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Adoption of Cloud-Based ERP Systems in SMEs: An Empirical Study Using the TOE Framework

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ABSTRACT:
Enterprise Resource Planning (ERP) systems are essential for integrating and supporting critical business processes across organizations. Traditional on-premise ERP systems, while effective, are costly, time-intensive and require significant infrastructure. Cloud-based ERP systems, delivered through Software-as-a-Service (SaaS), offer a flexible, cost-efficient and scalable alternative, particularly beneficial for small and medium-sized enterprises (SMEs). This study investigates the factors influencing the adoption of cloud-based ERP in SMEs in the UAE, applying the Technology-Organization-Environment (TOE) framework. A survey of 105 SMEs was conducted to identify critical adoption drivers, including relative advantage, top management support, firm size, technological preparedness and external pressures. Regression analysis indicates that relative advantage, upper management support, technological readiness and firm size significantly influence adoption, while complexity and compatibility are less critical. Findings provide insights for SME managers, SaaS providers and policymakers, highlighting the importance of leadership commitment, resource readiness and training. The study underscores that cloud ERP adoption is driven more by perceived benefits and organizational readiness than by competitive pressure. Future research should broaden the scope across industries and geographies to generalize the results.

KEYWORDS: Cloud ERP, SMEs, Technology-Organization-Environment (TOE) Framework, SaaS, ERP Adoption, Technological Preparedness, Top Management Support, UAE

INTRODUCTION

Supporting critical company processes across the board, the Enterprise Resource Planning System (ERP) is a database-driven, centralised information system. These systems are among the priciest and most intricate software solutions ever created. Conventional on-premise SaaP (Software as a Product) ERP systems require hefty hardware infrastructure and software licence purchases. Furthermore, putting an ERP system into place in a business is an expensive, time-consuming, high-risk process that takes years to complete and frequently calls for business process reengineering.

Our best guess is that NIST, the National Institute of Standards and Technology, covers every important aspect of cloud computing when it says: By utilising a shared pool of reconfigurable computing resources—including networks, servers, storage, applications and services—the cloud

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computing model enables rapid provisioning and delivery with minimal administrative effort or provider participation. This paves the way for easy, whenever-needed network access.

The foundation of cloud computing is a service-based business model. Here are some examples of the kind of services offered by cloud computing:

- **Infrastructure as a service (IaaS):** Customers can purchase computational power (CPU and memory) and hardware resources (storage) as services. This makes it possible for companies to rent these resources as opposed to investing in dedicated servers and networking hardware. For small enterprises and individual users, Amazon1 provides S3 for storage, EC2 for processing power and SQS for network communication.
- **Software as a service (SaaS):** Under this strategy, software products are not sold as separate consumer packages over the Internet, but rather as services. When it comes to customer relationship management (CRM) apps as a service, Salesforce.com is in the forefront. An other example would be the Google web-based office suite, which includes word processors, spreadsheets and more.
- **Platform as a service (PaaS):** Online support for rich web apps and services necessitates features across the whole application development lifecycle, from conceptualization to testing, debugging, deployment and operation. The programming environment that is most commonly utilised is a web browser. This category includes platforms such as Bungee Connect, Google App Engine, Microsoft Azure Services, Salesforce.com and Salesforce.com Internet Application Development platform 8. The capacity to build extensions, standalone web apps, repurpose existing services and collaborate is a key feature that PaaS offers to SaaS customers.

Cloud ERP

" Enterprise resource planning (ERP) systems that are deployed in a cloud setting are referred to as "cloud ERP software. Applications can be distributed across numerous servers and database resources thanks to load balancing and virtualization technologies, which are used in the construction of most, if not all, cloud environments.

Cloud ERP is promoted as a cutting-edge method of implementing an ERP system. It offers an economical, scalable, flexible, adaptive and efficient solution. Delivering mission-critical business data has been greatly aided by cloud ERP as a business management tool. ERP software as a service (SaaS) is offered to clients who wish to purchase ERP at a lower upfront cost without having to handle hardware, software, or updates. Consumers that need local access to their data server might create an internal cloud to lower recurring hardware expenditures while retaining more control over integration.

Software-as-a-Service (SaaS) frequently used to describe hosted or on-demand apps that are compatible with enterprise resource planning systems. In order to run and manage the entire

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solution, the SaaS vendor proactively handles the necessary IT infrastructure and procedures. This includes servers, operating system software, databases, data centre space, network access, power, cooling and more. A full application provided as a service on demand is what is meant by software as a service. A solitary cloud-based instance of the software caters to numerous end users or clientele.

Software-as-a-Service, or SaaS, is a process that uses cloud infrastructure and a "pay-as-you-go" pricing model to enable Application Service Providers (ASP) to offer various software applications via the Internet. Because of this, the user's personal computer is not required to launch the application. Additionally, it removes the massive burden of software maintenance, which includes upkeep, security and support. Running the most recent version of the application is a big advantage of SaaS. When it comes to on-campus software models, the SaaS model has clear operational and financial advantages over the rest. Because of its monthly fee-based business strategy, it is able to maintain extremely low operating costs and low membership costs, which are typically significantly less expensive than a licenced application charge. Businesses can access licenced applications through a subscription-based SaaS model of service delivery. It enables users to download and use applications without the need for expensive hardware or software, as long as they have access to a computer or server with internet connectivity. Additionally, it permits licencing of the programme for an individual user or for an entire user group. Document management, workflow systems, enterprise resource planning (ERP), customer relationship management (CRM), computerised human resources (HR), invoicing, service desk management, procurement and many more processes are now utilising SaaS.

RESEARCH OBJECTIVES

1. To investigate the key elements that affect the adoption of cloud-based ERP in SMEs, such as relative advantage, support from upper management, firm size, technological preparedness, pressure from trading partners and competitive pressure.
2. To look into how SMEs' adoption decisions are influenced by the relative benefits of cloud-based ERP systems, such as reduced costs, scalability and mobility.
3. To assess how important it is for top management to encourage the use of cloud-based ERP, with a particular emphasis on how it affects staff morale and resource availability.
4. To assess SMEs' technological preparedness and its importance in using current systems to successfully implement cloud-based ERP.

LITERATURE REVIEW

Shatat, A. S., & Shatat, A. S. (2021) As cloud-based ERP solutions continue to explode in popularity, the current business model is expected to be drastically altered in the not-too-distant future. By understanding the key challenges to cloud ERP system installation and the Critical Success Factors (CSFs), prospective customers will be able to embrace cloud ERP systems and

reap the benefits of this cutting-edge IT-based cloud revolution. Specifically, this research identifies the top ten CSFs that contribute to the smooth rollout of ERP systems hosted in the cloud. A survey tool was sent to 70 companies who use ERP systems hosted in the cloud. The results demonstrate a robust and positive association between eight CSFs and the implementation of cloud-based ERP systems. The positive but statistically insignificant relationship is limited to just two factors. Taken together, the results show that the CSFs have a major impact on cloud ERP system deployments.

Ahn, B., & Ahn, H. (2020) Companies are considering making the switch to a cloud-based ERP system from an on-premises one so that their operations can run more sustainably. This study employs the technology-organization-environment frameworks, the model of innovation resistance and the diffusion of innovation to conduct an in-depth examination. While there was no statistically significant relationship between the intention to implement cloud-based ERP and IT expertise, complexity, observability, data security, or customisation, there was a significant relationship between organisational culture, regulatory environment, relative advantage, trial ability and vendor lock-in. This study's findings have important implications for cloud-based ERP system vendors, governments who promote enterprise digitalization and organisations that are considering using cloud-based ERP.

Kenge, R., & Khan, Z. (2020) The ERP archive was initiated with the goal of unifying company activities and dates back to at least 1970. The ERP, whose name was given by the Gartner Group, was initially implemented in early 1990. Software companies such as SAP began implementing ERP in the early 1990s. A new version of R/3 was launched by SAP in 1992. With the addition of the customer-server hardware structure, SAP R/3 could now run on many stages at once. By the year 2000, every major ERP software system provider had addressed the Y2K issue. In response to the increasing variety of features and applications offered by ERP software vendors, the market for this type of software has exploded in the last decade. The purpose of this paper was to take a look at the latest developments in enterprise resource planning (ERP) software and the entire ERP implementation process. Furthermore, we tried to address specific problems or deficiencies in the ERP system application process by suggesting solutions. A key finding of the study is that ERP systems allow organisations to streamline their operations by bringing together various departments such as finance, marketing, manufacturing and human resources. These departments are then connected through advanced real-time data collection, processing and communication capabilities, which allow organisations to respond quickly to issues as they arise and maintain control over their entire business process.

Razzaq, A., & Mohammed, A. A. (2020) Due to the advantages of cloud ERP deployment over traditional ERP and other features that cloud computing technology offers, such as the fact that cloud ERP requires little upfront investment and can be implemented right away, cloud ERP

systems are a relatively new trend in ERP systems and are growing rapidly. Also, local ERP systems are looking at them as a possible replacement. Few things are as advantageous as cloud-based enterprise resource planning (ERP) systems for small and medium-sized businesses (SMEs). SMEs, however, are not adopting this system at the rate that was anticipated. Companies are reluctant to use cloud computing because they lack confidence due to the absence of success stories. SMEs would rather wait to see, monitor and hear other organisations' opinions on cloud ERP adoption before deciding whether or not to implement cloud technology. This essay focuses on cloud ERP's advantages, difficulties and possibilities. Potential users of cloud ERP, decision-makers in SMEs and service providers will find this paper helpful.

Zughoul, B., El-Omari, N. K. T., & Al-Refai, M. (2023) By conducting research and deploying enterprise resource planning (ERP) systems, medium and huge industries can consolidate their competitive position through activity integration. ERP systems have effectively utilised deep learning approaches to identify the key factors impacting the usability of SaaS. Predicting the success rate of cloud-like ERP systems based on several critical factors is the goal of this article, which undertakes a systematic review of the important factors impacting deep learning models. These models include recurrent neural networks (RNNs), multi-layer perceptrons (MLP), gated recurrent units (GRU) and the like. Additionally, the most essential variables have been sorted via using two categorical feature selection techniques, chi-square analysis and linear discriminant analysis (LDA). This set of 26 traits is based on their discovery in 741 scholarly articles.

RESEARCH METHODOLODY

Using the TOE paradigm, this study aims to identify the factors influencing the adoption of cloud-based ERP systems by SMEs. We used a questionnaire-based survey method in addition to the data from Global Entrepreneurship Monitor's reports on enterprises using cloud-based ERP systems. The research sample consisted of 300 SMEs that are currently utilising ERP systems. It is believed that during the course of the study, every single organisation had either already implemented or was about to implement a cloud-based enterprise resource planning system. This study aimed to boost the survey results' generalizability by including a variety of sectors. This study set out to recruit managers and business owners who have either participated in or been engaged with the implementation of enterprise resource planning (ERP) systems hosted on the cloud. The preliminary survey contact list was sourced from the UAE Business Directory and the Dubai Business Directory, which are available for each emirate. Companies having websites and email addresses were the only ones selected. This study mostly used semi-structured interviews to gather data, which allowed researchers to find connections between the factors that affect cloud computing's acceptability and adoption.

Research based on the TOE framework has come under fire for cherry-picking features that have already been proven effective in previous ARE developments. In order to assess the TOE

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framework tool, 105 respondents with executive positions at SMEs supplied the necessary data. Likert scales with seven points were used to frame the items. As it would have been challenging to interview 300 executives, questionnaires were emailed as a data collection approach. 105 surveys with some or all missing data made up the useable sample. This indicated a 35% response rate, which is in line with average expectations. At first, SPSS version 24 was used to codify and enter all of the data.

DATA ANALYSIS

A total of 105 completed questionnaires were analysed. The bulk of SMEs were in Dubai (51%), tiny (65%) and in the non-manufacturing industry (71%). Seventy percent of the respondents held a bachelor's degree and were non-Arab managers. Table 2 displays the results of the agreement analysis of the factors impacting the adoption of enterprise resource planning (ERP) systems hosted in the cloud. According to the study's TOE framework, eight factors influence ERP adoption. Mean scores indicate that respondents were aware of six aspects, but they rejected the idea that compatibility and complexity played a role in the adoption method. The majority of respondents agree that the study's components are essential for the adoption of ERP solutions on the cloud.

One of the most critical aspects of assessing the quality of concept measures is reliability, which is necessary for scale validity. For this purpose, Cronbach's alpha was calculated (Cronbach, 1951). Estimates that are greater than.70 are typically considered to fulfil the criteria for reliability. Trustworthiness levels of.50 and.60 are considered sufficient, according to Churchill (1979) and Nunnally (1978). Table 3 displays the results of the dependability analysis. All of the Cronbach's alpha coefficients were found to be higher than 0.76. This proved that the finished products and structures developed for this study were legitimate.

Factors influencing small and medium-sized enterprises' (SMEs') decision to use ERP systems hosted on the cloud are detailed in Table 4. It demonstrates that while all factors are important, respondents think that a number of factors significantly affect the adoption of cloud-based ERP systems by SMEs. These factors include support from upper management, firm size and competitive pressure. A fairly substantial connection (R=.798) exists between the factors and adoption. Another finding from the regression model is that cloud-based ERP system adoption has been explained to a degree of 63.6%. It turns out to be statistically significant. We looked at how significant the predicted predictors' regression coefficients were. Table 5 displays the results.

6. DISCUSSION

Several factors impact the adoption of cloud-based ERP systems in SMEs. These include a relative advantage, support from senior management, firm size, technological preparedness, competitive pressure and pressure from trading partners. Relative advantage is known to be affected by the advantages of cloud-based ERP systems, which include pay-as-you-go pricing, scalability,

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mobility, rapid upgrades, lower initial expenses and rapid setup. This study found that small and medium-sized enterprises (SMEs) will move to a cloud-based ERP system if they perceive it to have more benefits than an on-premises ERP. It follows that the relative benefit is crucial for the adoption of ERP systems on the cloud.

It was discovered that compatibility and complexity had no effect on the adoption of ERP systems hosted on the cloud. Another study (Low, 2011) found the same thing. People in charge and working for SMEs may struggle with cloud-based ERP solutions due to their relative complexity. One strategy for vendors and service providers to calm clients' anxieties is to offer free samples and interactive training for their services. The changes introduced by cloud-based ERP systems will be consistent with existing processes, provided that SMEs' prior experiences are compatible with the present information infrastructure. This indicates that incompatibility could be a barrier to the new system's adoption.

The introduction of new technologies cannot proceed without the backing of upper management. Inspiring and convincing employees to make use of new services and technology is largely their responsibility. Additionally, they need to provide the necessary resources to make sure the adoption process goes smoothly.

Technical preparedness is another critical component that helps cloud-based ERP systems work. In addition, it hints that organisational competence may help SMEs maximise the usage of existing IS applications and data resources across critical operations along the value chain when they integrate the cloud-based ERP system (Low, 2011). In light of this, businesses may implement new processes, upgrade their internet infrastructure, employ mobile devices with cloud connectivity and ensure compatibility across IT legacy systems.

7. CONCLUSION:

This study empirically examined the adoption of cloud-based ERP systems among SMEs in the UAE using the TOE framework. Results show that relative advantage, technological preparedness, firm size and upper management support are decisive in influencing adoption decisions. The availability of pay-as-you-go models, scalability and mobility were identified as key relative advantages encouraging SMEs to migrate from traditional ERP systems Interestingly, complexity and compatibility did not play a significant role, reflecting that SMEs may perceive cloud ERP as less disruptive if vendors provide sufficient training and support. Moreover, competitive and trading partner pressures were not found to be strong motivators, suggesting that SMEs prioritize internal efficiency gains over external pressures when adopting cloud ERP. For SME Management: Strong leadership support is essential to motivate employees and allocate resources for successful ERP adoption. For Cloud Providers: Offering free trials, training programs and integration support can reduce resistance and build trust among SMEs. For Policymakers: Encouraging digital transformation policies and incentives could accelerate adoption rates among

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SMEs hesitant to switch. Future work should examine cross-country comparisons and industry-specific adoption trends using both qualitative and quantitative methods. Incorporating case studies could provide deeper insights into post-adoption challenges and the long-term impact of cloud ERP on organizational performance. Overall, this study concludes that while cloud ERP adoption is influenced by multiple factors, the perceived benefits and readiness of SMEs outweigh external pressures, marking a significant shift in enterprise digitalization strategies

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