

Exploring Strategic Decision-Making Process in Hybrid Cloud Computing Adoption Among Small and Medium-Sized Enterprises

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Received: 27 January 2024 | Accepted: 15 March 2024 | Published: 31 March 2024

DOI: <https://doi.org/10.55057/ijbtm.2024.6.1.33>

Abstract: *This study delves into the strategic decision-making process concerning the adoption of hybrid cloud computing among Small and Medium-Sized Enterprises (SMEs) within the context of Bahrain. With the proliferation of digital transformation and the evolving landscape of technological infrastructure, the adoption of hybrid cloud solutions presents a compelling avenue for SMEs to enhance operational efficiency and competitive advantage. This research employs a qualitative approach, engaging in-depth interviews with 11 key stakeholders from diverse SMEs across Bahrain. Through thematic analysis, this study elucidates the multifaceted dimensions of the strategic decision-making process, encompassing factors influencing adoption, perceived benefits, challenges encountered, and the integration of hybrid cloud computing within the broader organizational strategy. The findings shed light on the considerations, including technological, organizational, regulatory, and socio-cultural aspects, shaping the adoption landscape of hybrid cloud solutions among SMEs in Bahrain.*

Keywords: Hybrid Cloud Computing; Strategic Decision-Making; Small and Medium-sized Enterprises (SMEs); Cloud Computing Adoption; Technology Strategy

1. Introduction

In the realm of contemporary business operations, (Yoo & Kim, 2018) observed that many organization are undergoing digital transformation for their survival and profitability. The strategic adoption of technological advancements, especially for cost saving (Koo & Kim, 2015) stands as a critical pillar for small and medium-sized enterprises (SMEs) to thrive in competitive landscapes. One such significant innovation reshaping the digital infrastructure is hybrid cloud computing. Bahrain, a growing hub of entrepreneurial endeavors, showcases a dynamic SME ecosystem contributing substantially to its economic growth.

The transformative potential of cloud computing, particularly the hybrid model amalgamating on-premises infrastructure with public and private cloud services, presents an enticing opportunity for these enterprises. However, navigating the intricacies of hybrid cloud adoption involves multifaceted considerations encompassing technological, financial, and operational dimensions.

The evolution of cloud technology has been remarkable, evolving from a mere data storage solution to a cornerstone of digital transformation strategies. Amidst this evolution, the hybrid

cloud model has emerged as a strategic choice offering a blend of scalability, security, and cost-efficiency. With hybrid cloud computing, Satya and Dittakavi (2022) noted that organizations are able to leverage services from a public cloud provider along with its own private cloud.

Cloud computing makes the communication between customers, suppliers and distributors (Attaran & Woods, 2019). Yet, for SMEs in Bahrain, the decision-making process behind embracing this hybrid model demands a thorough exploration to understand the motivations, challenges, and strategic drivers influencing their choices.

2. Statement of the Problem

The strategic adoption of hybrid cloud computing by SMEs in Bahrain is pivotal in the 21st century (Lakhiar et al., 2021), marked by both opportunities and challenges. Cloud computing provides an opportunity to leverage internet to provide software infrastructure for businesses (Attaran & Woods, 2019). While the promises of increased agility, enhanced security, and optimized operations (Banimfreg, 2023) are enticing, the decision-making process involved in its adoption remains complex and multifaceted. This study aims to dissect the strategic decision-making frameworks of SMEs in Bahrain, uncovering the factors influencing their choices, understanding the barriers hindering adoption, and identifying the critical drivers shaping their hybrid cloud strategies.

Through a comprehensive exploration of these facets, this research aims to offer valuable insights, aiding SMEs in Bahrain in making informed strategic decisions regarding the adoption of hybrid cloud computing, ultimately fostering their growth and competitive advantage in the digital landscape. In light of the evolving technological landscape and the strategic importance of cloud solutions for SMEs, this research seeks to address the following key questions:

RQ1. What factors are considered by SMEs management team when deciding on hybrid cloud computing adoption?

RQ2. Were there any challenges or obstacles encountered during the decision-making process to adopt Hybrid cloud computing in SMEs?

RQ3. How did the SMEs address the decision-making challenges?

3. Literature Review

3.1 Hybrid Cloud Computing in the SMEs

At present, cloud computing is an extensively adopted method for delivering a variety of services through the internet, providing for the needs of both individual consumers and enterprises (Böger, 2022). Its prevalence stems from its ability to offer scalability, accessibility, and diverse solutions that meet the demands of a broad user base, spanning from personal users seeking convenience to large-scale businesses aiming for enhanced efficiency and innovation. Cloud computing provides on-demand self-services and removes the need to buy IT infrastructure and applications (Priyadarshinee et al., 2017). Cloud computing provides virtual memory to real time applications (Srinivasan et al., 2015).

A hybrid cloud encompasses a blend of private cloud services, a public cloud, and/or on-site infrastructure for storage and computing (Fortinet, 2024). These diverse resources are coordinated to operate together with maximum smoothness and cohesion. Hybrid cloud computing is a dynamic fusion of private and public cloud infrastructures, embodying a flexible

and scalable solution for modern businesses. In the hybrid cloud model, organizations put some services on private cloud, others are placed on public cloud (Böger, 2022). It's essential characteristic lies in its versatility, and flexibility for managing computing resources (Satya & Dittakavi, 2022) allowing SMEs to harness the benefits of both private and public clouds.

This model enables companies to maintain sensitive data and critical operations within a secure private cloud environment while leveraging the accessibility, cost-efficiency, and agility offered by the public cloud for less sensitive tasks (Gundu et al., 2020) or fluctuating workloads. The adaptability inherent in hybrid clouds accommodates SMEs' diverse needs, allowing them to tailor their IT environments effectively, optimizing performance, security, and cost-effectiveness. Cloud computing has experienced swift growth, boasting distinctive attributes such as elasticity, resource pooling, on-demand provision, and extensive network accessibility (Khan et al., 2021).

For SMEs, the application of hybrid cloud computing manifests as a strategic enabler, offering a tailored approach to IT infrastructure management. Its deployment allows these enterprises to navigate the intricate landscape of digital transformation without overwhelming investment or compromising data security. SMEs can optimize resource allocation by utilizing the public cloud for non-sensitive operations, ensuring scalability during peak demands, while crucial data and mission-critical applications reside in a private, more controlled environment. Moreover, hybrid cloud solutions empower SMEs with the agility to swiftly adapt to market fluctuations and technological advancements, fostering innovation and competitiveness in an ever-evolving business landscape.

This approach not only streamlines operations but also empowers SMEs to meet the demands of a digital economy, facilitating growth and sustainability in their respective industries.

3.2 Key Factors in Hybrid Cloud Computing Decision Making

One of the fundamental things to the leadership of any organization before adopting hybrid cloud computing is to weigh the advantages and disadvantages. Different studies have worked on the factors influencing firms' decision to adopt cloud computing. (Khan et al., 2021) noted that Multiple-Criteria Decision Making (MCDM) approach, adopters of cloud computing rank and give priority to variable in accurate and precise manner. Hence, the categorization of the variables into three contexts which are technology, environmental organizational factors (Sohaib & Naderpour, 2017). The need to address storage challenges by organizations including government, reduce cost (Sohaib & Naderpour, 2017) and data security have necessitated the adoption of cloud computing (Shuraida & Titah, 2023; Yoo & Kim, 2018).

Cloud computing provides opportunity for enhanced scalability and cost efficiency (Sohaib & Naderpour, 2017). This paradigm shift in computing architecture allows businesses to dynamically adjust their computational resources based on demand, effectively scaling up or down in response to fluctuating workloads. The flexibility inherent in cloud solutions empowers organizations to optimize their infrastructure in real-time, ensuring optimal performance and resource utilization.

The choice to implement a hybrid cloud infrastructure frequently arises from a blend of operational necessities, long-term strategic goals of the organization, and compliance with regulatory standards (Satya & Dittakavi, 2022). This decision is intricately woven from the need to meet day-to-day operational demands while aligning with larger business visions and ensuring adherence to various regulatory frameworks.

Furthermore, the adopters of the hybrid cloud computing consider the management requirements. hybrid cloud management is the combination of both the management of public and private clouds (VMware, 2024). The adoption of the hybrid cloud computing offers strengthens businesses (Lakhiar et al., 2021). Banimfreg (2023), emphasizing that cloud computing facilitates on-demand scalability.

This capability empowers organizations to efficiently expand their resources in response to unexpected surges in data volume. The concept of on-demand scalability implies a dynamic and flexible infrastructure, allowing businesses to swiftly adapt to changing demands and effectively handle fluctuations in data influx.

Despite all the benefits embedded in the hybrid cloud computing, there are still some challenges it has that organizations will have to consider when deciding on its adoption. (Khan et al., 2021) raised the issue of complexity as a great challenge that must be put into consideration. Unlike public and private cloud computing, hybrid cloud computing combines the services of both public and private clouds. This therefore calls for a complex hybrid cloud management.

4. Methodology

4.1 Research Design

This study adopted a qualitative research design of phenomenological type. The researcher opted for this approach because of the interest in understanding the decision-making process for the adoption of hybrid cloud computing from the participants perspectives in the SMEs in Bahrain. Phenomenology qualitative research allow the researcher to understand the situation under study from the participants lived experience.

4.2 Population and Sample

The study population consisted of all the members of staff in the top management level (managerial echelon) in ten SMEs in Manama, Bahrain. Manama is the capital city of Bahrain where most the companies in Bahrain are concentrated. Thereafter, the researcher adopted a purposive sampling technique to select ten management staff (one from each of the 12-target population) for the study. Purposive sampling technique enables the researcher to select appropriate person who are relevant to the study in a particular setting. It is important to mention that each participant represents each of the SMEs in the study.

4.3 Approach

The study adopted semi-structured interview and field notes to obtain data from the participants. An interview protocol containing relevant questions that are capable of answering the research questions was developed to guide the interview process. The interview protocol consisted of ten questions on the decision-making process in the SMEs for the adoption of the hybrid cloud computing. The protocol was vetted by professional in the information and communication technology field and expert in qualitative study.

Fraenkel and Wallen (2009) asserted that this validation will enable the researcher to elicit information that serves the purpose of the study. Afterward, the researcher schedule interview meetings with all the participants considering their convenience. Eventually, all the interviews were conducted at the agreed time and place. The interview lasted for two months in Manama, Bahrain. The researcher used the observation fieldnotes for triangulation in establishing trustworthiness and credibility as suggested by Creswell (2014)

4.4 Method of Data Analysis

This study adopted a sequential approach to the analysis of the data collected on the field. First and foremost, the researcher converted the recorded interviews to mp3 format and then transcribed to text. Afterwards, the textual format of the transcripts was proofread while simultaneously listening to the audio records. After that, the transcript file was imported into NVivo software for analysis. The NVivo software aid the researcher to code into categories and sub categories. The results were grouped into themes and subthemes. thematic analysis allows for systematic exploration of different perspectives in the result of the study (Adewale & Potokri, 2023).

In the triangulation of the results for its reliability and validity, the researcher made use of the field notes on the strategic decision making on the adoption of hybrid cloud computing by SMEs. This approach strengthens the overall validity of the study by using multiple sources of evidence (Fusch et al., 2018).

5. Ethical Consideration

The research ensured that all participants involved in the interviews for data collection processes were fully informed about the nature and purpose of the study. Their informed consent was voluntarily obtained (Manti & Licari, 2018). The researcher made it clear that participation was totally voluntary and can be withdrawn at any point without consequences. Secondly, the confidentiality of the SMEs and individuals participating in the study was ensured by safeguarding the privacy of the participants. Similarly, I anonymized the data during analysis and reporting to prevent the identification of specific participants (RyersonUniversity., 2017).

In addition, participants were assured that their responses would be treated with utmost confidentiality. The interview records and transcripts were stored in secure locations, and the communication channels were encrypted such that unauthorized persons will not gain access to it.

6. Results

Table 1: Demographic information of the respondents

S/N	Gender	Years of Experience	Experience in HCC Decision Making	Current Role
1	Male	5	2	Chief executive officer
2	Female	7	3	Chief Technical Officer
3	Male	10	5	Chief executive officer
4	Female	8	4	Chief Operating Officer
5	Male	2	2	Chief executive officer
6	Female	3	3	Chief Information Officer
7	Female	5	5	Chief Technology Officer
8	Male	2	2	Chief Operating Officer
9	Male	3	3	Chief Financial Officer
10	Male	3	3	Chief Executive Officer
11	Male	3	3	Chief Executive Officer
12	Male	5	2	Chief Executive Officer

Table 1 presents the demographic information of the respondents, including their gender, years of work experience in SME, years of experience in Hybrid Cloud Computing (HCC) decision-making, and current roles. The table encompasses a total of 12 respondents. The gender distribution indicates a mix of male and female participants. The respondents' years of experience in decision-making vary, ranging from 2 to 10 years. The years of experience specifically in HCC decision-making range from 2 to 5 years. Regarding the current roles of the respondents, a diverse set of positions is evident. Chief Executive Officer (CEO) is the most common role, with multiple male and female participants holding this position. Other roles include Chief Technical Officer (CTO), Chief Operating Officer (COO), Chief Information Officer (CIO), and Chief Financial Officer (CFO). It is noteworthy that some participants hold similar roles but exhibit variations in their years of experience, highlighting the diversity within the sample.

RQ1. What factors are considered by SMEs management team when deciding on hybrid cloud computing adoption?

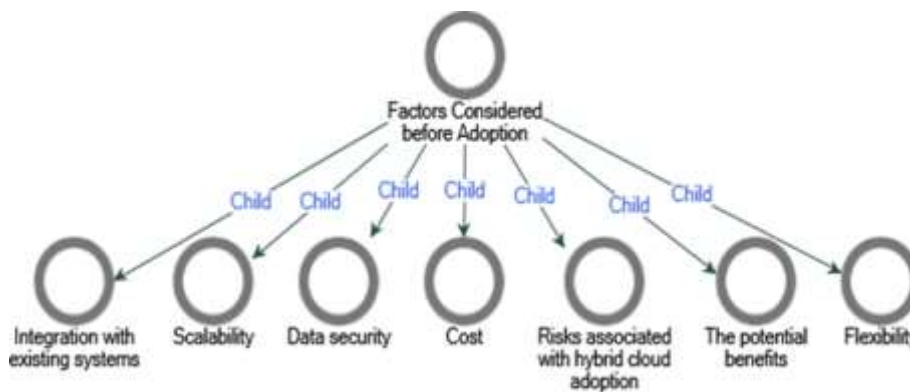


Figure 1: Factors SMEs Consider for Hybrid Cloud Adoption

Theme one pinpointed seven factors that considered by SMEs decision-makers before adopting hybrid cloud computing. These factors include integration with existing systems, scalability, data security, cost, risks associated with hybrid cloud adoption, the potential benefits, and flexibility

RQ2. Were there any challenges or obstacles encountered during the decision-making process to adopt Hybrid cloud computing in SMEs?

Theme two identified two major obstacles encountered during the decision-making process to adopt Hybrid cloud computing in SMEs in Bahrain as the issue of data security and the issue of compliance.

- i. Data Security: the first challenge faced by SMEs in deciding whether to adopt HCC for their business or not is the security of their organization's data. The respondents maintained that whenever they want to adopt a new system, they consider the extent to which their data is secure from the human and natural disaster. The challenges include maintaining data security across diverse environments. One of them expressed as follows:

*“One challenge we faced was ensuring data security when using cloud-based solutions”.*¹²

- ii. Compliance: Some respondents argued that the issue of compliance is a major challenge to the management of SMEs when making decision on the adoption of hybrid cloud computing. This revolves around ensuring that data handling, storage and transfer adhere to

industry standards and regulations. The challenges include navigating varying compliance requirements across regions, and effectively managing data governance in a hybrid setup to meet specific regulatory frameworks. A respondent reported that:

“One of the main challenges was ensuring that our existing IT infrastructure could integrate with the new hybrid cloud solution. 11

RQ3. How did the SMEs address the decision-making challenges?

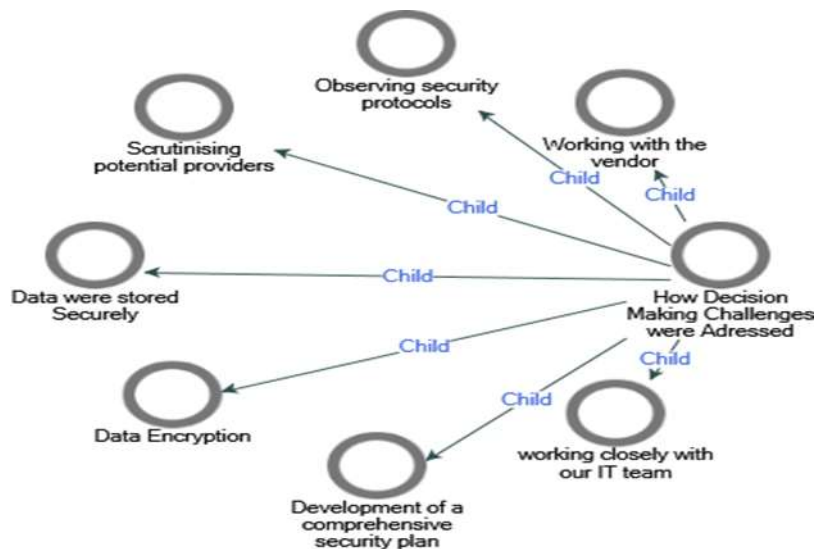


Figure 2: Addressing the Decision-Making Challenges

The respondents identified seven ways through which SMEs addressed decision-making challenges in adopting hybrid cloud computing. These includes working closely with our IT team, development of a comprehensive security plan, data encryption, data were stored Securely, scrutinizing potential providers, observing security protocols, and working with the vendor.

“We addressed this by working closely with our IT team to develop a comprehensive security plan and ensure that data was encrypted and stored securely.1

“We addressed this challenge by conducting a thorough analysis of our business needs and workload requirements.5

7. Discussion

The results of the study have indicated that mixed factors are considered before adopting hybrid cloud computing. It was found that the potential benefits embedded in it in terms of integration with existing systems, scalability, data security, cost, lesser risks associated with hybrid cloud adoption, and flexibility propelled them to adopt it. Concerning the integration with the existing system, this finding is in correspondence with Tawfik et al. (2022) who found that compatibility has significant effect on SMEs decision making for cloud computing adoption. This implies when an organization sees that the adoption will be compatible with its existing business culture and operation, it embraces the adoption of the hybrid cloud computing. Commenting on scalability, the result is in congruence with Banimfreg (2023) who argued that cloud computing permits on-demand scalability where organization scale up its resources to manage sudden influx of data.

The ability to scale up resources on demand ensures that organizations can meet increased computational, and storage needs without the constraints of traditional, fixed infrastructure. This adaptability is paramount in scenarios where data processing requirements fluctuate, enabling organizations to maintain optimal performance and responsiveness. Considering on the cost, Saygner and Ercan (2018) found that the economic value attached to the adoption of cloud computing services in terms of cost reduction is one the motivating factors usually considered by organization in decision making. Cloud computing as explained by Banimfreg (2023) offers a cost-effective solution by minimizing infrastructure expenses through the elimination of the necessity for expensive hardware and the reduction of maintenance costs. In the study conducted in Yemen, Alghushami et al. (2020) found that relative advantage in terms of cost, security, privacy, and reliability among many other factors of cloud computing have significant effects on the adoption of cloud services. Abied et al. (2022) cautioned however that any decision favoring the adoption should consider data security.

Furthermore, the result revealed that issue of data security and issue of compliance are the major challenges facing SMEs decision makers when attempting to adopt the hybrid cloud computing in their organization. Concerning the issue of data security, this finding agrees with Bollinad and Damera (2017) that the fear of cyber-attack and data insecurity are obstacles to decision making for adoption. Similarly, Khayer et al. (2021) reported that several security and privacy issues such as shared environment, storage lack of full control over data storage by company are great challenges to the decision-making for adoption.

Also, this study found that SMEs have used array of strategies to cope with the challenges identified in decision making for the adoption of the hybrid cloud computing. Commenting on working closely with the IT team, this finding is in congruence with Garrison et al. (2015) who found that managerial, relational and technical capabilities of the IT have significance influence on the successful integration of hybrid cloud computing services into the SMEs business operations.

Similarly, concerning working with the vendor and scrutinizing potential providers, the finding corroborates Zhang et al. (2021) that vendors' consulting, responsiveness, security, customers domain knowledge, platforms and technical capabilities are essential to decision to adopt cloud computing services. This implies that when SMEs top management discover the capability and reliability of the service providers to provide their hybrid cloud computing services need, they tend to decide in the favor of its adoption.

Development of a comprehensive security plan, data encryption, data were stored Securely, observing security protocols. These findings align with Pius et al. (2018) and Thabit et al. (2021) that data encryption will provide data confidentiality and information integrity in the use of computing services. Maintaining the confidentiality of data is crucial for individuals who entrust the cloud with their private or sensitive information (Hamdi et al., 2021). It is imperative for users to feel assured that their data is secure and protected from unauthorized access or breaches when stored in cloud environments.

Preserving data confidentiality not only safeguards personal and confidential information but also establishes a foundation of trust between users and cloud service providers. Users rely on the assurance that their sensitive data remains confidential, reinforcing the importance of robust security measures within cloud storage systems. Data integrity involves safeguarding data against unauthorized actions such as deletion, modification, or fabrication (Hamdi et al., 2021). This ensures that the information remains accurate, unaltered, and reliable. The significance of

data integrity lies in its ability to maintain the trustworthiness of information, preventing any malicious or unintended changes that could compromise the accuracy of the data.

Commenting on the issue of compliance, the finding is congruent with Banimfreg (2023) who explained that enterprises are obligated to adhere to a multitude of regulations that dictate the management, processing, and dissemination of data. These regulations, including but not limited to GDPR (General Data Protection Regulation), HIPAA (Health Insurance Portability and Accountability Act), and PCI-DSS (Payment Card Industry Data Security Standard), impose stringent guidelines on organizations to ensure the responsible and secure handling of sensitive information.

Compliance with these regulatory frameworks is imperative for organizations to maintain the trust of their stakeholders and safeguard the privacy and security of data. GDPR, for instance, focuses on protecting the personal data of individuals within the European Union, emphasizing transparency, consent, and data subject rights. HIPAA, on the other hand, is crucial for entities handling healthcare information, imposing standards to safeguard the confidentiality and integrity of patients' data. PCI-DSS specifically addresses the protection of payment card information, necessitating secure handling to prevent unauthorized access and potential financial fraud.

8. Conclusion

In conclusion, the exploration of the strategic decision-making process in the adoption of hybrid cloud computing among small and medium-sized enterprises (SMEs) unveils a complex landscape shaped by diverse factors. As SMEs navigate the dynamic intersection of technology, business goals, and resource constraints, the significance of informed and strategic decision-making becomes evident.

This study has shed light on the multifaceted considerations that SMEs must weigh when embracing hybrid cloud solutions. The findings underscore the importance of aligning hybrid cloud adoption with the specific needs and goals of each SME, recognizing that there is no one-size-fits-all approach. Strategic decision-making involves a meticulous evaluation of the existing IT infrastructure, security requirements, scalability needs, and financial considerations.

Moreover, understanding the organizational culture and fostering stakeholder collaboration emerge as pivotal elements in the successful integration of hybrid cloud solutions. While the adoption of hybrid cloud computing presents SMEs with opportunities for enhanced flexibility, scalability, and cost-effectiveness, it is crucial to acknowledge the associated challenges. Issues related to data security, integration complexities, and issue of compliance must be addressed through comprehensive strategic planning and continuous assessment.

Recommendation

Based on the findings of this study, the following recommendations are made for improved and effective decision making in the adoption of the hybrid cloud computing by the SMEs especially in Bahrain.

- i. **Regulatory Awareness:** Understand Bahrain's data protection laws and regulations to ensure compliance when adopting hybrid cloud solutions. This includes aligning with standards like the Personal Data Protection Law and other relevant regulations.

- ii. Local Support and Expertise: Seek local cloud service providers or partners with a strong understanding of the Bahraini market's specific needs and regulations. This ensures better support and compliance adherence.
- iii. Data Localization Consideration: Evaluate the need for data localization based on Bahrain's regulations. Ensure that sensitive data is stored and managed in compliance with local laws, considering any restrictions or requirements for data residency.
- iv. Engage with Industry Peers: Collaborate with other SMEs or industry groups in Bahrain to learn from their experiences and gain insights into successful hybrid cloud adoption strategies, especially concerning regulatory compliance.
- v. Government Initiatives: Explore government-backed initiatives or programs aimed at supporting cloud adoption among SMEs in Bahrain. These programs might offer resources, guidance, or financial incentives.
- vi. Security and Compliance Frameworks: Establish robust security and compliance frameworks tailored to Bahrain's regulatory environment. Ensure data protection measures align with local standards while leveraging international best practices.
- vii. Vendor Selection and Due Diligence: Thoroughly vet potential cloud service providers based on their ability to meet Bahrain's compliance requirements, security protocols, service quality, and support offerings.
- viii. Pilot Projects and Continuous Evaluation: Initiate small-scale pilot projects to assess the feasibility and effectiveness of hybrid cloud solutions within the Bahraini context. Continuously evaluate and refine the strategy based on feedback and outcomes.
- ix. Training and Skill Development: Invest in training programs to upskill internal teams or hire professionals familiar with Bahrain's regulatory landscape and hybrid cloud technologies to manage the adoption process effectively.
- x. Long-Term Strategy: Develop a long-term strategy that integrates the hybrid cloud adoption roadmap with the SME's overall business objectives, considering scalability, flexibility, and evolving regulatory requirements in Bahrain.

Limitations of the Study

The following limitations are observed in this study:

- i. The findings of this study may not be generalized because of the limited number of the participants to the top management level.
- ii. The use of quantitative study is often tagged to be subjective. Therefore, it will be fine if subsequent studies can make use of quantitative or mixed study approach to study the decision making in the adoption of the hybrid cloud computing.

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