

Barriers to Cloud Computing Adoption for SMEs in Saudi Arabia

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Abstract – *The purpose of this article is to study the business model of cloud computing and the factors affecting its adoption in Small and Medium Enterprises (SMEs) in the west coast of Saudi Arabia (KSA). In this paper, our focus is to investigate find an answer to the question as to what is stopping SME's in Saudi Arabia from adopting Cloud Computing given the substantial financial and technical benefits it offers.*

To provide comprehensive information, we have conducted a thorough analysis of Cloud Computing adoption in the global market and then compared it with that of the Middle East and North Africa. This comparison is carried out by utilizing the market share and total spending methods. The data of the current state of Cloud adoption in KSA was dissected and profiled in order to reach meaningful conclusions. In this study, we were able to compare the economic benefits that Cloud Computing has brought to the KSA and the future benefits, which are yet to be realized. Based on an extensive survey of 45 small and medium enterprises in Jeddah, we find that still are some concerns of security and privacy, and there is a general lack of awareness about the benefits. These hurdles are hampering the proliferation of Cloud Computing into SMEs. Throughout this research, we have followed the descriptive method that best suits the nature of the research and the dissection of the survey. Upon receiving the survey answers, a cross-section analysis was conducted across various industries to understand how the barriers to Cloud adoption vary from one setting to another.

Index Terms – *Cloud Computing Adoption, SMEs, Middle East, North Africa, West coast of Saudi Arabia*

1.0 INTRODUCTION

Cloud Computing is “an on-demand suite of infrastructure, server, storage, applications and information, which anybody, individuals, businesses or corporations can rent for a fee”. Cloud computing is becoming a game changer for Small-Medium Enterprises (SMEs) by offering scalable and affordable infrastructure and capabilities available as services.

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Hence, utilizing cloud technologies seems to be one the most attractive methodologies of cost minimization in SME's. Microsoft conducted a recent study of 3,000 SME's across 16 countries with the objective of understanding whether SME's has an appetite for cloud computing concluded that “43% of workloads will become paid Cloud services“ [1]. The rapid Small and Medium Enterprises can now tap into virtually unlimited computing resources only when needed, thus, significantly reducing the costs of building and sustaining the systems infrastructure. Cloud models are delivering on the promise of helping businesses work smarter by providing flexible, cost-effective access to technology and information. adoption of cloud computing as forecasted by Microsoft studies is not very far from the truth. According to [2], spending on cloud computing in enterprises is five times the rates of spending on other traditional IT systems. However, he argues that the cloud computing adoptions in countries' rates are directly related to the technological development level in each. In fact, the literature on cloud computing has been vastly concentrated on developed countries, both regarding theoretical frameworks to understanding the adoption of cloud computing in SME's and regarding empirical studies that quantifies this impact[2]. This research paper is an effort to fill the gap by empirically investigating the cloud computing adoption in Saudi Arabia through a set of surveys and interviews of SMEs in KSA.

According to [2], more than 70% of the respondents in the telecommunication & information technology sector answered yes when asked about the migration plan of their organization services and data to cloud computing. Similarly, 46% of the respondents in the manufacturing sector also answered yes. These results are positive indicators that the Saudi enterprises are not very far from embracing cloud computing and changing their operations to the cloud. These results have served as an effective starting point for this study.

1.1 Research Question

In this article, the main factors affecting the adopting of a cloud-computing in SMEs in the west coast of the KSA which includes the commercial and post city Jeddah, is going to be investigated. The KSA government has been actively supporting entrepreneurs by forms of subsidies, competitions and various other mentorship and acceleration programs. Through understanding the dynamics of the decision-making process related to cloud computing, this research can complement our efforts to create more value within the country. Ultimately, the objective of this study is to help start-ups, entrepreneurs and SMEs to reap the cost-effective benefits of cloud computing that would boost their performance, increase their profits and allow them to compete globally. The

central question that this research is to investigate is as to *what is stopping SME's in Saudi Arabia from adopting cloud computing given the substantial financial and technical benefits it can add*. The main target audiences for this research are the entrepreneurs, owners and founders of small businesses, decision makers in medium sized companies, and government officials that subsidies any form of cloud computing model. Many would argue that SMEs are the biggest winners in utilizing cloud computing to power up their operations. By definition, SME's are focused on cost minimizing and profit maximizing. A study conducted on 1,242 IT professionals by CDW found that "88% of cloud users pointed to cost savings and 56% of respondents agreed that cloud services have helped them boost profits" [3]. Additionally, 60% of respondents said cloud computing has reduced the need for their IT team to maintain infrastructure, giving them more time to focus on strategy and innovation. Moreover, "62% of the companies that have saved money are reinvesting those savings back into the business to increase headcount, boost wages and drive product innovation" [3]. Comparing the theoretical benefits of cloud computing to SME's can almost always lead to one conclusion - the adoption rates are likely to be high. However, as we will investigate in later sections, SME's in Saudi Arabia are still hesitant to adopt cloud-computing technologies. The focus of this research is not to examine whether SMEs are willing to adopt cloud computing as a viable resource and business strategy; but rather why are they willing to adopt it or not. This research seeks to pose these questions on a representative sample of small enterprises in Jeddah, Saudi Arabia to examine the reasons behind the resistance to adopting cloud computing regardless of the substantial potential value it may add to their organizations.

2.0 CLOUDTECHNOLOGY

A lot of literature is available on the definition and models of Cloud Computing [4] – [6]. Different aspects of cloud computing in Saudi Arabia have been studied by a number of researchers, which can be found in [2] and [7]. In summary, cloud technology is now matured and is being used extensively. This technology not only provides storage at affordable rates, it also provides infrastructure and services. Clouds are classified as public, private and hybrid. By resorting to cloud computing, one can start a new business with a relatively small capital. This is a huge benefit when we compare similar endeavours a couple of decades ago. Although much of the fears and apprehensions have been addressed adequately and effectively but in some parts of the world they still exist. Gartner [8] every year publishes hyper cycle of leading technologies. It's the hybrid cloud which is making a headline in Gartner reports of 2015 [8]. As in [4], the cloud computing technology has already attained its peak. However, many developing countries are still lagging behind and missing on benefits of this smart technology.

2.1 Cloud Growth

With the growth and various models for the cloud, it is very beneficial to understand how these growth rates are structured in relation to the cloud models. It is predicted that by 2018, 59% of the total cloud usage will be Software-as-a-Service (SaaS) as compared with 41% in 2013 [9]. On the other hand, Cisco [10] is predicting that 28% of the total cloud usage will be Infrastructure-as-a-Service (IaaS) in 2018 as compared to 44% in 2013. Finally, 13% of the total cloud usage will be Platform-as-a-Service (PaaS) as compared to 15% in 2013. Figure 3 below summarizes the growth patterns of SaaS, PaaS and IaaS over the period starting from 2013 till 2018 (Cisco, 2015) as in Figure 1

Figure 9. SaaS Most Highly Deployed Global Cloud Service by 2018



Source: Cisco Global Cloud Index, 2013-2018

Figure 1: Cloud Growth

Steering away from ratios and percentage growth, the actual amounts of spending on cloud computing technology can be of great importance as it facilitates a more realistic comparison between the global cloud computing adoption as opposed to the regional and finally local amounts spent. Most of the research available recently is focusing more on the SaaS model, and since SaaS is the winner in terms of growth projections, it would serve as valid base of comparison between the global, regional and local market. According to Centaur Partners' analysis [8] of SaaS and cloud-based business application financial sheets and projections, the SaaS global market has grown from \$13.5B in 2011 to \$32.8B in 2016, achieving a 19.5% CAGR. In Centaur Partners' research, certain categories were picked to represent the SaaS industry including : 1) Content Management 2) Communication and Collaboration 3) CRM and ERP 4) Office Suites and Project Management Suites. Figure 4 below details the growth of SaaS-based businesses' revenues vs. the worldwide SaaS and Cloud Software revenues growth for the period of 2011 to 2017.

2.2 Clouds and ERP

ERP is a class of software that can help business owners run all business operations on one system. ERP software can handle Financial Management, Project Management, Warehouse Management, Supply Chain Management, Human Resource Management, Reporting Management, Document Management, Email Integration and Customer Relationship Management. All these functions are designed and integrated to work with each other. To add a function to an ERP solution,

you just plug it and set it up in minutes. Cloud technology and ERP are benefiting from each other.

3.0 METHOD

We conducted a survey of a number of businesses in Jeddah, the commercial centre and the main port city of Saudi Arabia. A major challenge in getting data was the fact that micro enterprises are very conservative in nature. Therefore, a neutral, non-threatening survey had to be distributed through proper channel which was familiar to the respondents. Another challenge emerged through the interviews for the first subject related to their company turnover- in order to profile the companies. An approach was the formulated appropriately to gather unbiased data. A thorough analysis of the previous surveys posted by large organization bodies including the Euro Commission were studied and analysed. Pre-survey interviews were then conducted to test the validity of questions and rule out any bias that could have occurred.

3.1 Survey Content

Understanding the rationale behind selecting the questions is crucial to understanding and analysing the results. In this section, each question will be briefly presented and detailed. Table 1 illustrates the ten survey questions presented to respondents.

Table 1: Survey Questions

| | |
|---|--|
| Q1. What industry is your business part of? | Q2. Which of the following best describes your current job level? |
| Q3. What was the approximate revenue of your company in the past financial year? | Q4. What proportions of your total costs relate to Information Technology? |
| Q5. How familiar would you say are with what the cloud computing is? | Q6. Do you consider security and privacy concerns to be main barrier for cloud technology deployment |
| Q7. Which of the following do you perceive as main barrier to you using Cloud Services? | QUESTION 8: what would be the main driver for you to deploy cloud technology? |
| Q9. Which of the following service types you would consider to deploy? | Q10. Do you plan to invest in cloud computing in short, medium or long term? |

3.2 Survey Results

The first question was a proxy question to understand the nature of industries where the start-ups come from. We found that more than 20% of the respondents were from the Information Technology background. This was followed by the Education sector, then Manufacturing and finally Communications fields and services. The responses to the following question were filtered through these all these four fields:

Which of the following would you perceive as a main barrier to using cloud services? The result are summarised in Tables 2-5.

Table 2: Information Technology

| ANSWER CHOICES | PERCENTAGE | RESPONSES |
|--|------------|-----------|
| Security | 72.73% | 8 |
| Service Availability | 36.36% | 4 |
| Concerns | | |
| Initial Investments/ Capital | 36.36% | 4 |
| Provider Lock-in | 9.09% | 1 |
| Loss of Control | 36.36% | 4 |
| Training and Recruiting People to Deploy, Run and Maintain the service | 27.27% | 3 |

Table 3: Education

| ANSWER CHOICES | PERCENTAGE | RESPONSES |
|---|------------|-----------|
| Security | 100.00% | 5 |
| Service Availability | 40.00% | 2 |
| Concerns | | |
| Initial Investments/ Capital | 40.00% | 2 |
| Provider Lock-in | 0.00% | 0 |
| Loss of Control | 20.00% | 1 |
| Training and Recruiting People to Deploy, Run and Maintain the service | 40.00% | 2 |

Table 4: Manufacturing

| ANSWER CHOICES | PERCENTAGE | RESPONSES |
|--|------------|-----------|
| Security | 57.14% | 4 |
| Service Availability | 28.57% | 2 |
| Concerns | | |
| Initial Investments/ Capital | 42.86% | 3 |
| Provider Lock-in | 14.29% | 1 |
| Loss of Control | 28.57% | 2 |
| Training and Recruiting People to Deploy, Run and Maintain the service | 42.86% | 3 |

Table 5: Communications

| ANSWER CHOICES | PERCENTAGE | RESPONSES |
|--------------------------------------|------------|-----------|
| Security | 80.00% | 4 |
| Service Availability | 40.00% | 2 |
| Concerns | | |
| Initial Investments/ Capital | 20.00% | 1 |
| Provider Lock-in | 0 | 0 |
| Loss of Control | 60.00% | 3 |
| Training and Recruiting People to | 40.00% | 2 |

| |
|---|
| Deploy, Run and Maintain the service |
|---|

4.0 RESULTS

From the results of the surveys, it is evident that most of the micro businesses in KSA believe that security is a major concern when it comes to adopting the cloud technologies. It is the same with micro businesses that spend an average 30% average of their spending on IT and Technology and are somehow familiar with the cloud computing model. With the findings various industries answered that Initial Investments, Cost of Hiring and Training and Service Availability are also constraining the proliferation of cloud technologies in the kingdom. Therefore, it can be inferred that the sloppy growth of cloud adoption in major parts of the KSA does have distinct reasons, with the security and privacy concern being the most prominent of them.

With the dramatic benefits, cost minimization and profit maximization opportunities that the cloud brings to micro-businesses, a lot of attention from the authorities is required to realize these benefits in the growing sector of micro-businesses. Specifically, the policy decisions undertaken by the government can boost and reshape the cloud market in the country.

4.1 Limitations

This is a quantitative survey of only 45 companies in a limited geographical area. Nonetheless this data provides important insights that can be generalized and highlighted. There is undoubtedly still a need for further investigations and rigorous studies and analysis to be able to come up with actionable data that can be passed to policy makers. Further research would be required to devise policies and create initiatives that would impact the cloud adoption in KSA.

4.2 Conclusion and Recommendations

The cloud computing business model is a viable business model with various added-values to the individual, the company and the country. From our analysis of the survey responses, we can say that the major barriers behind adopting cloud computing in the KSA tend to security and privacy concerns - micro businesses in KSA are still hesitant to share their data with cloud service providers, despite the well-established facts that the cloud is generally more secure than in-house computing. Secondly, in the telecommunication industry, service availability is a major barrier to the adoption of cloud computing. Thirdly, initial investments - with most of the respondents spending more than thirty-percent of their budget on IT, they lack appropriate funding for cloud computing - although it may be considered as a mismanagement of resources. Fourthly, recruitment of skilled personnel to run and maintain the infrastructure is critical to the success. Policy makers should systematically tackle these issues and empower the SMEs to benefit from the technology.

Yamin [2] believes that the cloud computing model is administratively and dynamically similar to the outsourcing model. As a way forward to the identified challenges, the following are some recommendations targeted towards address the resistance toward cloud computing:

- 1- Since security and privacy are a top priority for individuals and organizations, the issue of trust exists. This can be mitigated by the anointed government body actively seeking cloud computing companies in KSA and acquiring them in partnership with trusted and reputable IT firms, hence transferring the trust from a commercial brand to a government entity. Furthermore, the government can actively with the major cloud computing companies strike white-labeling deals with IT firms globally, so they can offer their solutions both in Arabic and under the governments supervision and trust.
- 2- Create targeted programs to recruit, train and certify technicians/engineers to serve as pool of talents to serve the ecosystem.
- 3- Subsidies for the costs of adopting cloud computing, preferably after white-labeling and acquiring major local cloud computing companies.

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