ESJ Natural/Life/Medical Sciences Peer-reviewed

Challenges in Cloud Computing Adoption for SMEs in the Middle East

Fatma Abudaqqa
Istanbul Okan University, Turkey

Doi:10.19044/esj.2025.v21n3p13

Submitted: 11 November 2024
Accepted: 25 December 2024
Published: 31 January 2025

Cite As:
Abudaqqa F. (2025). *Challenges in Cloud Computing Adoption for SMEs in the Middle East*. European Scientific Journal, ESJ, 21 (3), 13. https://doi.org/10.19044/esj.2025.v21n3p13

Abstract

Technology's growth significantly affects how businesses grow because it offers new ways to do business. Due to a sharp rise in market competition and a rapidly changing business environment, businesses in all industries and sectors utilize information and communication technologies (ICTs) to enhance their company operations and boost their value. This study aims to address the challenges that prevent small and medium-sized businesses in the Middle East from adopting cloud computing, as well as the generally accepted techniques for eliminating these challenges. The study utilized a systematic review of relevant literature. The inclusion and exclusion criteria, as well as the analytic procedure, were documented in the study using the PRISMA protocol. The study also looked for pertinent journal publications that employed mixed, qualitative, and quantitative research methodologies using three pertinent databases: Sustainability, Google Scholar, and Emerald. The included English-language publications had to have been released between the first quarter of 2023 and 2016. More significantly, the evaluation did not include any research that did not concentrate on SMEs in the Middle East. Following an extensive analysis of the literature, it was discovered, among other things that infra needs to be more, budgetary restrictions, and a need for increased understanding of the significance of Industry 4.0. In conclusion, SMEs face challenges in adopting cloud computing, including financial constraints, restrictive policies, security concerns, and fear of losing investments in existing infrastructure, amongst others. Addressing these issues

 ISSN: 1857-7881 (Print) e - ISSN 1857-7431

through policy changes, competition, and tailored solutions can enhance cloud adoption and SME competitiveness.

Keywords: SMEs, Adoption, Cloud Computing, Challenges, Middle East

Introduction

Cloud computing has emerged as a transformative technology for businesses globally, offering scalable, cost-efficient, and flexible IT solutions. Small and Medium-sized Enterprises (SMEs), which are critical contributors to economic growth, particularly in developing regions, have begun to embrace cloud technologies to streamline operations and remain competitive. In the Middle East, SMEs account for more than 90% of all businesses (International Monetary Fund [IMF], 2020), making cloud adoption essential for their growth and innovation. However, despite the potential benefits, SMEs in the region face significant challenges in adopting cloud computing. The challenges include the lack of robust digital infrastructure; limited broadband penetration and inconsistent internet connectivity (Karim & Rampersad, 2017; Alsafi Tariq, 2020); cybersecurity concerns (Shirazi et al., 2017; Almorsy et al., 2016); fear of loss of control of data (Karim & Rampersad, 2017); lack of support from top management (Almubarak, 2017) and/or from government (Al-Ruith et al., 2018; Alsafi Tariq, 2020); limited knowledge of cloud computing (Al-Ruithe et al., 2018); as well as high service cost (Basahel et al., 2016; Alsafi & Fan, 2020). Overall, addressing these challenges requires collaborative efforts between governments, cloud service providers, and SMEs to enhance infrastructure, build trust in cloud security, and provide financial incentives to encourage wider adoption of cloud computing in the region.

The present study focuses on the factors that hinder the adoption of cloud computing technologies in SMEs operating in the Middle East region. Due to the practical advances in Industry 4.0, cloud computing helps bring various benefits like efficiency, scalability, and flexibility to business organizations. It allows SMEs to acquire superior and costly IT facilities and services they would otherwise not be able to afford. These are, for example, the storage of information, calculations, and software products provided through the Internet to help businesses work more effectively and productively.

However, despite these advantages, organizations, especially SMEs in the Middle East, face a number of challenges that limit the application of cloud computing technologies. These are complex and fundamental difficulties regarding the regional economy, culture, and technologies. For instance, many SMEs in the Middle East not only need a proper understanding of cloud computing but also an appreciation for the value of cloud computing. A

 ISSN: 1857-7881 (Print) e - ISSN 1857-7431

shortage of IT talent accompanies this ignorance to aid such businesses when choosing the right path to adopt. Furthermore, security issues, as well as incompatibility with currently used IT equipment, become critical limitations that should be considered with great attention.

This research aims to establish and critically evaluate the challenges that affect cloud-computing adoption across SMEs in the Middle East. This research is important; more specifically, it is the kind of study needed to fill the gap in research on cloud computing in a specific geographical region, which is yet to be investigated sufficiently. Previous research on cloud computing adoption has overwhelmingly addressed areas in the developed world, notably in North America and Europe. In contrast, the environment in this part of the world is entirely different regarding technology uptake, market forces, and readiness.

This research will help stakeholders, including policymakers, IT service providers, and heads of business entities, to design appropriate measures to deal with the barriers. For example, support can be provided to the policymakers in formulating appropriate regulatory structures that tackle issues to do with security and privacy in the hope of recommending that the IT service providers can then come up with suites of solutions suitable for the region's SMEs. Therefore, this research is vital for digitalizing SMEs in the Middle East to tap into the advantages of cloud computing, resulting in improved commercial operations and innovation to develop competitiveness in the global market.

Research Questions

The study aims to address two primary research questions: i) Which typical challenges prevent Middle Eastern SMEs from adopting cloud computing? ii) What are the generally accepted techniques for eliminating the challenges that have been found to prevent Middle Eastern SMEs from adopting cloud computing? These questions assist in the systematic review and help organize this study’s findings and discussion sections.

Literature Review

Cloud computing is defined by the National Institute of Standards and Technology (NIST) as "a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction” (Vu et al., 2020, p. 101426). Modern companies can only exist or grow with technology (Ajimoko, 2018). Cloud computing offers three primary services. These consist of infrastructure as a service, software as a service, and platform as a service (Čičak et al., 2023; Sultan, 2014). Software as a service

 ISSN: 1857-7881 (Print) e - ISSN 1857-7431

(SaaS) enables customers to access basic desktop applications like spreadsheets and word editing as a web service (Chemjor & Maru, 2017).

However, Chemjor and Maru (2017) defined Infrastructure as a service that provides a resolvable environment where users are authorized to carry out different operations on the server. These responsibilities include starting and stopping the server, defining firewall rules and access rights, connecting virtual disks to the server, installing software packages to customize the server, and so on. Platform as a service cloud service providers enable end users to execute applications they have developed or obtained using libraries, operating systems, tools for programming languages, web servers, and services on cloud infrastructure by providing them with a higher level of abstraction.

Quick flexibility, on-demand self-service, resource pooling, measurable service, and extensive network access are a few of the exceptional features of cloud computing that Dixit et al. (2021, p. 878) highlight. They are explained below:

i. Applications with quick elasticity, or those that can expand and shrink in response to demand, may be used almost immediately.
ii. Broad network connectivity includes standard hardware and thick/thin user networks such as laptops, PDAs, mobile phones, and workstations that may be utilized to access and control cloud-computing services via other networks or the internet.
iii. Measured Services involve distributing users, and providers, and improving, recording, managing, and charging users' facility consumption through specific metering competencies.
iv. On-demand self-service: Users can interact with cloud service providers in whatever way they see fit using their computing skills.
v. Resource pooling: A multi-tenant application dynamically transfers and reallocates simulated and actual attributes to accommodate returning users.

However, three obstacles to cloud computing adoption. These issues are worldwide in scope and are not exclusive to any one nation or area (Skafi et al., 2020; Baral & Verma, 2021; Kavitha et al., 2024). According to Dixit et al. (2021, p. 878) and Ajimoko (2018, p. 63), the primary challenge is finding technology adoption criteria and strategies enabling SMEs to make informed decisions about cloud computing adoption. The other major challenges are the lack of resources/expertise and cost management. According to Vu et al. (2020), the majority of businesses that have embraced cloud computing have done so for primary uses like file storage and email hosting.

 ISSN: 1857-7881 (Print) e - ISSN 1857-7431

Contribution of the Article to the Literature

This article contributes to the literature by responding to the following research questions: what factors prevent SMEs in the Middle East from adopting cloud computing? Prior studies on cloud computing adoption are overwhelmingly drawn from developed zones, including North America and Europe, where conditions related to technology and market are entirely different from LDCs. This article is helpful because, unlike many other sources that compare or generalize the experiences of SMEs in various countries, it is dedicated solely to the Middle East and, therefore, gives detailed information on the issues the Middle Eastern SMEs are most likely to confront – cultural perceptions of technology, legislation obstacles, and infrastructural constraints. This regional specification adds more depth to the topic under study by describing the Middle East experience, which may differ from the global trend of cloud computing adoption, thus contributing to knowledge diversification.

Moreover, the article under discussion uses the systematic literature review approach to organize the obtainable knowledge and define issues that present investigations cannot solve. This makes the interpretations more reliable since the outstanding findings are tried and tested with the available facts. The marking of individual barriers and providing concrete suggestions of how they might be overcome means that the article connects existing literature and the realization of ideas. It offers a valuable reference to guide the academic body, government, IT channel partners, and enterprises to establish suitable measures to promote cloud computing initiatives. In conclusion, it helps to develop current knowledge and encourage future studies to delve more into these issues. Therefore, it is a crucial reference in advancing the cloud computing camp in the Middle East.

Research Methodology

Design and Method

To address the research challenges, a systematic review of relevant literature will be used. Tranfield et al. (2003, p. 207) claim that a systematic literature evaluation aids an evidence-based study. The study will utilize a PRISMA flow chart to visually summarize the screening process- noting the inclusive and exclusive criteria.

Search Strategy and Selection Criteria

Using search criteria, a thorough and broad database search was carried out for the purpose of this systematic review to find pertinent and helpful papers. The search criteria utilized by the researcher were cloud computing, Middle East, SME, barriers, hurdles, challenges, and acceptance. To find and choose publications that include specific keywords and phrases,

 ISSN: 1857-7881 (Print) e - ISSN 1857-7431

we used the databases Emerald, Sustainability, and Google Scholar. While accomplishing this, the researchers' argument was settled and put to rest using a pre-established checklist. The examined publications were selected based on inclusion and exclusion criteria, as shown in Table 1 below.

Table 1: Inclusion and Exclusion Criteria

Inclusion	**Exclusion**
Journal Articles	Conference proceedings and dissertations
Available in full-text	Full text not available
Focus on SME	Focus on enterprises in general
Focus on cloud computing on SMEs in the Middle East	Cloud computing in SMEs outside the Middle East

Quality Assessment

The study restricts the search to publications published between 2016 and the first quarter of 2023 to evaluate the quality of the articles to be included in the systematic review analysis. All articles published before January 2016 must be eliminated for this to work. Furthermore, any papers not published in English and not explicitly focused on cloud computing in Middle Eastern SMEs are excluded. Likewise, the research has to focus on cloud computing usage by small and medium-sized enterprises in one or more Middle Eastern nations. Additionally, following extensive database searches, we exported to an MS Excel spreadsheet the titles, names of journals, abstracts, authors' names, keywords, years of publication, and publisher information. These exported data were then carefully examined by the predetermined sanity, compliance, and cleanliness standards.

Quality Assessment using PRISMA

Preferred Reporting Items for Systematic Reviews and meta-analyses (PRISMA), is a well-respected set of guidelines intended to increase the reliability and transparency of these studies (Adewale et al., 2022; Moher et al., 2009). Its main goal is to establish a dependable and exacting methodology for carrying out and disclosing these kinds of investigations. Deploying the PRISMA model facilitates the presentation of accurate and unambiguous results. The results model includes four stages: identification, screening, eligibility, and inclusion, which were strictly observed in this study. There are two primary parts to the PRISMA statement: a flow diagram and a 27-item checklist. The checklist acts as a guide for writers, directing them in the reporting of essential data in their systematic reviews (Shamseer et al., 2015). In contrast, the study selection process is illustrated graphically in Figure 1's flow diagram.

The study topic must be well-defined, and precise inclusion and exclusion criteria must be established. Next, using pre-planned search keywords and techniques, the researcher does a thorough literature search

 ISSN: 1857-7881 (Print) e - ISSN 1857-7431

across many databases (Google Scholar, Sustainability, and Emerald). Subsequently, the search results were filtered according to predefined standards, as previously mentioned, in order to find pertinent research that should be included in the review. The quality and potential biases of the chosen study were carefully evaluated. Data extraction was used to collect relevant data from every encompassed study, including sample size, research design, intervention specifics, results, and findings.

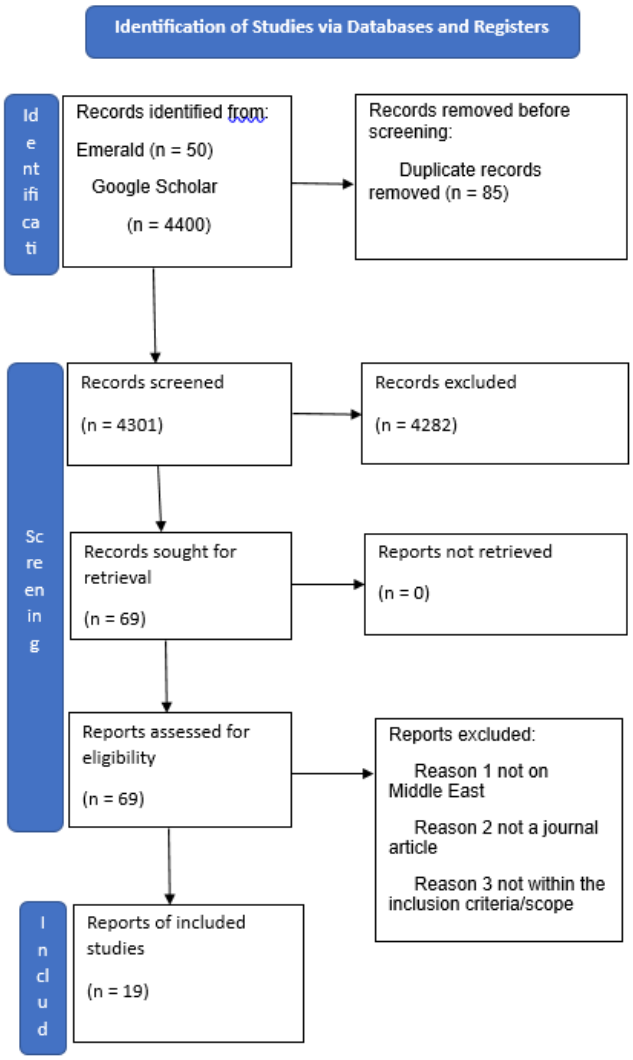

Figure 1: PRISMA Flow Diagram

Research Type

The research conducted is a systematic literature review. This type of research is particularly useful in accomplishing a literature review and in

 ISSN: 1857-7881 (Print) e - ISSN 1857-7431

seeking patterns and missing links in the intended literature. Various studies enabled us to have a research synthesis on the challenges that SMEs in the Middle East face in the adoption of cloud computing.

Data Collection Method

For data collection, a systematic search for relevant literature in academic databases based on terms related to cloud computing and SMEs in the Middle East region was conducted. The selection approach ensured that only perfect articles were included in the review. The first step was initially to review the title and abstract of the potential articles and then, from the filtered list, go through the full text.

Quantitative / Qualitative Analysis

4474 results were found after a comprehensive database search. After document filtering was used to remove duplicates, 85 papers were discarded. Four thousand two hundred eighty-two papers were eliminated using the articles and abstracts screening approach because they needed to fulfill the inclusion criteria out of the 4301 articles the researcher had assessed. Only 19 of the 69 publications evaluated completely satisfied the requirements to be included in this systematic review. This process is described in depth in the PRISMA protocol. Figure 2 presents the approach and results for all 19 studies that satisfied the requirements. The distribution of the included papers in the systematic review according to the research methodology is shown in Figure 2. Only one study employed the systematic review methodology; thirteen used the quantitative method, and five used the qualitative method. This suggests that studies on cloud computing in the Middle East frequently employ quantitative research designs.

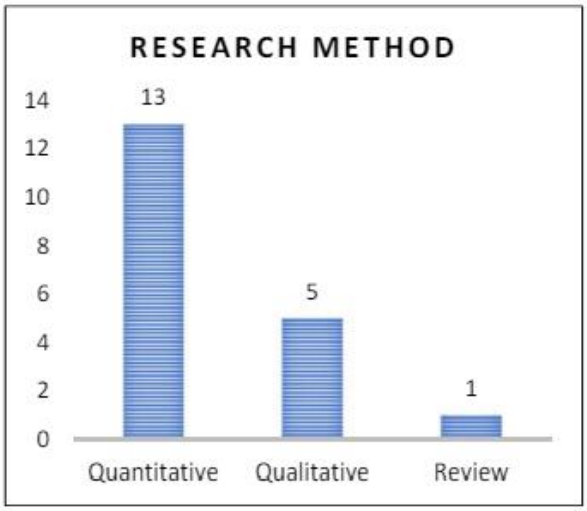

Figure 2: Distribution of Included Studies

 ISSN: 1857-7881 (Print) e - ISSN 1857-7431

Findings and Discussion

Numerous implicational research carried out in Middle Eastern nations has demonstrated that ignorance of Industry 4.0 (Suresh et al., 2018) and its components, including cloud computing (Alsafi & Fan, 2020), is the cornerstone of the hurdles that render cloud computing unappealing to SMEs. Many Middle Eastern countries now understand the importance of IT in growing and maintaining their economies (Shqair & Altarazi, 2022). However, many SMEs still need to learn that cloud computing is a component of the fourth industrial revolution. According to research done in Jordan (Shqair & Altarazi, 2022) and Saudi Arabia (Alsafi & Fan, 2020), the SMES need help to embrace and migrate to the cloud due to their lack of experience and understanding of cloud computing features.

Challenges in Cloud Computing Adoption for SMEs

Financial Resources Obstacles

Finance is essential for SMEs to utilize cloud computing successfully. A study carried out in Saudi Arabia discovered that cloud-computing services are rather expensive (Alsafi & Fan, 2020). Finding funding is a hurdle (Otman, 2021). One barrier that prevents SMEs from readily adopting cloud-computing services is the cost of acquiring cloud-computing infrastructure. In addition, the adoption of cloud computing in most cases entails not just the costs of infrastructure but also expenses related to training employees, upgrading legacy systems, as well as ensuring cybersecurity compliance. These hidden costs exacerbate financial pressures and can discourage SMEs from leveraging cloud solutions, despite their long-term benefits.

Business Compatibility

Research has also shown that one of the biggest obstacles to SMEs' successful adoption of cloud computing is its incompatibility with their diverse company operations. The degree to which new technology is compatible with organizational practices is known as compatibility. As a result, an invention that conflicts with SMEs' values is abandoned (Khayer et al., 2021).

Lack of Competition

Most company owners and upper management firmly believe that most of their rivals need to utilize cloud computing services, which presents another barrier to SMEs' adoption of cloud computing. The business adopts a fire brigade strategy, as there seems to be intense rivalry now (Tawfik et al., 2023). This perception creates competitive pressure for SMEs to adopt cloud solutions, yet many lack the resources, technical expertise, or strategic clarity needed to implement these services effectively, further widening the

 ISSN: 1857-7881 (Print) e - ISSN 1857-7431

technological and operational gap between small enterprises and larger, more cloud-savvy competitors.

Security Concern

Concerns about security and privacy are still another significant challenge preventing Middle Eastern SMEs from adopting cloud computing (Lutfi, 2022). Exploited system vulnerabilities, compromised credentials, APT, hacked interfaces and APIs, DoS attacks, shared technology and shared danger, data breaches, permanent data loss, inadequate diligence, cloud service abuse, and the APT parasite are among the frequently recognized security challenges (Alrababah, 2023). Scholars perceive security and privacy as the primary barriers preventing Small and Medium Enterprises from adopting cloud computing (Hamdi et al., 2021, p. 605).

Top Management Decisions

The effective use of cloud computing by SMEs depends on top management support. In addition to managing resources, they establish goals. It is always challenging to get upper management to agree to provide adequate funding or resources for adoption (Amron et al., 2019, p. 1055). The value cloud computing services bring to the company, particularly in cost savings, data management, and self-service capabilities, needs to be communicated well to management. This is necessary since top management's commitment influences organizational culture and readiness for change, which are critical for overcoming resistance and ensuring smooth cloud adoption.

Government Policies and Laws

Abell et al. (2021) pointed out that while some have restricted operating regulations, government laws and policies also have a part to play in adopting cloud computing services. Several nations worldwide, notably those in the Middle East, lack legal frameworks governing the use of technology. This challenge causes SMEs to doubt implementing cloud computing in their operations. One major barrier to cloud computing adoption by SMEs in the Middle East, particularly in emerging nations, has been the government's indifference to providing venues for user education (Alsharari et al., 2020, p. 299).

Breakdown in the Infrastructure

According to Al-jabri and Alabdulhadi (2016), organizations' concern about losing significant investments in their computing infrastructure has been noted as a barrier that causes them to reconsider embracing cloud computing. One of the main challenges to adopting cloud computing is the high cost of infrastructure and equipment (Lutfi, 2022). This challenge pertains to internet

 ISSN: 1857-7881 (Print) e - ISSN 1857-7431

connectivity in several ways, including price, speed, and stability, so that early-stage startup companies and prospective customers interested in the innovative services these startups offer may connect to the internet. A similar investment in communication infrastructure is needed for cloud computing adoption, which means additional costs. SMEs are so discouraged from adopting cloud computing due to this hurdle.

Lock-ins from Vendors or Providers

Research findings also indicate that SMEs' apprehension about having their data exclusively managed by one supplier may deter their adoption of cloud computing services. The phenomenon of vendor lock-in has been identified as a plausible obstacle to the widespread adoption of cloud computing, as it binds firms to a single provider, even without technological use (Alsafi & Fan, 2020). There is evidence that the incapacity of cloud computing users to maintain total control over their data needs to be revised (Alanezi, 2018). They depend on the outside organization or service provider for data control and management (Alsharari et al., 2020).

The study established that all these barriers are closely linked, which is why SMEs in the Middle East still rarely implement cloud computing. There is a need to enhance the awareness of these barriers and partially embark on security enhancement to support the integration of the systems. The results presented in this paper align with prior studies on the determinants of cloud computing adoption. However, it also states that SMEs in the Middle East have several significant problems that differ from those in other regions. For instance, it is evident that cultural constraints and the state of the economy of a particular region mostly influence the barriers.

Conclusion

The many challenges that stand in the way of Middle Eastern SMEs embracing cloud computing have been identified and documented in this study. The adoption of cloud computing among SMEs faces significant challenges that hinder its widespread implementation and acceptance. Key barriers include a lack of competition among cloud service providers, restrictive government policies and regulations, and financial constraints that limit SMEs' ability to invest in new technologies. Concerns about data security and privacy, coupled with apprehensions surrounding top management decisions, further exacerbate resistance to cloud adoption. Additionally, the incompatibility of cloud solutions with SMEs' diverse operational needs, alongside the fear of losing substantial investments in existing computing infrastructure, causes many SMEs to reconsider transitioning to cloud-based systems. The literature review indicates that the numerous advantages of cloud computing services for Small and Medium Enterprises in the Middle East may

 ISSN: 1857-7881 (Print) e - ISSN 1857-7431

not be fully realized in this fourth industrial revolution era unless specific barriers are removed, including those related to infrastructure, security, finance, government policies, and laws, awareness/knowledge, and top management decision-making.

Addressing these challenges requires a multi-faceted approach, thus, Middle Eastern small and medium-sized businesses must combine their reliance on top management assistance with their access to cutting-edge technologies.

Recommendations

Everything depends on knowledge to succeed. Getting the necessary information is the first step toward a smooth and successful adoption of cloud computing (Yoshino & Taghizadeh Hesary, 2016). The relevant parties in every Middle Eastern small and medium-sized enterprise's IT department must take action that is more significant. According to Alghamdi (2019), for SMEs to operate as they should, their technical or operational team has to become knowledgeable about cloud computing. A lack of ICT proficiency hampers the need to be improved in cloud computing. Furthermore, the government's organization of educational initiatives has the potential to reduce technological obstacles to cloud computing adoption (AL-Shboul, 2019).

Reliability, familiarity, and regular use of the technology can mitigate the effect of perceived complexity on trust (Alsmadi et al., 2022). Adopting cloud computing and employee training, particularly for IT staff, can only happen when upper management is persuaded and prepared to back the move. Alsmadi et al. (2022) reported that cloud-computing organizations may devise strategic plans to enhance service support, accessibility, security, and privacy protocols by using the constraints that have been identified. A robust cloud strategy that addresses legal and regulatory considerations, infrastructure, and the supply side of the cloud economic ecosystem, government cloud use, financial repercussions, and human resources are necessary to implement cloud computing effectively (Skafi et al., 2020).

Policies ought to consider the diversity of cloud consumers, the range of cloud business models and services, and the intricacy of the cloud economy (Skafi et al., 2020, p. 79168). Additionally, [6] suggests that management may alter this circumstance if they can teach staff members about the new technology's advantages, including its relative necessity and the need to accept it. The government should start an intervention program to help SMEs, such as Oman's Riyaadah strategy (Alouffi et al., 2021). Riyaadah is recognized as a consultative body since it offers non-financial support to businesspersons and aids them via feasibility studies, training, consulting, and promoting small and medium-sized company (SME) products at domestic and international exhibitions. The Middle Eastern governments should establish policies that

 ISSN: 1857-7881 (Print) e - ISSN 1857-7431

encourage enterprises to use cloud computing for their operations (AL-Shboul, 2019).

In addition, it is plausible that cloud computing's comparative advantage may only fully realize the organization's economic value with a balance between technology potential and top management support (Tawfik et al., 2022). For this reason, the computer supply firm has to properly inform upper management about the comparative benefits of cloud computing adoption. Convincing Small and Medium Enterprises that cloud computing reduces operating expenses and boosts productivity is one method the provider may use to win over users to their cause (Nassoura & Hassan, 2021). Providers must ensure that data is safe to eliminate or reduce the anxiety of securing cloud computing. According to a survey in Saudi Arabia, more SMEs would use cloud computing services if there is proof of data protection and robust security measures. Furthermore, Alsmadi et al. (2022) suggested implementing a strategy plan to improve security, trust, and service accessibility.

Limitations

There are several limits to this systematic review of research on challenges that SMEs face while using cloud computing. Initially, the examination focused on works released in 2019 and the first quarter of 2023. The results, therefore, are restricted to these particular years. Additionally, specific consideration was paid to the challenges or obstacles that SMEs in the Middle East faced when utilizing the four databases used explicitly for this purpose. According to this, only papers that were written in English were taken into account. The knowledge that all Middle Eastern nations also speak Arabic creates a constraint for research.

The first limitation of this study lies in the point that it analyses data from published sources, meaning that the information may only reflect some of the obstacles that SMEs experience in the Middle East. Moreover, applying the inclusion criteria, certain research with the given topic can have been published in languages other than English or before/after the specified period. Future studies should overcome these limitations by including more studies and conducting survey research to provide evidence of the facts.

Suggestions for Further Studies

Further evaluations may broaden the review's scope in terms of the year covered, databases examined, and number of papers examined, contingent upon the limitations noted in this one. Correspondingly, it is possible to compare the challenges faced by the Middle East and other continents in adopting cloud computing

 ISSN: 1857-7881 (Print) e - ISSN 1857-7431

Conflict of Interest: The author reported no conflict of interest.

Data Availability: All data are included in the content of the paper.

Funding Statement: The author did not obtain any funding for this research.

References:

1. Abell, T., Husar, A., & May-Ann, L. (2021). Cloud Computing as a Key Enabler for Digital Government Across Asia and the Pacific.
2. Adewale, S., Omodan, B. I., & Awodiji, O. A. (2020). A Systematic Review of Post-COVID-19 Pandemic Strategies to Improve Instruction of Technical and Vocational Education and Training in Nigeria. *Education*, *15*(2), 200-210.
3. Ajimoko, O. J. (2018). Considerations for the Adoption of Cloudbased Big Data Analytics in Small Business Enterprises. *Electronic Journal of Information Systems Evaluation*, *21*(2), 63-79.
4. Alanezi, M. A. (2018). Factors influencing cloud computing adoption in Saudi Arabia's private and public organizations: a qualitative evaluation. *International Journal of Advanced Computer Science and Applications*, *9*(4).
5. Alghamdi, F. A. (2019). *An Enhanced Conceptual Model of Factors Affecting the Adoption of Cloud Computing in SMEs: A Case Study of Saudi Arabia* (Doctoral dissertation, University of Canberra).
6. Al-Jabri, I.M. and Alabdulhadi, M.H., 2016. Factors affecting cloud computing adoption: perspectives of IT professionals. *International Journal of Business Information Systems*, *23*(4), pp.389-405.
7. Almorsy, M., Grundy, J., & Müller, I. (2016). An analysis of the cloud computing security problem. arxiv preprint arXiv:1609.01107.
8. Almubarak, S.S. (2017). Factors influencing the adoption of cloud computing by Saudi university hospitals. *International Journal of Advanced Computer Science and application*, 8(1).
9. Alouffi, B., Hasnain, M., Alharbi, A., Alosaimi, W., Alyami, H., & Ayaz, M. (2021). A systematic literature review on cloud computing security: threats and mitigation strategies. *Ieee Access*, *9*, 57792-57807.
10. ALRABABAH, Z. (2023). Barriers to Cloud Computing Adoption Among SMEs in The Middle East: A Systematic Review. *Journal of Theoretical and Applied Information Technology*, *101*(17).
11. Al-Ruithe, M., Benkhelifa, E., & Hameed, K. (2018). Key issues for embracing the Cloud Computing to adopt a digital transformation: A study of Saudi public sector. *Procedia computer science*, 130, 1037-1043.

 ISSN: 1857-7881 (Print) e - ISSN 1857-7431

12. Alsafi T., & Fan, I. (2020a) Cloud computing adoption barriers faced by Saudi manufacturing SMEs. In: 15th Iberian Conference on Information Systems and Technologies (CISTI), 24-27 June 2020, Sevilla, Spain. https://doi.org/10.23919/CISTI49556.2020.9140940
13. Alsafi, T., & Fan, I. S. (2020b). Investigation of cloud computing barriers: a case study in Saudi Arabian SMEs. *Journal of Information Systems Engineering and Management*, *5*(4), em0129.
14. Alsharari, N. M., Al-Shboul, M., & Alteneiji, S. (2020). Implementation of cloud ERP in the SME: evidence from UAE. *Journal of Small Business and Enterprise Development*, *27*(2), 299-327.
15. AL-Shboul, M. D. A. (2019). Towards better understanding of determinants logistical factors in SMEs for cloud ERP adoption in developing economies. *Business Process Management Journal*, *25*(5), 887-907.
16. Alsmadi, D., Halawani, M., Prybutok, V., & Al-Smadi, R. (2022). Intention, trust and risks as core determinants of cloud computing usage behavior. *Journal of Systems and Information Technology*, *24*(3), 178-201.
17. Amron, M. T., Ibrahim, R., Bakar, N. A. A., & Chuprat, S. (2019). Determining factors influencing the acceptance of cloud computing implementation. *Procedia Computer Science*, *161*, 1055-1063.
18. Baral, M. M., & Verma, A. (2021). Cloud computing adoption for healthcare: An empirical study using SEM approach. *FIIB Business Review*, 10(3), 195–207. https://doi.org/10.1177/23197145211012345
19. Basahel, A., Yamin, M., & Drijan, A. (2016). Barriers to cloud computing adoption for SMEs in Saudi Arabia. *BVICAM's International Journal of Information Technology*, 8(2), 1044-1048.
20. Chemjor, E. M., & Maru, L. (2017). Effect of user perception on the relationship between technology context and adoption of cloud computing: Evidence from SMES in Nairobi county, Kenya. *V (11)*, 10-28.
21. Čičak, B., Gaši, N., & Ćosić, M. (2023). Main types of cloud services - explained. *Nauka i Tehnologija*, 11(1), 17–26. https://doi.org/10.58952/nit20231101017
22. Dixit, A., Sharma, D. P., Sharma, S. K., & Dhaka, M. (2021, December). A brief review of Data Analytics approach for Small and Medium Scale Enterprises over Clouds. In *2021 International Conference on Computational Performance Evaluation (ComPE)* (pp. 878-885). IEEE.
23. Hamdi, M., Olayah, F., Al-Awady, A. A., Shamsan, A. F., & Ghilan, M. M. (2021). Attitude towards adopting cloud computing in the saudi

 ISSN: 1857-7881 (Print) e - ISSN 1857-7431

banking sector. *Intelligent Automation and Soft Computing*, *29*(2), 605-617.
24. IMF (2019). Enhancing the Role of SMES in the Arab World—Some Key Considerations. http://www.imf.org/external/pp/ppindex.aspx
25. Kavitha, S., Srinivasan, S., Manasa, N., & Band, G. (2024). Financial analytical usage of cloud and appropriateness of cloud computing for certain small and medium-sized enterprises. *AIP Conference Proceedings*, 2800(1), 123456. https://doi.org/10.1063/5.0147890
26. Karim, F., & Rampersad, G. (2017). Factors Affecting the Adoption of Cloud Computing in Saudi Arabian Universities. *Computer and Information Science*, 10(2), 109-123.
27. Khayer, A., Jahan, N., Hossain, M. N., & Hossain, M. Y. (2021). The adoption of cloud computing in small and medium enterprises: a developing country perspective. *VINE Journal of Information and Knowledge Management Systems*, *51*(1), 64-91.
28. Lutfi, A. (2022). Understanding the intention to adopt cloud-based accounting information system in Jordanian SMEs. *International Journal of Digital Accounting Research*, *22*.
29. Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & PRISMA Group*, T. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Annals of internal medicine*, *151*(4), 264-269.
30. Nassoura, M. B., & Hassan, S. (2021). Impact of intention to adopt cloud-based human resource management on innovation behaviour: the mediating role of leadership support in smes in Jordan. *PalArch's Journal of Archaeology of Egypt/Egyptology*, *18*(09), 1380-1395.
31. Otman, K. (2021). Small and medium enterprises in the Middle East and North Africa region. *International Journal of Business and Management*, *16*(5), 12-21.
32. Shamseer, L., Moher, D., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., ... & Stewart, L. A. (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. *Bmj*, *349*.
33. Shirazi, F., Seddighi, A., & Iqbal, A. (2017). Cloud computing security and privacy: an empirical study. In International Conference on Human-Computer Interaction (pp. 534-549). Springer, Cham.
34. Shqair, M. I., & Altarazi, S. A. (2022). Evaluating the status of SMEs in Jordan with respect to Industry 4.0: a pilot study. *Logistics*, *6*(4), 69.
35. Skafi, M., Yunis, M. M., & Zekri, A. (2020). Factors influencing SMEs' adoption of cloud computing services in Lebanon: An empirical analysis using TOE and contextual theory. *IEEE Access*, *8*, 79169-79181.

 ISSN: 1857-7881 (Print) e - ISSN 1857-7431

36. Sultan, N. (2014). Making use of cloud computing for healthcare provision: Opportunities and challenges. *International Journal of Information Management*, 34(2), 177–184. https://doi.org/10.1016/j.ijinfomgt.2013.12.011
37. Suresh, N., Hemamala, K., & Ashok, N. (2018). Challenges in implementing industry revolution 4.0 in INDIAN manufacturing SMES: insights from five case studies. *International Journal of Engineering & Technology*, *7*(2.4), 136-139.
38. Tawfik, O. I., Durrah, O., Hussainey, K., & Elmaasrawy, H. E. (2023). Factors influencing the implementation of cloud accounting: evidence from small and medium enterprises in Oman. *Journal of Science and Technology Policy Management*, *14*(5), 859-884.
39. Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British journal of management*, *14*(3), 207-222.
40. Vu, K., Hartley, K., & Kankanhalli, A. (2020). Predictors of cloud computing adoption: A cross-country study. *Telematics and Informatics*, *52*, 101426.
41. Yoshino, N., & Taghizadeh Hesary, F. (2016). Major challenges facing small and medium-sized enterprises in Asia and solutions for mitigating them.