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An Examination of the Factors Affecting the Adoption of Cloud Enterprise Resource Planning Systems in Egyptian Companies

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***Abstract*—**Enterprise resource planning (ERP) is an integrated system that helps companies in managing their resources. There are two types of ERP systems, the traditional ERP systems, and the cloud ERP systems. Cloud ERP systems were introduced after the development of cloud computing technology. This research aims to identify the factors that affect the adoption of cloud ERP in Egyptian companies. Moreover, the aim of our study is to provide guidance to Egyptian companies in the cloud ERP adoption decision and to participate in increasing the number of the cloud ERP studies that are conducted in the Middle East and in developing countries. There are many factors influencing the adoption of cloud ERP in Egyptian organizations which are discussed and explained in the research. Those factors are examined through combining the Diffusion of Innovation theory (DOI) and technology-organization-environment framework (TOE). Data were collected through a survey that was developed using constructs from the existing studies of cloud computing and cloud ERP technologies and was then modified to fit our research. The analysis of the data was based on Structural Equation Modeling (SEM) using Smart PLS software that was used for the empirical analysis of the research model.

***Keywords*—**Cloud computing, cloud ERP systems, DOI, Egypt, SEM, TOE.

I. Introduction

THE current changes in the business environment and information technology, have forced business and nonbusiness organizations to adapt to these changes to achieve their ultimate objectives and organizational goals. In the present time, most organizations are seeking to achieve a competitive advantage over their competitors and to gain customers' satisfaction. Companies have to manage their resources in a strategic way in order to sustain their competitive advantage which could be done through the adoption of Enterprise Resource Planning (ERP) systems. Recently, many organizations have adopted some form of the ERP systems. In the past few years, ERP systems implementation has gained attention and more companies became aware of its importance, and also the desire for rapid ERP systems implementation has increased as well [1]. It is an integrated information system that is designed to help effective and efficient use of the organization's resources. However, prior research provide evidence that the implementation of ERP systems might not be successful in some organizations due to several factors that should be taken into consideration when designing the system.

ERP is a system that aims to combine and integrate all the functional units of the business in a cooperative way, and it can also extend to involve external parties from the organization to include them in the process of integration [2]. According to [3], ERP systems can be used by companies as a strategic tool and resource to allow gaining competitiveness through business processes integration and optimizing the existing available resources. Moreover, ERP consists of different functional modules which various departments and areas of an organization for example accounting, human resources, sales, production, procurement, transportation, and inventory control [4]. The adoption of the ERP is considered to be very beneficial to the organization because it helps in offering better customer service, empowerment of the organization, better quality and improved productivity, enhanced resource management, and better decision making and planning as well as cost reduction [5]. On the other hand, like any technology, ERP systems over time have gone through a lot of evolution and upgrade processes to improve its implementation and functionality and to enhance the integration capabilities as well [2]. With the emergence and development of cloud computing, cloud ERP systems were developed in which the software is accessed to through a web browser and hosted on the servers of the vendor. Cloud computing can be defined as the online form of computing in which the users have access to applications through a browser where the applications are installed, and data are kept on a server that is not house [6]. Companies use the cloud as it allows them to surpass all the barriers and difficulties related to data exchange mainly with the interorganizational systems [7]. The cloud-based services have the flexibility that played an essential role in moving the ERP systems' solutions into the cloud platforms [8]. The cloud computing services are divided into categories that represent the type of services: the Software as a Service (SaaS), the Infrastructure as a Service (IaaS), and the Platform as a service (PaaS) [9], [10]. A cloud ERP is a provided ERP by cloud providers. The cloud ERP is a revolution in enterprise services as it is considered to be flexible, efficient, scalable, and cost-effective as well [11]. According to [4], the term cloud ERP refers to the utilization of

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computer resources, such as software, hardware, database servers, platform, application, and software packages, for the majority of individuals who are involved in the service-level understanding of the processing and payment over a network. Cloud ERP is regarded as a major improvement and advancement for companies as it allows companies to effortlessly expand, prevent the unwanted staffing, in addition to cost reduction [7]. Moreover, cost savings and the growing of competitive advantage are considered from some of the benefits of using cloud-based ERP solutions [12].

According to [13], the use of cloud ERP is common in the developed countries but in many countries in the Middle East, including Egypt, it is still not well known yet. Until this time, there are limited research on the cloud ERP adoption in developing countries and the Middle East. Furthermore, the adoption of cloud ERP in companies in developing counties is considered not only difficult but also challenging [14].

Many companies have failed to implement ERP systems successfully [15]. However, prior research provide evidence that the implementation of ERP systems might not be successful in some organizations due to several factors that should be taken into consideration when designing the system [16], [17]. Moreover, Cloud ERP nowadays has been widely used and known in developed countries and there have been many studies investigating the factors that affect the adoption of the cloud ERP [13]. However, there are few studies discussing such an issue in developing countries [18], like Egypt, which has been one of the main reasons for conducting this study.

The aim of this research is to identify the factors that affect the adoption of cloud ERP in the Egyptian companies by investigating the innovation characteristics, and technological, organizational, and environmental contexts that influence the company's decision to adopt cloud ERP. Those factors will be examined through combining the Diffusion of Innovation theory (DOI) and Technology-Organization-Environment framework (TOE). Moreover, our study acts as a guide to companies in Egypt in the adoption decision of cloud-based ERP systems and participates in increasing the number of studies conducted in developing countries and the Middle East, especially in Egypt. Additionally, this study seeks to support the country's endeavors in digital transformation and motivate the reliance on information technology in various organizations all over the country. Also, to provide recommendations to Egyptian companies regarding the adoption of cloud ERP decision through pointing the main factors contributing to successful adoption.

The remainder of this research is organized as follows: Section II includes the literature review, followed by research model and hypotheses development in Section III. The methodology of the study is presented in Section IV. Data analysis is presented in Section V. Finally, Section VI includes the discussion of the research results and conclusion.

II. Literature Review

Currently, the emergence of cloud computing technology has made a huge transformation in the companies or organizations that use ERP systems [19]. And therefore, enabling the traditional ERP to evolve to cloud ERP because of the advantages, improvements, and flexibility provided by the cloud-based ERP [20]. According to [19], cloud-based ERP is an approach to ERP in which the cloud computing services and platforms are used in order to flex the transformation of the business process. Cloud-based ERP systems are considered to be a significant improvement to companies as they provide many benefits to the companies adopting them and the use of cloud ERP is growing more and more since they enable companies to easily expand, avoid unessential hiring and reduce the costs [13].

There are several definitions of ERP. According to [21], ERP is an integrated system used by a company in the enhancement and improvement of data management and processes, in improving the process of decision making, as well as improving the product quality, and also provides collaboration across departments. ERP is a "business management software" which combines all the processes of the whole company into an integrated system [22]. Al-Mashari [23] defined ERP system as a software that can be customized and includes integrated business solutions for an organization's fundamental administrative functions, such as accounting and HR as well as its essential processes, such as warehouse management. Moreover, an ERP system automates the main corporate processes and activities, such as manufacturing and human resources, through the implementation of best practices to help in fastening the decision-making process, assist in reducing costs and have greater managerial control [24]. On the other hand, cloud ERP is a combination of the traditional ERP services and the lower costs and flexibility provided by the cloud computing technology [7].

Many of the studies that were conducted in this area identified the benefits and drawbacks of cloud ERP adoption, while others have listed the factors affecting the adoption of cloud ERP. The study done by Abd Elmonem et al. [2] has introduced a systematic literature review (SLR) of the benefits and drawbacks of the cloud ERP compared to the traditional ERP. The main identified benefits according to this study are fast implementation, availability and easiness of update, reduced cost, expendability, and enhanced accessibility. As for the challenges, these are identified as security and performance risks, integrating and customizing limitations, and the IT competencies loss. Then the authors recommended that before moving to the cloud ERP instead of the traditional one, companies should compare the benefits gained and challenges faced from the cloud ERP in order to take the right decision. The study of [20], compared the performance of the traditional ERP and the cloud ERP systems. It highlighted that the main benefits of cloud ERP are the flexibility it provides and the simpler integration and maintenance of applications. Pareek [25] also compared traditional ERP with cloud ERP systems and found that the cost of cloud ERP implementation is less than that of the traditional ERP, and additionally mentioned that the flexibility provided by the cloud ERP systems assures competitive advantage for the companies adopting them. Moreover, a South African study by Scholtz et al. [26] analyzed the benefits and challenges of the cloud ERP from the

companies' perception. It was found that the most significant benefit of the cloud ERP systems is the flexibility it provided as it can be accessed from any place while the main drawback for the adoption of a cloud ERP is the security risks.

Furthermore, there are some studies that identified the factors that influence the adoption of the cloud ERP. The study of [27], identified that there are some factors influencing the decision of adoption of cloud computing and cloud ERP such as the ease of use, credibility, relative advantage, and the organizational behavior towards new technologies. In Saudi Arabia, Albar et al. [13] investigated the factors affecting the adoption of cloud ERP using the TOE framework and DOI theory and concluded that those factors had a remarkable effect on the adoption of cloud ERP systems. A Nigerian study conducted by Usman et al. [5] discussed the factors that affect the adoption of cloud ERP among the Nigerian manufacturing SMEs, it also used the TOE framework and DOI theory. It was found that the factors that influence cloud ERP adoption are relative advantage, compatibility, technology readiness, cost savings, security concerns, top management support, regulatory support, competitive pressure, and cloud knowledge. In addition, research was conducted by Zamzeer et al. [7], in which they used the TOE framework to identify the factors affecting cloud ERP adoption by Jordanian SMEs. The study has found that the most effective factors influencing the adoption of cloud ERP systems in Jordanian SMEs are management and service provider support. Moreover, some factors were found to have a moderate effect on cloud ERP adoption, which are the relative advantage, firm size, compatibility, innovation, trialability, cost, political situation, and location of the server. Last but not least, there were factors identified as critical success factors (CSF) that turned out to be ineffective, un-influential and have a small effect on cloud ERP adoption in SMEs in Jordan such as previous IT experience, complexity, scope of the market and competitive pressure.

III. Research Model and Hypotheses Development

This research investigates the factors that influence cloud ERP adoption in Egyptian companies using the Diffusion of Innovation theory (DOI) and the Technology-Organization-Environment framework (TOE) that are considered to be the appropriate theoretical foundations when studying the adoption of any technology such as cloud ERP. According to [28], the DOI theory evaluates why, how and the rate at which new concepts and ideas are adopted. The five factors affecting new technology adoption are compatibility, complexity, relevant advantage, observability, and trialability [28]. Many studies have found that those five innovation characteristics enable and assist the adoption and implementation of a technological innovation and help in measuring the diffusion rate of a technology [29], [30]. The five innovation characteristics have an important role in the adoption or rejection of a technological innovation like the cloud ERP [13]. According to [31], the DOI created a base for the technology diffusion models development for example, the TOE. Moreover, [31] have set the characteristics of the TOE framework which are the technological, organizational, and environmental characteristics; those characteristics have an impact on adopting a technological innovation. The TOE framework was applied in several studies that examine the information systems applications (IS) adoption, for example in the ERP studies by [32], [33], [13], and [7]. Fig. 1 presents the model of the study. It shows that the main factors affecting cloud ERP adoption including: innovative characteristics, technological context, organizational context, and environmental context.

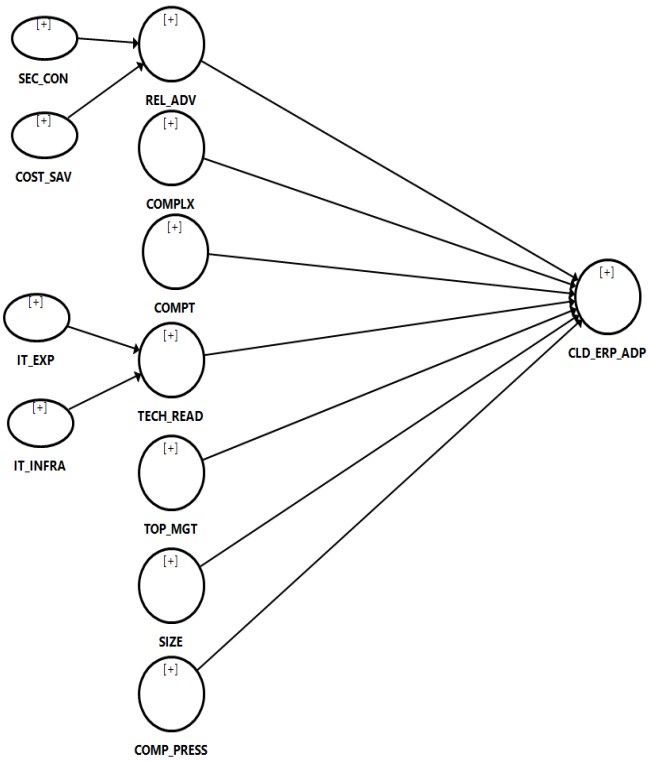

Fig. 1 Research Model

A. Research Hypotheses

1. Innovation Characteristics

The DOI theory consists of five innovation characteristics that influence the adoption of a new technology. Many studies have found that those five innovation characteristics enable and help in the adoption of an innovation and assist in measuring the diffusion rate of a technology [29], [30]. According to [34], an innovation is the idea or practice that is considered new by individuals or by other adoption units. The innovation characteristics have an important role in the adoption or rejection of an innovation like the cloud ERP [13]. It is found that many studies in the IT field exclude the two variables, trialability and observability, as they are not always related to the process of innovation diffusion [35], [36].

Cloud-based innovations gives the innovation a chance to lower the IT financial investments, reduce the consumption of energy, decrease infrastructure costs, and lower the maintenance costs and the total capital investment in computing [5], [36], [35], [37]. Cloud computing technology provides cost-effective ways of businesses transformation by re-inventing new means for how products are consumed and sold.

This is expected to improve the relative advantage of the company. As defined by [28; p. 15], relative advantage is the "degree to which an innovation is perceived as better than the idea it supersedes". Hence, the following hypothesis is developed:

H1: There is a significant positive relationship between relative advantage and adoption of cloud ERP systems.

Since relative advantage can be positively affected by cost savings [36], [38], [5], the following hypothesis is proposed:

H1a: There is a significant positive relationship between cost savings and relative advantage.

The security concern might have an impact on the relative advantage of a company. A security breach is a situation in which the company loses sensitive information and data, intellectual property, customer data, or personal records or any important records [39], [5]. It is worth mentioning that moving to cloud solutions adds extra levels of data security complexity and affects the company's adoption decision of an innovation [40], [36], [38], [5]. Thus, it is expected to have a negative relationship between security concerns and relative advantage. Therefore, the following hypothesis is developed:

H1b: There is a significant negative relationship between security concerns and relative advantage.

According to [28; p. 15], Compatibility is "the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters". When companies find out that new technologies are compatible with their current application systems, then they should consider the adoption of these technologies [7]. Hence, we propose the following hypothesis:

H2: There is a significant positive relationship between compatibility of innovation and adoption of cloud ERP systems.

According to [28; p.15], complexity is "the degree to which an innovation is perceived as difficult to understand and use". This means the more complex the innovation is perceived the less the intention to adopt it. Hence, the following hypothesis is proposed:

H3: There is a significant negative relationship between complexity and adoption of cloud ERP systems.

2. Technological Context

The technological context refers to the organization's available technological characteristics for the adoption of technology in the company [36]. It includes both the structural aspects and the specialized human resources. The technological context consists of IT infrastructure, IT employees' expertise and skills, and technology readiness. IT infrastructure of the company simplifies the information flow when the cloud ERP is based on it; as a result, the company has to make sure that there is a sufficient and adequate bandwidth of internet connectivity to be able to adopt the cloud ERP system [41], [21], [13]. Moreover, if the company's employees do not have enough IT expertise and skills, they will not have the motivation to dedicate extra time and effort for the adoption of cloud ERP [42], [43]. Technology readiness affects the adoption of a new technology, technology readiness refers to the existence of a well implemented IT infrastructure, and experienced and skilled IT personnel. Thus, if the company has the strong technological infrastructure and specialized IT personnel, then it has a high level of technological readiness [44], [36], [35], [5]. Therefore, the following hypotheses are developed.

H4: There is a significant positive relationship between technology readiness and adoption of cloud ERP systems.

Based on the results of [44], [36], [35], and [5], it is proposed that technology readiness is positively affected by IT expertise and IT infrastructure. This leads to the following hypotheses:

H4a: There is a significant positive relationship between IT expertise and technology readiness.

H4b: There is a significant positive relationship between IT infrastructure and technology readiness.

3. Organizational Context

The organization's characteristics are defined in terms of the available resources that assist and support the adoption and acceptance of the innovation [45]. The organizational context in our study consists of top management support and firm size.

Top management support influences the adoption of cloud ERP [44] because top management in any company allocates the resources required for the cloud ERP adoption and it approves the project before it is executed [24], [46]. Therefore, it is proposed that top management support will have a positive impact on the adoption of cloud ERP systems. This leads to the following hypotheses:

H5: There is a significant positive relationship between top management support and adoption of cloud ERP systems.

Firm size can influence the adoption of a cloud ERP, larger firms have more resources than smaller ones and thus can take more risks associated with the adoption of an innovation like cloud ERP [32], [47]. Hence, the following hypothesis is proposed:

H6: There is a significant positive relationship between firm size and adoption of cloud ERP systems.

4. Environmental Context

The environmental context includes the competitive pressure. The competitive pressure is recognized as a key driver for the diffusion of technology, it is referred to as the pressure felt from the competitors [36]. Cartman et al. [48] discovered a relationship between competitive pressure and the adoption of ERP. Thus, the following hypothesis is proposed:

H7: There is a significant positive relationship between competitive pressure and adoption of cloud ERP systems.

IV. Research Methodology

This study aims to investigate the hypotheses proposed. The study relies on converting the hypothesis in a measurable form and to test the research framework as well. This research includes 11 variables using the TOE framework and the DOI theory. Measurements were developed from previous studies and adjusted to be suitable for the Egyptian environment and the context of the research. A 5-point Likert scale was used to measure each variable. Age is measured in years and gender is measured as a binary variable (0= male, 1= female).

A. Questionnaire Design

The questionnaire was created to incorporate questions of the study's variables and hypotheses.

It was classified into two sections: The first includes information related to the organization, and demographic information of the respondents. The second section contains questions related to the constructs included in the research model.

Since the questionnaire was conducted in Egypt and the official spoken language among Egyptian citizens is Arabic, the developed questionnaire had two versions, an English version of the questionnaire that was later translated into Arabic and reviewed by a group of reputable academics to be distributed in the Egyptian companies. It is noteworthy that there was a printed version of the questionnaire given to qualified individuals working in Egyptian organizations, and an online version of the questionnaire created with Google Forms.

A survey was used to collect data and it was developed using constructs from the current cloud computing and cloud ERP technologies articles and then was modified in order to fit to our research. The study's analysis was based on Structural Equation Modeling (SEM) using SmartPLS software which was used for the research model's empirical analysis. The online copy of the questionnaire was done using Google Forms and was emailed to some experienced individuals, ERP users (consultants and managers), IT specialists cloud solutions experts, and CIOs. Moreover, to increase our sample size, the hard copy of the questionnaire was distributed to the previously mentioned positions in Egyptian organizations as well.

V. Analysis of Results

A. Demographics of the Respondents

After distributing the questionnaire, using the soft and hard copies, there were 196 responses collected with a response rate of 37%. Most of the respondents in the survey were male with 80.77% and female with 19.53%. Some responses, 17 responses, were eliminated as they did not qualify for the requirements of the survey, or they did not correctly answer the manipulation check question included leaving our sample size at 179 responses. All of the participants of our questionnaire are well educated, and the majority of them (73.17%) had more than 5 years of experience in the IT field. Our sample also included participants from higher positions in their organizations, such as CIO, and IT managers. See Fig. 2.

	Frequency	Percentage (%)
Position:		
ERP (consultants or users)	81	45.25%
IT Specialists and managers	69	38.55%
Chief Information Officer (CIO)	14	7.82%
Others	15	8.38%
Gender:		
Male	144	80.47%
Female	35	19.53%
Age:		
Less than 30 years	79	44.13%
30 – 39 years	72	40.22%
40 – 49 years	19	10.61%
50 – 59 years	9	5.02%
60 years or more	0	0
IT Experience:		
0 – less than 5 years	48	26.82%
5 – less than 10 years	67	37.43%
10 – less than 15 years	29	16.20%
15 – less than 20 years	15	8.37%
20 years or more	20	11.17%

Fig. 2 Demographics of the respondents

B. Measurement Model

The measurement model refers to the association between the latent constructs and the items corresponding to them [50]. The partial least squares-structural equation modelling (PLS-SEM) using Smart-PLS is used to perform these measures [49]. The analysis of the study was done using Structural Equation Modeling (SEM) with Partial Least Squares (PLS) method to examine the research model, that is used widely in the field of social sciences research [50]. The use of PLS is considered adequate to test the measurement model and to validate the structural model's causality [49]-[51]. Consistent with above, all constructs were placed with the contribution of prior studies in this area. Then the measurement model was examined to evaluate reliability and validity of the constructs [49].

The results of the measurement model, reliability, validity, correlations, and outer loading are shown respectively (see Figs. 3, 4, and 5).

According to [52], Cronbach's alpha assists in defining the reliability and scale's trustworthiness based on the variables' internal consistency. Cronbach's Alpha was used to measure the scales' reliability and all of the results. According to [53], an alpha ranging from 0.5 to 0.7 indicates moderate reliability and is considered to be accepted. There were two variables were the Cronbach's Alpha is more than 0.5, which are cost savings and competitive pressure, showing that the results are reliable according to [53]-[55]. The Cronbach's alpha of compatibility is 0.692 which is also accepted [50], [56], [57]. As for the rest of the variables, the Cronbach's alpha was more than 0.7 which indicates strong reliability [50], [51].

	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
CLD_ERP_ADP	0.869	0.939	0.884
COMPLX	0.780	0.900	0.818
COMPT	0.692	0.828	0.616
COMP_PRESS	0.533	0.809	0.680
COST_SAV	0.540	0.811	0.682
IT_EXP	0.819	0.893	0.736
IT_INFRA	0.780	0.872	0.696
REL_ADV	0.798	0.882	0.714
SEC_CON	0.880	0.942	0.891
SIZE	0.731	0.881	0.787
TECH_READ	0.707	0.837	0.631
TOP_MGMT	0.731	0.830	0.621

Fig. 3 Reliability and Convergent validity

	CLD_ERP_ADP	COMPLX	COMPT	COMP_PRESS	COST_SAV	IT_EXP	IT_INFRA	REL_ADV	SEC_CON	SIZE	TECH_READ	TOP_MGMT
CLD_ERP_ADP	1	-0.303	0.489	0.389	0.239	0.512	0.452	0.303	0.106	0.191	0.388	0.543
COMPLX	-0.303	1	-0.228	-0.169	-0.177	-0.323	-0.197	-0.128	0.108	-0.093	-0.194	-0.262
COMPT	0.489	-0.228	1	0.390	0.191	0.546	0.588	0.485	0.075	0.235	0.455	0.507
COMP_PRESS	0.389	-0.169	0.390	1	0.180	0.411	0.382	0.346	0.109	0.150	0.398	0.357
COST_SAV	0.239	-0.177	0.191	0.180	1	0.092	0.224	0.200	0.176	0.264	0.187	0.249
IT_EXP	0.512	-0.323	0.546	0.411	0.092	1	0.560	0.339	0.100	0.204	0.498	0.604
IT_INFRA	0.452	-0.197	0.588	0.382	0.224	0.560	1	0.330	0.050	0.385	0.667	0.539
REL_ADV	0.303	-0.128	0.485	0.346	0.200	0.339	0.330	1	-0.043	0.123	0.284	0.349
SEC_CON	0.106	0.108	0.075	0.109	0.176	0.100	0.050	-0.043	1	0.125	0.100	0.061
SIZE	0.191	-0.093	0.235	0.150	0.264	0.204	0.385	0.123	0.125	1	0.286	0.217
TECH_READ	0.388	-0.194	0.455	0.398	0.187	0.498	0.667	0.284	0.100	0.286	1	0.569
TOP_MGMT	0.543	-0.262	0.507	0.357	0.249	0.604	0.539	0.349	0.061	0.217	0.569	1

Fig. 4 Correlation Matrix

	CLD_ERP_ADP	COMPLX	COMPT	COMP_PRESS	COST_SAV	IT_EXP	IT_INFRA	REL_ADV	SEC_CON	SIZE	TECH_READ	TOP_MGMT
CLD_ADOP1	0.940											
CLD_ADOP2	0.940											
COMPLX1		0.883										
COMPLX2		0.925										
COMPT1			0.780									
COMPT2			0.774									
COMPT3			0.799									
COMP_PRESS2				0.779								
COMP_PRESS3				0.867								
COST_SAV1					0.872							
COST_SAV3					0.777							
IT_EXP1						0.860						
IT_EXP2						0.916						
IT_EXP3						0.792						
IT_INFRA1							0.829					
IT_INFRA2							0.894					
IT_INFRA3							0.775					
REL_ADV1								0.835				
REL_ADV2								0.907				
REL_ADV3								0.788				
SEC_CON2									0.958			
SEC_CON3									0.929			
SIZE1										0.908		
SIZE2										0.866		
TECH_READ1											0.855	
TECH_READ2											0.740	
TECH_READ3											0.785	
TOP_MGMT1												0.884
TOP_MGMT2												0.741
TOP_MGMT3												0.730

Fig. 5 Outer Loadings

Additionally, Composite reliability (CR) was used to test the internal consistency of the scales for the sample and the results were more than 0.7 for all variables, indicating that the scales are reliable [49], [50]; see Fig. 3. To evaluate the measurement model, convergent validity and discriminant validity were used. Convergent validity was measured using average variance extracted (AVE), it is preferred that its value be more than 0.5 [58] .See Fig. 3. Last but not least, discriminant validity was assessed using cross loadings and Fornell-Larcker criterion. The cross loadings of our results are accepted as the cross loadings criterion entails that each indicator's outer loading should be higher than all the cross loadings [59]. See Fig. 6. Fornell et al. [58] suggested that the square root of the AVE has to be more than the correlations between the constructs, which has occurred in our results. See Fig. 7.

	CLD_ERP_ADP	COMPLX	COMPT	COMP_PRESS	COST_SAV	IT_EXP	IT_INFRA	REL_ADV	SEC_CON	SIZE	TECH_READ	TOP_MGMT
CLD_ADOP1	0.940	-0.285	0.474	0.356	0.207	0.482	0.417	0.252	0.158	0.195	0.335	0.504
CLD_ADOP2	0.940	-0.284	0.446	0.375	0.242	0.481	0.432	0.319	0.042	0.164	0.395	0.516
COMPLX1	-0.242	0.883	-0.206	-0.176	-0.228	-0.298	-0.213	-0.112	0.113	-0.130	-0.222	-0.209
COMPLX2	-0.300	0.925	-0.208	-0.135	-0.106	-0.289	-0.151	-0.119	0.086	-0.047	-0.138	-0.261
COMPT1	0.300	-0.226	0.780	0.405	0.177	0.418	0.400	0.412	0.068	0.200	0.340	0.390
COMPT2	0.397	-0.210	0.774	0.321	0.123	0.466	0.409	0.412	0.057	0.099	0.315	0.401
COMPT3	0.431	-0.118	0.799	0.224	0.155	0.401	0.554	0.331	0.054	0.254	0.408	0.401
COMP_PRESS2	0.281	-0.139	0.319	0.779	0.166	0.425	0.396	0.269	0.059	0.149	0.350	0.305
COMP_PRESS3	0.354	-0.142	0.326	0.867	0.137	0.273	0.253	0.301	0.115	0.105	0.313	0.289
COST_SAV1	0.190	-0.069	0.116	0.165	0.872	0.060	0.156	0.184	0.151	0.211	0.097	0.178
COST_SAV3	0.209	-0.249	0.212	0.131	0.777	0.096	0.224	0.143	0.141	0.230	0.230	0.244
IT_EXP1	0.370	-0.284	0.458	0.298	0.027	0.860	0.420	0.194	0.113	0.191	0.423	0.461
IT_EXP2	0.480	-0.294	0.516	0.339	0.127	0.916	0.543	0.340	0.036	0.185	0.476	0.563
IT_EXP3	0.470	-0.251	0.426	0.435	0.076	0.792	0.476	0.340	0.118	0.145	0.375	0.533
IT_INFRA1	0.485	-0.220	0.508	0.308	0.236	0.580	0.829	0.266	0.025	0.373	0.498	0.497
IT_INFRA2	0.386	-0.198	0.550	0.304	0.216	0.466	0.894	0.242	0.044	0.336	0.617	0.447
IT_INFRA3	0.269	-0.077	0.410	0.347	0.109	0.367	0.775	0.323	0.055	0.260	0.544	0.410
REL_ADV1	0.280	-0.156	0.377	0.240	0.111	0.215	0.202	0.835	-0.08	0.104	0.103	0.231
REL_ADV2	0.254	-0.121	0.426	0.282	0.213	0.315	0.291	0.907	-0.078	0.169	0.241	0.296
REL_ADV3	0.235	-0.040	0.430	0.366	0.181	0.331	0.350	0.788	0.063	0.025	0.392	0.366
SEC_CON2	0.104	0.097	0.038	0.098	0.126	0.078	-0.011	-0.045	0.958	0.065	0.055	0.038
SEC_CON3	0.096	0.108	0.113	0.108	0.220	0.115	0.123	-0.035	0.929	0.187	0.145	0.083
SIZE1	0.183	-0.076	0.251	0.119	0.247	0.235	0.344	0.085	0.127	0.908	0.250	0.176
SIZE2	0.154	-0.091	0.159	0.151	0.220	0.117	0.341	0.138	0.092	0.866	0.260	0.212
TECH_READ1	0.274	-0.178	0.392	0.304	0.171	0.442	0.639	0.188	0.082	0.288	0.855	0.433
TECH_READ2	0.315	-0.268	0.226	0.369	0.123	0.411	0.456	0.188	0.015	0.120	0.740	0.508
TECH_READ3	0.346	-0.015	0.460	0.283	0.148	0.331	0.480	0.309	0.140	0.264	0.785	0.425
TOP_MGMT1	0.594	-0.229	0.478	0.378	0.261	0.566	0.435	0.367	0.106	0.141	0.458	0.884
TOP_MGMT2	0.302	-0.182	0.338	0.190	0.121	0.415	0.434	0.148	-0.034	0.209	0.471	0.741
TOP_MGMT3	0.242	-0.215	0.345	0.202	0.161	0.405	0.450	0.247	0.017	0.222	0.463	0.730

Fig. 6 Cross Loadings

	CLD_ERP_ADP	COMPLX	COMPT	COMP_PRESS	COST_SAV	IT_EXP	IT_INFRA	REL_ADV	SEC_CON	SIZE	TECH_READ	TOP_MGMT
CLD_ERP_ADP	0.940											
COMPLX	-0.303	0.904										
COMPT	0.489	-0.228	0.785									
COMP_PRESS	0.389	-0.169	0.390	0.824								
COST_SAV	0.239	-0.177	0.191	0.180	0.826							
IT_EXP	0.512	-0.323	0.546	0.411	0.092	0.858						
IT_INFRA	0.452	-0.197	0.588	0.382	0.224	0.560	0.834					
REL_ADV	0.303	-0.128	0.485	0.346	0.200	0.339	0.330	0.845				
SEC_CON	0.106	0.108	0.075	0.109	0.176	0.100	0.050	-0.043	0.944			
SIZE	0.191	-0.093	0.235	0.150	0.264	0.204	0.385	0.123	0.125	0.887		
TECH_READ	0.388	-0.194	0.455	0.398	0.187	0.498	0.667	0.284	0.100	0.286	0.795	
TOP_MGMT	0.543	-0.262	0.507	0.357	0.249	0.604	0.539	0.349	0.061	0.217	0.569	0.788

Fig. 7 Fornell-Larcker

C. Structural Model

The following step after testing the measurement model is to assess and evaluate the structural model. Multicollinearity for all the constructs was tested first as it constitutes a threat to the model design [60]. Multicollinearity is considered as a data problem because it leads to serious problems to the estimates of the model parameters' reliability [61]. The variance inflation factor (VIF) indicated that multicollinearity did not exist

because all variance inflation factors obtained were less than 4, which is less than the conservative threshold of 5 [36], [62]. See Fig. 8. After Multicollinearity test, we assessed the structural model using the path coefficient also the relationship between the exogenous and endogenous variables was examined using the t-statistics and path coefficient (β) [50]. In order to detect the path relationship among the variables and the path significance levels, the structural model was made to test the hypotheses. using the bootstrapping method. See Fig. 9. The results provided support for all the formulated hypotheses except hypothesis (1b), hypothesis (1) and hypothesis (6) that were not supported as they were insignificant.

	CLD_ERP_ADP	COMPLX	COMPT	COMP_PRESS	COST_SAV	IT_EXP	IT_INFRA	REL_ADV	SEC_CON	SIZE	TECH_READ	TOP_MGMT
CLD_ERP_ADP												
COMPLX	1.092											
COMPT	1.711											
COMP_PRESS	1.326											
COST_SAV								1.032				
IT_EXP											1.457	
IT_INFRA											1.457	
REL_ADV	1.374											
SEC_CON								1.032				
SIZE	1.107											
TECH_READ	1.683											
TOP_MGMT	1.737											

Fig. 8 Multicollinearity test

Our study has found that the following hypotheses are accepted and supported because their $p < 0.05$, cost savings hypothesis (H1a) ($\beta = 0.214$, $p < 0.05$) the result is consistent with [36], [63], [64], compatibility (H2) ($\beta = 0.219$, $p < 0.05$) consistent with [64], [66], complexity (H3) ($\beta = -0.136$, $p < 0.05$) same as [13], [36], IT expertise (H4a) ($\beta = 0.182$, $p < 0.05$) same as [67], IT infrastructure (H4b) ($\beta = 0.565$, $p < 0.05$) consistent with [67], top management support (H5) ($\beta = 0.331$, $p < 0.05$) the result is consistent to [13], [36], [65], and finally, competitive pressure (H7) ($\beta = 0.155$, $p < 0.05$) result is the same as [13], [44], [68] See Fig. 9.

On the other hand, it was also found that the following hypotheses were rejected and not supported as their $p > 0.05$. Security concerns (H1b) ($\beta = -0.081$, $p > 0.05$) our result is consistent with [69], [36], relative advantage (H1) ($\beta = 0.007$, $p > 0.05$) our result is consistent with [4], [69], [66], technology readiness (H4) ($\beta = 0.002$, $p > 0.05$) the result is consistent with [66], [44], [70], and lastly, firm size (H6) ($\beta = 0.031$, $p > 0.05$) our result is consistent with [71], [63], [4]. The reason behind this that the culture in Egypt is different than that of developing countries and that people in Egypt are still not fully aware of the cloud ERP or cloud computing technology in general.

	Path Coefficient (β)	Standard Deviation	T Statistics	P Values	Comment
COMPLX -> CLD_ERP_ADP	-0.136	0.065	2.103	0.036	(Supported)
COMPT -> CLD_ERP_ADP	0.219	0.083	2.631	0.009	(Supported)
COMP_PRESS -> CLD_ERP_ADP	0.155	0.066	2.349	0.019	(Supported)
COST_SAV -> REL_ADV	0.214	0.089	2.414	0.016	(Supported)
IT_EXP -> TECH_READ	0.182	0.071	2.548	0.011	(Supported)
IT_INFRA -> TECH_READ	0.565	0.072	7.814	0.000	(Supported)
REL_ADV -> CLD_ERP_ADP	0.007	0.072	0.091	0.927	(Not Supported)
SEC_CON -> REL_ADV	-0.081	0.089	0.907	0.365	(Not Supported)
SIZE -> CLD_ERP_ADP	0.031	0.058	0.526	0.599	(Not Supported)
TECH_READ -> CLD_ERP_ADP	0.002	0.081	0.024	0.981	(Not Supported)
TOP_MGMT -> CLD_ERP_ADP	0.331	0.070	4.715	0.000	(Supported)

Fig. 9 Structural Model Results

VI. Conclusions

Cloud ERP nowadays has been widely used and known in developed countries and there have been many studies investigating the factors that affect the adoption of cloud ERP. However, in developing countries like Egypt there are not adequate studies discussing such issue. Our study was based on the DOI theory and the TOE framework. Data were collected through a survey that was developed using constructs from the existing studies of cloud computing and cloud ERP technologies. Analysis of the study was based on Structural Equation Modeling (SEM) using SmartPLS software that was used for the empirical analysis of the research model. The results of the study show that the reliability and validity of the constructs are accepted. Additionally, multicollinearity test has shown that multicollinearity does not exist. Moreover, the following hypotheses are accepted, cost savings (H1a), compatibility (H2), complexity (H3), IT expertise (H4a), IT infrastructure (H4b), top management support (H5), and

competitive pressure (H7). However, there were some hypotheses that are rejected which are security concerns (H1b), relative advantage (H1), technology readiness (H4), and firm size (H6).

This study contributes to the cloud ERP literature by increasing the number of studies conducted in this area in developing countries and filling the existing gap concerning cloud ERP. Moreover, it provides useful insights for Egyptian companies to assist them in the decision of cloud ERP adoption through highlighting the main factors contributing to the successful adoption. This research helps in increasing the awareness of business owners and investors about cloud ERP adoption.

The study, however, was limited to Egyptian companies, and it only reflects the Egyptian reality. So, the research findings cannot be generalized to represent the overall condition in developing countries. Future research can be conducted in other developing countries. The research can also be extended to cover countries of different cultures to investigate the impact of culture on the adoption of cloud ERP systems. Additionally, this research aimed to measure and identify the most distinguished factors that affect the adoption of cloud ERP in Egyptian companies instead of listing all of the possible factors affecting the adoption. Future studies could consider other factors and measure their effect on the cloud ERP adoption decision.

References

[1] M. Ali, E. S. Nasr, and M. H. Gheith, "A requirements elicitation approach for cloud based software product line ERPs," ACM Int. Conf. Proceeding Ser., vol. 28-29-May-, pp. 34–39, 2016, doi: 10.1145/2944165.2944171.

[2] M. A. Abd Elmonem, E. S. Nasr, and M. H. Geith, "Benefits and challenges of cloud ERP systems – A systematic literature review," Futur. Comput. Informatics J., vol. 1, no. 1–2, pp. 1–9, 2016, doi: 10.1016/j.fcij.2017.03.003.

[3] D. Maditinos, D. Chatzoudes, and C. Tsairidis, "Factors affecting ERP system implementation effectiveness," J. Enterp. Inf. Manag., vol. 25, no. 1, pp. 60–78, 2011, doi: 10.1108/17410391211192161.

[4] M. A. AL-Shboul, "Towards better understanding of determinants logistical factors in SMEs for cloud ERP adoption in developing economies," Bus. Process Manag. J., vol. 25, no. 5, pp. 887–907, 2019, doi: 10.1108/BPMJ-01-2018-0004.

[5] U. M. Z. Usman, M. N. Ahmad, and N. H. Zakaria, "The determinants of adoption of cloud-based ERP of Nigerian's SMEs manufacturing sector using TOE framework and DOI theory," Int. J. Enterp. Inf. Syst., vol. 15, no. 3, pp. 27–43, 2019, doi: 10.4018/IJEIS.2019070102.

[6] L. Jain and S. Bhardwaj, "Enterprise Cloud Computing: Key Considerations for Adoption," Int. J. Eng. Inf. Technol., vol. 2, Jan. 2010.

[7] M. Zamzeer, Y. Alshamaileh, H. I. Alsawalqah, M. Al-Hassan, E. J. A. Fannas, and S. S. Almubideen, "Determinants of cloud ERP adoption in Jordan: An exploratory study," Int. J. Bus. Inf. Syst., vol. 34, no. 2, pp. 204–228, 2020, doi: 10.1504/IJBIS.2020.108342.

[8] S. Gupta, S. C. Misra, N. Kock, and D. Roubaud, "Organizational, technological and extrinsic factors in the implementation of cloud ERP in SMEs," J. Organ. Chang. Manag., vol. 31, no. 1, pp. 83–102, 2018, doi: 10.1108/JOCM-06-2017-0230.

[9] S. L. Saini, D. Kumar Saini, J. H. Yousif, and S. V. Khandage, "Cloud computing and enterprise resource planning systems," Proc. World Congr. Eng. 2011, WCE 2011, vol. 1, pp. 681–684, 2011.

[10] N. Sénica, C. Teixeira, and J. S. Pinto, "Cloud computing: A platform of services for services," Commun. Comput. Inf. Sci., vol. 220 CCIS, no. PART 2, pp. 91–100, 2011, doi: 10.1007/978-3-642-24355-4_10.

[11] R. Sharma and B. Keswani, "Study of Cloud Based ERP Services for Small and Medium Enterprises (Data is Processed by Text Mining Technique)," Sales. J. Inf. Syst., vol. 1, no. 13, pp. 2–10, 2014.

[12] G. J. Mohammed and M. A. Burhanuddin, "The Influence of Factors to Adopt Cloud-based ERP for Iraqi SMEs," J. Adv. Res. Dyn. Control Syst., vol. 10, 2018.

[13] A. M. AlBar and M. R. Hoque, "Factors affecting cloud ERP adoption in Saudi Arabia: An empirical study," Inf. Dev., vol. 35, no. 1, pp. 150–164, 2019, doi: 10.1177/0266666917735677.

[14] U. Iqbal, E. Uppström, and G. Juell-Skielse, "Cloud ERP implementation challenges: A study based on ERP life cycle model," in Advances in Enterprise Information Systems II :, 2012, no. 1, pp. 389–405, doi: 10.1201/b12295-43.

[15] D. A. Almajali, R. Masa'deh, and A. Tarhini, "Antecedents of ERP systems implementation success: a study on Jordanian healthcare sector," J. Enterp. Inf. Manag., vol. 29, no. 4, pp. 549–565, 2016, doi: 10.1108/JEIM-03-2015-0024.

[16] S. V. Grabski, S. A. Leech, and P. J. Schmidt, "A review of ERP research: A future agenda for accounting information systems," J. Inf. Syst., vol. 25, no. 1, pp. 37–78, 2011, doi: 10.2308/jis.2011.25.1.37.

[17] F. Mahmood, A. Z. Khan, and R. H. Bokhari, "ERP issues and challenges: a research synthesis," Kybernetes, vol. 49, no. 3, pp. 629–659, 2020, doi: 10.1108/K-12-2018-0699.

[18] N. S. A. Suhaimi, A. Nawawi, and A. S. A. P. Salin, "Impact of enterprise resource planning on management control system and accountants' role," Int. J. Econ. Manag., vol. 10, no. 1, pp. 93–108, 2016.

[19] D. M. Bahssas, A. M. AlBar, and M. R. Hoque, "Enterprise Resource Planning (ERP) Systems: Design, Trends and Deployment," Int. Technol. Manag. Rev., vol. 5, no. 2, p. 72, 2015, doi: 10.2991/itmr.2015.5.2.2.

[20] C. M. Navaneethakrishnan, "A Comparative Study of Cloud based ERP systems with Traditional ERP and Analysis of Cloud ERP implementation," Int. J. Eng. Comput. Sci., vol. 2, no. 9, pp. 2866–2869, 2013.

[21] K. Haji Salum and M. Z. Abd Rozan, "Exploring the Challenge Impacted SMEs to Adopt Cloud ERP," Indian J. Sci. Technol., vol. 9, no. 45, 2016, doi: 10.17485/ijst/2016/v9i45/100452.

[22] H. Klaus, M. Rosemann, and G. G. Gable, "What is ERP ?," 2000.

[23] M. Al-Mashari, A. Al-Mudimigh, and M. Zairi, "Enterprise resource planning: A taxonomy of critical factors," Eur. J. Oper. Res., vol. 146, no. 2, pp. 352–364, 2003, doi: https://doi.org/10.1016/S0377-2217(02)00554-4.

[24] C. R. Holland and B. Light, "A critical success factors model for ERP implementation," IEEE Softw., vol. 16, no. 3, pp. 30–36, 1999, doi: 10.1109/52.765784.

[25] R. Pareek, "Analytical Study of Cloud ERP and ERP," Int. J. Eng. Comput. Sci., vol. 3, no. 10, pp. 8710–8717, 2014, (Online). Available: http://ijecs.in/issue/v3-i10/44 ijecs.pdf.

[26] B. Scholtz and D. Atukwase, "An Analysis of the Perceived Benefits and Drawbacks of Cloud ERP Systems: A South African Study," pp. 75–87, 2016, doi: 10.1007/978-3-319-25153-0_7.

[27] S. S. Bharadwaj and P. Lal, "Exploring the impact of cloud computing adoption on organizational flexibility: A client perspective," Proc. 2012 Int. Conf. Cloud Comput. Technol. Appl. Manag. ICCCTAM 2012, pp. 121–131, 2012, doi: 10.1109/ICCCTAM.2012.6488085.

[28] E. M. Rogers, Diffusion of Innovations, 4th Edition. Free Press, 2010.

[29] R. G. Fichman, "Information Technology Diffusion: A Review of Empirical Research," 1992.

[30] G. C. Moore and I. Benbasat, "Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation," Inf. Syst. Res., vol. 2, no. 3, pp. 192–222, 1991, doi: 10.1287/isre.2.3.192.

[31] L. G. Tornatzky et al., "The Process of Technological Innovation: Reviewing the Literature," Natl. Sci. Found., no. May, pp. x, 264, 1983, (Online). Available: http://www.csa.com/partners/viewrecord.php?requester=gs&collection=TRD&recid=N8426466AH.

[32] Y. Zhu, Y. Li, W. Wang, and J. Chen, "What leads to post-implementation success of ERP? An empirical study of the Chinese retail industry," Int. J. Inf. Manage., vol. 30, no. 3, pp. 265–276, 2010, doi: 10.1016/j.ijinfomgt.2009.09.007.

[33] H. Liu and X. Wang, "Strategy Research of Enterprise Information Planning Based on TOE-TAM Model: Case Study for ERP Implementation of a Discrete Manufacturing," in 2010 2nd International Workshop on Database Technology and Applications, 2010, pp. 1–5, doi: 10.1109/DBTA.2010.5658969.

[34] E. M. Rogers, Diffusion of innovations. New York: Free Press, 1995.

[35] R. Martins, T. Oliveira, and M. A. Thomas, "An empirical analysis to assess the determinants of SaaS diffusion in firms," Comput. Human Behav., vol. 62, pp. 19–33, 2016, doi: 10.1016/j.chb.2016.03.049.

[36] T. Oliveira, M. Thomas, and M. Espadanal, "Assessing the determinants of cloud computing adoption: An analysis of the manufacturing and services sectors," Inf. Manag., vol. 51, no. 5, pp. 497–510, 2014, doi: 10.1016/j.im.2014.03.006.
[37] H. F. Cervone, "Managing Digital Libraries : An overview of virtual and cloud computing," 2010, doi: 10.1108/10650751011073607.
[38] M. Amini and A. Bakri, "Cloud Computing Adoption by SMEs in the Malaysia : A Multi-Perspective Framework based on DOI Theory and TOE Framework," vol. 9, no. 2, 2015.
[39] K. R. Sarkar, "Assessing insider threats to information security using technical , behavioural and organisational measures," Inf. Secur. Tech. Rep., vol. 15, no. 3, pp. 112–133, 2010, doi: 10.1016/j.istr.2010.11.002.
[40] M. Espadanal, "Cloud Computing Adoption by firms," 2012.
[41] M. Chopra, J. Mungi, and K. Chopra, "A survey on use of cloud computing in various fields," Int. J. Sci. Eng. Technol. Res., vol. 2, no. 2, pp. 480–488, 2013.
[42] M. Lutovac and D. Manojlov, "The successful methodology for enterprise resource planning (ERP) implementation," J. Mod. Account. Audit., vol. 8, no. 12, p. 1838, 2012.
[43] S. Venkatraman and K. Fahd, "Challenges and success factors of ERP systems in australian SMEs," Systems, vol. 4, no. 2, 2016, doi: 10.3390/systems4020020.
[44] C. Low, Y. Chen, and M. Wu, "Understanding the determinants of cloud computing adoption," Ind. Manag. Data Syst., vol. 111, no. 7, pp. 1006–1023, 2011, doi: 10.1108/02635571111161262.
[45] S. K. Lippert and C. Govindarajulu, "Technological, organizational, and environmental antecedents to web services adoption," Commun. IIMA, vol. 6, no. 1, p. 14, 2006.
[46] F. F. H. Nah, K. M. Zuckweiler, and J. L. S. Lau, "ERP implementation: Chief information officers' perceptions of critical success factors," Int. J. Hum. Comput. Interact., vol. 16, no. 1, pp. 5–22, 2003, doi: 10.1207/S15327590IJHC1601_2.
[47] F. Thiesse, T. Staake, P. Schmitt, and E. Fleisch, "The rise of the 'next-generation bar code': an international RFID adoption study," Supply Chain Manag. An Int. J., vol. 16, no. 5, pp. 328–345, Jan. 2011, doi: 10.1108/13598541111155848.
[48] C. Cartman and A. Salazar, "The influence of organisational size, internal IT capabilities, and competitive and vendor pressures on ERP adoption in SMEs," Int. J. Enterp. Inf. Syst., vol. 7, no. 3, pp. 68–92, 2011.
[49] J. Henseler, C. M. Ringle, and R. R. Sinkovics, "The use of partial least squares path modeling in international marketing," in New Challenges to International Marketing, vol. 20, R. R. Sinkovics and P. N. Ghauri, Eds. Emerald Group Publishing Limited, 2009, pp. 277–319.
[50] J. F. Hair, W. C. Black, and B. J. Babin, Multivariate Data Analysis: A Global Perspective. Pearson Education, 2010.
[51] J. F. Hair, C. M. Ringle, and M. Sarstedt, "Partial least squares structural equation modeling: Rigorous applications, better results and higher acceptance," Long Range Plann., vol. 46, no. 1–2, pp. 1–12, 2013.
[52] A. Lehman, N. O'Rourke, L. Hatcher, and E. Stepanski, JMP for basic univariate and multivariate statistics: methods for researchers and social scientists. Sas Institute, 2013.
[53] P. R. Hinton, C. Brownlow, B. Cozens, and I. McMurray, SPSS Explained. Routledge, 2004.
[54] R. A. Peterson, "Meta-analysis of Alpha Cronbach ' s Coefficient," J. Consum. Res., vol. 21, no. 2, pp. 381–391, 2013.
[55] J. C. Nunnally, Psychometric Theory. McGraw-Hill, 1967.
[56] B. B.-H. Chai, P. S. Tan, and T. S. Goh, "Banking Services that Influence the Bank Performance," Procedia - Soc. Behav. Sci., vol. 224, no. August 2015, pp. 401–407, 2016, doi: 10.1016/j.sbspro.2016.05.405.
[57] Y. P. Pai and S. T. Chary, "Dimensions of hospital service quality: A critical review: Perspective of patients from global studies," Int. J. Health Care Qual. Assur., vol. 26, no. 4, pp. 308–340, 2013, doi: 10.1108/09526861311319555.
[58] C. Fornell and D. F. Larcker, "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error," J. Mark. Res., vol. 18, no. 1, pp. 39–50, 1981, doi: 10.1177/002224378101800104.
[59] M. Bataille, M. Vonarx, and A. Vermersch-Langlin, "Illustration of diagnostic and prognostic difficulties during the early stages of generalized bullous fixed drug eruptions," Eur. J. Dermatology, vol. 27, no. 1, pp. 86–88, 2017, doi: 10.1684/ejd.2016.2884.
[60] D. E. Farrar and R. R. Glauber, "Multicollinearity in Regression Analysis: The Problem Revisited," Rev. Econ. Stat., vol. 49, no. 1, pp. 92–107, Oct. 1967, doi: 10.2307/1937887.
[61] A. Alin, "Multicollinearity," WIREs Comput. Stat., vol. 2, no. 3, pp. 370–374, 2010, doi: https://doi.org/10.1002/wics.84.
[62] M. Alauddin and H. S. Nghiemb, "Do Instructional Attributes pose Multicollinearity Problems ? An Empirical Exploration," Econ. Anal. Policy, vol. 40, no. 3, pp. 351–361, 2010, doi: 10.1016/S0313-5926(10)50034-1.
[63] C. H. J. C. Lin, "Factors affecting the adoption of cloud services in enterprises," Inf. Syst. E-bus. Manag., vol. 14, no. 4, pp. 791–822, 2016, doi: 10.1007/s10257-015-0300-9.
[64] M. Amini and A. Bakri, "Cloud computing adoption by SMEs in the Malaysia: a multi-perspective framework based on DOI theory and TOE framework," J. Inf. Technol. Inf. Syst. Res., vol. 9, no. 2, pp. 121–135, 2015.
[65] Y. Alshamaila, S. Papagiannidis, and F. Li, "Cloud computing adoption by SMEs in the north east of England: A multi-perspective framework," J. Enterp. Inf. Manag., 2013.
[66] A. Alhammadi, C. Stanier, and A. Eardley, "The determinants of cloud computing adoption in Saudi Arabia," 2015.
[67] Naseebullah, S. Bin Basri, P. D. D. Dominic, and M. Jehangir, "Technology readiness impact on E-procurement implementation," ICBEIA 2011 - 2011 Int. Conf. Business, Eng. Ind. Appl., pp. 89–93, 2011, doi: 10.1109/ICBEIA.2011.5994265.
[68] P. Ifinedo, "An empirical analysis of factors influencing Internet/e-business technologies adoption by SMEs in Canada," Int. J. Inf. Technol. Decis. Mak., vol. 10, no. 04, pp. 731–766, 2011.
[69] A. Gutierrez, E. Boukrami, and R. Lumsden, "Technological, organisational and environmental factors influencing managers' decision to adopt cloud computing in the UK," J. Enterp. Inf. Manag., 2015.
[70] M. M. Salem and G.-H. Hwang, "Critical Factors Influencing Adoption of Cloud Computing for Government Organizations in Yemen," J. Distrib. Sci., vol. 14, no. 11, pp. 37–47, 2016.
[71] P. K. Senyo, J. Effah, and E. Addae, "Preliminary insight into cloud computing adoption in a developing country," vol. 29, no. 4, pp. 505–524, 2016, doi: 10.1108/JEIM-09-2014-0094.