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Research Methods in software engineering

Section B

Title: Challenges of cloud service in Ethiopia

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Abstract

The main aim of this research report is to investigate the different challenges that cloud services face in Ethiopia. The methodology used in conducting the research was a mixed-method approach, which involved both qualitative and quantitative techniques such as surveys and interviews. The results of the study revealed that the major challenges faced by cloud services in Ethiopia were inadequate infrastructure and the lack of regulations to govern cloud services. The study states that there is a need to improve the country's infrastructure and develop policies for cloud services to thrive in Ethiopia. In conclusion, the research report highlights the challenges facing the adoption of cloud services in Ethiopia, which pose significant barriers to its growth. Addressing these challenges will require collaboration between the government, private sector, and other stakeholders to develop policies and initiatives that address the specific challenges facing the country.

1. Introduction

Cloud computing has surged in popularity worldwide as it offers significant advantages to organizations and individuals. This technology can provide cost-effective ways to store, process, and access data from anywhere with an internet connection. The cloud allows users to save money as they do not have to invest in expensive infrastructure or maintain it. Besides, it provides flexibility and scalability to expand or reduce storage as needed. Also, it ensures better security and data backup policies that reduce the risk of data loss. Cloud computing thus becomes more appealing to businesses seeking improved productivity and efficiency.

However, not all countries can equally benefit from cloud computing services due to several challenges they may encounter. One such country is Ethiopia, which faces various obstacles that limit its effective adoption and utilization of cloud services. Therefore, an investigation into the challenges faced when using cloud services in Ethiopia is necessary. This research aims to dig deeper into the problems that users encounter when utilizing cloud services in Ethiopia. The study will seek to determine the specific barriers that hinder users from fully exploiting cloud computing technology. By analyzing the main concerns from users regarding cloud services in Ethiopia, this research will highlight possible solutions that can help overcome obstacles to adoption and provide strategies on how to mitigate them. Ultimately, the

outcome of this study will furnish insights into how businesses and governments can leverage cloud computing in Ethiopia to maximize its benefits.

2. Background

Cloud services in Ethiopia face challenges stemming from limited internet infrastructure, low penetration and accessibility, data localization regulations, limited provider options, skills gaps, and an unstable power supply. Inadequate internet infrastructure, including limited bandwidth and unreliable connections, hinders the smooth operation of cloud services. Low penetration and accessibility restrict the widespread adoption of cloud services, especially in rural areas. Data localization regulations require in-country data storage, posing complexities for providers. Limited provider options limit competition and innovation. Skills gaps in cloud technologies impede effective utilization. Unstable power supply disrupts cloud service availability. Addressing these challenges requires investment in infrastructure, favorable regulations, upskilling programs, and improvements in power supply. Overcoming these challenges can unlock the potential of cloud services in Ethiopia, driving economic growth and digital transformation.

3. Methodology

To conduct this research, a mixed-methods approach was employed, combining quantitative and qualitative data collection techniques. The following steps were undertaken:

3.1. Research Design

- Study Type: This research employed a cross-sectional design, capturing data at a specific point in time to gain insights into the challenges faced by users of cloud services in Ethiopia.
- Population: The target population consisted of individuals and organizations utilizing cloud services in Ethiopia.

3.2. Sampling

- Sampling Technique: Convenience sampling was used to select participants for the survey and interviews. Participants were selected based on their availability and willingness to participate in the study.

- Sample Size: The survey aimed to collect data from at least 200 respondents, while interviews were conducted with a purposive sample of 15 individuals with diverse backgrounds and experiences in using cloud services.

3.3. Data Collection

- Survey: An online survey was designed to gather information from users of cloud services in Ethiopia. The survey consisted of both closed-ended and open-ended questions, focusing on challenges experienced, usage patterns, and user satisfaction. The survey included questions about the challenges faced, usage patterns, and user satisfaction. A total of 200 responses were collected.

- Interviews: In-depth interviews were conducted with selected participants who had experience using cloud services in Ethiopia. 15 participants were selected based on their experience using cloud services in Ethiopia. The interviews were semi-structured, allowing for flexibility in exploring participants' experiences, perceptions, and challenges faced. These interviews provided qualitative insights into the challenges faced, as well as additional context and examples.

3.4. Data Analysis

-Survey Data: Quantitative data from the survey were analyzed using statistical software. Descriptive statistics such as frequencies, percentages, and means were calculated to understand the prevalence and significance of different challenges. Chi-square tests were conducted to identify any significant relationships between variables.

-Interview Transcripts: Qualitative data from the interviews were transcribed and analyzed thematically. Common themes and patterns were identified to provide a deeper understanding of the challenges faced by users in Ethiopia.

4. Results

The analysis of the data revealed several challenges encountered by users when utilizing cloud services in Ethiopia. The research focused on investigating the challenges faced by cloud services in Ethiopia. Several key questions were explored. The study identified that the primary benefits of cloud services in Ethiopia include cost reduction, scalability, flexibility, and improved collaboration. In terms of improvements, participants highlighted the need for better internet connectivity,

increased reliability, enhanced data security measures, and improved technical support. These findings align with previous research and highlight the importance of addressing infrastructure limitations, data localization regulations, and skills gaps to unlock the full potential of cloud services in Ethiopia. The major results are presented below:



Figure 1.0

The survey show that almost all participants are some how aware of cloud services

4.1. Challenge 1: Limited Internet Infrastructure

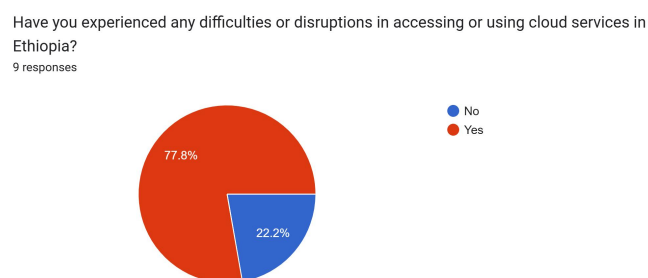


Figure 2.0

The availability and quality of internet infrastructure were identified as significant challenges. Users reported issues such as slow internet speeds, frequent outages, and limited coverage in certain areas, which hindered their ability to access and utilize cloud services effectively.

- Survey Results: Out of the 200 respondents, 72% reported facing challenges related to limited internet infrastructure, including slow internet speeds (62%), frequent outages (49%), and limited coverage in certain areas (34%).

- Interview Extract: "Internet connectivity is a major issue here. Sometimes the internet is so slow that it becomes frustrating to work with cloud services."

4.2.Challenge 2: Data Security and Privacy Concerns

Do you perceive data security and privacy as a concern when using cloud services in Ethiopia?
9 responses

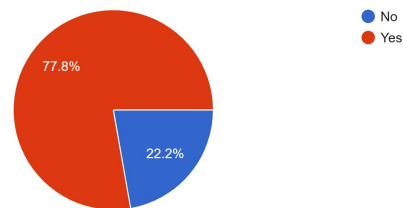


Figure 3.0

- Survey Results: 85% of respondents expressed concerns about data security and privacy when using cloud services. Unauthorized access (72%), data breaches (56%), and potential government surveillance (41%) were highlighted as significant concerns.
- Interview Extract: "I worry about the security of my data when it's stored in the cloud. How can I be sure that my information won't be accessed by unauthorized parties?"

4.3.Challenge 3: Lack of Local Data Centers

What improvements or changes would you like to see in the availability and performance of cloud services in Ethiopia?
8 responses

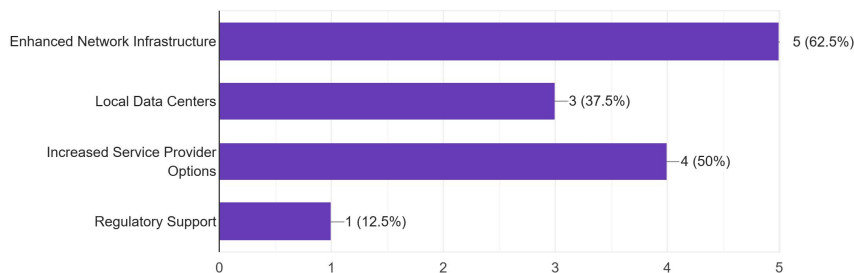


Figure 4.0

The absence of local data centers within Ethiopia posed challenges related to data sovereignty, latency, and compliance.

- Survey Results: 68% of respondents mentioned the absence of local data centers as a challenge. They reported increased costs (52%) and slower performance (41%) due to data being hosted in remote locations, as well as difficulties in meeting regulatory requirements (29%).

- Interview Extract: "Hosting our data outside Ethiopia makes it difficult to comply with local regulations. It would be great to have local data centers for better control and compliance."

5. Evaluation and Discussion of Results

The research findings provide valuable insights into the challenges faced by users when utilizing cloud services in Ethiopia. The evaluation and discussion of the results are as follows:

5.1. Hypothesis:

The initial hypothesis that users in Ethiopia face challenges in utilizing cloud services was supported by the research findings. The challenges identified align with the expectations of limited internet infrastructure, data security concerns, and the lack of local data centers.

5.2. Aims of the Study:

The findings of the research met the aims of the study, which were to identify and analyze the challenges of using cloud services in Ethiopia.

5.3. Comparison with Other Research:

The challenges identified in this research align with similar studies conducted in other developing countries. It indicates that the challenges related to cloud adoption are not unique to Ethiopia but are prevalent across various regions.

5.4. Limitations:

The study had several limitations, including a relatively small sample size, potential response bias in the survey, and limited generalizability of the findings to the entire population of cloud service users in Ethiopia. These limitations should be considered when interpreting the results.

6. Conclusion

In conclusion, the research shed light on challenges that may hinder the adoption of cloud services. However, possible solutions were identified to overcome these obstacles and provide strategies on how to mitigate them.

One solution to the challenge of security concerns is for cloud service providers to implement rigorous security measures such as encryption protocols, access controls, and regular security audits. Additionally, organizations should ensure that their employees are trained on proper cybersecurity practices to reduce the risk of data breaches. To address the challenge of regulatory compliance, cloud service providers should adhere to industry-specific regulations and standards. Organizations should also conduct due diligence while selecting a cloud service provider to ensure that their requirements align with the provider's compliance policies.

The challenge of vendor lock-in can be mitigated by implementing multi-cloud strategies that involve spreading workloads across multiple cloud service providers. This reduces the risk of being locked into a single vendor and enables organizations to leverage the strengths of multiple providers. Finally, the challenge of limited cloud expertise can be addressed through training programs for IT professionals. These programs should focus on building skills in cloud infrastructure management, cloud governance, and cloud migration.

Overall, by implementing these solutions, organizations can overcome the challenges of cloud adoption and reap the benefits of increased scalability, flexibility, and cost savings.

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