Shboul [14] proposed a framework from two theories (DOI, TOE) to investigate the main determinants of logistical factors that impact the adoption of cloud ERP in developing economies SMEs. The findings indicated that compatibility, trialability, technical barriers, Top management support, enterprise readiness, enterprise status and competitive pressure have a significant effect on the adoption of cloud ERP.

Tongsuksai et al. [35] analysed the critical success factors in systematic review which influence cloud ERP adoption, and they found eight factors have been identified which are security of systems, the trustworthiness of service provider, employee knowledge, availability of system, scalability, privacy of data, ease of integration and training of user.

Cheng [36] suggested a hybrid model based on expectation-confirmation model (ECM), DeLone and McLean IS success model and task-technology fit (TTF) model to examine whether quality factors and TTF as the antecedents to user beliefs can affect organizational users' continuance intention of cloud enterprise resource planning (ERP). The study found that users' perceptions of system quality, information quality and TTF all contributed significantly to their satisfaction, confirmation, and perceived usefulness, which directly or indirectly led to their continuance intention of cloud ERP. While Awan et al. [7] explained that factors such as data security, customization limitation, external pressure, awareness, resistance to change, vendor competence, and lack of knowledge are the main problems to be mentioned when deciding either to adopt the cloud ERP systems among Pakistani SMEs or reject.

Another study proposed a theoretical model for adopting cloud ERP in private and government organizations KSA [15]. In this model, factors are derived from literature using the TOE and DOI frameworks, and within four dimensions, which are the characteristics of innovation; technological context; organizational context; and environmental context. This proposed model helps understand the aspects that the organizations need to develop to be ready for cloud ERP adoption.

Salum and Rozan [9] proposed a conceptual framework for barriers and cloud ERP drivers in SMEs. It classifies barriers and drivers into seven aspects: the technological side, the organizational side, and the environmental side-the economic aspect; the side of business models; human and sellers.

#### **4. Proposed Conceptual Framework Research**

Many factors affect the success of technology adoption and diffusion, or failure and embedded it. Many theories have been improved for this purpose at the individual and organizational level [37]. Since our research deals with the

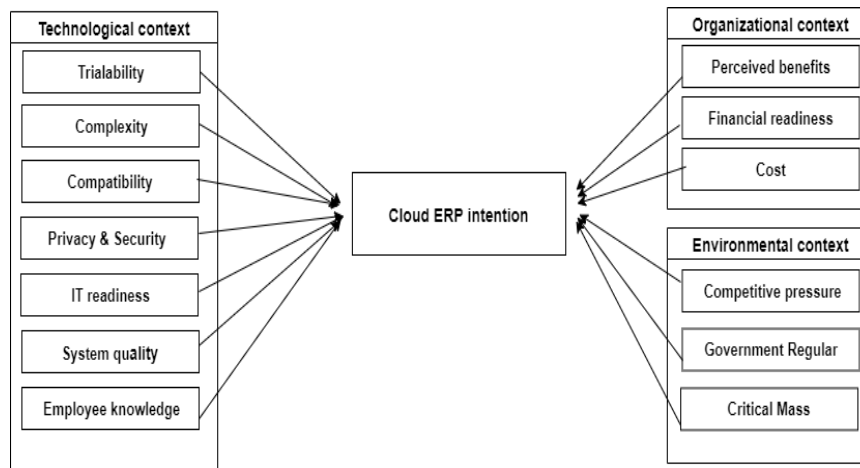
adoption of cloud ERP in Malaysian SMEs, we will use theories that examine the diffusion and adoption of innovation at the organizational level, see Table 2. According to the literature review, the organizations' behaviour in adopting and diffusion innovation is not always apparent. It appears that there is not a single theory suitable for models of innovation and technological adoption in organizations. Many researchers recommended that more than one theory or model be incorporated, enabling the researcher to provide a research framework capable of understanding the fundamental factors affecting the diffusion and adoption of innovation [15, 38]. To ensure a better understanding of regulatory decisions regarding the adoption and diffusion of technological innovation in enterprises, the study framework must be comprehensive, and variables designed explicitly for innovation privacy [38, 39].

We proposed theoretical framework research based on the diffusion of innovation (DOI), critical mass theory (CMT) and Iacovou. These theories are compiled in the framework of technological-organizational-environment research TOE [22] as it shows in including technology factors that indicate (trialability, complexity, compatibility, privacy & security, IT readiness, system quality, employee knowledge), organizational factors that indicate (perceived benefits, financial readiness, costs); environmental factors that refer to (competitive pressure, government regular, critical mass) [22, 40, 41]. The factors in the proposed framework are adopted from the literature (as shown in Table 1) and examined in previous studies in different innovations.

**Table 1. Framework constructs from peer-reviewed journals.**

Reference	TOE			DOI			Iacovou et al.		CMT	Adoption Field				
	Cost	Privacy & Security	SQ	Competitive pressure	Government regular	Knowledge	Trialability	Complexity	Compatibility	Perceived benefits	Financial readiness	IT readiness	Critical mass	
[44]							x			x	x	x		E-Business
[28]				x						x	x	x		EDI
[45]	x	x		x	x			x	x					Cloud computing
[46]	x	x	x		x	x		x		x		x		Cloud computing
[9]	x	x		x	x	x			x					Cloud ERP
[47]	x	x			x			x	x	x		x	x	EDI
[48]						x						x	x	ERP
[19]	x			x						x		x		SaaS ERP
[11]	x	x		x										Cloud ERP
[15]				x	x	x		x	x	x		x		Cloud ERP
[49]		x		x				x	x			x		Cloud ERP
[50]				x				x	x	x				RFID
[51]		x		x						x				SaaS ERP
[52]				x		x	x	x	x					Cloud computing
[53]			x		x						x			Cloud ERP

The merging of these theories requires a robust framework that is cable to employ its advantages and be comprehensive to investigate issues of adopting innovation. Therefore, our choice of TOE framework in its three contexts (technology, organizational, environmental) not because it only addresses the institution's variables such as the organization size, structures, communication, and knowledge. Staff rather deals with the features of technology in the DOI theory such as critical mass, compatibility, complexity, trialability, organization readiness, and perceived benefits as shown in Fig. 3. The adoption of the TOE framework has the potential to provide a comprehensive investigation of issues of cloud ERP adoption in SMEs where no other theory is able to give the three contexts on its own to address accreditation issues with reference to the theoretical rules that we previously mentioned [22]. We have also noted that most of the previous studies that study the factors that affect the cloud ERP adoption in the institutional context have used the TOE framework in its three contexts (technology, organizational, environmental).



**Fig. 3. Research proposed framework for cloud ERP adoption in SMEs.**

Therefore, it is an appropriate decision for the purposes of this research and a rational justification for using this framework in this study to investigate adoption factors. The TOE structure, however, alone ignores the influence of inter-organizational relations. The company climate is defined by institutionalism and confusion, which can bring opportunities (i.e., emerging technologies and resources) and restrictions (i.e., decision process control) [42]. The implementation of the TOE framework helps to support and enhanced what has been ignored in other theories, such as DOI theory, which lacks the environmental framework [43]. The study of perceived benefits and readiness of the organization (financial and technical) effectively impacts the increase and acceleration adoption rate of novel innovation within organizations [27].

The inclusion of the critical mass theory into the conceptual framework because of its ability to explain the adoption decision-making process or not is that the adoption of this technique is somewhat collective decision-making [44]. Our proposed conceptual framework for this research is derived from theories of adopting robust information technology, the most used in previous studies, and it has been investigated and examined empirically.



**Table 2. Previous studies used theoretical models and frameworks to examine factors affecting information systems (IS) innovations adoption.**

Theory/Model	References
TOE	[42, 45, 46, 47, 26]
DOI	[26, 50, 44, 45]
CMT	[31, 48, 58, 59]
IACOUVO	[46, 28, 47, 56]

## 5. Research Hypotheses

Based on the factors derived in the proposed conceptual research framework, thirteen hypotheses were developed to analyse the factors and answer research questions.

### 5.1. Technological context

#### 5.1.1. Trialability

Rogers [41] described the extent to which innovation can be limitedly experimented. Trialability was established as a significant driver with a positive effect in various ICT studies, such as adopting information technology innovation, e-commerce adoption in Singapore's SMEs, and IT adoption such as cloud ERP [15, 60]. This would potentially contribute significantly to the cloud ERP adoption in combination with other attributes which are perceived to be critical for this research to be investigated. Since cloud ERP is a promising technology for improving the performance of Malaysian SMEs, this researcher forecasts that as per hypothesis one:

#### **Hypothesis 1:**

Trialability has a direct positive effect on cloud ERP's adoption intent.

#### 5.1.2. Complexity

Complexity is the second element in this research which has been adapted from DOI theory. Rogers [41] further defines complexity as "the degree to which an innovation is perceived as relatively difficult to understand and use". An innovation's complexity is considered a barrier to new technology adoption [50]. Premkumar [56] considered the fundamental explanation for the slower rate of technology adoption. Oliveira et al. [50] refers to the complexity factor that has negatively affected cloud computing adoption. In view of these previous studies, SMEs are predicted to be less likely to accept cloud ERP if the adoption or usage is difficult or complex. The below hypothesis is suggested accordingly:

#### **Hypothesis 2:**

Complexity factor has a negative impact on SMEs' adoption of cloud ERP.

#### 5.1.3. Compatibility

Compatibility is one of the variables that has been derived from the DOI theory. According to the Rogers [41], compatibility is among the constructions that have a significant effect on the rate of acceptance of innovations. Compatibility was a significant determinant by studies that studied the diffusion mechanism of innovations [26, 50, 57, 58]. The compatibility of cloud ERP with the work

environment is postulated to have a positive effect on the decision to adopt cloud ERP; the associated hypothesis is:

**Hypothesis 3:**

Increasing the degree of "compatibility" of cloud ERP with firms practises and technologies has a positive impact on adopting cloud ERP.

**5.1.4. Privacy and security**

It indicates the capacity of a cloud ERP service provider to control access to applications, service details and physical facilities that provide services [59]. Cloud service providers claim they have the potential to safeguard the information of organizations than the organizations themselves more strongly [60]. Data security and privacy consider the primary concern of any company. Hosting data under another company's control often represents a crucial issue requiring strict safety policies from cloud ERP service providers [61]. cloud ERP service providers try to offer tools for guaranteeing the safety and security of their customer data [62]. Privacy concerns in cloud ERP include the security of data privacy in the event of data transfer, use, dissemination, archiving and removal [63]. Privacy and security are described as the security of utilities, data centres and media in this study. Higher privacy and security levels have a positive impact on the decision to implement cloud ERP; the following hypothesis was therefore established in the sense of cloud ERP:

**Hypothesis 4:**

Privacy and security concerns will positively influence the SMEs intent to adopt cloud ERP.

**5.1.5. IT readiness**

IT infrastructure, as well as employee IT expertise, are part of the technical context. Kowtha and Choon [64] point out that the use of new technology is heavily dependent on supportive resources and existing technologies because companies already familiar with IT seem to have a positive attitude towards further IT expansion. As Olivera [50] points out, companies with a higher degree of technical readiness are best positioned to adopt cloud computing. In the research conducted in KSA, the positive impact between IT readiness and the intention to adopt cloud ERP is stated [15]. The intention of the cloud ERP adoption, therefore, depends on the readiness of the ICT infrastructure of an enterprise that enables the flow of information within an enterprise. Based on the discussion referred to above, the following conclusions were suggested for this analysis:

**Hypothesis 5:**

IT readiness has a direct positive impact on the intent of cloud ERP adoption.

**5.1.6. System quality**

System quality involves the favourable features (e.g., ease of use, flexibility, and reliability of system) of the information system [65]. In study refers that, if users find mobile banking easy and smooth to reach, fetch, enterprise system on their mobile devices using mobile banking, they will see a high match between mobile banking and their task [66]. Cheng [67] research has shown that the perceived system quality of users greatly affected their satisfaction and cloud ERP confirmation, which

resulted in their continued intent of cloud ERP directly or indirectly [67]. In this context, higher system quality would contribute to a greater degree of willingness to accept innovation, more usage, and improved user satisfaction, leading to positive impacts on cloud ERP adoption. Hence, this study hypothesizes:

**Hypothesis 6:**

System quality will have a significant and positive impact on the intention of SMEs to move to the ERP cloud system.

**5.1.4. Employee knowledge**

Although the cloud ERP is unarguably a progressive, labour-saving innovation, its acceptance is complex and challenging due to the ICT necessary skills [15]. It is possible to consider the employee's identification of past similar practises on a scale that illustrates the degree of correlation between previous experiences and present practice [68]. A company with workers with a broad level of experience of innovation faces fewer confrontations and challenges with the implementation and practice of new technology [63, 69]. The positive association between IS adoption and IS degree of employee knowledge was demonstrated by practical experience [15, 63, 68]. To adopt cloud ERP, the following hypothesis was developed:

**Hypothesis 7:**

Increased employee knowledge has a positive effect on the adoption of cloud ERP.

**5.2. Organization context**

**5.2.1. Perceived benefits**

Perceived benefits apply to the anticipated benefits of technology innovations. The models of Rogers and Iacovo suggest that improved management understanding of the relative value of innovation strengthens the possibility that the management, financial and technological resources required to make use of innovation will be allocated [28]. The adoption of IOS relies mainly on perceived benefits, which is one of the critical reason's companies embrace and continue using Internet technology. There are direct or indirect perceived benefits. Immediate benefits include running cost savings and better functioning. At the same time, indirect benefits are advantages resulting from the use of technologies, such as enhanced customer services [54]. Previous studies argued that e-business firms could gain such benefits as sales growth, new market penetration, and cost reduction [28, 54, 70]. Based on the above discussion that:

**Hypothesis 8:**

Benefits would have a positive effect to cloud ERP adoption.

**5.2.2. Financial readiness**

Another significant factor recognized in the innovation literature is financial resources [27]. Sufficient financial resources allocated to e-business allow businesses to obtain and transform these required resources into superior e-business features. Therefore, businesses with the greater financial investment are more likely to succeed in adopting e-business effectively and thus appear to achieve a greater degree of use [71].

Prior research on the organizational adoption of IT innovation has shown that financial preparation positively affects an organization's intention to adopt IT innovations [27]. As Ha et al. [72] discovered, the organizational intent to adopt virtual worlds has a positive impact on financial readiness. Another study shows that financial readiness can imply whether the company has the funds to pay for implementing cloud ERP technology and subsequent costs that might occur after implementation [73]. Therefore, we propose the following hypothesis:

**Hypothesis 9:**

Higher financial readiness leads to greater intent to adopt cloud ERP.

**5.2.3. Cost**

The cloud ERP solution is gaining popularity in companies, and that due to the cloud ERP solution reduce the cost and IT infrastructure maintenance [74]. Recognized variations between traditional ERP and cloud ERP systems can be classified as economic (e.g., cost) [73]. Singh and Nagpal [75] stated that cloud ERP provides standard ERP services along with cloud flexibility at a minimum cost. The low cost of accessing services increases the potential to achieve the adoption of the ERP cloud. The following hypothesis is built in this sense of the cloud ERP:

**Hypothesis 10:**

Reducing the costs associated with using the cloud ERP will positively impact the adoption intentions.

**5.3. Environment context**

**5.3.1. Competitive pressure**

Environmental factors are critical for ICT adoption. ICT adoption and usage increase as trading partners and consumers use new technologies. External pressure from consumers, rivals, and trading partners to adopt a specific form of technology has been described as having a positive impact on ICT adoption [55].

The competitive environment is thought to speed up the adoption of new technology in an enterprise [76]. In a study by Oliveira and Martins [77], they discovered that competitive pressure is a strong forecaster of the adoption of e-business in the telecommunications and tourism sectors. Furthermore, Lin [78] noticed that competitive pressure is positively related to the possibility of companies adopting e-supply chain management systems. Based on the discussion referred to above, the following hypotheses are proposed:

**Hypothesis 11:**

A competitive factor has quite a positive impact on the decision towards adopt the cloud ERP.

**5.3.2. Government regular**

Government guidelines can be clarified as government support to promote the strengthening of the IS innovation capacity of organizations [14]. Previous research has shown that government regulations and practices are the main drivers for the use of emerging technological innovations, particularly in developing countries [40, 79].

Further research has also shown that organizations are more likely to adopt emerging technologies if a specific government is specifically committed to them [14, 15, 63]. Based on the discussion alluded to above, the following hypothesis is developed:

**Hypothesis 12:**

Government rules and regulations for cloud ERP have a positive effect on the intention to adopt cloud ERP.

**5.3.3. Critical mass**

The critical mass theory is known for its ability to clarify the decision-making mechanism for adoption [80]. Rogers [41] claims that the critical mass is correlated to network externalities, meaning that the value of a product or service rises with the number of users. Several studies refer those views of the critical mass of instant messaging have a beneficial impact on the behavioural intentions of using this innovation [31].

The German banks' explanation for not using 12 telecommunications technologies has been analysed by Mahler and Rogers [80], and the low rate of innovation diffusion ranks high as the trigger. Research on the acceptability of communication technologies shows that network externalities are positive for the use of electronic communication technologies [81]. Cloud ERP systems are regarded as collaborative inventions, so their implementation depends on cooperation between potential adopters [82]. It is hypothesized from the debate above that:

**Hypothesis 13:**

Critical mass will be positively affected to intent of cloud ERP adoption.

**6. Discussion, Limitation and Future work**

The current study provides a crucial contribution to the domain of information system adoption by exploring the issues impacted by SMEs in adopting cloud ERP solution. A total of thirteen variables were derived from the literature studies, based on four integrated theoretical frameworks of the technology organization environment (TOE) structure, diffusion of innovation (DOI), critical mass theory (CMT) and Iacouvo. These variables include: trialability, complexity, compatibility, privacy & security, IT readiness, system quality, employee knowledge, perceived benefits, financial readiness, costs, competitive pressure, competitive pressure, critical mass. These factors are divided into three dimensions, specifically: technological; organizational and environmental factors.

The proposed framework for the study has not yet been validated at the present time. To validate this framework, it is suggested that the structural equation model (SEM) be used to determine the consistency and reliability of the framework. Without any limitations, the analysis has not been completed. Current research has been carried out in the information system adoption field, including cloud computing and ERP adoption research. That is means that the research only represents chosen studies and omits any IS studies not coming under these parameters.

Another drawback is that most of the variables were derived from only four theories and models of the information system by the developed framework; this resulted in limiting the range of additional factors from other information system theories. The third constraint was that it was only from the viewpoint of SMEs that

the proposed framework was focused. The research brings an opportunity for a new framework to be created that targets other players. Finally, for future work, it is inevitable to build instruments for quantitative surveys and statistical tests for the proposed framework.

## 7. Contribution

### 7.1. Theoretic contribution:

There will be insights into research in this study. This research will take a broad approach to evaluating the adoption of the ERP cloud in Malaysian SMEs from a theoretically and empirically perspective. The research framework was built based on ICT literature on innovation. The framework would then be tested empirically using multivariate analysis statistical techniques. The research of bivariate correlations in SMEs is common in previous research. The multivariate analysis considers interdependencies between buildings not covered by bivariate analyses. This study extends the utility of the integrated TOE, DOI, critical mass theory, and Iacovou framework in providing guidance on the intention of the organization to adopt cloud ERP systems.

### 7.2. Practical contributions

The results of this work provide an invaluable basis for making informed decisions about cloud adoption by consultants, decision makers, and managers in SMEs.

- Implication for technology consultants and cloud ERP vendors: Recognizing the factors contributing to the design of strategies and better products and services.
- Implications for decision-maker of the organization: Help decision-makers assess potential adoption and expand their understanding of factors influencing outcomes by providing them with a collection of objective and accurate metrics to evaluate the determinants influencing adoption
- Implication for authorities and decision-maker: The understanding of factors driving the adoption of the cloud ERP that will enable the government to take various procedures to refine and improve business processes and increase connectivity between SMEs through the proposed privacy regulations, data protection legislation and the enhancement of existing legislation to improve privacy; adopt policies to facilitate digital transformation and embrace technological advances to enable businesses to thrive and compete

## 8. Conclusion

The current research investigated the determinants of cloud ERP adoption using the case of Malaysian SMEs. This research:

- builds up a conceptual research framework for providing answers to the primary research question and objectives,
- aimed to identify the factors that influence the intention of cloud ERP adoption in Malaysian SMEs.

To get a complete understanding of the utilization of cloud ERP, this specific research used a combination of four theories TOE, DOI, Iacovou, and CMT, which were based on the literature related to IS.

Finding from this research presents the most influential factors towards adopting cloud ERP based on the literature. The results obtained from this research can be used as a foundation for future research on the area of cloud ERP as well as providing guidelines for the design implementation of projects related to cloud ERP.

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