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Adoption of Cloud Services in Central Banks: Hindering Factors and the Recommendations for Way Forward

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Abstract: Current research on cloud computing often focuses on the technology itself and the benefits that one company can use and choose from cloud services. Most of the research has focused on mainstream enterprises and limited regard to Central Banks' (CBs') Cloud Computing Adoption (CCA). CBs are continually exploring opportunities to enhance IT efficacy while minimizing expenditures and ensuring data protection and network security. This paper investigates the factors affecting the CBs' CCA by surveying 40 CBs representing approximately 25% of total CBs worldwide. The main participants were senior IT managers who are responsible for any IT decisions in CBs. The findings are also significant for other organizations or businesses where data privacy is crucial. The study results indicate that CBs are still reluctant to migrate to the public cloud. Influential factors preventing CCA are data protection, privacy, and risks.

Keywords: Central Banks, Cloud Computing Adoption, Cloud Services, and Hindering factors.

JEL classification: I21, L32, L33, L52, Y20.

1. Introduction

Cloud computing (CC) can be referred to as current and future technology. The market continues to be highly competitive, and technological advancement continues to evolve. There is a need for people and companies to stay together in this development. The literature has shown many advantages and limitations of cloud computing adoption (CCA) in the banking sector (Africa, 2018; Almarabeh and Majdalawi, 2019; Asadi, Nilashi, Husin & Yadegaridehkordi, 2017; Ghule, Chikhale & Parmar, 2014; Moşteanu, Roxana, Faccia, Cavaliere & Bhatia, 2020; Olufemi, 2018; Rani and Gangal 2012; Rieger, Gewald & Schumacher, 2013; Sallehudin, Razak & Ismail, 2015; Singh, Tanwar, & Srivastava, 2018; Suhaimi, Hussin, & Mustaffa, 2007). Documents and research on the use of cloud technology by financial institutions are available (Bataev, 2018a; Bataev, 2018b; Christauskas and Miseviciene, 2012; Fenu and Surcis, 2009; Lampe, Wenge, Müller & Schaarschmidt, 2013; Misra and Doneria, 2018; Nanos, Manthou & Androutsou, 2019; Nawaz, Malik, Shafi & Khan, 2015; Nicoletti, 2013; Rajini, Ramamoorthy, Rammohan, Rajakumar & Niveditha, 2020; Shi, Xia & Zhan, 2010; Wenge, Lampe, Müller & Schaarschmidt, 2014). However, certain financial bodies, such as CBs are still reluctant to CCA and exploiting its advantages. There have been many existing and ongoing discussions on CBs' CCA without a definite consensus. Therefore, this study aims to investigate why CCA will still be an essential part of CBs' Information Technology (IT) decisions and explore primary factors responsible for the slow CBs' CCA (Aharony, 2015; Awadallah, 2016; El-Gazzar, Hustad, & Olsen, 2016; Gangwar and Date, 2016; Hon and Millard, 2016; Scott, Van Reenen & Zachariadis, 2017).

CBs are the country's first financial institutions. These are respected institutions, and all decisions need to be clarified not to affect their integrity. CC can offer numerous advantages to CBs, including reduced costs and efficient IT. The authors (Lehtimäki and Palmu, 2019) investigate whether central bank communication can be used to explain anticipated changes in their most important monetary policy tool, the short-term refinancing rate, as well as whether the public can trust central bank communication during financial crises.

This study investigates why CBs do not exploit CCA's benefits, concerns, and motivating factors for CCA. A set of guidelines will be formed to help CBs in CCA decision-making. The research outcome will also reinforce the view that CBs were scared and unprepared to move to a cloud computer due to many obstacles. There is a need to address concerns regarding data protection and privacy, among other things, to ensure their willingness for CCA. As part of the study, we have contacted 40 CBs for this survey, representing approximately 25% of total CBs

worldwide. The main participants were senior IT managers responsible for all IT decisions in CBs. Participants received an email request to participate through a survey link. The participants were also sent two email reminders, followed by a telephone call. Other participating CBs were those from Mauritius, Lesotho, Seychelles, Malawi, Indonesia, and North Macedonia.

The anonymous survey was conducted, and participants needed to respond to all survey questions. All participants provided their informed consent before participating in the study. This study's primary purpose was to obtain a true and accurate understanding of CBs in different countries on different continents regarding their ideas and CC use. They have provided that all CBs are mostly the same irrespective of size and culture. The study was designed based on the literature review findings. The study also looks at the role of banks in selecting various programs. There are specific or target applications where these institutions may wish to provide cloud services such as procurement, human resources, application development, and project management (Adeleye, Annansingh & Nunes, 2004; Bhardwaj, Garg, Garg & Gajpal, 2021; Cole, Bhardwaj, Garg & Shrivastava, 2019; Hon and Milard, 2016; Marinho, Prakash, Garg, Savaglio & Bawa, 2021; Martin, 2008; Muchai, 2015; Njenga, Garg, Bhardwaj, Prakash & Bawa, 2019; Ramaru, Garg & Chakraborty, 2021; Ricks, Crawford & Menand, 2018).

The CBs applications and collected data are exceedingly sensitive. Data protection and privacy are essential, making them hesitant to use CC for these. CBs seek adaptation and deployment of IT for efficiency, reduce operational costs, business continuity, and disaster recovery. Therefore, CBs would be ready for CCA as a part of their IT strategy to achieve all these benefits through CCA. Also, there are many common concerns in the minds of CBs inhabiting CCA, mainly data protection, privacy, risk, contracts, and compliance (Abualrob & Kang, 2016; Hon and Milard, 2018;). Even in the face of those challenges, the CC future looks brighter. IT managers also emphasized that support is needed for security, privacy, and data protection for ensuring that managers continue to embrace cloud technology.

The rest of the paper is organized as follows: Section 2 gives a literature review. Section 3 discusses the theoretical structure and guidelines of the survey. Section 4 presents the results and evaluations, followed by Section 5 which concludes the paper and discusses the directions for future work.

2. Literature Review

The top benefits of CCA in an IT organization include reduced cost and share-holders' control. Moreover, with continuous investment and swift CC technological developments, a shortage of literature describing CC's spread and acceptance is still evident (Alsanea, 2015). Many aspects prevent CCA, including security issues, necessity, law, and regulations. Therefore, it is vital to develop guidelines and models to assist organizations in decision-making or to use CC technology. According to Gartner, "Worldwide end-user spending on public cloud services is forecast to grow 18.4% in 2021 to total $304.9 billion, up from $257.5 billion in 2020, according to Gartner, Inc. The pandemic validated cloud's value proposition" (Gartner, 2021).

2.1. Cloud computing service (CCS) models

There are three CC service models: Infrastructure as a service (IaaS), software as a service (SaaS), and platform as a service (PaaS) and can be compared based on their distinctive features as shown in Figure 1.

Figure 1: Cloud Computing Service (CCS) Model ("IaaS Vs. PaaS Vs. SaaS: What is the Difference", 2021)
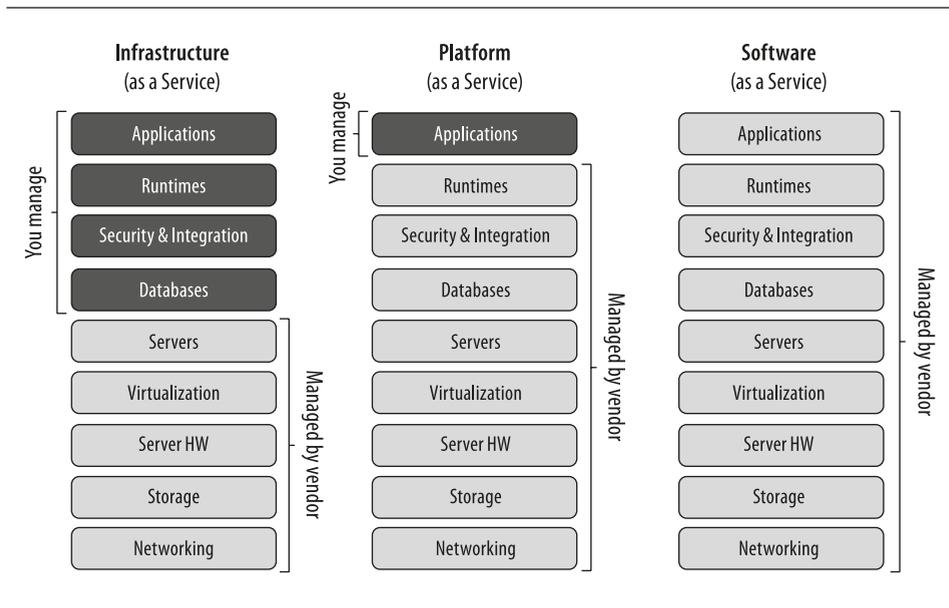
Investment in CC will have no choice but to use at least one of them as needed if they want to remain competitive in the market and improve their productivity and efficiency. SaaS is expected to achieve rapid growth, followed by IaaS. However, Gartner (2021) emphasized that cloud infrastructure services or infrastructure such as service (IaaS) also significantly share the growing market.

- **Infrastructure as a Service (IaaS)**: It introduces a way to provide comprehensive infrastructure resources ranging from software, operating systems, servers, storage, and network equipment in addition to an IP-based object as part of the desired service. Clients do not need to purchase the latest technology, software licenses, or software development environment. However, such resources can be bought and used on-demand. Clients, however, are responsible for maintaining their information systems and security.
- **Platform as a Service (PaaS)**: It provides software development tools and system design. In other words, it provides a platform and environment for developers to build online applications and services on a subscription basis. PaaS providers also offer a service to help users develop their systems from the first and second phases to testing and deployment. Other features of the PaaS operating system, development tools, data management service, support, server software, etc.
- **Software as a service (SaaS)** - This service enables clients to use provider applications running on cloud infrastructure (Alsanea, 2015). Clients run those programs using different devices using a small client, program interface, or web browser. The client does not have to worry about infrastructure, including network, storage, servers, and applications. However, the client can make some local application configuration settings for the user.

2.2. Types of cloud computing (CC)

There are four types of CC technology: public cloud, private cloud, community cloud, and hybrid cloud. Public clouds are open to the public, private clouds are only available to the organization, public/ community clouds are shared within the community, and hybrid clouds contain two or more types of clouds. The differences between the four types of utility models are listed in Table 1.

Table 1: Difference between the four types of cloud computing service (CCS) models

Attribute/ Type	Private cloud	Public cloud	Community cloud	Hybrid cloud
Ownership	• Single ownership. • All information is private and belongs to the same organization.	• Many owners. • Details of most businesses are stored in a shared location.	• Group ownership. • Information belongs to a group or community with similar intentions.	• Many owners. • A combination of public and private clouds. Multiple organizations publicly own some data, and some data is privately owned by one organization.
Management	• The organization manages its cloud.	• A cloud vendor manages the cloud.	• Public members or a third party owns the cloud.	• Each organization manages the private cloud while the cloud vendor is responsible for the public cloud.
Public Exposure	• No	• Yes	• No	• Yes for public cloud and No for private cloud.
Data Centre	• Within the organization.	• Different locations depending on the seller.	• Within community members or a third party.	• Within the private and distinct areas depending on the public vendor.
Security	• Very secure	• Less secure	• Quite secure	• A combination of public and private cloud.
Infrastructure	• The organization needs to buy and manage all the equipment.	• Infrastructure and availability go down to the cloud vendor.	• The community owns the infrastructure. Members share expenses.	• A combination of public and private cloud.
Cost	• It is costly due to the purchase of hardware.	• Costs go down to the cloud reseller. The user only pays for what they need.	• It's not too expensive. Cost shared.	• A combination of public and private cloud.
Usefulness	• Maintenance of applications where security issues, delays, and delays are major regulatory issues	• For critical services like webmail and data-sensitive storage	• By sharing information and requests between members	• A combination of public and private cloud
Access	• Intranet / VPN	• Internet	• Intranet / VPN	• Intranet / VPN

2.3. Assessing the Need for the Cloud Computing Adoption (CCA)

One of the key benefits for organizations is to move to CC technology to reduce their infrastructure costs and gain control over their data centers. Spending on IT infrastructure has been classified as a significant expense. However, with the benefit of CC, it can now be classified as revenue costs. CC can bring personal benefits to countries where IT skills are acquired, given that this technology does not require highly skilled people. Another reason to explore the need for cloud acceptance is environmental concerns (Alsanea, 2015). Datacentres have a high cost of electricity and cooling of almost 53% enough to be considered an essential standard.

The authors (Rakshit and Bardhan, 2020) investigate the impact of bank rivalry on India's financial stability experimentally. Further, utilize a dynamic panel model to see if increased bank rivalry hurts commercial banks' financial stability in India over the period of 1996 to 2016. The overlooked problem of central banks' social responsibility is addressed in the study by Vallet (2021), indicating that because central banks have "structural power" over economies and societies, their authority should be managed and controlled by society through a dependable social responsibility framework.

CCA has a significant impact on IT costs in an organization. An organization may not need to purchase large quantities of equipment such as servers or invest in communications. The organization will not have to worry about security checks, software maintenance, data backups, system updates, and other services agreed with the provider. Business applications and data-resistant data storage are better suited to using CC than sensitive security applications. CC technology is readily available, highly efficient, and cost-effective, and suitable for financial institutions and healthcare organizations (Alsanea, 2015). The authors (Africa, 2018; Almarabeh and Majdalawi, 2019; Asadi et al., 2017; Bataev, 2018; Hanafizadeh, & Zare Ravasan, 2018; Lampe et al., 2013; Misra and Doneria, 2018; Nanos et al., 2019; Nawaz et al., 2015; Olufemi, 2018; Rana, Barnard, Baabdullah, Rees & Roderick, 2019; Raut, Gardas, Jha, & Priyadarshinee, 2017; Sallehudin et al. 2015; Singh et al., 2018; Shi et al., 2010; Wenge et al., 2014) find the need to adopt CCSs for banking, finance, education, business, and manufacturing sectors.

2.4. Factors hindering the Cloud Computing Adoption (CCA)

Many factors are hindering the CCA, as summarized in Table 2. Such factors can range from environmental, technical, and organizational issues.

Table 2: Main factors affecting the cloud computing adoption (CCA)

Types	Concerns	References
Technical	• Compatibility issues around bandwidth and connectivity. • Service availability and reliability • Data Lock-in • Integration issues • Lack of monitoring solutions • Many issues found during trials	Alismaili et al., 2020; Alsanea, 2015; Amron, Ibrahim & Chuprat, 2017; Asadi et al. 2017; Awadallah, 2016; Eijk, 2015; Gupta, Misra, Kock & Roubaud, 2018; Njenga et al., 2019; Ramaru et al., 2021; Singh and Mansotra, 2019; Senarathna, Wilkin, Warren, Yeoh & Salzman, 2018; Yoo & Kim, 2018;
Organizational risks	• Loss of Governance • Compliance concerns • Internal Expertise • Staff reluctant to changes	Alismaili et al., 2020; Eijk, 2015; El-Haddadeh, 2020; Gupta et al., 2018; Njenga et al., 2019; Sayginer and Ercan, 2020; Senarathna et al., 2018; Yoo & Kim, 2018.
Legal	• Data protection (liability) • Licensing • Agreement • Regulations of country provider • Dispute resolutions	Gangwar and Date., 2016; Hiran and Henten, 2019; Phaphoom, Wang, Samuel, Helmer & Abrahamsson, 2015; Sayginer and Ercan, 2020;
Security	• Data loss • Physical attacks (hacking) • Social Engineering • Data privacy	Alsanea, 2015; Hay et. al.2011; Ramaru et al., 2021; Senarathna et al., 2018; Singh and Mansotra, 2019; Yoo & Kim, 2018.
Costs	• Hidden costs • Confusion and headache of procuring pay on-demand service	Amron et al., 2017; Benlian and Hess, 2011; Saya et al., 2010; Benlian and Hess, 2011; Njenga et al., 2019; Senarathna et al., 2018; Yoo & Kim, 2018.
Others	• IT managers fearing their position • Deciding on the right cloud vendor • Cultural barriers • Quality of Service	Amron et al., 2017; Gupta et al., 2018; Njenga et al., 2019; Senarathna et al., 2018; Yoo & Kim, 2018.

When it comes to banks, the two main challenges of CC to be addressed are:

- **Security**: The primary objective of a bank`s IT department is to protect the privacy and security of financial and personal data and the most critical applications. Banks cannot risk security breaches as this would affect their credibility, reputation, and competitive edge.

- **Regulatory and compliance**: In many countries, some laws and regulations require that all financial details of bank customers remain in their home country and be readily available. Specific compliance rules require that data are not combined with other data such as shared servers or data. Therefore, banks should have a clear understanding of where their data resides in the cloud.

2.5. Moving to the cloud

The organization can take many steps before moving on to the cloud. First, an organization needs to evaluate and determine the problem they want to solve using CC. Problems can be in the form of a technical or operational problem or provide customers with a new service or capability. Second, the organization needs to decide if the service they want to use can be self-sufficient. If the service is not central to their business, it is wise to move to the cloud. Often, those services require a lot of attention and support that can be very expensive. Third, there is a need to test whether the cloud provider will meet your expectations. Organizations need to do their best and determine if their needs can be compared to a cloud provider. If you are unsure, moving to the cloud is not an option. The organization must evaluate the use of cloud services. If the app is to be used regularly, it is advisable and costly to use it internally. Regular use of services can be as expensive as charging cloud providers for each use. Finally, after deciding on their needs, the organization needs to determine which cloud service model to choose between SaaS, PaaS, and IaaS, taking into account user information, security, and compliance. After deciding which cloud service model to use, the decision should also be made in selecting appropriate deployment models from the private, public, community, and hybrid, taking into account user experience, security, and obligations. The hybrid model is believed to be the preferred option for many organizations. However, every organization has its own needs and requirements to choose a model that suits it most. The above text clearly shows that there are many interests concerning CC technology; however, we must not ignore its acceptance challenges. While ideas are widely available, implementing them remains a significant challenge. More research is needed, and guidelines need to be made before financial institutions such as central banks can start using the technology. A clear framework needs to be developed by defining the implementation of CC models directly related to financial institutions where data privacy and security are at the top of their list.

3. Theory

The study was conducted on 40 CBs across the continent, representing about 25% of the world's total CBs worldwide. The data collected from the 40 selected CBs, have been an excellent number to reach an acceptable and logical conclusion because all CBs are naturally similar. However, during contacting the CBs asking them to participate in the study, many questions were asked, and some were unwilling to participate while others needed to be persuaded. This clearly shows that CBS has a firm policy of sharing information. Given all the persuasive arguments, reminders, and explanations of that study's benefits, four other CBs neglected to participate in this study. Some CBs said that they do not use and do not plan to use CC at their facility, leaving a total of participants to complete a survey on eleven CBs, representing only 7% of CBs worldwide.

However, the results of the study highlight that there are some common concerns regarding cloud acceptance in CBs. These institutions well know CC, as all stakeholders are aware of it and have discussed it internally. However, CC will still achieve significant results for those institutions as it has not yet been part of banks` IT strategies. This shows that more work is needed for cloud vendors or cloud specialists to convince those institutions to start that technology fully. However, research shows that many CBs use some form of CC in the form of email services and minimal web hosting. A look at significant inaccuracies shows that data protection and privacy are important factors influencing cloud compliance decisions. However, CBs see a loss of data control or services, risk compliance, and law enforcement as other areas that need to be addressed before CC is given the green light.

More than 90% of CBs said that CC has been discussed within their facility, which means there is an interest in the technology. In comparison, 27% have taken this technology seriously by claiming that CC has been officially discussed but is not yet part of their IT strategy. Doubts can be explained by the fact that in most CBs tested, IT decisions are made with management involvement. Managers have representatives from all departments throughout the institution, and apparently, most of them do not have the necessary IT knowledge. This leaves IT administrators with a considerable challenge in convincing them to provide CC support, as shown in the items mentioned above.

Critical factors that prevent the adoption of CC identified by CBs are data protection and privacy, data control failures, or services risk, and compliance. Dealing with those things does not just mean that CB will move to the cloud. Research has shown that more than 50% of banks are not sure when they will be fully op-

erational whenever CC, and less than 50% are said to enter after one year of all the critical issues mentioned. This clearly shows that CC vendors have a specific task they have prepared to win the hearts of CBs. Following concerns raised during the literature review regarding CCA, a question was asked to identify areas where each CB needed guidance regarding decision-making through CC. The research clearly shows that both managers and IT are required in any decision-making process concerning IT.

This is also reflected in the responses provided to participants regarding areas that need support. Security, privacy, and data protection make up 82% of the respondents answers. Most owners have information about the organization's business units, so data protection is a priority for management. Without proper procedures, control and validation, the chance of approval is minimal. Also, IT must convince managers to be able to participate in any IT programs in the organization. This can also be illustrated from research responses that IT managers need support and guidance in building a business case (64%) with sufficient facts and weights to convince management.

4. Results and Evaluation

The survey was sent to 40 CBs where they all have the same type of business that will serve as a legal authority in dealing with the country's financial issue. However, of the 40 participants addressed, only 11 completed the full questionnaire. In telephonic interviews, some CBs informed that they were not considering using CC at this moment and therefore did not respond. Given that all CBs have almost the same functions and are always in the public eye, protecting national data and confidentiality are their utmost priority. This research data analysis is based on assumptions using an error limit ± 14% and a confidence level of 95%. The various questions asked, and the answers of the respondents are listed in Table 3.

Table 3: Questionnaire survey with Respondents Responses

Question No.	Question	Answer Options	Response Count (11)	Response (% age)
1.	What is your level of knowledge about cloud computing (CC)?	I know enough about CC.	10	90.9%
		I have some knowledge about CC.	1	9.1%
		I have no knowledge of CC.	0	0.0%

2.	What is the size of the organization you represent?	50-250 Employees	2	18.2%
		250-500 Employees	5	45.5%
		500-1000 Employees	3	27.3%
		1000-2000 Employees	0	0.0%
		Over 2000 Employees	1	9.1%
3.	Who is responsible in your organization for taking decisions related to IT?	The management only	0	0.0%
		The management with support from the IT	2	18.2%
		Both the management and IT	9	81.8%
		The IT responsible only	0	0.0%
		Others	0	0.0%
4.	Has CC been formally incorporated into your organization strategy?	CC has been discussed internally, and it is part of our IT strategy.	0	0.0%
		CC has been discussed formally and is not part of our IT strategy.	3	27.3%
		CC has only been discussed internally.	7	63.6%
		CC has not been discussed in our organization.	1	9.1%
5.	Does your organization use internal IT resources or outsourcing?	Internal	3	27.3%
		Outsource	0	0.0%
		Both	8	72.7%
6.	Does your organization use CC? (such as usage of email or other offering services related to CC).	Yes	5	45.5%
		No	6	54.5%
7.	If you are using CC, please specify the use. (select all that applies).	For e-mail	5	45.5%
		For web hosting	6	54.5%
		For data	3	27.3%
		Others (please specify)	3	27.3%
8.	Which IT services/ applications supporting business processes will your organization most likely to be outsourced to a CC service (CCS) provider? (select all that applies).	Banking applications (accounting)	0	0.0%
		Payment systems	0	0.0%
		Payroll	0	0.0%
		Human Resources	1	9.1%
		Procurement	7	63.6%
		Online Banking	0	0.0%
		Project Management	6	54.5%
		Application development on the cloud	7	63.6%
		Others (please specify)	2	18.2%
9.	Out of the four cloud deployment models which model your organization is using or planning to use (select all that applies)?	Public Cloud	1	9.1%
		Private Cloud	8	72.7%
		Hybrid Cloud	3	27.3%
		Community Cloud	3	27.3%
10.	Which CCS models are you already using or implementing? Choose all that applies.	Software-as-a-Service	5	45.5%
		Platform-as-a-Service	0	0.0%
		Infrastructure-as-a-Service	1	9.1%
		None of the above	6	54.5%

11.	What are the most important benefits of CC for your organization (select all that applies)?	Operational Cost savings	4	36.4%
		Flexibility and scalability of IT resources	5	45.5%
		Increased collaboration	0	0.0%
		Pricing flexibility	0	0.0%
		Convenience or the development teams	0	0.0%
		IT efficiency	7	63.6%
		Software cost savings	0	0.0%
		Hardware utilization	2	18.2%
		Hardware cost savings	3	27.3%
		Business continuity and disaster recovery capabilities	6	54.5%
		Lack of expertise in certain domains	4	36.4%
		Others (not mentioned)	1	9.1%
12.	What are the greatest factors affecting CCA in your organization? (state all that applies)	Data protection and privacy	11	100.0%
		Existing infrastructure	1	9.1%
		Risk	8	72.7%
		Loss of control over data or services	9	81.8%
		Physical control	1	9.1%
		Regulatory compliance	7	63.6%
		Contract issues	4	36.4%
		Geographic proximity	1	9.1%
		Integration with existing systems	1	9.1%
		The unclear scheme in the pay per use approach	0	0.0%
		Not Sure	0	0.0%
		Other (please specify)	0	0.0%
13.	If all the factors stated above (Q12) is being addressed, how fast will your organization move to the cloud?	Already using cloud	0	0.0%
		Less than 1 year	0	0.0%
		Above 1 year	5	45.5%
		Not sure	6	54.5%
		Never move to the cloud	0	0.0%
14.	In which areas of CC decision making you need support?	Technical Knowledge	4	36.4%
		Creating a business case	7	63.6%
		Security, Privacy and Data Protection issues	9	81.8%
		Cost-Benefit Analysis/ROI	2	18.2%
		Other (please specify)	0	0.0%
15.	One of the biggest issues with CC is the contractual agreement. What are your main concerns regarding a CC contract?	Guarantees for peak loads	2	18.2%
		Support and management of incidents	9	81.8%
		Quality of service	4	36.4%
		Physical and network security	3	27.3%
		Other (please specify)	0	0.0%

Following the research conducted, one of CC's main areas where significant issues often arise is constructing contracts. Given all of the above factors in Q12 the CBs concern, the contractual agreement must be carefully considered those items and agreed upon by both parties. The critical areas of the contract agreement that CBs feels compelled to follow if they want to use CC are the following in terms of queries. Using the error limit ± 14% with a confidence level of 95%, 82% of CBs consider the support and management of events a priority, followed by Service Quality (36%), Physical and Network Security (27%), and Assurance of Assignment (18%).

The results show that a high percentage falls in the area of incident support and management. This is an area where CBs have many concerns, especially where they have to resolve the dispute. Given that the cloud service is taken over by a business with an international company most of the time, the issue of support and event management can be a burden simply because both parties are in different jurisdictions and can have a legal impact.

4.1. Academic Application and Limitations

While the study's findings could be used as a measure for CBs and other similar institutions to decide on CC, there was significant confusion over the use of cloud services. It was found that many CBs initially claimed not to use CC while continuing that CC was used for services such as email and web hosting. It clearly shows that CC is still a complex and confusing technology, and a lot of work needs to be done in studies to reduce the fears that are holding back the growth of CC. Moreover, the main reasons for delaying acceptance are data confidentiality and risk, because so many books are needed to address two key factors. The study limit was the smallest sample size and the lowest response in the study.

4.2. Business Application and Limitations

The Research findings can be beneficial to CC providers and can contribute to the growth of CC across all economic sectors. Discovery clearly shows the areas where cloud providers need to deal with it to profit in the niche market. CBs are unique in their methods. They use many programs, some of which can be very complex and expensive. They require a lot of money, and by moving to the cloud, both sides can benefit. The main issue considered is related to the contract agreement. According to Delgado (2010), most Service Level Agreements (SLAs) for all major cloud providers follow the same pattern of conditions and compensation,

with a strong focus on service availability. This common practice needs to be revised. A contractual agreement should not be made solely but must be made according to the needs of each institution`s functions and nature of business. A significant limitation of the research was the lack of research focused on CC providers. For this reason, these findings are unjustifiable if those concerns and regression of cloud providers identified by CBs are still in place or CBs do not have the necessary information. Therefore, researchers should not base their thinking solely on this study.

5. Conclusion and Future Scope

One of the opening questions about cloud adoption in CBs shows that all CBs are knowledgeable about CC and that this technology has been discussed somehow in their facility. Most CBs said CC installation was officially discussed but is not part of their IT strategy, while some CBs show that these technologies were talked about and there was no other implementation. The results also show that CBs already use CC such as email services and web hosting and 73% indicated that outsourcing is part of their IT operations. By adopting CC, CBs could gain certain benefits such as cost savings. Areas where support is needed are data protection and privacy and the making of a business case. Business Continuity follows the most prominent benefit seen in adopting CC to CBs` IT efficiency. In Business Continuity Areas, they are also aware of the difficulties of having their own DR centre. By embracing the cloud, they can benefit greatly because there is no need to spend money.

The biggest obstacle identified by CBs is slowing down their movement when it comes to CC for data protection and privacy and risks. CBs deals mainly with the country's government and financial information that is very sensitive and confidential. The leakage of this data can have a significant impact on CB itself. Damage can be catastrophic as CB is one of the most critical institutions in the country. This damage could also affect the whole country as it could affect economic decisions. The information in CB is distinguished from sensitive to confidential and should be well protected. So far, CC providers have not convinced CBs or CBs are afraid to move to the cloud simply because of the risks involved.

The most common types of CBs` CC are software as a service where 46% say they use it while 54% say they do not use any of the three types. However, only 9% use or utilize the infrastructure as a service. The majority of CBs (73%) said they used or planned to use a private cloud compared to only 9% favouring the public cloud. Having a private cloud enables CB to have excellent power to control its

data as all the data stays inside, and many risks can be minimized. Another good thing that emerges is that CBs do not want to use any CC for applications such as accounting, payment systems, and salaries. All of these programs will contain personal information of their customers. CBs may choose to use other programs such as application development, procurement, and project management where confidential information is not involved.

CC has been shown to bring many benefits to CBs and specific areas of concern such as data protection and privacy. About 50% of CBs shows that once all those problems are addressed, they are willing to move to a computer cloud while the rest are not sure when that should happen. These findings are at least a good sign that CBs appreciate the benefits of using the cloud, but there is still a long way to go. Finally, CB facilities are one of the most challenging facilities to explore. They have a robust internal policy regarding disclosure and need a lot of convincing evidence.

5.1. Future work

The study's findings indicate that some common factors delay the CCA in CB facilities regardless of culture, size, and region. Key areas of concern that have been identified are data privacy, risk, and contractual agreements. The study also concluded that CBs are committed to change such technology's use once those concerns are addressed or within a year. In addition to conducting research focused on large cloud providers, there is a risk of using this research only to provide a realistic picture of CC's actual performance. The study aimed at large cloud providers is recommended, considering all the significant features expressed by CBs. Although there are documents regarding the CCA by Financial Services / Institutions which offer other similar services as CBs, research on CC in CBs is not available. In this way, the researcher suggests that a web page or web tools to be developed to provide information and allow participants to communicate and seek clarification. Further research is commendable, including extensive data and more CC data targeting financial institutions, especially in data privacy and compliance.

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