

An Exploratory Study Assessing The Role Cloud Computing Has In Achieving Strategic Agility With The Banking Industry

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Abstract

This paper will seek to assess the role of Cloud computing in achieving strategic agility within the UK banking sector and provides implications on how organizations in the banking sector can become more agile in their operations. Previous research has shed light on how using Cloud technology can enhance an organization's innovation, which is a key factor in any rapidly changing sector. In order to assess the role Cloud technology has on achieving strategic agility in the banking sector, we identify the facilitators or barriers to achieving strategic agility successfully. An exploratory research design is adopted since there is little or no similar research in this area.

1. Introduction

In order to be a competitive organization in the banking sector, it is crucial to ensure that technologies that the organization uses aids cost reductions and improves its efficiency. Firms cannot be competitive if their information systems (ISs) and business strategies are not aligned [1]. One of the more recent disruptive technologies used in banking is Cloud computing [2]. Mell and Grance (2010) [3] define Cloud in the National Institute of Standards and Technology as “a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.” The implementation of any technological system at an organization is made generally with the view of becoming more efficient. However, with the upsurge of academic and industry interest in strategic agility [4], we explore whether Cloud technology can impact organizations' strategic agility within the UK banking sector. Information

and communications technology (ICT) per se has accelerated increased intense global competition meaning that organizations now must be flexible and change rapidly to support strategy that depends on organizational agility with [5] citing trends of this in the banking sector. There is motivation to explore the use of Service Oriented Architectures (SOA) such as the Cloud within the banking sector as it provides many benefits for the bank such as, cost savings, business continuity, business agility coupled with focus, and also green IT [6]. In view of this, the objective of this paper is to assess the putative role cloud computing has in achieving strategic agility within the banking industry.

2. Literature Review

Much like in many other industries, IBM [7] believes that banks using cloud technology can allow them to “create a flexible and agile banking environment”. Researching the area of cloud technology in the banking sector has shown that there has been a large adoption of cloud technology within the sector of late, with 61% of financial institutions now developing Cloud strategy [8]. This points to the fact that the banking industry is fast moving therefore organizations are constantly trying to gain an advantage. The capital expenditure for advanced infrastructure has been a long standing stumbling for organizations in the sector therefore cloud has meant that they now only have to budget for functional expenses and wages for the services they will use [9].

Literature on Cloud technology in banking has given insights into how the cloud has affected the sector thus far. Accenture [10] have identified some key trends that have arisen as a result of the uptake of cloud computing within the banking industry. These include: Distributed IT, Disaggregation of business process flows and infrastructure, Data-driven insights. Rapid digitization enables more sophisticated customer intelligence, enabling banks to migrate to “social enterprises” and reinvent their

relationships with customers. While there is a broad range of literature on the putative benefits of using Cloud technology for banks, more research is needed into how organizational wide strategy can change in order to become as agile as possible.

There are three types of Cloud [11]: (i) Infrastructure as a Service (IaaS), (ii) Software as a Service (SaaS) and (iii) Platform as a Service (PaaS). IaaS are commonly used to complete tasks such as extending current data center infrastructure for temporary workloads (e.g. Christmas holiday traffic). Providers of this product include Amazon Web Services and Microsoft Azure. SaaS represents the largest cloud market, using the web to deliver applications, that are managed by a third party vendor. Examples of this product include Google apps and Salesforce. The final offering is PaaS, which “increases developer productivity and utilization rates while decreasing an application’s time to market” [12]. According to [13] there are then 4 types of Cloud deployments: (i) Private Cloud, (ii) Community Cloud, (iii) Public Cloud and (iv) Hybrid Cloud which is a combination of two or more cloud options that are unique entities however enables data and application portability. Further, banks need to decide on the geographic location of Cloud Data Centers. [14] cites that using data centers in less developed regions of the world will mean that costs are reduced. Using data centers in cheaper locations can aid an organizations strategic agility, however data security must also be considered. If data is stored at different locations around the world, it can become unclear as to which data protection laws – from which region - cover this data meaning that confidential data will be handled differently.

Due to Cloud’s complex nature, customization can be seen as a barrier to innovation, which contradicts the consensus of cloud computing lowering barriers to innovation for organizations [15]. Whilst the literature delves greatly into defining and classifying the types, implementations and locations of a cloud service, there is a lack of research into the advantages of them when aiming to achieve strategic agility. Further primary research is needed in order to determine the most suitable type of cloud solutions for the banking industry; hence our work.

Research into the specifics of strategic agility has begun to take shape in the last 10 years. Lewis et al (2014) [16] note that in hypercompetitive environments, organizational survival very much depends on strategic agility, which in essence means flexible and mindful responses to constantly changing environments. Lewis et al (2014) [16] and

Doz and Kosonen (2010) [4] both explore the three capabilities involved in strategic agility. The capabilities are as followed: (i) Strategic sensitivity; (ii) Leadership unity; (iii) Resource fluidity. Lewis et al (2014) [16] suggests that contradictions underlie the three capabilities. Strategic sensitivity is the ability for an organization to alert and able to integrate new possibilities, however it also raises tensions due to the learning from and then letting go of experiences as well as the need to engage ideas from the top to the bottom. This may be a new way of working for many organizations, in particularly in the banking industry, which historically has a hierarchical communication systems. Doz and Kosonen (2010) [4] note that strategic sensitivity “is fostered by the combination of a strong externally oriented and internally participative strategy process, a high level of tension and attentiveness and a rich, intense, and open dialogue.” Leadership unity is defined by bold and strategic decision making which means demonstrating strong commitment from top management through to the middle managers. This means that teamwork is valued for an organization wanting to become agile. Indeed, Lewis et al (2014) [16] highlights that achieving leadership unity depends on the promotion of collectiveness, including convergent thinking, homogenous perspectives and collective agreements. The final capability put forward by Lewis et al (2014) [16] and Doz and Kosonen (2010) [4] is resource fluidity. Resource fluidity requires change and switching of resources but this all depends on the consistency of the organization making full use of their resources to start with. Ultimately, strategic agility depends on leaders’ and management’s response to competing demands.

Najrani (2016) [17] states that for an organization to be agile, they need to have the ability to recognize a change in the market and then allocate the resources to take advantage of it. Some research has been carried out on how different IT methods affect agility within banking. Aburub’s (2015) [18] findings suggests that although use of ERP systems on bank’s agility is significant, ERP usage may not influence sufficiently the current agility drivers in bank and there may be other significant factors that contribute towards agility within the banking sector. The organization culture of the firm must be considered [19] and then combined with the bank’s cloud strategy in order to yield results that are positive. This point is further enhanced by the reductionist theory of technological determinism which suggests society’s technological advancements drive society’s social structures. Orlikowski (1990) [20] refutes this notion, suggesting the relationship between

technological advancement and organizational productivity bears no relation. This point is backed up by Aburub (2015) [18] and Mircea (2009) [19]. Much of the literature found on the topic of strategic agility makes reference to the need for a sound organization structure within an organization in order to become agile. There has also been literature found that explores the impact of organizational culture on the adoption of information systems in the banking sector.

After the above literature review some conclusions can be made. There is a wide range of literature published by both academics and organizations around cloud technology and the many uses in industries it has. However, there is little evidence of the specific uses of cloud technology within the Banking industry. There may also be lack of literature due to organizations wanting to keep confidentiality about the technology they possess. There is a range of non-academic articles discussing the slower uptake of cloud within the industry, pertaining to the barriers of uptake – more specifically security concerns. Although there is extensive literature regarding cloud in general, and some specific to other industries, this may not be relevant to the industry explored in this paper. This therefore highlights the need for further research into assessing the role cloud computing has in achieving strategic agility with the banking industry. The paper aims to explore all of the areas put forward within current literature by the conduct of further research with industry experts allowing for the creation of more realistic set of theory development, giving a better understanding of cloud technology’s role in facilitating strategic agility within the sector.

3. Methodology

We adopted an exploratory approach in view of the paucity of literature on cloud technology use within the Banking industry. Given the relative ‘bluewater’ nature of the research, we decided on an inductive means of generating theory, allowing for new and previously unexplored categories to be identified. We adopted an interpretivist epistemology in order to embrace the complex and dynamic nature of the social world under study [21]. This approach was important to the study as it allowed to be less judgemental of participants’ responses, facilitating the exploratory nature of the study. The data approach was qualitative, being based on meanings expressed through words of the participants [22]. This allowed our findings to present an understanding of the current situation while allowing for common

themes to be identified and then explored in more depth [23].

The basis of the data collection was one-to-one semi-structured interviews with banking directors and employees, technological consultants and cloud solution providers [24]. The table below shows the different types of participants involved in the study.

Table 1 – Interviewees

Participant Type	Number of Participants	Participant Codes
Directors within Banking Sector	2	Director A, Director B
Employees within a Large Banking Organisation	2	Employee A, Employee B
Strategy Analysts	2	Analyst A, Analyst B
Cloud Solution Providers	2	Provider A, Provider B

In addition to interviews, email was used in order to initiate contact and follow up with participants where clarification was required. Burns (2010) [25] notes that combining the uses of email and interviews can provide useful results as well as helping to build a rapport with the participants. Each interview was subject to extensive note taking. This allowed us to collate as much data as possible in order to ensure results could be utilized effectively. Audio recordings were used in every interview so that they could be transcribed after the interviews had taken place and also meant that we could revisit the interview to ensure important data was not missed from the study.

The basis of the questions asked were to understand the areas of the banking industry that had seen cloud advancements, the main facilitators to cloud adoption as well as the main barriers to adoption, the uses of cloud within the banking industry and the key success factors to effective cloud solutions. The questions also explore the ability of cloud to enhance organizations strategic agility before asking the participant on their thoughts on the direction of cloud in the next five to ten years. In terms of sampling, a self-selection method was chosen initially as part of the study. This was ideal for the study as there were limitations on the contacts that were available to us in order to begin the study. Laerd (2017) [26] notes that self sampling means that participants that agree to the study are more likely to be committed thus leading to ‘greater willingness to provide more insight’ into the topic being explored. Through a limited ‘snowball’ process we acquired further participants who were recommended by people we had already interviewed [27]. This meant

that there was an increased number of relevant participants taking part in the research for the study and allowed us to gain further insights and broader perspectives on the topics of exploration. To ensure the quality of the data collected was high, various methods of qualitative comparison analysis (QCA) were used [28] in conjunction with the methods outlined by Miles and Huberman (1994) [29]. These methods included checking coherence of data, checking against existing theories, testing of conjectures and developing new theoretical arguments.

In terms of the data analysis, the lead researcher categorized and structured the data collected. This was important since it made the findings easier to comprehend; comparisons between the different transcriptions took place which meant that key themes and patterns could be identified as well as the development and testing of theories. A coding process allowed for themes to be derived from interview transcriptions and then they were categorized in order of frequency. The different sets of categories put forward in the study were structured with an analytical framework, which allowed effective analysis of the data. The unit of data is defined as a singular whole answer relevant to the theme, which is a paragraph in the transcription of the interviews. Coding trees were created as part of the categorizing process in order to identify the frequency of themes. Coding trees are useful to the study as they outline the frequency of each theme and sub theme before being ranked in order of importance. In addition to this, coding trees allow for the cross checking of data against existing theories [22]. The lead researcher structured key codes into a thematic display table in order to conduct analysis of content in rank order pertaining to the frequency of the terms in the coding tree. This also allowed us to test against conjectures whilst using the data as a base to develop new theoretical arguments. Having described our method we move on to a presentation of our findings.

4. Findings

Shown below (Table 2) is a thematic display of the core themes and sub-themes garnered from the interviews conducted. The core themes and the sub-themes presented in the thematic display will serve as a structure within this section using comparisons between the participant's responses where possible.

Answers given by the directors and employees interviewed, identified that the most popular type of deployment of cloud solutions within the banking

sector centered on using private platforms. Director A noted in his response that “private deployments of the cloud are favored within the sector due to the control over data being much less when using public cloud services.”

Table 2: Thematic Display

Core Themes	Sub-Themes
1. Types of Cloud	1.1 Deployment Type 1.2 Service Type
2. Barriers to Adoption	2.1 Culture 2.2 Data Security
3. Facilitators to Adoption	3.1 Change Management
4. Business Functions	4.1 Evidence of Implementation Seen
5. Strategic Agility	5.1 Capabilities of Agility
6. Size of Organisations Using Cloud	6.1 SME's 6.2 Large Organisations

Cloud providers seemingly recognized the reasoning behind the use of private solutions being down to data security amongst other factors. Although Cloud Provider B suggested that hybrid could be an option for banks, “they can be hard to use due to fragmentations of the systems”. This is consistent with Director B who notes that “using multiple platforms of cloud has its difficulties due to validation of the systems.” Cloud providers on the whole recommend hybrid deployment type as an ideal way of reaping benefits from both the public and private platforms, but when compared to directors' view there seems to be resistance to the adoption of this process as a result of fearing that it will be hard to integrate appropriately to suit the organizations concerned.

Employee B stated that, “the availability of public providers was not ready for the organization in terms of security features that the banking domain needs and the checks and controls that the bank needed to have in place”. Director B, who suggests that it is harder for the organization to see who owns the data and where it comes from when using a Public cloud, echoes this view. Both of these views suggests that it can be hard to be sure where data resides in the public cloud as well as concerns over controls on this data with the security aspect being explored. This seemingly rules out the use of Public or Hybrid deployment.

There are instances where the hybrid cloud can be used to good effect. They can be a choice offered to banking organizations trying to integrate a legacy system. Provider A notes that “a popular option that can be offered is to many organizations is a hybrid solution in which legacy data will be housed in a data center maintained by us whilst also running concurrently with a privately hosted IaaS solution”. On the completion of the reviewing the responses from the participants and the additional secondary literature being reviewed, suggestions can be made

that the legacy data will not be under the same scrutiny of data security and compliance as data that will be stored on the non-legacy system. This then means that hybrid deployment can be a viable solution in this instance.

From the analysis of the data collected, we found that IaaS solutions were the favored service type when adopting cloud solutions. Provider B says “the key trends that are being seen within the banking sector and the relationship with cloud includes the need to have standardization of technologies. Using an Infrastructure as a Service solution allows true standardization as well as simplifying the organizations infrastructure acquisition cycle and procedures”. Provider A and Provider B both discussed the role PaaS could play in the future as a cloud is adopted further within the banking industry. “There may be a shift in future to the use of Platform as a Service, due to the need to provide a standardized multi-tiered solution which will allow business partners of the banking organizations to migrate their applications to the same platform (Provider B).” Provider A adds that using PaaS could facilitate more efficient processes within the banking organizations. “Organisations are looking to the Cloud as a way of introducing some structure and standardization into their internal systems and Platform as a Service represents the most likely way to achieve this ... so when internal systems, come up to be replaced or refreshed they will be done to the cloud rather than on premises saving on time.”

In addition, it was found that SaaS solutions might be attractive to organizations looking to adopt cloud. This is because organizations can have more control over SaaS solutions, in the sense that it can be designed in accordance to laws and regulations that the organization would have to adhere to whilst IaaS solutions do not allow this same freedom. “Using IaaS, infrastructure level compliance is invariably in the hands of the provider, however the compliance of the software stored on the infrastructure can be controlled by the organization.” (Director B)

On conclusion of the research being carried out, all participants identified culture as a barrier to the successful implementation of cloud within the banking industry. Further analysis on the responses found that ‘fear’ and ‘conservative’ were frequently used and were the highest ranked themes when discussing cloud adoption. Director A noted, “There is a fear when adopting a new system as it is probably quite unfamiliar to people in the organization, who are used to traditional virtual machine or traditional physical machines. There is definite uncertainty on how long it will take to get up and running and sometimes there is a resistance to take that risk on

some projects”. This shows that organizations as whole within the banking sector are fairly content with their current methods of working and are maybe unwilling to unsettle that, for what they see cloud as, a risk. Provider A, feels that adoption of cloud services depends on the type of bank in question and how risk averse they are. “Investment banks are more willing to push the boundaries where is your traditional retail bank is reluctant to be the first mover as they do not see the advantage. If you show an investment bank a way of getting 10 times more performance out and they can do it with very little effort they are likely to go for it.” Despite this Strategy Analyst B states, “In the context of technology enabling strategic agility, it is logical to see the benefits of the cloud. The main thing is the idea of resources being centralised”. Employee B notes that “current technological systems and indeed ways of work are becoming old and new behaviours seen within the organization are appearing to be more suited to the cloud”. This suggests that the industry as a whole is starting to look to the future, with the cloud being considered as a new technology that can be exploited. Strategy Analyst A states, “Adoption is something that has to be weighed up by the organization. In terms of data not being in house and therefore not stored locally, legislation on storage of data must be looked. Looking at the reliability of the provider must also be considered.” Director B notes that “the culture of fear and conservatism will not remain, once cloud providers prove they can provide high levels of security at all times”. This suggests that the use of the public cloud is an option in the future if security of data can be guaranteed.

Providers are beginning to understand the fears and concerns of organizations in the banking sector and are taking steps to ease these fears. Provider B states, “we have a much more localized data center strategy, so rather than having a large data center in Europe or a large data center in the States we have built out smaller data centers on a country-by-country basis. So if you were to look across Europe, we have got data centers dotted all over the continent. This makes it much easier to start to have those conversations with clients a say that they like the idea of cloud but they do not want their data to leave the country. Indeed, in some places you cannot move the data out of the country due to legislative law. The first approach to that is giving you the ability to put your data in the country that you want it to reside in. Another thing is to think about this in terms of border security and we go through all of the usual certification and accreditations to say that we run these cloud data centers to the appropriate level e.g. PCI Compliance”. “If we are providing services to

lots of companies, we need a cloud that is absolutely rock solid and potentially is more secure than any organization that is trying to do it themselves. We have to deal with many more threats in many more countries in many more Industries and therefore will have more experience doing it than a small organization would” (Provider A). This shows the theme of trust being critical to the potential barrier into the use of cloud. Provider A backs this point up by using Alibaba Cloud, a Chinese Cloud company as an example. “Chinese consumers across a variety of industries have adopted Alibaba’s Cloud service despite other available offerings, due to their trust in culture acceptance that a local company geographically can be trusted“. The choice of using a provider closer to the origin of the company, meaning that data will be stored locally, is seen to be the preferred option by many organizations.

Another barrier to adoption was data security. Many of the participants suggested that the reliability of a disaster recovery plan is crucial in the adoption of cloud. Director A noted that when adopting cloud solutions, data center tiers provide a framework to availability and this is standard practice throughout the industry. “Disaster recovery services can be a barrier to us or any organization adopting cloud services, as we may not be compatible with public cloud infrastructure as a result of the nature of data we carry. Finding a disaster recovery system that does not match fully with our application stack could ultimately lead to loss of data and failure to run at full capacity in the event of downtime” (Director A). Encryption was another issue within this theme. Provider B stated that “clients data needs to be safeguarded and this is carried out through the encryption of databases and using HTTPS traffic. This encryption is carried out with both data-in-flight and data-at-rest”. In addition to this, all participants suggested that there was a shift towards data security standards being the norm with Cloud use across all industries, not just the banking industry. Provider B stated, “Data security is something that we try to assure to all banking organization, through the compliance standards set by the Federal Financial Institutions Examination Council”.

The responses from the participants identified change management as key facilitator into the adoption of Cloud. The main reason for this being the case is due to Cloud solutions being a relatively new technology. Many participants highlighted the need for constant engagement as a facilitator of adoption. Provider A states that banks are “really experimenting with it and some are further down the line large scale exploitation route than others, but given the nature of the Banking industry constant

engagement is needed when an organization is implementing cloud. This is due to that fact that this is a new technology and therefore guidance is needed in order to secure success.” Another lower ranking theme of Change Management identified was the idea of openness. “The idea of openness which is an idea with strategic sensitivity may be enabled through the use of cloud. The use of cloud will include more people and therefore will make decision making a group decision.” (Strategy Analyst B). This suggests that the adoption of cloud will facilitate openness within organizations, which in turn will lead to better business performance. Director B notes, “A key success factor with the adoption of cloud solutions is stakeholder buy-in. The organization as a whole needs to on board with the adoption of the cloud solution from the beginning.” Stakeholder buy-in seems to be crucial, meaning that all stakeholders and champions of the cloud must conform to the vision and strategic direction of the organization.

Communications was also a theme that was identified as a facilitator of cloud adoption. Employee A stated “communication, so being able to be open and collaborate in terms of being agile is key when transitioning to new technologies.“ The scope of communication can be set really wide as organizations implementing cloud will need as much guidance as possible. Provider B notes that this communication can come from a variety of sources. “Organisations can benefit from a variety of support options, from around the clock support from Cloud specialists to online forums and online chats. Communication is key for an organization learning the cloud.”

The responses garnered from the participants allowed us to understand how the adoption of cloud had affected business functions for organizations within the banking industry. Participants stated that back office functions were one of the biggest adopters of Cloud, whilst closely followed by Financial Technology (Fintech) operations. “Back office functions has benefited from the adoption of cloud services. In terms of banking organizations, it is the easiest function to shift onto the cloud due to there not being any confidential data being held. Using a SaaS solution to carry out back office function is popular within the industry as it allows automation, which can be linked directly to saving money for an organization. In addition Fintech operations are increasingly shifting to the cloud, using the services it provide to compete in key banking products.” (Provider A)

When discussing the role strategic agility had on the adoption of cloud, all participants identified the elements of strategic agility. These elements are

strategic sensitivity, leadership unity and resource fluidity. All participants identified strategic sensitivity and role it plays in the adoption of cloud solutions. Employee A states, “it took a very long time to process all the information used after each day, but with the use of the new servers and services, we are able to process the information that we need in shorter times.” This shows the effects the cloud can have on shortening process times for organizations leading to agility. Director A echoes this point, stating that “the firm is fully focused on becoming more efficient and delivering change quicker but also understanding when new ideas are not going to work. 'Fail faster and move forward'. Cloud use allows the organization to have a strategy that is sensitive and can be changed”. Ultimately the findings show that cloud adoption has the capacity to help banking organizations to react to their business environment quicker than what was previously possible.

Participants also identified leadership unity as a theme. Strategy Analyst B says, “Cloud may enable the organization become lean in terms of centralizing decision making. Knowledge sharing is another positive that will no doubt arise as a result of technological advancements. The use Cloud may be a way of breaking down tensions and by using the Cloud, there is no longer the problem of having different information in different parts of the organization meaning consistency will occur, which will lead to quicker, more effective decision making.” Strategy A adds, “Leaders can share insights as a result of using Cloud and can therefore justify their decision. Having information in meetings for example, will allow the leader to show their position”. Both statements identify the role cloud solutions can play for the leadership of an organization. The Cloud allows decisions to be made by leaders, while justifying them to fellow employees and also customers. Participants when interviewed also identified resource fluidity as a theme. Employee B stated, “the fact that all employees are able to access their files they need in quicker times means that it allows us to complete tasks in quicker than ever before as there are less processes involved in accessing information.” Director A added, “Within minutes of market volatility kicking off, I can have additional resources available to me in order to take advantage of that or protect myself.” The key point being recognized is that the adoption of cloud enables organizations to move their resources depending on the environment they find themselves in.

The majority of participants pointed out that they felt that SME’s were driving the adoption of cloud within the banking industry. “We have seen a trend

of smaller banking organization taking to the cloud quicker than their larger counter parts. The main reason for this outcome has to be because of the highly regulated territory the larger organizations operate in. With back-office functions being one of the specific areas driving cloud growth, it is easy to see why smaller banks are moving towards the solutions as it helps cut costs”. (Provider A) Director A also notes that capital means that smaller organizations have no choice but to use the cloud in order to keep up with their larger competitors. “Smaller bank organizations may not have the required amount of capital in order to own their data centers and therefore see benefit in the adoption of Cloud solutions.” (Director A)

With respect to large Organisations, Director B provided insight on the direction of cloud technology within the next 5-10 years and suggested that changes in the banking environment will cause larger organizations to move on to the cloud at a quicker rate. “There is a lot of demand from regulators to change the way banks are structured, especially investment banks, so what I’m hoping for is a that cloud adoption will allow banks to focus more on the end customer and delivering quicker processes in order to compete with smaller start-up banks. We will find that a lot of the boring tasks can be automated as a result of the cloud and it will allow banks to focus on building new features for customers at a quicker rate and also allow banks to respond to regulatory issues at a faster rate.” (Director B)

To summarize, the findings indicate that private solutions were the most popular deployment for organizations within the sector. There has also been a recent trend of Hybrid systems in which providers handle legacy data for their clients. IaaS remains the preferred choice of service types although there were suggestions from participants that recognize that PaaS and SaaS may become prominent in the future. Barriers to the adoption of cloud found that culture and data security ranked the highest. Many organizations suffered from conservatism when discussing implementation of cloud solutions. There was also a lack of trust from organization with third party cloud providers. Another barrier identified was data security although there was recognition that that there were improvements in that there are now industry wide standards that are required to be followed by law. The findings noted that the key facilitator for cloud adoption in the banking industry was change management. There was a focus on stakeholder buy-in, in which all parties involved with the bank must be on board with the technological changes and all strategies must be aligned with the changes in order to take full advantage of what is on

offer. Communications was also theme identified as theme, with the view that it was vital to ensure awareness for new initiatives throughout an organization. Back office functions and Fintech were identified as the main business functions that implemented cloud solutions. Back office could deploy the use of cloud as the data used was on the whole not confidential. Fintech benefited as it allowed for quicker response times to market movement. Findings assessing the role cloud played in the agility of strategy showed that the cloud benefited the capability of strategy. Strategy can be more sensitive as a result of the cloud allowing organizations to be more reactive to the environments, allowing strategy to be shaped depending on the position of the organization. Leadership can be improved as result of the sharing of insights and also the collaborative working the cloud promotes. Resources could also become more fluid due to cloud as it facilitates quicker changes in resource deployment. All participants agreed that SME's were making bigger breakthroughs with the adoption of cloud compared to larger organizations. The main reason found is that smaller organizations do not have the capital to host their own datacenters.

5.0 Discussion

The following section discusses the findings of the study and comparisons will be made with the literature review. The literature provided a basis to determine what the key barriers and also key facilitators to the adoption of cloud were in the sector. The study uncovered that culture was considered a large barrier when implementing the cloud into organizations. A Trust Marque report [30] notes that the adoption of cloud has subjected IT departments to new requirements and task they may not have previous experience of. This could lead to a 'fear' of the implementation of the cloud solutions due to the users not being familiar with the technology. Fear ranked high as a theme when discussing the culture barriers to cloud adoption.

Conservatism was also ranked highly as a culture barrier to the adoption of cloud. The study found that there was skepticism with placing data in the hands of third party providers, as the data would be confidential and the worry that it could fall into the wrong hands. The literature failed to acknowledge how much of a role conservatism plays in slowing the rate of public cloud adoption, however Haywood (2010) [31] notes "Banks that do outsource business-critical functions by placing them into a public cloud still need to retain the ability to assess, supervise and enforce provider performance, manage risks through

appropriate contractual remedies, and maintain the security of and access to data". This coupled with the responses suggests that banks are unwilling to adopt the public cloud as it could put strain on the bank trying to conform to regulatory compliance.

Data security also was seen as a barrier to adoption. The theme of encryption was common when participant's responses were analyzed. Huang and Palvia (2001) [32] notes that "physical, transaction, file and folder, application device and user guidance" were all aspects that must be considered when addressing data security. The participants recognized this with their responses noting that encryption of both data-in-flight and data-at-rest in conjunction with the frameworks put in place were required. There is evidence to suggest that the providers are beginning to comply with the frameworks put forward, a view shared by participants meaning that work is being done to minimize this barrier to implementation.

The literature also revealed facilitators to Cloud implementations. Huang and Palvia (2001) [33] recognized that change management as being a facilitator to new technology acceptance, throughout all industries. Findings suggested that change management was indeed crucial to the adoption of cloud within the banking sector. The findings also found that areas of focus within change management that affect cloud adoption were stakeholder buy-in concerning the new technology and acceptance of it, communication and also openness.

Four main deployment types were identified by Dillon (2010) [13]; private, public, community and hybrid. Whilst the findings show that most banking organizations favor private deployment, this does not always mean that the data will be stored on premise, with off-site private deployment also an option. The literature was not developed in terms of which deployment types were suited to which functions within the bank however the findings suggests that Hybrid and Public clouds are being recommended to banking organizations for use in the not to distant future. Although these recommendations were made, other participants gave reasons why some cloud types such as hybrid and public may not be suited and therefore falls in line with the literature which did not show definitive answers of the most complete deployment types for the industry as a whole.

Zhang et al (2010) [11] shows that there are 3 service types that can be adopted by banking organizations. Ibid [11] also notes that IaaS provides an infrastructure for temporary workloads, SaaS uses the web to deliver applications whilst PaaS is a cloud software environment where applications sit. The literature found was not industry specific however the

findings gave us an insight into the services that are currently being used. All participants noted that there are no restrictions in terms of service type, if the deployment was private and the function was unregulated in business terms.

In terms of current service types being used in the industry, the participants recognized that IaaS solutions were the most popular due to the fact it enabled organizations to achieve true standardization and also allowed the organizations to simplify the organizations infrastructure and acquisition cycle and procedures. Finding also showed that there might be a shift towards adoption of SaaS solutions due to the fact that all infrastructures must qualify with laws and regulations within the industry and SaaS can be tailored to adhere with these. The participants also noted the role PaaS could play within the banking industry noting that it could be used to promote efficiency in the future if implemented properly.

In the literature review, Lewis et al (2014) [16] and Doz and Kosonen (2010) [4] note that survival in hypercompetitive environments depends on strategic agility. All participants recognized that this was indeed true and also noted that the implementation of cloud solutions allowed banking organizations to be agile in their processes. Lewis et al (2014) [16] and Doz and Kosonen (2010) [4] also put forward the three capabilities of strategic agility; strategic sensitivity, leadership unity and resource fluidity. All participants were aligned in their thoughts, noting that the adoption of cloud led to capabilities of strategic agility being reached. Participants noted that strategic sensitivity could occur, as the adoption of cloud technology allows the shortening of process times. This means the organization can find out if a strategy works or not and if not they are able to tailor the strategy at a quicker rate. In essence the cloud allows an organization to react to their environment faster. Leadership unity could also be achieved through the adoption of cloud. The participants noted that the cloud enabled heightened involvement for all stakeholders as information could be shared easily and allowed leadership decisions to be justified. Finally resource fluidity can be reached as a result of the implementation of cloud solutions. The participants noted that the cloud allowed for quicker redeployment of resources, meaning that organizations can be more agile in their processes as a whole.

6. Implications and Conclusions

This study explored the role cloud computing on achieving strategic agility within the banking

industry. Different types of deployment and services were analyzed from the data collected in order to ascertain the key barriers and facilitators to adoption of them. The study collated the views of different professions in order to gain their views on cloud within the sector and understand how cloud use will develop within the sector. The study shows that private deployment types are the most popular for organizations within the sector. This was identified through all participants, noting that public deployments in business functions that hold confidential data was not a viable option. There is considerable grey area over regulatory laws regarding public deployments. Moving forward, regulator bodies, cloud providers and banking organizations must collaborate in order to forge an understanding on the topic, as the study shows there is a lack of understanding. IaaS systems are deemed the most popular amongst organizations currently. Whilst this is convenient for the banks that may not have the capital to purchase the servers outright for themselves, there seems that there will be movement to PaaS systems as the larger organizations begin to move towards the use of cloud. The multi-tiered platform that PaaS allows means that organizations will be able to become even more agile in their processes as well as facilitating collaboration with partners. SaaS also have a role to play within the industry, being used for back office functions for many. For organizations in the sector to have success in the implementation of cloud, systems must be designed to comply with the relevant legal requirements. In addition to this organizations should begin to contracts with providers to ensure that the right products are available in order to become more agile. Change management must be deployed across the organization through a team to ensure the correct training is being delivered and instilling a vision of new Cloud technology usage. The research garnered showed the positive impact the cloud has on achieving strategic agility within the organization. From participant responses, the benefits seen from cloud adoption range from flexible infrastructure, reduced time for provisioning and reduced time to market. All in all recommendations are made for research to be focused into correct deployment and service types of cloud within the sector. This also needs to consider the type of banking concern, e.g. investment, consumer, and so forth (Provider A); this is also a means by which we can refine our future research. Further exploration will allow organizations to become familiar with the best fitting cloud, leading to the destruction of the conservative culture that large banking organizations have towards the implementation of Cloud solutions.

7. References

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