Pakistan Journal of Life and Social Sciences

RESEARCH ARTICLE

Factors Influencing the Adoption of Cloud Enterprise Resource Planning Systems in Egyptian Small and Medium Enterprises: Assessing the Effects of Fit and Viability

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ARTICLE INFO	ABSTRACT
	Cloud Enterprise Resource Planning System (CERP) provides various benefits to small and medium enterprises (SMEs) leading to improved operational efficiency. Nevertheless, SMEs in developing countries exhibit lower rates of CERP adoption and holistic views of the influential factors are still lacking. Drawing on the diffusion of innovation, technology-organization-environment, and fit-viability model, a conceptual model was developed based on the factors identified through a qualitative investigation among 23 Egyptian SMEs together with those reported in similar research. Using an online survey, data was collected from 236 executives to empirically validate the model. The results found that fit and viability are significant determinants of CERP adoption in Egyptian SMEs. Observability, compatibility, top management support, technological readiness, and competitive pressure significantly impact CERP adoption through the mediation effects of fit and viability. These findings revealed new insights regarding CERP adoption in a developing country. Integrating FVM into the DOI/TOE is a novel approach that contributes to the existing body of knowledge. This model provides a comprehensive view that can help executives, academics, and service providers to better understand the determinants of CERP adoption, and in turn, accelerate the adoption rate.

1. INTRODUCTION

Information technology (IT) deployment is associated with several benefits. Factors like increased globalization, rapidly changing customer demands, dynamic business climate, and continuous technological advancements have reinforced the need for IT adoption (Jayeola, Sidek, Rahman, Bali Mahomed, & Jimin, 2020; Øverdal, Haddara, & Langseth, 2023). To streamline their business processes many organizations have replaced their legacy systems with enterprise systems, such as Enterprise Resource Planning (ERP). The integration ideology of ERP promotes efficient, productive, and profitable planning and management of resources resulting in reduced costs, improved efficiency, better communication, and enhanced quality of products or services (Haddara, Gøthesen, & Langseth, 2021). While initially designed for large enterprises, the extensive benefits of ERP have gained the attention of an increasing number of small and medium enterprises (SMEs) (AL-Shboul, 2019; Alsharari, Al-Shboul, & Alteneiji, 2020; Azhar, 2022). Many SMEs have begun to consider ERP implementation to improve organizational performance and survive the intense market competition (Abdelghaffar & Abdel Azim, 2010; Haddara & Elragal, 2013). However, the average cost of implementing an ERP system for medium-sized organizations can range between 150,000 to 750,000 US dollars. Additionally, organizations often surpass their initial ERP budgets by almost 18%. ERP implementation is a complex and risky project that requires a substantial amount of capital, highly

skilled IT personnel, well-maintained IT infrastructure, and a high degree of business process re-engineering. Besides, it often takes longer than scheduled (Haddara, Fagerstrøm, & Mæland, 2015).

SMEs are rather characterized by limited financial resources, lack of suitable IT infrastructure, limited IS knowledge, and lack of IT skills and competencies, which make ERP adoption a difficult and critical endeavor for them (Haddara & Elragal, 2013; Schniederjans & Yadav, 2013). Nevertheless, the advance of cloud computing (CC) technology enabled the development of alternative approaches for ERP systems that suit SMEs' characteristics and needs (Al-Ghofaili & Al-Mashari, 2014). At present, the ERP system is provided through the Software-as-a Service (SaaS) model. The so-called Cloud ERP (CERP) has become one of the famous phenomena in the business environment and among researchers alike (Bhatti, 2017; Burchin, Darwish, & Erkayman, 2017; Salum & Rozan, 2017). Using this model, the ERP system is owned, hosted, and managed by a service provider to be utilized by the organization through the internet. Based on the pay-per-use model, organizations pay for the needed modules only, costs are paid as subscriptions on yearly basis and calculated according to the number of users (Loukis, Janssen, & Mintchev, 2019; SØrheller, HØvik, Hustad, & Vassilakopoulou, 2018). Hence, CERP is characterized by higher scalability, flexibility, and reliability, cost and time savings, and ease of maintenance and updates. All of which make it an appropriate solution for SMEs. The latter can now seize the benefits of an ERP while saving the extreme costs that traditional ERP systems impose (Øverdal et al., 2023).

In the last few years, CERP market has been accelerating. It is projected that CERP market will be worth 101.1 billion US dollars by the year 2025 and expected to grow at a CAGR of 11.9% during the period 2020 to 2027. Oracle and Panorama ERP Consulting reports for the year 2023 revealed that almost 53% of organizations are choosing CERP. This evolution is due to organizations; especially SMEs, had begun to realize the numerous benefits offered by CERP (AlBar & Hoque, 2019; Lutfi, 2021). Additionally, the global crises caused by COVID-19 pandemic raised the need for increased remote work possibilities which further accelerated the adoption of various cloud-based services and digital infrastructures worldwide (Ahn & Ahn, 2021). However, developed countries mostly contribute to the higher rates of CERP adoption (Øverdal et al., 2023; Qutaishat, Abushakra, Anaya, & Al-Omari, 2023). Recent studies have emphasized the need for a deeper understanding of CERP in SMEs, especially in Middle Eastern developing countries like Egypt, where adoption rates lag despite potential benefits (AL-Shboul, 2019; AlBar & Hoque, 2019; Lutfi, 2021; Razzaq et al., 2021; Razzaq, Asmai, Talib, Ibrahim, & Mohammed, 2020; Zamzeer, 2019). Prior scholars called for more research comprising primary data collection in different country contexts to enhance the understanding and expertise in the CERP field and accelerate the adoption rate in the developing world (Al Hadwer, Tavana, Gillis, & Rezania, 2021; Haddara et al., 2021). Therefore, the present study helps to enrich the existing knowledge by examining the determinants of CERP adoption in Egypt. This study thus answers the following research question; **"What are the factors influencing CERP adoption in Egyptian SMEs?"**

To our best knowledge, there hardly exist any studies examining CERP adoption in Egyptian context. Therefore, a preliminary qualitative investigation was conducted through semi-structured interviews prior to the main quantitative study to grasp an insight of this understudied phenomenon in Egypt. Through mapping the preliminary qualitative results to those revealed by prior studies, the most relevant factors were identified. Accordingly, a conceptual model was proposed based on the theoretical foundation of diffusion of innovation (DOI), technology organization environment (TOE), and fit viability model (FVM). Following, a quantitative study was conducted through online surveys on a larger sample of Egyptian SMEs to empirically evaluate the conceptual model hypothesized. Finally, the significant factors that influence CERP adoption in Egyptian SMEs were identified.

The remainder of this paper is organized as follows: Section 2 presents the related literature focusing on SMEs and CERP in developing countries. Section 3 describes the research design starting by the qualitative study design and findings, their relevance to previous studies, the theoretical foundation upon which the conceptual model was developed and the hypotheses, and finally the quantitative study design. Section 4 presents the results and interpretation of the analyzed data and the implications of the study. Section 5 presents the conclusion drawn from the study. Lastly, section 6 presents the limitations and future research work.

1. RELATED LITERATURE

1.1 SMEs and ERP

The importance of SMEs as major drivers of economic development has been recognized worldwide. Particularly in developing economies, SMEs are considered the engine of economic growth due to their significant contribution to the gross domestic product (GDP) and lower unemployment rates (Elnaggar & Elsayed, 2023; Jayeola, Sidek, Rahman, Mahomed, & Hu, 2022). As stated by the Central Bank of Egypt, SMEs constitutes 98% of Egypt's private sector and contributes to 75% of the total employment. In addition to providing job opportunities, SMEs cover a wide spectrum of industries and hence provide the lower and middle-income population with low-priced consumption goods and services (Elghany, 2015). Hence, SMEs are significantly important in Egypt's socioeconomic development, which makes their survival and growth crucial to the welfare of the whole economy (Hustad, Olsen, Jørgensen, & Sørheller, 2019). In that regard, improving SMEs' performance and maintaining their resilience have become increasingly important. Unfortunately, Egyptian SMEs often face impediments to growth, especially in the current unfavorable business environments (Metawa, Elhoseny, & Mutawea, 2021). To successfully survive, SMEs must adopt innovations that help them to attain a strong competitive advantage. IT is becoming a vital business strategy that improves SMEs' performance (Elnaggar & Elsayed, 2023).

Among the most well-known IT solutions that enhance the overall performance of organizations is the ERP system. ERP has been considered a strategic tool by which organizations improve their performance and business effectiveness which led to grabbing SMEs' attention towards its adoption (AL-Shboul, 2019; Azhar, 2022; Haddara & Elragal, 2013; Razzaq et al., 2020). However, ERP adoption is deemed challenging and, in most cases, unaffordable for SMEs, particularly in developing countries (Abdelghaffar & Abdel Azim, 2010; AL-Shboul, 2019; Razzaq et al., 2020; Salum & Rozan, 2017). That is because an ERP project is capital and human intensive. A successful ERP implementation requires the involvement of IT and business personnel in the adopting organization as well as external consultants. In addition to the high upfront costs, ERP implementation also involves additional costs which lead to exceeded budgets and time (A. Elragal & M. Al-Serafi, 2011; Chauhan & Jaiswal, 2015; Haddara & Päivärinta, 2011; Haji Salum & Abd Rozan, 2016). Hence, ERP implementation usually qualifies very complex projects that require long-term commitment from organizations to maintain continuous efficiency (Felderer & Piazolo, 2016; G. Mohammed & Burhanuddin, 2018). Consequently, almost 50% of ERP projects fail on their first trial. It is also the reason that traditional ERP systems are most adopted by large enterprises (S. Gupta, Misra, Singh, Kumar, & Kumar, 2017; Yasiukovich & Haddara, 2020).Therefore, ERP vendors utilized the CC technology to provide SMEs with ERP solutions tailored to their limitations (Razzaq et al., 2020).

1.2 What Makes CERP Viable for SMEs?

Through the SaaS model of CC, the ERP application is accessed virtually by the organization on "as-needed" basis (Seethamraju, 2015; Yasiukovich & Haddara, 2020). Given that SMEs are handicapped with limited finances, skilled manpower and IT expertise, CERP turns out to be the convenient solution by allowing SMEs to exploit the benefits and privileges of an ERP system at lower costs and easier implementation. CERP helps SMEs to integrate their business processes and functions leading to more efficient and reliable operations (Jayeola, Sidek, Abd Rahman, Mahomed, & Jimin, 2022; Kumar, Samalia, & Verma, 2017). CERP have recently received increasing attention due to their evident financial and functional benefits. The most advantageous feature of CERP lies in its high flexibility, which comes in four means (Chang, 2020):

- Economic flexibility; due to the different pricing options available depending on the chosen bandwidth and storage (Jain & Sharma, 2017).

- Process flexibility: due to the easier scaling of the functionalities and resources utilized in the system.

- Performance flexibility: the system can be accessed 24/7 from any location (Chen, Liang, & Hsu, 2015).

- Market flexibility: through helping organizations to perform better than their competitors (Azhar, 2022; Øverdal et al., 2023).

Moreover, it is estimated that implementing CERP takes 50% to 70% less time and 15% less cost (Lutfi, 2021). In addition, when adopting CERP, the service provider is held responsible for backups, disaster recovery, and system maintenance. This is considered a superior benefit for SMEs as they often lack IT skills and expertise in-house (Abd Elmonem, Nasr, & Geith, 2016; Alsharari, 2020). Furthermore, SMEs will be able to focus their capacities and resources on their core activities rather than focusing on the technical aspects to run the system which in turn leads to better productivity (Haji Salum & Abd Rozan, 2016; Scholtz & Atukwase, 2016; Zadeh, Akinyemi, Jeyaraj, & Zolbanin, 2018). The limited availability of resources, time, and capital, make SMEs better candidates for adopting CERP as compared to larger enterprises (Jayeola, Sidek, Rahman, et al., 2022). Therefore, CERP is more viable and significantly beneficial for SMEs (Abdelmoniem, 2016; S. Gupta, Misra, Kock, & Roubaud, 2018; Koç, Ekren, Oberer, & Erkollar, 2019; Yasiukovich & Haddara, 2020; Zadeh et al., 2018).

1.3 CERP Adoption in Developing Countries

Adopting CERP can enable SMEs in developing economies to catch up technologically with their counterparts in developed ones (Mpanga & Elbanna, 2019). There exists an increasing attention towards the flexibility of CERP in streamlining business processes for organizations, and it has been accepted by its intended organizational users in different countries (Cheng, 2019). However, the adoption rate in developing countries is yet below expectations (Awan et al., 2021; Koç et al., 2019; Lutfi, 2021; Razzaq et al., 2021; Zamzeer, 2019). Several studies highlighted the fact that CERP is still infancy and less dominant than other cloud-based enterprise systems (Burchin et al., 2017; Demi & Haddara, 2018; Qutaishat et al., 2023; Valdebenito & Quelopana, 2019). Many SMEs are hesitant towards CERP adoption. Plus, the lack of adequate and comprehensive information and knowledge about CERP in developing economies leads to misconceptions that hold back its adoption in SMEs (Alsharari, 2020; Loukis et al., 2019). The lower adoption rates are more realized in Africa and Middle East where CERP is not yet fully embraced by SMEs (AL-Shboul, 2019; AlBar & Hoque, 2019; Alsharari et al., 2020; Hasheela Miss, Smolander Professor, & Mufeti Dr, 2016; Qutaishat et al., 2023; Scholtz & Atukwase, 2016; Usman, Ahmad, & Zakaria, 2019; Zamzeer, 2019). To date, only a few studies have provided a holistic assessment of the factors affecting CERP adoption in developing countries context (Ahn & Ahn, 2021; AL-Shboul, 2019; Awan et al., 2021; V. Gupta & Bhatia, 2017; Haji Salum & Abd Rozan, 2016; Salum & Rozan, 2017; Seethamraju, 2015; Valdebenito & Quelopana, 2019; Zhong & Rohde, 2014). Most of those studies are conducted in Europe, followed by Asia, with minimal studies in Africa (AL-Shboul, 2019; Hasheela et al., 2016; Qutaishat et al., 2023; Scholtz & Atukwase, 2016; Usman, Ahmad, & Zakaria, 2016; Zamzeer, 2019). None of the existing studies had examined the determinants of CERP adoption in context of Egyptian SMEs. This study therefore fills the identified gap by providing a comprehensive investigation of the factors that influence CERP adoption in Egyptian SMEs. A thorough literature review was conducted to explore related work on empirical investigation of CERP adoption in SMEs in developing countries. This resulted in identifying the common significant factors as shown in Table 1.

Table 1. Factors Influencing CERP Adoption Reported from Prior Studies in Developing Countries

Reference Study	Technological						Organizational				Environmental			
	Relative	Complexity	Compatibility	Trialability	Observability	IT readiness	Top management support	Firm size	Organizational readiness/system	CERP Knowledge	Competitive pressure	Regulatory support	Vendor support	Vendor reputation
(Seethamraju, 2015)	√					√			√				√	√
(Qian, Baharudin, & Kanaan-Jebna, 2016)							√							

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15
(Hasheela et al., 2016)					√				√						
(Bhatti, 2017)	√				√	√	√			√					
(Usman et al., 2019)			√			√	√			√					
(Zamzeer, 2019)						√								√	
(AlBar & Hoque, 2019)	√	√			√	√	√			√	√				
(AL-Shboul, 2019)			√		√	√	√	√		√					
(Ahn & Ahn, 2021)	√			√				√			√				
(Lutfi, 2021)		√		√	√	√									√
(Awan et al., 2021)									√	√		√			
(Qutaishat et al., 2023)		√		√	√	√									

1.4 Theoretical Foundations

Table 1 implies that recent studies have examined CERP adoption at the organizational level as it is considered a strategic decision. Among the most widely used theories for technology adoption at the organizational level are diffusion of innovation (DOI) and technology organization environment framework (TOE).

Diffusion of Innovation (DOI)

Developed by Rogers, (1995), the DOI theory holds that five characteristics namely, relative advantage, compatibility, complexity, trialability, and observability, can influence innovations' adoption in organizations (Ahn & Ahn, 2021; Qutaishat et al., 2023). Relative advantage is regarded as how much an innovation is thought to be superior to the solution it supersedes. Compatibility measures the extent to which the innovation fits the organization's existing values, needs, and current practices. Complexity refers to the level of difficulty encountered in utilizing innovations. Observability refers to the degree to which the innovation's adoption results are noticeable to others. Trialability is regarded as the degree to which an innovation may be experimented on a small scale prior to adoption. Several empirical studies have confirmed the prediction of DOI in CC and CERP adoption research (AlBar & Hoque, 2019; Alsharo, 2017; Das & Dayal, 2016; Oliveira, Thomas, & Espadanal, 2014; Usman et al., 2019; Vidhyalakshmi & Kumar, 2016).

Technology Organization Environment (TOE)

Tornatzky and Fleischer, (1990) developed the TOE framework claiming that organizations' decision to adopt an innovation is driven by technological, organizational, and environmental aspects. The technological context refers to equipment, infrastructure, practices, or IT personnel available in the organization. The organizational context refers to the characteristics of the organization and its resources. The environmental context comprises influences external to the organization's border like, competitors, business partners, suppliers, and governments. The comprehensiveness of the TOE framework contributed to its widespread and effectiveness in studying organizations' IT adoption. Existing studies on CERP adoption have utilized the TOE framework differently as it provides a taxonomy upon which researchers can select different factors relevant to the context of their studies (Burchin et al., 2017; Matias & Hernandez, 2019; Qian et al., 2016; Razzaq et al., 2021; Salum & Rozan, 2017; Valdebenito & Quelopana, 2019; Zamzeer, 2019).

Combining DOI and TOE

The technological aspects of TOE intersect with the innovation characteristics proposed by DOI while TOE compensates for the lack of environmental context in the DOI. Thus, TOE and DOI do meaningfully supplement each other resulting in a more robust framework (Hsu & Lin, 2016; Matias & Hernandez, 2019; Oliveira et al., 2014; Razzaq et al., 2021; Tongsuksai, Mathrani, & Taskin, 2020).

Several studies justified the integration of DOI and TOE in explaining the factors influencing CERP adoption (Ahn & Ahn, 2021; AL-Shboul, 2019; AlBar & Hoque, 2019; Qutaishat et al., 2023; Usman et al., 2019).

Fit Viability Model (FVM)

Founded from the task-technology fit (TTF), the fit dimension was modified in the FVM to be more objective in evaluating the match between the organization's task requirements and the innovation's technological characteristics, while considering individual factors to be part of the organizational viability (Liang, Huang, Yeh, & Lin, 2007). Viability comprises the organizational and environmental factors that impact the organizational readiness to adopt a certain innovation (Muhammad & Wickramasinghe, 2020). In the CC research domain, Mohammed, Ibrahim, Nilashi, & Alzurqa, (2017) integrated DOI and FVM to investigate the factors influencing the adoption of CC in implementing e-government in Yemen. Another study in South Korea aimed to identify the success factors of CC adoption through FVM (Yoo & Kim, 2019). Qasem et al., (2021) integrated TOE, DOI, FVM, and institutional theory to study the factors affecting CC adoption in higher educational institutions. Given that the FVM is generic, its constructs may also be tailored to the nature of CERP. According to researchers and practitioners, the FVM can be useful in helping organizations and IS vendors to plan for successful adoption. If the fit of the innovation is good but the viability is low, the organization shall find out what is required to increase its readiness for adoption, while an innovation that does not fit the organization's tasks or requirements would not be likely adopted. In that case, it is the vendors' role to try to tailor their systems to the organization's needs (Salum & Rozan, 2017; Turban, Bolloju, & Liang, 2011).

2. RESEARCH DESIGN

The present study applied the exploratory sequential mixed method approach which has been increasingly exploited in business research when patterns of the investigated phenomenon need to be revealed prior to developing the research model and formulating hypotheses. Besides, utilizing the mixed method approach in the IS field enables the researcher to provide stronger inferences than a single method (Creswell, 2014; Sekaran & Bougie, 2016). As previously mentioned, inferences from prior studies are insufficient to identify the factors causing the lower rates of CERP adoption in the developing world. Therefore, the current research was carried out in two phases, where both exploratory and descriptive research approaches were utilized. In the first phase, the exploratory research approach was adopted where qualitative data was collected to clarify the research problem, unfold information about SMEs' perceptions regarding CERP adoption, and identify specific factors in the Egyptian context. These qualitative findings were mapped to those found by prior studies. The relevant factors together with new factors discovered shaped the conceptual model hypothesized for this research. The second phase employed the quantitative approach to empirically validate the research model. The survey method was utilized to collect empirical data from a larger sample of Egyptian SMEs which was further statistically analyzed to evaluate the significance of the hypothesized factors. Phase1 is discussed below in more detail while phase 2 is discussed later after presenting the research model.

2.1 Phase 1: The Preliminary Qualitative Study

The interpretive approach was utilized in the preliminary phase of the present research to grasp an initial view of the factors that might be affecting CERP adoption in Egyptian SMEs. Using semi-structured interviews, data was collected from a sample of Egyptian SMEs. Interviews help in capturing a rich image of the participants' views and perceptions based on their understanding and using their own words, which results in highlighting significant factors concerning the topic (Yin, 2013). The interview questions were adapted from similar studies (Alshamaila, Papagiannidis, & Li, 2013; Das & Dayal, 2016; Zamzeer, 2019) and adjusted according to the aim of the study. Besides, the semi-structured approach enables participants to add more opinions to understand their perceptions and intentions towards CERP adoption.

Sampling and Unit of Analysis

The interviews were conducted with SMEs' CEOs and/or managers. The convenience sampling technique was utilized where information was collected from participants who were conveniently

available and willing to participate. The sample was picked from a list of SMEs available online while others were peer-introduced. Participating companies were chosen from various industries to be able to gather substantive insights about the research phenomenon. This resulted in a richer data set that better served as the basis upon which the study was built. A total of 23 interviews were conducted. This sample size was determined according to the point of saturation, when no more new information was realized from the interviews.

RESULTS AND ANALYSIS

All interviews were digitally recorded under the participants' permission in addition to written field notes to ensure the validity of the interviews' analysis. Writing field notes is important in capturing the researcher's thoughts and interpretations while the recordings help to fill the missing points and check the field notes against the actual responses to avoid the researcher's bias and ensure that interviewees' responses are adequately represented (Halcomb & Davidson, 2006). Further, both were used to transcribe each interview separately. Content analysis was manually conducted to depict the common themes and perceptions and identify similar terms. Next, beliefs and perceptions that map similar concepts were clustered together, followed by clustering the concepts that map similar constructs. The analysis process not only involved the mapping of codes relevant to existing studies, but also the coding of new concepts discovered. Finally, the analyzed data was used in drawing the researcher's conclusion about the current state of CERP adoption in Egyptian SMEs and the perceived influential factors.

Like other studies' views, false perceptions towards CERP still exist among Egyptian SMEs. Most importantly, out of 23 organizations, only 3 have implemented CERP. Hence, this qualitative investigation reinforced the research problem as it highlighted the low rate of CERP adoption among Egyptian SMEs. Furthermore, different factors were identified, some of which contradict prior studies, some are similar, and others are newly discovered. The common themes identified were IT infrastructure, compatibility, lack of successful adoption cases, unobserved results of adoption among competitors, lack of efforts from service providers, the capabilities and functionalities of service providers, the internet reliability, the availability of sufficient IT skills, and the enthusiasm of owners and top managers. On the other hand, factors like relative advantage, security concerns, complexity, and governmental support seemed to be uninfluential. In addition, most participants raised their concerns regarding the applicability of CERP to their business operations. As one mentioned "despite CERP benefits, I'm not sure if it is applicable to our operations". Another one mentioned "even if CERP is lower in terms of costs, I would pay more for another system that better fits my business". Similar thoughts were repeatedly mentioned implying that the fit of CERP to the organization's business operations seems to influence CERP adoption. Other participants questioned if CERP system can be a viable solution at their current state. They are not sure if they can realize added value from CERP. As one mentioned "maybe when we get bigger in scope, we can be ready to adopt CERP". Another one mentioned "I'm not sure if lower costs are enough to gain the needed benefits and to add value to our company". Others are indecisive if they are ready to adopt it successfully. Organizational readiness, in terms of technological capabilities, enthusiasm and support form top managers, and the economic feasibility of adopting the system in their current circumstances, seemed to be another factor influencing CERP adoption among Egyptian SMEs. That said, fit and viability of CERP appeared to be important factors that seemed ignored by prior studies. The next section links the preliminary study results to prior studies' findings.

2.2 Relevance of Preliminary Study Results to Prior Studies

Studies have shown evident differences in the factors influencing CERP adoption across different country contexts. Contrasting findings can be justified in terms of cultural differences between a developed and a developing country (Al Hadwer et al., 2021; Yasiukovich & Haddara, 2020). As more research is focused on developed countries, more studies in developing countries are critically needed to address the contextual and social idiosyncratic differences between the two contexts (Senyo, Addae, & Boateng, 2018). Nonetheless, as shown in Table 1, even though some countries may share several commonalities, country-specific differences are still apparent. Hence, the influential factors identified by existing studies in other developing countries cannot be directly applied to Egypt. Particularly, in CERP adoption research, there are shortcomings related to the geographical distribution of studies. This enforced the importance of conducting the qualitative preliminary study

described above. The interpretation of prior studies, in addition to the preliminary qualitative findings, helped to construct the conceptual model that best describes CERP adoption in Egyptian context. Table 2 illustrates the mapping of the qualitative findings to empirical findings reported in other developing countries to identify the most relevant factors.

Table 2 Mapping explored factors to related literature

Factor	Hypothesized (√) /Not hypothesized (X)	Preliminary Study	Supporting Studies
Relative Advantage	X	Do not seem to be influencing adoption as the majority already know about the benefits of CERP yet did not drive them to adoption. Benefits were more significant for those who already adopted CERP. There are other factors that deemed more important for MSMEs than the benefits of CERP.	- RA does not seem a key factor to influence cloud adoption in several countries (Al Hadwer et al., 2021) - RA found uninfluential among non-adopters (Usman et al., 2019) - RA has insignificant effect (AL-Shboul, 2019; Qutaishat et al., 2023) - RA have only moderate effect on SMEs decision to adopt CERP but the least important factor (Zamzeer, 2019) - RA does not significantly impact CC adoption (Matias & Hernandez, 2019; Skafi, Yunis, & Zekri, 2020)
Compatibility	√	SMEs are more concerned with how compatible CERP would be with their business operations and processes regardless of its benefits and lower cost.	- Compatibility is the most significant factor affecting the adoption of SaaS applications, more than RA and complexity (Yang, Sun, Zhang, & Wang, 2015) - RA is not important if CERP is not compatible with the firm's operation (Usman et al., 2019) - Compatibility significantly impacts CERP adoption (AL-Shboul, 2019; Hasheela et al., 2016) - Compatibility has the most important influence on SMEs' decision to adopt CC (Nguyen & Liaw, 2022)
Complexity	X	The majority are not concerned with complexity of the system. They believe cloud applications are easier to use	- Complexity has insignificant effect on CERP adoption (Ahn & Ahn, 2021; AL-Shboul, 2019; Bhatti, 2017; Zamzeer, 2019) - All DOI factors are accepted except Complexity (Mohammed et al., 2017)

Observability	√	Participants declared they usually use applications that appear to be useful in other organizations.	- Observability has the most influence on adopting cloud services (Hsu & Lin, 2016) - Observability had a positive significant impact on intention to adopt CERP (Qutaishat et al., 2023) - Those who are hesitant are aware of potential benefits but waiting for successful stories from others (Alsharo, 2017) - Low rate of CERP adoption in SMEs in developing countries is due to lack of successful stories (Qian et al., 2016; Razzaq et al., 2020)
Technological Readiness	√	The majority stated that a stable IT infrastructure and reliable internet connection are very important to adopt CERP. Some participants mentioned the importance of IT skills	- Poor internet connectivity affects CERP adoption (Hasheela et al., 2016) - TR has significant influence on CERP adoption (AL-Shboul, 2019; AlBar & Hoque, 2019; Bhatti, 2017; Seethamraju, 2015) - Employees' IT skills have significant impact on SMEs' intention to adopt CERP (Qutaishat et al., 2023) - TR has the most important influence on SMEs' decision to adopt cloud technologies (Nguyen & Liaw, 2022)
Security Concerns	X	Other factors seemed way more important. Some participants did not even mention any security-related issues. The majority mentioned that choosing a reputable and well-known service provider will eliminate any security worries. They would ensure that their data is kept safe and managed in a more professional way than in-house.	- It is more reliable and safer for SMEs to have their data stored at the SP (Seethamraju, 2015) - Security concerns of CERP are less relevant to SMEs (Duan, Faker, Fesak, & Stuart, 2013; Haddara et al., 2021) - Security concerns do not affect the successful implementation of CERP (S. Gupta et al., 2018; V. Gupta & Bhatia, 2017) - Security issues are not encountered when adopting CERP in SMEs if the service provider has high technical capabilities (Alsharari, 2020; Koç et al., 2019) - Security concerns have no significant effect on CERP adoption in SMEs (Ahn & Ahn, 2021; AL-Shboul, 2019; Qian

			et al., 2016; Usman et al., 2019) - Security concerns deemed insignificant in affecting adoption of cloud technologies in several countries (Al Hadwer et al., 2021; Haddara et al., 2015)
Top Management Support	√	TMS seems a strong factor that would lead to CERP adoption as shown by all participants.	- The greater percentage of reviewed studies reported a significant influence of TMS on CERP adoption. - TMS has the highest impact on CERP and CC adoption in SMEs (Nguyen & Liaw, 2022; Qutaishat et al., 2023)
Service Provider Support	√	The majority declared that service provider selection is critical and that the support provided; in terms of training, immediate response, quality of service, etc. would strongly affect their decision to adopt. Majority mentioned that they cannot see any efforts from service providers.	- Vendor support is one of the most influential factors of CERP adoption (Salum & Rozan, 2017; Seethamraju, 2015; Zamzeer, 2019) - The ability of the cloud vendor to provide support whenever needed is one of the main factors considered by SMEs when deciding whether to adopt or reject a CERP system (Haji Salum & Abd Rozan, 2016) - SP support strongly influence SMEs' decision to adopt CERP (Alsharari, 2020) - Successful CERP adoption depends on the vendor support (Chen et al., 2015)
Regulatory Environment	X	Some declared that Egyptian government is not supporting cloud. Many did not mention any concerns regarding the government support	- Government support significantly rejected (AL-Shboul, 2019; Chang, 2020; Hsu & Lin, 2016; Qutaishat et al., 2023; Senyo, Effah, & Addae, 2016; Usman et al., 2019) - Technology is developing at a rate that surpasses legislation, and thus companies do not consider the importance of governmental support in their decision to adopt. And CC has not yet gained enough consideration from policy makers in developing countries' governments (Senyo et al., 2016)

Competitive Pressure	√	It seems from participants that SMEs in the same industry are concerned with how competitors are using systems and applications that enhance their competitiveness. Organizations operating in the same industry are utilizing similar applications.	- CP has significant impact on CERP adoption (AL-Shboul, 2019; AlBar & Hoque, 2019; Bhatti, 2017; Sandu & Gide, 2018; Usman et al., 2019) - CP has stronger effect on CERP adoption more than partner pressure, especially for SMEs (Yang et al., 2015)

2.3 Proposed Conceptual Model (DOI/TOE FVM) and Developed Hypoteses

This study incorporated DOI and TOE where the constructs were identified based on the mapping results as shown in Table 2. Furthermore, prior researchers claimed that although good innovation characteristics lead to more adoption and diffusion of a technology, some technologies are known to be exceptionally good, yet not adopted. This claim was similarly indicated from the qualitative investigation which found that despite the CERP benefits and its known effectiveness, the majority are yet hesitant towards adoption. The findings revealed that CERP adoption seemed to depend more on its applicability to their organizations and the latter's readiness. As deemed by these observations, the fit and viability of CERP must have been considered. While prior studies had examined the direct effect of DOI/TOE constructs on CERP adoption, this study revealed that they can have an indirect effect on adoption through the fit and viability of CERP. Accordingly, it was rational to incorporate the FVM into the DOI/TOE framework to provide a comprehensive understanding of the factors influencing CERP adoption in Egyptian SMEs. Figure 1 illustrates the integrated conceptual model proposed for the study.
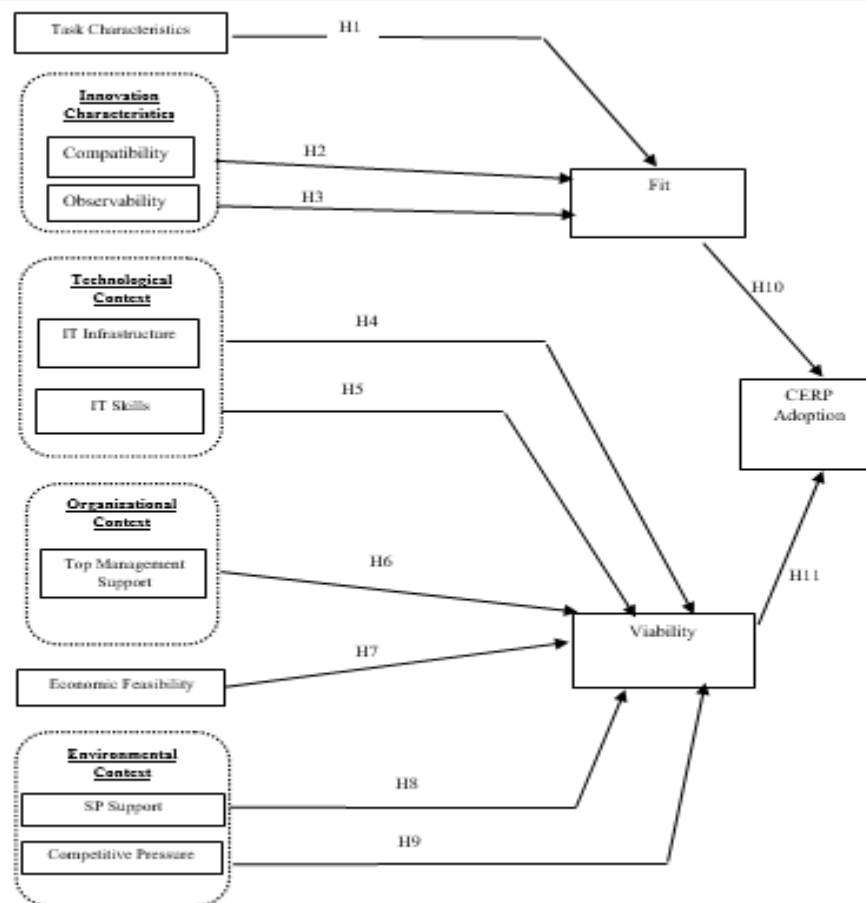
Figure 1 Conceptual Model

Factors Measuring Fit Dimension

Task Characteristics (TC)

Task characteristics constitute the task requirements and the nature of the tasks performed in the organization (Liang et al., 2007; Mohammed et al., 2017). In this study, the task characteristics refer to the different tasks performed within the organization's operations, the degree of tasks' agility, and the computing needs required to perform the tasks. Besides, as this study is focused on CERP, the level of integration between different tasks among departments, and the dependency of tasks on one another are also considered among the task characteristics that might determine whether CERP fits the organization or not. Several participants in the preliminary study highlighted their concern if CERP is applicable to perform their operational tasks. Therefore, this study proposes the following hypothesis:

H1: Task characteristics positively influence the fit of CERP to SMEs

Compatibility (COMP)

A technology is more likely to be adopted if it is compatible with the organization's current systems or applications, practices, and needs (Rogers, 2003). Yang et al., (2015) findings revealed that compatibility is the most significant factor that influence SaaS adoption, showing higher significant impact than relative advantage and complexity. Their results indicated that potential adopters are more concerned with the transition phase; how smooth it can be, and how the SaaS solution can perfectly handle their business processes. Further, Hasheela et al., (2016) found compatibility on top of the factors leading to reluctance of Namibian SMEs to adopt CERP. Besides, AL-Shboul, (2019) and Usman et al., (2019) found empirical evidence that compatibility is the only significant factor among other DOI factors influencing CERP adoption in developing countries. The qualitative findings drawn from the preliminary study are in line with prior studies reporting that compatibility affects SMEs' decision to adopt CERP. Therefore, this study proposes the following hypothesis:

H2: Compatibility positively influences the fit of CERP to SMEs.

Observability (OBS)

The extent to which successful adoption cases are visible and communicated to others possibly affects IT adoption rates positively (Lin & Chen, 2012). Many studies argued that the lack of successful adoption stories is one of the main reasons behind the lower rate of CERP adoption in developing countries (Alsharo, 2017; Awan et al., 2021; Qian et al., 2016; Razzaq et al., 2021, 2020). According to Burchin et al., (2017), observing successful stories of early adopters fosters prospective adopters' decision to adopt CERP. This view was clearly indicated by participants in the qualitative study where most of them clearly stated "we don't see other companies in the same industry using CERP". Several empirical studies found positive significant impact for observability on SMEs' adoption decision (AlBar & Hoque, 2019; Das & Dayal, 2016; Hsu & Lin, 2016; Qutaishat et al., 2023). Therefore, this study proposes the following hypothesis:

> H3: Observability positively influences the fit of CERP to SMEs.

Factors Measuring Viability Dimension

Technological Readiness (TR, ITS)

Technology adoption in organizations has often necessitated a well-structured IT infrastructure and IT-skilled staff. While CC technology has made it easier to adopt complex systems like ERP, it is still debatable that technological readiness is important for CERP adoption. A study conducted in UAE found that organizations that can develop good internet infrastructure, implement mobile technology, and ensure the compatibility of their current legacy systems to CERP are more likely to adopt it (Bhatti, 2017). Similarly, Koç et al., (2019) and Senyo et al., (2016) argued that reliable internet connection is necessary for the successful adoption of cloud-based services. Studies asserted that poor IT infrastructure and unreliable internet connections with low bandwidth impede CERP implementation in developing countries (Alsharo, 2017; Burchin et al., 2017; Hasheela et al., 2016). IT skills were also reported by few studies as a significant factor influencing CERP adoption in SMEs (AlBar & Hoque, 2019; Qutaishat et al., 2023). In the qualitative study, some participants highlighted that the state of IT infrastructure and the frequent power outages that used to occur in Egypt can hinder CERP adoption. Also, several participants seemed concerned about internet reliability when considering CERP deployment and others mentioned their need for IT skilled staff to use CERP. Overall, Nguyen & Liaw, (2022) concluded that technological readiness has the most important impact on SMEs' decision to adopt CC. In addition, several studies reported empirical evidence on the significant impact of technological readiness on CERP adoption in SMEs (AL-Shboul, 2019; AlBar & Hoque, 2019; Bhatti, 2017; Seethamraju, 2015; Usman et al., 2019). Therefore, this study proposes the following hypotheses:

> H4: IT infrastructure positively influences the viability of CERP to SMEs

> H5: IT skills positively influence the viability of CERP to SMEs

Top Management Support (TMS)

Top management support has been extensively evident by scholars as one of the most influential factors of IS adoption. The extent to which the CEO recognizes the benefits of cloud-based services and tends to exploit them, determines the likelihood of adopting these services in SMEs (Yang et al., 2015). Valdebenito & Quelopana, (2019) also proposed that sufficient support from the top management highly encourages CERP adoption in SMEs. The strong effect of TMS has been mostly undebatable. Based on systematic literature reviews, Al Hadwer et al., (2021) concluded that TMS has a greater impact than relative advantage on the adoption of cloud-based applications, and Nguyen & Liaw, (2022) reported that TMS is ranked the top organizational factor influencing CC adoption. Similarly, Qian et al., (2016) found that TMS is responsible for roughly 77.7% of CERP adoption in Malaysian SMEs. Likewise, using empirical evidence, AL-Shboul, (2019) and Qutaishat et al., (2023) discovered that TMS has the highest impact on CERP adoption in SMEs in developing countries. Moreover, TMS has been reported by many studies as a significant positive factor for embracing CERP by SMEs (Ahn & Ahn, 2021; AlBar & Hoque, 2019; Khayer, Talukder, Bao, & Hossain, 2020; Usman et al., 2019; Zamzeer, 2019). Not surprisingly, similar insights are drawn from the qualitative study. Therefore, this study proposes the following hypothesis:

> H6: Top Management Support positively influences the viability of CERP to SMEs

Economic Feasibility (EF)

Economic feasibility refers to the trade-off between the benefits achieved from an investment and the costs incurred. An IT solution that helps the organization to reduce costs while providing an acceptable Return on Investment is more likely to be more economically feasible (Liang et al., 2007; Mohammed et al., 2017; Yoo & Kim, 2019). Adopting CERP minimizes upfront, maintenance, and operational costs. Yet, findings from the qualitative study indicated that the lower cost of CERP is not enough to drive adoption. Participants mentioned that they might pay more for another system if it better fits their business and yields more benefits or higher ROI. Other participants argued that the operational costs of CERP might not be that effective in the long run. This issue has also been argued by prior studies as the uncertainty aspect of CC and its part of its EF (Alshamaila et al., 2013). However, Mohammed et al., (2017) found it statistically insignificant. Asset specificity is another important aspect that determines the EF of an IT solution. It refers to the hardware, software, training, or consultations that organizations might need to acquire for certain innovations adoption (Liang et al., 2007; Yoo & Kim, 2019). As CC eliminates the need for additional infrastructures and technical IT skills, asset specificity can increase the EF of CERP and hence make it a viable option for SMEs (Mohammed et al., 2017). This point was also emphasized by participants who stated that the lack of additional costs is an important factor that can encourage them to adopt CERP. Therefore, this study proposes the following hypothesis:

> H7: Economic feasibility positively influences the viability of CERP to MSMEs

Service Provider Support (SP_SUP)

Khayer et al., (2020) recommended that the continuous support provided by the SP is a critical motivator for SMEs to utilize cloud-based services. The importance of customer support was emphasized by Chen et al., (2015) and Johansson & Ruivo, (2013). Both studies argued that the service quality and support provided, and the customer experience are far more important than the features of the CERP system itself. Likewise, in the qualitative study, two CERP adopters outpointed the same issue where one of them stated "choosing the right SP is the key for successful adoption. I believe many of the failed adoptions were due to wrong choice of the SP, not because of the system". Besides, most participants emphasized the importance of SPs in encouraging them to adopt CERP. The same was reported by Haji Salum & Abd Rozan, (2016) which discovered that SP support was one of the main factors affecting Malaysian SMEs' decision whether to adopt or reject a CERP project. Furthermore, a Turkish qualitative study reported that SPs contribute into the low level of awareness about CERP systems. Due to SMEs' lack of technological skills and experience, they can only guarantee the benefits of CERP if they are clearly announced by the SPs (Koç et al., 2019). The same issue was raised by many participants in the preliminary study claiming that SPs are mostly to blame for the lack of awareness. They stated that the way in which SPs promote their CERP solutions would encourage them to adopt. In addition, several studies found that SP support positively influences CERP adoption in SMEs in developing countries context (Alsharari et al., 2020; Salum & Rozan, 2017; Seethamraju, 2015; Zamzeer, 2019). Therefore, this study proposes the following hypothesis:

> H8: Service provider support positively influences the viability of CERP to SMEs

Competitive Pressure (CP)

Competitive pressure has been extensively acknowledged by scholars as an important factor affecting IS adoption (Low, Chen, & Wu, 2011). Furthermore, CERP adoption serves as a strategic tool that enables SMEs to improve their operational efficiency, acquire greater market share, and process real-time data more accurately leading to enhanced market competitiveness. Accordingly, several studies recommended that CP is a significant factor influencing CERP adoption (AL-Shboul, 2019; Salum & Rozan, 2017; Valdebenito & Quelopana, 2019). Sandu & Gide, (2018) reported that CP was the only significant factor positively affecting the adoption of cloud-based services among Indian SMEs. Several empirical research have found a positive significant impact for CP on CERP adoption in developing countries (AlBar & Hoque, 2019; Bhatti, 2017; Haji Salum & Abd Rozan, 2016; Usman et al., 2019) A Korean study also found that CP was the most influential factor positively affecting the viability of organizations to successfully adopt CC (Yoo & Kim, 2019). The insights drawn from the qualitative study match the above-mentioned studies recommending that CP does affect CERP adoption. Several participants indicated that rivals tend to follow each other if an innovation appears

useful in their field. Many participants also highlighted that the ability of CERP to help them to attain a competitive advantage and drive a market expansion would be one of the most important reasons driving them to adopt CERP. Therefore, this study proposes the following hypothesis:

H9: Competitive pressure positively influences the viability of CERP to SMEs

The Mediating Effects of Fit and Viability

Mohammed et al., (2017) and Yoo & Kim, (2019) found empirical evidence that fit and viability have a positive significant mediating effect on CC adoption. In the current study, fit refers to the degree by which CERP characteristics are relevant to the task requirements in SMEs. Organizations must ensure that the functionalities of CERP support its business processes and aid their improvement (Salum & Rozan, 2017). Viability refers to the extent to which the organization, affected by its surrounding environment, is ready to adopt CERP, as well as the perceived degree of CERP added value. An Indian study revealed that the software fit to the business is among the main determinants affecting the adoption of CERP (Seethamraju, 2015). Similarly, CERP functional fit was found as one of the eight challenges affecting its adoption in Malaysian SMEs (Haji Salum & Abd Rozan, 2016). Moreover, Lutfi, (2021) argued that potential adopters often consider a logical evaluation of CERP attributes in terms of its appropriateness prior to embracing the system. Furthermore, in their review study, Øverdal et al., (2023) revealed that an increased functional fit and more appropriate alignment of CERP solutions can increase organizations' intentions towards adoption. Similarly, the qualitative findings indicated that most Egyptian SMEs are mainly concerned about the fit of CERP to their various operations and business requirements. Also, several participants are not sure whether CERP is a viable solution to their organizations. Prior studies utilizing FVM argued that an IS adoption is likely to fail if viability is low regardless of the system's high fit (Larosiliere & Carter, 2016; Turban et al., 2011). Besides, studies highlighted the importance of organizational readiness, in terms of technological, financial, and support from top management, in influencing CERP adoption (Tongsuksai, Mathrani, & Weerasinghe, 2023). Likewise, the qualitative investigation also implied that such factors affect SMEs' readiness towards CERP adoption. Accordingly, the present study proposes that fit and viability are essential factors influencing CERP adoption. In addition, certain DOI and TOE factors indirectly influence CERP adoption through the effects of fit and viability. Therefore, this study proposes the following hypotheses:

H10: The fit of CERP positively influences CERP adoption.

   H10a: Fit mediates the relationship between TC and CERP adoption.

   H10b: Fit mediates the relationship between COMP and CERP adoption.

   H10c: Fit mediates the relationship between OBS and CERP adoption.

H11: The viability of CERP positively influences CERP adoption.

   H11a: Viability mediates the relationship between IT infrastructure and CERP adoption.

   H11b: Viability mediates the relationship between IT skills and CERP adoption.

   H11c: Viability mediates the relationship between TMS and CERP adoption.

   H11d: Viability mediates the relationship between EF and CERP adoption.

   H11e: Viability mediates the relationship between SP support and CERP adoption.

   H11f: Viability mediates the relationship between CP and CERP adoption.

2.4 Phase 2: The Quantitative Study

Phase 2 involved the empirical examination of the proposed research model. Data was collected via an online questionnaire targeting SMEs' executives operating in different industries. Two weeks after the initial email, reminder emails and phone calls were sent to non-respondents.

Questionnaire Design

The questionnaire was divided into eight sections that included the measuring items for the 12 constructs of the research model. It was provided in English and Arabic versions to increase the response rate as Arabic is the native language in Egypt. To ensure the validity of the measuring

instrument, it was developed based on a thorough literature review where measurement items were adapted from previous empirical studies. An iterative process of items selection and refinement was also done to select the items that best suit the research context. The items selected have established adequate reliability and validity in prior studies (Ahn & Ahn, 2021; AlBar & Hoque, 2019; Chang & Hsu, 2019; Cheng, 2019; Gangwar, Date, & Ramaswamy, 2015; Hsu & Lin, 2016; Kim, Jang, & Yang, 2017; Liang et al., 2007; Mohammed et al., 2017; Oliveira et al., 2014; Oliveira, Martins, Sarker, Thomas, & Popovič, 2019; Yoo & Kim, 2019). Items for all predictors were measured using the common five-point Likert scale ranging from "strongly disagree" to "strongly agree". To ensure the content validity, the questionnaire was sent to academics and practitioners with expertise in the field. According to their feedback some questions were slightly modified for more clarity. It was also sent to 5 organizations, as suggested by Hair, Black, Babin, & Anderson, (2010) that are not included in the main sample to ensure the comprehension and clarity of the questions and to make sure it is not too lengthy. After their feedback no further modifications were made.

The Sample

As previously mentioned, the population of the present study constitutes all SMEs in Egypt. Therefore, the random sampling technique was employed as it holds that each element within the population has equal probability of being selected in the sample (Creswell, 2014; Sekaran & Bougie, 2016). The minimum sample size required was calculated using "G Power" as advised by Hair, Hult, Ringle, & Sarstedt, (2017). Using Cohen's recommended medium effect size of 0.15, the commonly accepted statistical power of 80%, and significance level (p value) of 0.05, with 11 predictors, the minimum sample size required was 123. Accordingly, 800 questionnaires were distributed taking into consideration the lower response rates of online surveys. A total of 236 usable responses were included in the analysis.

It is worth noting that although 60% of the respondents are utilizing CC generally, only 32% are adopting CERP, which indicates a lower level of adoption as has been found in the literature and the preliminary study. In addition, the greatest percent of the 76 CERP adopters operates in the IT industry. This is not surprising as normally in developing countries like Egypt, IT organizations have more IT literate and skilled personal and thus are the most aware of IT innovations like CERP.

RESULTS AND ANALYSIS

The statistical analysis was based on the partial least square-structural equation modelling (PLS-SEM) using SmartPLS 4 (Sarstedt, Ringle, & Hair, 2021).

Reliability and Validity

Reliability and validity ensure the goodness of the measuring instrument. Reliability was assessed using Cronbach's alpha and composite reliability. However, the true value of reliability "rhoa" lies between the too conservative value obtained by Cronbach's alpha and the too liberal value obtained by CR (Sarstedt et al., 2021). Factor loadings were used to measure the indicator reliability while the convergent validity was evaluated using the Average Variance Extracted (AVE). Table 3 presents Cronbach's alpha, CR, and AVE values. According to Hinton, (2004), values ranging from 0.5 to 0.7 are considered moderate reliability. Thus, the reliability of all constructs is confirmed. The factor loadings assessment required the dropping of 3 items that had low loadings and their removal improved AVE and CR. Other few items that had loadings less than 0.7 but greater than 0.4 were retained as their constructs' AVE met the threshold of 0.5 (Hair, Risher, Sarstedt, & Ringle, 2019). Thus, convergent validity is confirmed.

Table 3 Cronbach's alpha, CR, and AVE

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
CERP_ADOP	0.796	0.857	0.905	0.827
COMP	0.740	0.749	0.849	0.653
CP	0.596	0.638	0.777	0.543
EF	0.667	0.703	0.796	0.502
FIT	0.832	0.849	0.888	0.665

ITS	0.804	0.816	0.872	0.631
OBS	0.787	0.788	0.862	0.610
SP_SUP	0.676	0.756	0.800	0.581
TC	0.532	0.695	0.718	0.474
TMS	0.890	0.891	0.924	0.753
TR	0.690	0.704	0.808	0.514
VIAB	0.766	0.798	0.863	0.679

Discriminant validity was assessed using Fornell and Larcker Assessment and Heterotrait-Monotrait Ratio. Table 4 demonstrates that all constructs are discriminant as the square root value of each construct's AVE is greater than its correlations with all other constructs. Table 5 shows that HTMT ratios of correlations are all below the threshold value of 0.90 which also confirms the discriminant validity of all constructs.

Table 4 Fornell and Larcker

	CERP_ADOP	COMP	CP	EF	FIT	ITS	OBS	SP_SUP	TC	TMS	TR	VIAB
CERP_ADOP	0.909											
COMP	0.448	0.808										
CP	0.403	0.376	0.737									
EF	0.353	0.535	0.460	0.708								
FIT	0.503	0.466	0.576	0.458	0.816							
ITS	0.45	0.542	0.496	0.361	0.491	0.794						
OBS	0.406	0.528	0.552	0.488	0.463	0.427	0.781					
SP_SUP	0.078	0.232	0.357	0.37	0.302	0.322	0.351	0.762				
TC	0.239	0.333	0.214	0.263	0.277	0.221	0.257	0.114	0.688			
TMS	0.525	0.583	0.451	0.557	0.572	0.486	0.479	0.263	0.381	0.868		
TR	0.385	0.538	0.452	0.459	0.421	0.527	0.404	0.327	0.100	0.439	0.717	
VIAB	0.434	0.638	0.531	0.471	0.599	0.61	0.452	0.282	0.253	0.572	0.635	0.824

Table 5 HTMT Ratios

	CERP_ADOP	COMP	CP	EF	FIT	ITS	OBS	SP_SUP	TC	TMS	TR	VIAB
CERP_ADOP												
COMP	0.553											

CP	0.534	0.521									
EF	0.436	0.696	0.690								
FIT	0.597	0.577	0.760	0.610							
ITS	0.539	0.716	0.688	0.460	0.602						
OBS	0.506	0.682	0.743	0.633	0.569	0.541					
SP_SUP	0.15	0.274	0.586	0.55	0.401	0.417	0.481				
TC	0.304	0.486	0.398	0.484	0.331	0.349	0.359	0.212			
TMS	0.608	0.696	0.554	0.677	0.656	0.576	0.569	0.355	0.544		
TR	0.48	0.749	0.667	0.641	0.544	0.694	0.534	0.407	0.216	0.546	
VIAB	0.516	0.831	0.719	0.624	0.738	0.758	0.554	0.306	0.361	0.677	0.832

Hypotheses Significance

The bootstrap was applied using 5,000 samples to obtain the t values. The one-tailed hypotheses were evaluated at a significance level of 5% (Hair et al., 2017). Evaluating the structural model revealed that 8 hypotheses are accepted (H2, H3, H4, H5, H6, H9, H10, H11) and 3 are rejected (H1, H7, H8) as shown in Table 6.

Table 6 Hypotheses Significance

	Hypotheses	t value	p value	Result
H1	TC -> FIT	1.611	0.054	Rejected
H2	COMP -> FIT	3.770	0.000	Accepted
H3	OBS -> FIT	3.654	0.000	Accepted
H4	TR -> VIAB	4.569	0.000	Accepted
H5	ITS -> VIAB	4.197	0.000	Accepted
H6	TMS -> VIAB	3.509	0.000	Accepted
H7	EF-> VIAB	0.914	0.180	Rejected
H8	SP_SUP -> VIAB	0.701	0.242	Rejected
H9	CP -> VIAB	2.767	0.003	Accepted
H10	FIT-> CERP_ADOP	6.118	0.000	Accepted
H11	VIAB-> CERP_ADOP	3.335	0.000	Accepted

The mediating effects of fit and viability were also examined through bootstrapping to measure the indirect effects of the constructs. As shown from Table 7, 3 out of the 9 mediation hypotheses were found insignificant while the others were all significantly supported.

Table 7 Mediating Effects

Indirect Effect	t value	p value	Result
CP -> VIAB -> CERP_ADOP	2.085	0.019	Accepted
TC -> FIT -> CERP_ADOP	1.448	0.074	Rejected
COMP -> FIT -> CERP_ADOP	3.376	0.000	Accepted
SP_SUP -> VIAB -> CERP_ADOP	0.659	0.255	Rejected
OBS -> FIT -> CERP_ADOP	3.014	0.001	Accepted

ITS -> VIAB -> CERP_ADOP	2.533	0.006	Accepted
TMS -> VIAB -> CERP_ADOP	2.486	0.006	Accepted
EF -> VIAB -> CERP_ADOP	0.824	0.205	Rejected
TR -> VIAB -> CERP_ADOP	2.570	0.005	Accepted

3. DISCUSSION OF THE RESULTS

Several findings are consistent with prior studies. Compatibility was found to have a significant effect on the fit of CERP as well as a significant indirect effect on adoption. This is in line with the findings of Mohammed et al., (2017) which also found a significant positive impact for compatibility on the fit of CC to implement e-government services in Yemen. SMEs often have limited resources and time and hence they are not likely to adopt a technology that requires major changes in their practices and systems or that does not match their business requirements. These results are in line with AL-Shboul, (2019); Das & Dayal, (2016); Tongsuksai et al., (2023); Usman et al., (2019) which found the same in several developing countries. On the other hand, these findings differ from AlBar & Hoque, (2019); Bhatti, (2017); Qutaishat et al., (2023) who did not find significant impact for compatibility on CERP adoption in Saudi Arabia, Jordan, and UAE. These conflicting results might be due to different organizations' structures or different levels of advancements across countries.

The results of the present study confirmed the direct and indirect significant impact of observability on fit and adoption of CERP. This indicates that Egyptian SMEs consider CERP an appropriate system only if its usage and benefits are clearly visible in other similar organizations. Similar findings were found in Saudi Arabia, Jordan, and Taiwan (AlBar & Hoque, 2019; Hsu & Lin, 2016; Lutfi, 2021; Qutaishat et al., 2023). Also, Razzaq et al., (2020) highlighted the importance of observability arguing that the lack of successful stories of CERP adoption is the reason behind the lower level of adoption in developing countries, which clearly seems to be the case in Egypt.

This study did not find a significant impact for task characteristics. These findings contradict with Mohammed et al., (2017) and Yoo & Kim, (2019). However, this might be due to different studies' contexts. In those studies, the researchers considered the task requirements in relation to the nature of the technology as their context was more specific. For example, E-government tasks using CC, or IT companies implementing CC. However, in the present study, it is hard to specifically relate task requirements to CERP as the latter has various functionalities and attributes that serve different industries in different ways. Besides, their study was based on CC adopters while in the present study, most respondents are non-adopters and operating in different industries. They might not be able to determine if their tasks require a CERP system or not. Besides, respondents were CEOs and managers who do not necessarily have IT backgrounds to identify the technological requirements for their tasks.

This study found that technological readiness, shaped by IT infrastructure and IT skills, significantly impacts the viability of CERP and indirectly CERP adoption. These findings indicate that Egyptian SMEs that have more technological capabilities in terms of well-established infrastructure, hardware, good internet reliability, and sufficient IT skills, are more likely to consider CERP a viable solution and further adopt it. Although few prior studies have argued that TR may not essentially impact CC adoption (Matias & Hernandez, 2019; Wu, Cegielski, Hazen, & Hall, 2013; Yang et al., 2015), the findings of the present study are in line with several studies which reported TR as a facilitator of CC and CERP adoption; particularly in Middle Eastern developing countries (AL-Shboul, 2019; AlBar & Hoque, 2019; Mpanga & Elbanna, 2019; Nguyen & Liaw, 2022; Oliveira et al., 2014; Qutaishat et al., 2023; Skafi et al., 2020). This also explains why the greatest percent of CERP adopters in the present study are operating in the IT industry. In addition, using the FVM, Mohammed et al., (2017) and Yoo & Kim, (2019) found similar results in Yemeni and Korean SMEs.

Top management support showed a strong direct and indirect significant impact on the viability and adoption of CERP. These findings are not surprising as TMS has been vastly reported in IS research as one of the most significant factors that positively influence adoption. The adoption of cloud-based systems is considered a strategic decision. Executives are more likely to favor the adoption of an innovation only if they understand it and hold positive attitudes towards it. In addition, the degree of TMS largely determines the extent to which the adoption of cloud-based applications will be

successful (Low et al., 2011). These findings appear common in various developing countries. AL-Shboul, (2019) and Qutaishat et al., (2023) reported that TMS had the highest significant impact on CERP adoption among SMEs in various developing countries. Similarly, based on recent systematic literature reviews, TMS was ranked as the top organizational factor influencing the adoption of cloud-based technologies in SMEs in the developing world (Al Hadwer et al., 2021; Nguyen & Liaw, 2022).

This study neither found a direct nor an indirect impact for economic feasibility on the viability and adoption of CERP. These findings may seem unexpected as CERP shall be a feasible solution for SMEs. An earlier qualitative study found that adopting CERP provides organizations with various benefits beyond cost reduction (Margherita & Braccini, 2020). A probable reason for the insignificance of EF might be the lack of awareness about CERP. Studies in developing countries revealed that SMEs, due to limited knowledge, might fear that cloud-based services involve unexpected additional costs and thus cannot realize the great value propositions of cloud solutions (Sharma, Gupta, Acharya, & Jain, 2023). That seems the case among Egyptian SMEs. Likewise, Qian et al., (2016) found that, due to limited awareness, cost effectiveness does not influence SMEs' intention to adopt CERP in Malaysian SMEs, and Skafi et al., (2020) found it an insignificant factor in Lebanon. Similarly, the impact of EF on the viability of CC was found insignificant in Korea and Oman (AlAjmi, Yassin, & Alhadhrami, 2023; Yoo & Kim, 2019).

The direct and indirect impacts of SP support on the viability and adoption of CERP was found insignificant. These findings appear to contradict prior studies. However, those studies highlighting the positive influence of SP support were all qualitative investigations conducted among CERP adopters. Alsharari, (2020) found that the professionalism of the SP had positive impact on the success of CERP adoption. López & Ishizaka, (2017) found that the level of support and the quality of the service provided are important criteria upon which organizations select a SP. Likewise, Margherita & Braccini, (2020) found that a highly qualified SP increases the satisfaction of the adopting organizations. This does not necessarily affect the adoption decision itself. Similar findings were indicated by the qualitative investigation. Participants who already adopted or took the decision to adopt CERP are the ones who emphasized the importance of SP support. Therefore, one can explain that the effect of SP support is more realized post adoption and hence it might be the reason it appeared insignificant in the present study as the number of adopters among respondents is already low.

The present study found that competitive pressure significantly affects viability and adoption of CERP which indicates that Egyptian entrepreneurs evaluate the value of CERP based on their competitors. The more organizations use CERP in a specific industry, the more rivals perceive it as a valuable system and feel pressured to adopt it. These findings match various prior studies. Soliman & Karia, (2017) found significant influence of CP on ERP perceived value among Egyptian HEIs at the pre-implementation phase. Their assumption suggested that Egyptian HEIs may be influenced by their competitors to perceive the values created by an ERP system and thus decide to use it. Similarly, Awa, Ukoha, & Emecheta, (2016) explained the significant effect of CP on ERP adoption by arguing that competition assures the certainty about the values of ERP systems, which, in turn, influences the adoption decision positively. That was particularly indicated by most participants in the preliminary investigation which possibly explains the empirical significance of CP on viability and further on CERP adoption. Likewise, CP was reported as a significant factor influencing CERP adoption among SMEs in several developing countries (AL-Shboul, 2019; AlBar & Hoque, 2019; Bhatti, 2017; Usman et al., 2019)

Finally, the highlight of the present study was the inclusion of fit and viability as important determinants. This study revealed a significant impact for fit and viability on CERP adoption and a significant mediation effect between DOI/TOE variables and adoption. Similar results were found among Yemeni and Korean SMEs (Mohammed et al., 2017; Yoo & Kim, 2019). This study's results are also in line with Liang et al., (2007) which reported that IT infrastructure, IT skills, and TMS strongly affect the viability of a technology. In conclusion, this study discovered new perspectives by which SMEs are influenced to adopt CERP. According to the qualitative investigation, followed by the empirical one, it is quite shown that CERP adoption in Egypt is mainly influenced by the fit or applicability of the CERP system to SMEs' operations as well as the latter's readiness and perception of how valuable CERP adoption is. While prior studies reported similar DOI and TOE factors that

influence CERP adoption, the present study revealed the indirect effect of those factors on adoption through their influence on fit and viability of CERP.

3.1 Theoretical Contributions

This study helps to enrich the knowledge and understanding of the influential factors of CERP adoption, and thus fills the existing research gap in the context of SMEs in developing countries, particularly in the Middle East. Despite prior studies' efforts to identify the factors affecting CERP adoption, they have not yet reached clear-cut evidence of the exact determinants (AL-Shboul, 2019; Christiansen, Haddara, & Langseth, 2021; Haddara et al., 2021; Tongsuksai et al., 2020). Most of the prior studies focused on either TOE separately or integrated TOE with DOI to study CERP adoption. In this regard, the present study contributes to the existing body of knowledge by integrating FVM to DOI/TOE. The findings of this study demonstrated that fit and viability, influenced by DOI/TOE factors, strongly impact CERP adoption. Consequently, this study uncovered new perspectives of influential factors that have not gained attention from prior research. The development of a comprehensive conceptual model grounded on DOI/TOE/FVM is considered a novel approach in examining CERP adoption.

3.2 Practical Contributions

This validated model provides Egyptian SMEs' executives with insights about the factors affecting CERP adoption which can help them to better plan for adoption. Using the effect of fit and viability, along with the factors that impact both, this research model can serve as useful guidelines by which CEOs can evaluate the fit of CERP to their businesses as well as their readiness. CEOs will be able to identify whether CERP fits them or not, or whether they need technological and organizational changes to be ready for adoption. Moreover, the findings that technological readiness and TMS are the main factors influencing CERP through viability give an important implication for executives. The latter can make use of these findings to increase their potential to learn more about CERP, assign the required resources, and encourage their staff to utilize it. They can also start finding ways to enhance their IT infrastructure and to improve IT skills among their staff. Besides, this research revealed a noticeable lack of awareness and limited knowledge regarding the characteristics and applicability of CERP to SMEs. This is an important implication that shall be carefully considered by CERP vendors in Egypt. It was clearly indicated in the preliminary investigation that SMEs cannot see any efforts from vendors concerning CERP which is hindering their adoption. The findings shall encourage CERP vendors to enhance their interaction with SMEs to remove any ambiguity to be able to create a healthy environment for CERP adoption that can further lead to increased rate of adoption in Egypt.

Finally, the Egyptian government can use this research as a guideline to identify SMEs' needs for CERP adoption. The government can boost SMEs' technological readiness through improving the IT infrastructure and internet reliability in different areas and granting funds for SMEs to buy hardware or maintain internal networks. They can also collaborate with different CERP vendors to raise awareness and knowledge about CERP among SMEs through organizing seminars and workshops and funding CERP projects. Helping SMEs to improve their overall performance through CERP adoption will positively impact the Egyptian economy. Plus, collaborations between CERP vendors and educational institutions to offer courses and learning sessions about new innovations like CERP can help to boost the knowledge and IT skills of candidate employees and further help in higher rates of CERP adoption in organizations.

4. CONCLUSION

This study underscores the crucial roles of fit and viability in CERP adoption among SMEs. This study found that observability and compatibility significantly impact CERP adoption through their significant effect on fit. Technological readiness, TMS, and CP significantly impact CERP adoption through their significant effect on viability. This research is among other scholars' attempts to explore the factors influencing CERP adoption in SMEs. However, this study is considered the first to include fit and viability constructs through extending DOI/TOE to the FVM. Consequently, this research discovered new perspectives concerning CERP adoption in a developing country like Egypt which paves the way for future studies in other countries. The examined integrated model provides a comprehensive view of the influential factors causing the lower rate of CERP adoption in Egypt as well as in other developing countries sharing similar profile. Accordingly, practitioners, vendors,

governments, and SMEs' executives can use this study to better plan for overcoming those causes and hence accelerate the rate of CERP adoption in their economies. Therefore, this study answers the research question and provides theoretical and practical contributions in solving the research problem.

5. Limitations and Future Work

This study did not take industry type into consideration. Therefore, future studies shall focus on specific industries to examine if the adoption factors can differ from one industry to the other. Future studies can also include other factors like the size or scope of the organization which may also affect the viability of CERP. Future studies shall also utilize FVM to investigate CERP adoption in other developing countries and compare the results.

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