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Doctoral School of Economic and Regional Sciences

INVESTIGATION OF KEY FACTORS AFFECTING CLOUD COMPUTING ADOPTION IN SYRIA

Doctoral (Ph.D.) Dissertation

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1. INTRODUCTION AND OBJECTIVES

In the face of intense market competition and a significantly changing business environment, firms have increasingly been compelled to adopt advanced information technologies (IT) to improve their business operations (Pan and Jang, 2008; Sultan, 2010). As of late, cloud computing has emerged as a leading paradigm in information technology as its utilization is perceived as a significant area for IT innovation and development (Armbrust *et al.*, 2010; Ercan, 2010; Goscinski and Brock, 2010). Cloud computing has become central to many domains of IT, including applications, operating systems, enterprise software, and other technological solutions for firms (Armbrust *et al.*, 2010).

Gartner (Gartner, 2009) defined cloud computing as a style of computing where highly scalable IT capabilities are provided as a service to external users via web technologies. Erdogmus (Erdogmus, 2009) described cloud computing as a pool of highly scalable, virtualized infrastructure suitable for hosting end-user applications that are charged by utilization. (Sultan, 2010) characterized IT capacities that are delivered and consumed in real time over the Internet. Many computing models have aimed to deliver a utility computing vision, and these incorporate cluster computing, grid computing, and, more recently, cloud computing (Buyya *et al.*, 2009; Armbrust *et al.*, 2010).

Cloud computing services, such as enterprise resource planning (ERP), enable users to communicate simultaneously with numerous servers and to exchange data among them (Hayes, 2008). Additionally, network technology and telecommunication have been advancing quickly; they include 3G, FTTH, and WiMAX. Cloud computing services provide users with robust technical support, which can generate significant user demand (Buyya *et al.*, 2009; Pyke, 2009). In this manner, cloud computing offers versatility and adaptability to meet on-demand market needs.

Companies are seeking to align their business processes and their information systems in order to meet their needs with trading partners (Ercan, 2010). In high-tech enterprises, pervasive data transformation practices have become essential for improving operational effectiveness. Developing cloud computing capabilities is crucial for gaining competitive advantage, as the way industries engage with clients is rapidly evolving. It is also becoming an increasingly necessary component of organizations' business strategies (Pyke, 2009). The diffusion of cloud computing has become a major area of research since it empowers firms to execute information exchanges along the value chain (e.g., distribution, finance, manufacturing, sales, customer

service, data sharing, collaboration with partners) (Gartner, 2009; Pyke, 2009). Cloud computing will be adopted by organizations that are likely to utilize a hybrid approach involving on-premises, public, and private cloud services where appropriate (Goscinski and Brock, 2010). The concept of private cloud computing involves organizations deploying key enabling technologies (such as virtualization and multi-tenant applications) to create their own private cloud environment. At that point, individual business units pay the IT department for using standardized services under agreed-upon chargeback mechanisms. For some organizations, this approach is less disruptive than a full migration to the Public Cloud. This approach can make it easier to hand over individual services to third-party providers in the future (Ercan, 2010).

1.1 Research Motivation

The information technology (IT) sector is characterized by rapid evolution and continuous innovation, driven by the global demand for more efficient, scalable, and cost-effective solutions. As organizations strive to improve their operational efficiency and service delivery, the adoption of emerging technologies has become a key strategy in achieving these goals. In recent years, organizations have increasingly turned to cloud technologies to modernize their IT infrastructure. Cloud computing allows users to access computing resources such as servers, storage, and software over the internet, eliminating the need for extensive physical infrastructure and enabling real-time, on-demand service provision.

Cloud computing presents numerous practical advantages for organizations that make it particularly valuable in today's digitally driven environment. These include cost reduction, as it removes the capital expenditure associated with traditional IT infrastructure; scalability, allowing businesses to increase or decrease resources based on demand; flexibility and mobility, enabling users to access systems from any location; faster deployment, reducing time-to-market for services; and automatic updates and maintenance, lowering the burden on internal IT teams. These features collectively contribute to enhanced agility and competitiveness, particularly for small and medium-sized enterprises (SMEs) and startups that may lack the resources for large-scale IT operations. As organizations around the world accelerate their digital transformation efforts, cloud computing continues to play a central role in reshaping business models, enabling innovation, and supporting remote work environments.

In the context of Syria, the adoption of cloud computing is becoming not only beneficial but increasingly necessary. Following years of conflict, Syria is entering a phase of economic rebuilding and institutional restructuring. This period is expected to stimulate a resurgence of business activities across various sectors, particularly within the technology and services industries. As companies seek to modernize operations and meet new demands, cloud-based platforms present a strategic opportunity to overcome traditional limitations in infrastructure, reduce costs, and improve service delivery. Furthermore, cloud solutions offer the potential to support remote collaboration, e-commerce, digital education, and e-government services, all of which are vital for sustainable growth in the post-conflict era.

Nevertheless, the transition toward cloud adoption in Syria is not without challenges. While the benefits of cloud computing are well-documented globally, local conditions pose specific barriers that need to be carefully considered. Decision-makers in Syrian organizations often cite concerns about data security, privacy, regulatory uncertainty, limited internet infrastructure, and lack of technical expertise. These issues can lead to hesitation or delay in adopting cloud technologies, especially in environments where trust in digital systems is not yet fully established.

Moreover, there is a notable absence of academic and empirical research focused on cloud computing in Syria. Most existing studies on cloud adoption are conducted in developed countries or relatively stable emerging markets, with limited applicability to Syria's unique political, economic, and technological context. As a result, there is a significant knowledge gap in understanding the specific needs, perceptions, and decision-making processes of Syrian businesses regarding cloud computing.

This research is therefore driven by the urgent need to bridge this knowledge gap by exploring the critical factors influencing cloud adoption in Syria. By generating context-specific insights, the study aims to support informed decision-making, policy development, and strategic planning among Syrian organizations, IT professionals, and service providers. Ultimately, the findings of this research will contribute to a tailored framework for cloud computing adoption that aligns with Syria's current realities and future aspirations, helping to pave the way for a more resilient, digitally empowered economy.

1.2 Research Problem

Although cloud computing has achieved widespread global adoption and is now considered a cornerstone of modern digital infrastructure, its implementation within Syria remains both limited and poorly understood. In many countries, cloud technologies have accelerated innovation, streamlined operations, and supported new digital business models. However, this global momentum has not been equally reflected in Syria, where the uptake of cloud computing remains sporadic and hindered by a range of contextual challenges. Existing academic literature on cloud computing adoption primarily focuses on developed economies or offers generalized findings from broader developing regions. These studies often overlook the complex and unique socio-political, economic, and technological landscape that characterizes countries like Syria.

Syria is currently undergoing a significant phase of economic and institutional transformation, which introduces new possibilities alongside notable obstacles. As businesses attempt to modernize and align with global trends, the adoption of cloud-based technologies could play a critical role in enabling scalable growth, enhancing service delivery, and fostering innovation. However, the Syrian business ecosystem still faces considerable barriers. Among the most prominent are limited internet and ICT infrastructure, ongoing economic instability, sanctions and trade restrictions, and gaps in digital literacy and workforce training. These issues not only complicate technology adoption but also raise questions about long-term sustainability, data sovereignty, and security.

Such barriers may significantly influence the behavioural intention, perceived usefulness, and organizational readiness to adopt cloud computing technologies in Syria. For instance, organizations may hesitate to transition to cloud platforms due to fears of data breaches, dependency on foreign service providers, or lack of local support expertise. Additionally, regulatory ambiguity concerning data protection and IT governance further complicates the decision-making process for both private enterprises and public institutions.

Despite these pressing concerns, there is a notable absence of localized, empirical research that specifically examines the factors impacting cloud computing adoption in Syria. Most available studies fail to capture the nuanced interplay between cultural attitudes, infrastructural limitations, political constraints, and business priorities that influence technology adoption in fragile or post-conflict settings. Without robust data and analysis grounded in the Syrian

context, policymakers, IT leaders, and business owners lack the insights necessary to develop effective strategies for cloud integration.

This research seeks to address this critical gap in knowledge by systematically exploring and analyzing the key factors that either facilitate or hinder the adoption of cloud computing within Syrian organizations. Through a comprehensive investigation grounded in established theoretical frameworks, the study aims to generate context-specific findings that can inform practical adoption models, policy recommendations, and capacity-building initiatives.

Ultimately, this research will contribute to building a foundation for Syria's digital transformation by supporting more informed, strategic, and sustainable adoption of cloud-based technologies across sectors.

1.3 Research Objectives

This study aims to investigate the key factors influencing the adoption of cloud computing technologies within Syrian business organizations and to evaluate how these factors shape organizational decision-making. The specific objectives of the research are as follows:

1. To examine the current extent of cloud computing adoption among organizations in Syria.
2. To identify the main factors that influence cloud adoption decisions in the Syrian context.
3. To assess the levels of awareness, readiness, and willingness among Syrian firms to implement cloud-based technologies.
4. To evaluate the perceived benefits and concerns, such as security, cost, and scalability, from the perspective of organizational decision-makers.

Although extensive research exists on cloud computing adoption in other regions, there remains a clear gap in the literature concerning the specific conditions affecting adoption in Syria. In particular, little is known about how factors such as security concerns, regulatory frameworks, perceived usefulness, and system functionality impact decision-making in this context. This study seeks to address that gap by providing context-specific insights that can inform future research, policy, and practice.

2 RESEARCH MODEL AND HYPOTHESIS

2.1 Research model

This conceptual model as shown in Figure 1 illustrates the proposed relationships among technological, organizational, and environmental determinants and their influence on the behavioral intention to adopt cloud computing services within the Syrian context. Grounded in the Technology–Organization–Environment (TOE) framework, the model integrates seventeen hypotheses to systematically examine the multidimensional factors that affect cloud adoption decisions.

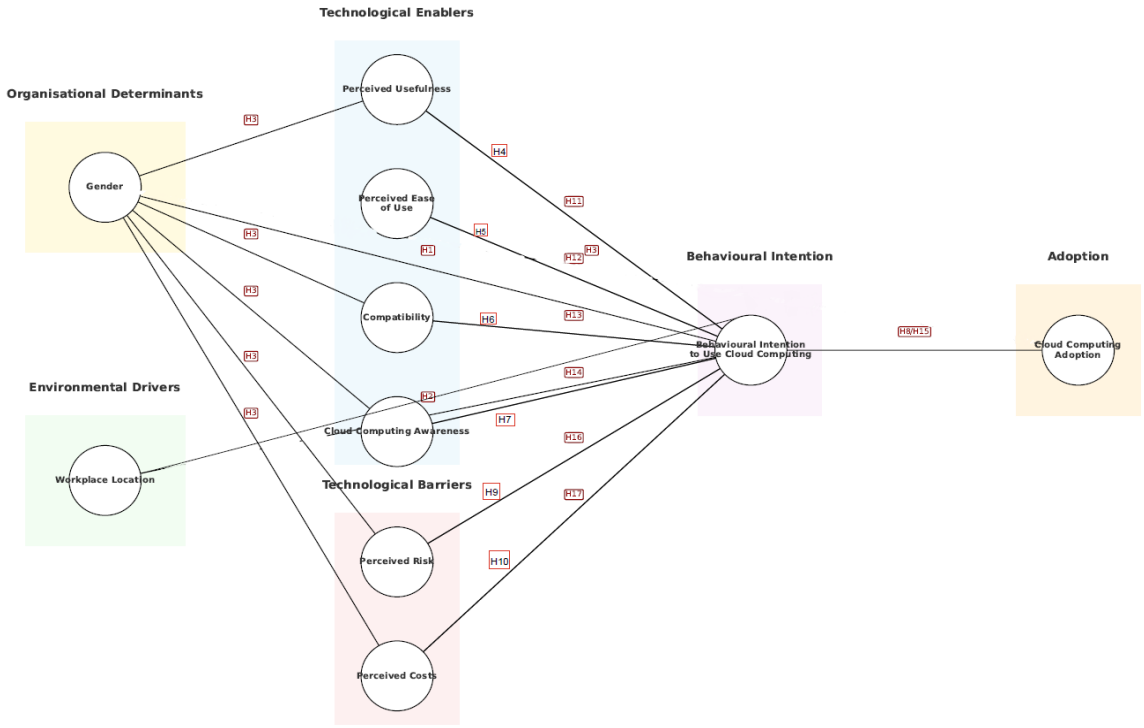

Figure 1:Research Model

Source: Author's own development

2.2 Research Hypotheses

Building on an integrated TAM–TOE framework, (Gangwar, Date and Ramaswamy, 2015) underscore that security perceptions are a key determinant in the adoption of cloud computing. Furthermore, (Xue, Ray and Gu, 2011) experimentally demonstrate that environmental uncertainty encompassing regulatory instability and infrastructural unpredictability

significantly influences how organizations govern their IT infrastructure, highlighting the importance of context in shaping cloud adoption decisions. Usability and perceived benefit must be complemented by contextual feasibility (Phaphoom *et al.*, 2017). Institutional dynamics, such as national ICT agendas and governance capacity play a critical role in shaping how hypotheses are formulated in cloud computing research (Ali and Osmanaj, 2020). Additionally, emerging literature suggests digital literacy should be introduced as a control variable, particularly in countries undergoing digital transformation (Cetindamar, Abedin and Shirahada, 2024) .

Based on the proposed research model and an extensive review of relevant literature, seventeen statistical hypotheses (H1–H17) have been developed to examine the key factors that influence the adoption of cloud computing. These hypotheses are grounded in well-established theoretical frameworks and empirical evidence, aiming to investigate the relationships between technological, organisational, and environmental factors, as well as adoption pathways and the influence of behavioural intention on adoption perceptions.

The seventeen statistical hypotheses are grouped into six main categories that align with the core themes of the research model:

- Technological enablers of intention

H4: There is a significant relationship between behavioural intention to use cloud computing and perceived usefulness.

H5: There is a significant relationship between behavioural intention to use cloud computing and perceived ease of use.

H6: There is a significant relationship between behavioural intention to use cloud computing and compatibility.

H7: There is a significant relationship between behavioural intention to use cloud computing and cloud computing awareness.

- Technological barriers to intention

H9: There is a significant relationship between behavioural intention to use cloud computing and perceived risk.

H10: There is a significant relationship between behavioural intention to use cloud computing and perceived costs.

- Organisational determinants

H1: Gender significantly determines behavioural intention to use cloud computing.

H3: Gender significantly determines behavioural intention to use cloud computing, perceived usefulness, compatibility, cloud computing awareness, cloud computing adoption, perceived risk, and perceived costs.

- Environmental/contextual drivers

H2: The location of the workplace significantly determines behavioural intention to use cloud computing.

- Adoption pathway (intention → adoption)

H8: There is a significant relationship between behavioural intention to use cloud computing and cloud computing adoption.

H15: Behavioural intention to use cloud computing significantly determines cloud computing adoption.

- Impact of behavioural intention on adoption perceptions

H11: Behavioural intention to use cloud computing significantly determines perceived usefulness.

H12: Behavioural intention to use cloud computing significantly determines perceived ease of use.

H13: Behavioural intention to use cloud computing significantly determines compatibility.

H14: Behavioural intention to use cloud computing significantly determines cloud computing awareness.

H16: Behavioural intention to use cloud computing significantly determines perceived risk.

H17: Behavioural intention to use cloud computing significantly determines perceived costs.

3 MATERIALS AND METHODS

This chapter presents the methodology adopted to investigate the adoption of cloud computing among Syrian organizations. The study employed a mixed-methods research design, integrating both quantitative and qualitative approaches to provide a comprehensive understanding of adoption behavior. The research was guided by a pragmatic philosophy, which emphasizes methodological flexibility and practical problem-solving. A deductive approach was used to test hypotheses derived from the Technology–Organization–Environment (TOE) framework and the Technology Acceptance Model (TAM), while an inductive element was incorporated through interviews to capture contextual insights.

A sequential explanatory design was followed. The first phase involved a large-scale survey of 400 IT professionals and managers from both public and private organizations in Syria. The structured questionnaire collected data on technological, organizational, and environmental determinants of adoption, along with demographic and organizational details, cloud usage patterns, motivations, and perceptions. It contained 36 closed-ended questions, including Likert-scale items measuring constructs such as perceived usefulness, ease of use, compatibility, awareness, adoption, perceived risk, and costs. To overcome logistical challenges in Syria, a combination of cluster, convenience, and systematic sampling techniques was applied, ensuring diversity and representativeness in the sample.

The second phase comprised semi-structured interviews with selected stakeholders. These qualitative insights helped validate and enrich the survey results, shedding light on contextual barriers such as infrastructure limitations, vendor mistrust, security concerns, and cost challenges.

Quantitative data were analyzed using SPSS, applying descriptive statistics, Pearson's correlation, regression, and ANOVA, with Spearman's rho correlations conducted to confirm robustness. Qualitative data were thematically analyzed to identify patterns and provide depth to the statistical findings. Ethical approval was obtained prior to data collection, and confidentiality, informed consent, and voluntary participation were strictly ensured throughout the research process.

This mixed-methods design not only captured measurable trends but also revealed contextual challenges to cloud adoption in Syria, underscoring the central role of organizational readiness

particularly infrastructure, training, and support while also highlighting the modest impact of behavioral intention compared to broader organizational and environmental factors.

3.1 HYPOTHESIS OUTCOMES

The summary Table 1 below clearly indicates which hypotheses were fulfilled and which were not, thereby highlighting the key findings and relationships derived from the empirical analysis.

Table 1: Summary of hypothesis results

Source: Author's own development

Hypotheses	Results
H1: Gender determines behavioural intention to use significantly	Not Fulfilled
H2: The location of the workplace determines behavioural intention to use significantly.	Partially Fulfilled
H3: Gender determines behavioural intention to use, perceived usefulness, compatibility, cloud computing awareness, cloud computing adoption, perceived risk and costs significantly.	Not Fulfilled
H4: There is a significant relationship between behavioural intention to use and perceived usefulness.	Not Fulfilled
H5: There is a significant relationship between behavioural intention to use and perceived ease of use.	Not Fulfilled
H6: There is a significant relationship between behavioural intention to use and compatibility.	Not Fulfilled
H7: There is a significant relationship between behavioural intention to use and Cloud computing awareness.	Not Fulfilled
H8: There is a significant relationship between behavioural intention to use and Cloud computing adoption.	Fulfilled
H9: There is a significant relationship between behavioural intention to use and perceived risk.	Not Fulfilled
H10: There is a significant relationship between behavioural intention to use and costs.	Not Fulfilled

H11: Behavioural intention to use determines perceived usefulness significantly.	Not Fulfilled
H12: Behavioural intention to use determines perceived ease of use significantly	Not Fulfilled
H13: Behavioural intention to use determines compatibility significantly.	Not Fulfilled
H14: Behavioural intention to use determines Cloud computing awareness significantly.	Not Fulfilled
H15: Behavioural intention to use determines Cloud computing adoption significantly.	Fulfilled
H16: Behavioural intention to use determines perceived risk significantly.	Not Fulfilled
H17: Behavioural intention to use determines costs significantly.	Not Fulfilled

4 RESULTS AND DISCUSSIONS

This study identifies the factors that influence the decision to adopt cloud computing technologies in Syria and examines the relationships between these factors and adoption behavior, which will be determined based on the Technology-Organization-Environment (TOE) framework. Additionally, this research presents the challenges and issues of cloud computing adoption.

4.1 Conclusion and recommendations

4.1.1 Conclusion

This research has comprehensively examined the factors influencing the adoption of cloud computing in Syrian organizations using a mixed-methods approach grounded in the Technology-Organization-Environment (TOE) framework and Technology Acceptance Model (TAM). The study was structured into two phases exploratory and empirical combining qualitative interviews and a large-scale quantitative survey to uncover both general and context-specific determinants of cloud computing adoption.

The qualitative findings from in-depth interviews revealed critical concerns such as infrastructural limitations, organizational resistance to change, lack of trust in cloud service providers, and cost misconceptions. These insights guided the refinement of the conceptual model and survey instrument. The quantitative phase involved the collection of responses from 400 IT professionals and decision-makers across Syria, providing a robust dataset for hypothesis testing. The findings indicated that organizational factors such as IT readiness, availability of technical support, and staff training were the most influential in shaping behavioral intention toward cloud computing adoption. Technological variables like perceived usefulness and ease of use, while significant in developed contexts, showed limited impact. Environmental factors such as regulatory support and vendor service quality showed mixed effects.

Statistical tests such as ANOVA and Pearson correlation revealed that gender and cloud awareness did not significantly affect behavioral intention, while workplace location showed only a weak but statistically significant relationship in one specific context (“assuming I had access to Cloud computing, I intend to use it”). Although perceived risk and perceived cost

were frequently cited in literature as barriers, this study's quantitative results did not find them to be significant predictors of behavioral intention. The most notable finding was that behavioral intention significantly predicted cloud computing adoption, confirming H8 and H15. This research offers original empirical evidence from an under-researched context and highlights unique challenges for Syrian organizations, including limited local data centers, unstable internet connectivity, and the absence of clear legal frameworks for data security and privacy.

Overall, this research advances the understanding of cloud adoption in developing and conflict affected regions by offering a localized view supported by theoretical rigor and empirical validation. The findings underscore the importance of building internal capacities, increasing awareness, and implementing supportive policy frameworks to encourage wider cloud adoption. These insights can guide stakeholders including policymakers, IT leaders, and cloud providers in shaping strategies tailored to the specific needs and limitations of the Syrian digital ecosystem.

4.1.2 Recommendations

Based on both qualitative and quantitative findings, the study offers strategic recommendations to support the successful implementation of cloud computing in Syrian organizations. These recommendations are tailored for policymakers, senior management, IT teams, and cloud service providers, aiming to dismantle key adoption barriers and harness existing enablers. Specifically, policymakers are urged to prioritize the establishment of clear legal frameworks and inter-institutional coordination to address prevalent concerns related to data protection and cloud vendor accountability (Alkhater, 2022). Capacity-building efforts should include localized training tailored to organizational contexts and digital maturity (Haryanti, Rakhmawati and Subriadi, 2023). Enhancing SME participation in the cloud ecosystem necessitates streamlined procurement regulations and user-friendly onboarding frameworks to reduce entry barriers and promote broader engagement (OECD, 2019). Public-private partnerships could play a crucial role in building cloud governance structures that align with sector-specific needs (Li and Guo, 2024). Finally, targeted incentives such as cloud adoption tax credits or subsidized bandwidth can accelerate diffusion in nascent digital economies (Andres *et al.*, 2020).

Organizational factors emerged as some of the most influential predictors of cloud adoption. Therefore, Syrian organizations should prioritize enhancing their internal capacity and readiness. This can be achieved by developing comprehensive digital transformation plans that incorporate cloud computing into core business operations, equipping IT departments with modern cloud-compatible tools, and offering continuous training and professional development to build employee competence in cloud management. Furthermore, assigning specialized teams or roles to manage cloud transitions, from planning through implementation and monitoring, will support smoother integration and adoption.

A second key recommendation is the strengthening of national ICT infrastructure and the development of local cloud capabilities. Infrastructure limitations, such as unreliable internet and the lack of local data centers were identified as significant obstacles. To address this, Syria should invest in the expansion of high-speed broadband to enable secure, real-time access to cloud platforms. Establishing domestic data centers and edge computing facilities will also mitigate concerns related to latency, data security, and regulatory compliance. These efforts could be further enhanced through public-private partnerships (PPPs) aimed at co-developing scalable and resilient cloud ecosystems.

Additionally, widespread awareness and cultural change initiatives are necessary to overcome internal resistance and low cloud literacy among decision-makers. Awareness programs and workshops that highlight the strategic value of cloud technologies should be rolled out across government bodies and the private sector. Incorporating cloud-related topics into university curricula, offering industry certifications, and facilitating professional seminars can promote long-term cloud literacy. A culture of innovation and experimentation should be cultivated within organizations, encouraging the implementation of small-scale pilot projects that showcase the tangible benefits and return on investment of cloud solutions. Sharing successful case studies from comparable economies or regional contexts can further reinforce the value of cloud adoption.

Developing a robust regulatory and legal framework is equally critical. Many organizations remain cautious due to concerns over data security, privacy, and the lack of legal protection. Therefore, it is essential to enact and enforce comprehensive data protection laws that regulate data storage, cross-border transfers, and user consent. Additionally, compliance standards for cloud providers should be established to govern cybersecurity, service-level agreements (SLAs), and risk management practices. Regulatory bodies or digital transformation authorities

could be created to oversee and guide cloud service use, particularly in sensitive sectors such as healthcare, education, and finance. These frameworks should be aligned with international best practices while remaining sensitive to Syria's unique legal, social, and economic context.

Financial incentives are also necessary to make cloud adoption more accessible, especially for small and medium-sized enterprises (SMEs). To alleviate cost-related barriers, the government could introduce cloud adoption grants, tax reliefs, or subsidized financing programs. Cloud vendors should be encouraged to offer flexible and scalable pricing models that accommodate varying organizational sizes and needs. Moreover, consulting services should be made available to assist organizations in evaluating the cost-benefit of adoption, selecting appropriate deployment models (such as hybrid or community clouds), and navigating the transition process effectively.

Finally, fostering a vibrant local cloud services ecosystem will be key to ensuring long-term digital sovereignty and innovation. Currently, overreliance on foreign vendors limits local control and innovation potential. Syria should promote local entrepreneurship in the cloud sector by supporting tech startups and infrastructure firms. Creating national or community cloud platforms dedicated to public institutions and essential sectors can enhance centralized and secure data management. Collaboration networks between local technology providers, academic institutions, and government agencies should also be established to drive innovation in cloud-based applications tailored to sectors like e-government, education, and healthcare.

By implementing these strategic recommendations, Syria can create a more supportive environment for cloud computing adoption one that not only addresses current limitations but also empowers organizations to harness the transformative potential of cloud technologies in the years to come.

4.2 Limitation of the study

While this research makes a significant contribution to the understanding of cloud computing adoption within the Syrian context, several limitations should be acknowledged. These limitations may have influenced the scope, generalizability, and depth of the findings, and they also provide opportunities for future research.

- Geographical and Contextual Constraints

The study was geographically confined to organizations operating in Syria, a country that presents a unique combination of economic, infrastructural, and political challenges. Although this focus was intentional and relevant to the research objectives, the findings may not be generalizable to other developing or conflict-affected countries without careful contextual adaptation.

- Sample Composition and Representativeness

The data collected in the quantitative phase came primarily from IT professionals and decision-makers across various organizations. While their insights are crucial, the sample may not fully represent the views of other important stakeholders such as general employees, administrative staff, or end-users of cloud-based systems. Moreover, the use of non-probability sampling techniques (e.g., purposive and convenience sampling) may have introduced sampling bias, limiting the representativeness of the population.

- Reliance on Self-Reported Data

Both the survey and the interview data relied on participants' self-reported perceptions and experiences, which may be influenced by social desirability bias or inaccuracies in self-assessment. Although anonymity and confidentiality were maintained to reduce these risks, the subjective nature of responses must be acknowledged as a limitation.

- Cross-Sectional Design

The research adopted a cross-sectional design, capturing data at a single point in time. As such, it does not reflect changes in organizational behavior, technology readiness, or policy developments over time. A longitudinal approach would have provided richer insights into how cloud adoption evolves under dynamic conditions, especially in a rapidly changing digital environment.

- Limited Scope of Variables

While the conceptual model integrated key constructs from the TOE and TAM frameworks, it could not incorporate every potential variable influencing cloud computing adoption. Factors such as vendor lock-in, political instability, international sanctions, and user experience design were not explicitly analyzed but may hold significant relevance in the Syrian context.

- Likert-Scale Measurement and Statistical Assumptions

A methodological limitation of this study lies in the treatment of Likert-scale responses as interval data for parametric analyses such as ANOVA and regression. While this approach is widely accepted in large-sample research, it remains debated in methodological literature. To mitigate this concern, the study systematically applied assumption testing (normality and variance checks) and confirmed results through non-parametric robustness checks. Nevertheless, the inherent subjectivity in treating ordinal data as interval-level should be acknowledged as a potential limitation.

4.3 Future suggestions

While this study has provided valuable insights into the factors influencing cloud computing adoption in Syrian organizations, several important areas merit further investigation. Building on the findings, limitations, and contextual challenges addressed in this research, the following suggestions are offered for future academic inquiry and practical investigation.

- Conduct Longitudinal Studies

This study utilized a cross-sectional design, capturing data at a single point in time. Future research should adopt longitudinal approaches to monitor how cloud computing adoption evolves over time, particularly as the regulatory environment, infrastructure, and organizational capabilities develop. Long-term studies would provide more accurate insights into the adoption lifecycle and post-adoption outcomes.

- Expand the Demographic and Sectoral Scope

Future studies should include a broader range of participants, including non-IT employees, general users, and top-level executives, to gather diverse perspectives. Additionally, sector-specific investigations (e.g., healthcare, education, and manufacturing) could provide more detailed insights into industry-specific adoption barriers and requirements. Comparative studies between public and private sectors would also enhance the understanding of institutional differences in adoption readiness.

- Include Additional Variables and Theoretical Models

Although the study was grounded in the TOE and TAM frameworks, future researchers may consider incorporating additional constructs such as trust in government, user experience

design, vendor lock-in concerns, cloud service maturity, and digital leadership. Further, the application of alternative models such as the Unified Theory of Acceptance and Use of Technology (UTAUT) could offer complementary insights.

- Explore Post-Adoption and Impact Evaluation

This study focused on behavioral intention and readiness to adopt cloud computing. Future research could explore post-adoption behaviors, including satisfaction levels, impact on organizational performance, return on investment (ROI), and change in operational efficiency. Evaluating the outcomes of cloud adoption could guide strategic decisions and help refine implementation practices.

- Conduct Comparative Regional Studies

To place Syrian cloud adoption in a broader regional context, future studies could perform comparative analyses across other Arab or developing countries. This would help identify shared challenges and unique enablers, offering valuable policy insights and best practices that can be adapted across borders.

- Assess the Role of Policy and Governmental Support

Further research should examine the influence of national digital policies, legal frameworks, and government initiatives on cloud adoption. This includes assessing the effectiveness of cybersecurity laws, data localization requirements, and public-private partnerships. Policy-oriented studies could support governments in creating more enabling environments for digital transformation.

4.4 New scientific results

This chapter outlines the principal scientific contributions derived from the research findings. Each result is directly linked to the key hypotheses presented in the conceptual framework and emphasizes how the study expands the academic discourse on cloud computing adoption in fragile and underrepresented contexts, particularly Syria.

1. Technological Enablers of Intention: The results indicate that H4, H5, H6, and H7 were not fulfilled. This means that in the Syrian context, perceived usefulness, ease of use,

compatibility, and awareness do not significantly predict behavioural intention to adopt cloud computing. This contrasts with the expectations of the Technology Acceptance Model (TAM) and the TOE framework, which typically place these variables as primary adoption drivers. The lack of significance suggests that in fragile environments with sanctions, infrastructure gaps, and vendor restrictions, technological perceptions are outweighed by systemic and environmental constraints, thereby limiting their impact on adoption intentions. These null findings were confirmed through ANOVA diagnostics and robustness checks (normality, variance homogeneity, Mann–Whitney/Kruskal–Wallis), strengthening the validity of the conclusions.

2. Technological Barriers to Intention: Both H9 and H10 were not fulfilled, indicating that perceived risk and perceived costs do not significantly affect behavioural intention in the studied context. This diverges from many studies in stable economies where these barriers often deter adoption. In Syria, where risk and cost concerns are part of the general business environment, they appear to have little marginal impact on the decision to adopt cloud services. Non-parametric robustness checks yielded consistent results, confirming that these barriers were not significant even under alternative statistical assumptions.
3. Organisational Determinants: The findings show that H1 and H3 were not fulfilled, meaning gender does not significantly determine behavioural intention, perceptions, or adoption outcomes. This contrasts with certain developing-country studies where demographic variables influence adoption. In Syria's case, structural and environmental barriers appear to dominate decision-making, minimising demographic effects. ANOVA diagnostics (normality, variance homogeneity) and Mann–Whitney U tests confirmed the robustness of these null effects.
4. Environmental/Contextual Drivers: H2 was partially fulfilled. Workplace location had a significant effect only on the statement "Assuming I had access to cloud computing, I intend to use it." The eta squared value ($\eta^2 = 0.020$) indicates a weak relationship. This suggests that geographical variation plays only a minor role, as infrastructural and policy challenges are pervasive nationwide. As only two workplace groups (capital vs. city) existed, post hoc tests were not applicable. Full inferentials (Levene's test, ANOVA, effect size, CI) were reported to substantiate this partial effect.
5. Adoption Pathway (Intention → Adoption): H8 and H15 were fulfilled, confirming a strong link between behavioural intention and actual adoption. This aligns with established adoption theories, reinforcing that fostering intention can directly lead to adoption even in

high-risk environments if the necessary infrastructure and access are available. Both parametric regression and non-parametric robustness checks supported this pathway.

6. Impact of Behavioural Intention on Adoption Perceptions: None of H11**,** H12**,** H13**,** H14**,** H16, or H17 were fulfilled. This means behavioural intention does not significantly determine post-adoption perceptions of cloud computing. In the Syrian environment, perceptions seem to be shaped more by real-world operational realities (e.g., service reliability, vendor access, sanctions impact) rather than by pre-adoption expectations. The robustness checks confirmed these null relationships across all methods applied.

4.5 Summary

This PhD research investigated the key factors influencing the adoption of cloud computing services in Syrian organizations using a mixed-methods approach. The study was motivated by the increasing global interest in cloud technologies and the noticeable gap in scholarly research addressing adoption within conflict-affected and resource-constrained environments such as Syria. Despite the growing relevance of cloud computing in enabling digital transformation, especially in developing regions, Syria has remained underrepresented in empirical literature. This study aimed to bridge that gap by providing a structured and contextual analysis based on both theoretical foundations and real-world data.

The research was grounded in the integration of two established theoretical models: the Technology–Organization–Environment (TOE) framework and the Technology Acceptance Model (TAM). These models were combined to construct a comprehensive conceptual framework consisting of technological, organizational, and environmental variables hypothesized to influence behavioral intention to adopt cloud computing.

The study was conducted in two main phases. The first phase, a preliminary (exploratory) phase, involved qualitative data collection through in-depth interviews with IT professionals and organizational decision-makers. This phase provided valuable context-specific insights and revealed emerging themes, including infrastructure limitations, trust issues, and organizational resistance to change. These qualitative insights were used to refine the research model and inform the design of the survey.

The second phase involved empirical (quantitative) research, using a structured questionnaire distributed to 400 participants from various sectors in Syria. Statistical analysis, including

descriptive statistics, ANOVA, and Pearson correlation, was conducted using SPSS to test the relationships between the independent variables and behavioral intention to adopt cloud computing.

The findings of the study revealed that, contrary to expectations from prior TAM- and TOE-based research, technological enablers such as perceived usefulness (H4), perceived ease of use (H5), compatibility (H6), and awareness (H7) did not significantly influence behavioural intention in the Syrian context. Similarly, technological barriers perceived risk (H9) and perceived cost (H10) were found not to be significant predictors. Organisational determinants related to gender (H1, H3) were also not significant. Environmental/contextual drivers (H2) showed only a weak, partial effect, with workplace location influencing intention in limited cases.

In contrast, the adoption pathway (H8, H15) was strongly supported, confirming that behavioural intention significantly predicts actual cloud computing adoption. However, behavioural intention did not significantly influence post-adoption perceptions (H11–H14, H16, H17), suggesting that in Syria, user perceptions are shaped more by real-world operational experiences after adoption rather than by pre-adoption expectations.

These results underscore that in fragile and sanction-affected environments, traditional technological predictors are overshadowed by systemic, infrastructural, and policy-related barriers. Adoption in such contexts appears to depend more on overcoming external constraints than on altering individual technology perceptions.

The study offers several scientific contributions, including the empirical testing of established adoption models in a fragile-state context, the identification of non-significant roles for widely accepted TAM variables, and the confirmation of the behavioural intention–adoption link under severe environmental constraints. It also presents strategic recommendations aimed at policymakers, organizations, and service providers to facilitate cloud adoption through infrastructure development, legal and regulatory reform, vendor access, and targeted organizational capacity-building.

In conclusion, this research provides a robust foundation for understanding cloud computing adoption in Syria and similar environments. It emphasizes the need for localized models, questions the universal applicability of common adoption predictors, and provides practical

guidance for stakeholders working toward digital transformation in high-risk, resource-limited settings. The study also opens pathways for future research, particularly in exploring post-adoption impacts, cross-country comparisons, and the evolving role of government and international cooperation in enabling cloud innovation.

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