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Influences on Adoption of Cloud-Based ERP Systems in SMEs

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Abstract
This paper examines the factors influencing the adoption of cloud-based enterprise resource planning (ERP) systems by small and medium-sized enterprises (SMEs) in the UAE. The research utilizes the Technological-Organizational- Environmental (TOE) framework to identify the determinants affecting cloud-based ERP adoption. Key factors such as relative advantage, top management support, technology readiness, com- petitive pressure, and trading partner pressure are identified as influential determinants. Additionally, factors such as perceived complexity and organizational culture are analyzed for their impact on adoption. The findings are useful for cloud service providers to better understand adoption dynamics and to develop strategies that improve interactions with SMEs.

Keywords: Cloud-Based ERP, SMEs, Technological- Organizational-Environmental (TOE) Framework, Adoption Factors, UAE

I. INTRODUCTION

Cloud computing has significantly transformed the way enterprises access and manage IT services, offering reduced upfront costs, scalability, and flexibility. The adoption of cloud-based ERP systems has become particularly important for small and medium-sized enterprises (SMEs) that need to streamline operations, improve efficiency, and manage limited resources effectively. Cloud ERP systems enable SMEs to adopt cutting-edge technologies without the burden of main- taining complex infrastructure, which is particularly beneficial for businesses with budget constraints.

This study investigates the adoption of cloud-based ERP systems among SMEs in the UAE using the TOE framework. The objective is to understand the key factors that influence SMEs' decision to adopt these systems, focusing on tech- nological, organizational, and environmental aspects. SMEs contribute more than 70% to the UAE's GDP and play a crucial role in economic growth. Despite the potential benefits of cloud ERP systems, adoption by SMEs remains limited due to a combination of technological and non-technological barriers, and this paper aims to address the gap by identifying the main determinants and providing actionable recommendations to enhance adoption rates.

II. RELATED WORK

Previous research on ERP adoption has largely focused on large enterprises, often overlooking the unique challenges

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(SGSITS) faced by SMEs. Studies by authors such as Salim et al. (2015) and Bhatti (2017) highlight the advantages of cloud- based ERP for SMEs, particularly in reducing IT maintenance and operational costs. The TOE framework has been widely used in similar studies to categorize the influencing factors into technological, organizational, and environmental contexts. This study builds on these works by focusing specifically on SMEs in the UAE, where the dynamics of cloud adoption may differ from other regions due to unique market conditions and cultural influences.

The work by Oliveira and Martins (2010) used the TOE framework to analyze the adoption of various technologies in European countries, highlighting the significance of or- ganizational factors such as top management support and company size. Similarly, Gangwar et al. (2014) explored the adoption of cloud computing using an integrated TAM-TOE model, revealing that technological factors like compatibility and complexity play a critical role in the adoption process. These factors are often compounded in SMEs due to limited IT capabilities and the lack of specialized personnel who can manage the integration of new technologies.

Furthermore, Alharbi et al. (2016) noted that perceived data security risks and lack of trust are significant challenges in cloud adoption among SMEs. These challenges are particu- larly relevant in the UAE, where data protection regulations and concerns about data sovereignty play a critical role in the decision-making process. Additionally, SMEs often lack the necessary IT expertise, which makes the perception of complexity a significant barrier. These factors are especially problematic in environments where data privacy laws are stringent, and any compliance failure can lead to legal and financial repercussions for SMEs.

In addition to these studies, Low et al. (2011) examined cloud adoption in small businesses and found that relative advantage, complexity, and top management support are vital determinants. They emphasized that smaller organizations tend to be more risk-averse, and hence the perceived risks of cloud ERP can significantly affect adoption rates. Premkumar (2003) also highlighted the role of external pressures, such as competitive pressure and customer demands, which are especially relevant for SMEs that need to respond quickly to changes in market dynamics to stay competitive.

In another study, Borgman et al. (2013) explored the influence of environmental factors, particularly regulatory policies and government incentives, on cloud adoption in SMEs. Their findings indicated that favorable government policies and subsidies can ease the adoption process by reducing perceived risks and financial burdens. In the context of the UAE, the government's focus on digital transformation and innovation is a facilitating factor that can influence SMEs positively, provided that support mechanisms are effectively communicated and accessible.

Davis (1989), in his Technology Acceptance Model (TAM), emphasized the role of perceived ease of use and perceived usefulness in technology adoption. These aspects are particu- larly critical for SMEs adopting ERP systems, as they need assurance that the technology will not only meet their needs but also be simple enough to integrate without significant disruptions. Studies like those by Chang et al. (2012) have expanded on TAM by integrating it with TOE, thus offering a broader understanding of how internal and external factors collectively shape adoption decisions.

Hsu et al. (2014) introduced the concept of absorptive capacity, which refers to an organization's ability to recognize, assimilate, and apply new knowledge, and found it to be a crucial factor in cloud technology adoption. SMEs with higher absorptive capacity are better positioned to take advantage of cloud ERP systems, as they can more effectively understand and leverage new technologies. This concept is relevant in the context of UAE SMEs, as it highlights the importance of not just the

availability of technology, but also the capability of SMEs to utilize it effectively.

A study by Tornatzky and Fleischer (1990) originally formulated the TOE framework, which has been utilized by many researchers to assess technology adoption across various organizational contexts. The adaptability of the TOE framework has made it particularly suitable for SMEs due to the dynamic nature of technology acceptance within these businesses. More recent works, such as that by Zhu and Kraemer (2005), have applied the TOE model in the e-business adoption context, demonstrating that technology compatibility, competitive pressure, and external support services have a significant impact on adoption outcomes.

Bharati and Chaudhury (2015) analyzed the digital transfor- mation of SMEs, emphasizing the role of government-driven initiatives and market readiness. Their research indicated that the presence of supporting infrastructure, such as IT education and specialized service providers, significantly influenced the adoption rates among SMEs. This perspective is particularly applicable to the UAE, where ongoing governmental initiatives like the UAE Vision 2021 aim to drive digital innovation and IT infrastructure development, providing an enhanced environment for cloud ERP adoption.

III.METHODOLOGY

This study uses a mixed-method approach that combines qualitative and quantitative data to provide a more comprehensive understanding of cloud ERP adoption among SMEs. A questionnaire-based survey was conducted to collect data from SMEs in the UAE that have adopted or are considering adopting cloud-based ERP systems. A sample of 105 SMEs was used, and data were analyzed using descriptive and inferential statistical techniques. The survey included questions on technological readiness, top management support, competitive pressure, perceived benefits, data security, and other factors based on the TOE framework.

The mixed-method approach allows for the triangulation of data, which enhances the reliability and validity of the research findings. By combining quantitative survey data with qualitative interview insights, the study captures both measur- able factors and deeper perceptions of cloud ERP adoption. The interview data provide context to the statistical results, highlighting how different factors influence decision-making processes at a more nuanced level. For example, while survey data can indicate the importance of top management support, interviews can reveal how leaders' attitudes and understanding of cloud technology directly impact adoption decisions.

IV.METHODOLOGY

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The methodology involves the following steps:

- Step 1: Data Collection - A survey was conducted among 105 SMEs in the UAE. The respondents were primarily managers involved in IT decision-making. Additionally, interviews were conducted

with 15 IT managers to gain deeper insights into their perceptions and challenges regarding cloud ERP adoption.

- Step 2: Data Analysis - The collected data were analyzed using SPSS to identify relationships between adoption factors and the decision to implement cloud-based ERP. The interviews were transcribed and analyzed themat- ically to extract common themes related to adoption barriers and drivers.
- Step 3: Model Testing - The TOE framework was used to test the significance of each factor influencing adoption. A regression analysis was performed to determine the strength of the relationships between the identified factors and the adoption decision.
- Step 4: Hypothesis Testing - Hypotheses related to factors like relative advantage, complexity, top management sup- port, and data security concerns were tested to evaluate their impact on adoption. The results of hypothesis testing were used to validate the TOE framework in the context of UAE SMEs.

The mixed-method approach ensures that the research cap- tures both quantitative and qualitative aspects of cloud ERP adoption, providing a comprehensive view of the influencing factors and contextual nuances specific to SMEs in the UAE.

V. RESULTS AND DISCUSSION

The results of the study indicate that relative advantage, top management support, technology readiness, competitive pressure, and trading partner pressure significantly influence the adoption of cloud-based ERP systems among SMEs in the UAE. Table I presents the key metrics and their influence on adoption.

TABLE I SUMMARY OFINFLUENCING FACTORS

Factor	Influence on Adoption	Significance
Relative Advantage	Positive	High
Top Management Support	Positive	Very High
Technological Readiness	Positive	High
Competitive Pressure	Positive	Medium
Trading Partner Pressure	Positive	Medium
Complexity	Negative	High
Organizational Culture	Positive	High
Data Security Concerns	Negative	High

Top management support emerged as a crucial factor, high- lighting the importance of leadership in facilitating the adop- tion process. Technological readiness, including infrastructure and IT human resources, also plays a significant role, suggest- ing that SMEs with better technological capabilities are more likely to adopt cloud ERP solutions. Competitive pressure and trading partner influence were found to moderately affect adoption, indicating that external factors also play a role but are secondary to internal organizational factors.

Additionally, complexity was found to negatively influence adoption decisions. SMEs that perceived

cloud-based ERP systems as complex were less likely to adopt them. This aligns with the findings of Gangwar et al. (2014), who empha- sized the importance of minimizing complexity to encourage technology adoption. Cloud ERP vendors should consider providing user-friendly interfaces, comprehensive training, and ongoing support to reduce perceived complexity. The reduc- tion of perceived complexity can lead to an increase in the confidence of SMEs, thus enhancing adoption rates.

Another significant finding was the role of organizational culture in cloud ERP adoption. SMEs that foster a culture of innovation and openness to new technologies were more inclined to adopt cloud-based ERP systems. This suggests that organizational readiness is not only about technological infrastructure but also about the mindset of employees and management. A culture that encourages experimentation and values technology as a key driver of business success plays a pivotal role in cloud ERP adoption.

Furthermore, perceived cost savings and operational effi- ciency were major motivators for SMEs to consider cloud ERP systems. The ability to reduce upfront investments in IT infrastructure and to pay on a subscription basis makes cloud ERP an attractive option for SMEs with limited budgets. Interviews with IT managers revealed that concerns about data security and lack of control over data were some of the signif- icant barriers to adoption. To mitigate these concerns, cloud service providers must ensure transparency in data handling practices, provide robust security features, and comply with local regulations to gain trust among SMEs.

A. Post-Adoption Challenges

Another critical aspect identified during the interviews was the challenges SMEs face post-adoption. These challenges include data migration issues, integration with existing sys- tems, and the need for continuous training. Many SMEs lack the technical expertise to handle these challenges effectively, which can lead to dissatisfaction with the cloud ERP sys- tem. Service providers must offer ongoing support, including training programs and customer service, to ensure a smooth transition and continued effective use of the system.

The post-adoption phase is crucial as it determines the long- term success of the ERP implementation. SMEs that receive adequate support are more likely to fully utilize the capabilities of cloud ERP systems, thereby maximizing the benefits in terms of productivity and efficiency.

VI. CONCLUSION

This study provides insights into the factors influencing the adoption of cloud-based ERP systems in SMEs, specifically within the UAE context. The results indicate that relative advantage, top management support, technological readiness, competitive pressure, trading partner pressure, complexity, data security concerns, and organizational culture are key determinants. These findings are valuable for service providers aiming to tailor their offerings to meet the needs of SMEs. Future research could explore the adoption process in different regions or sectors to further validate the TOE framework.

Moreover, cloud service providers should focus on reducing the complexity of their ERP solutions and enhancing their compatibility with existing systems to foster greater adoption rates. Training programs, workshops, and trial versions of the ERP systems could also help SMEs better understand the benefits and functionalities, thus reducing the resistance to adoption. Service providers should also work closely

with SMEs to address security and privacy concerns, as these are significant barriers that affect trust and willingness to adopt cloud solutions.

Another area for future research could be the examination of post-adoption experiences, such as the challenges faced by SMEs after implementing cloud ERP systems and the overall impact on business performance. Understanding the long- term benefits and any issues that arise post-adoption could help refine strategies to support SMEs effectively throughout their cloud ERP journey. Additionally, cross-regional studies could shed light on how different regulatory environments and cultural factors affect the adoption and success of cloud-based ERP systems.

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