Cloud Economy of Developing Countries

Mohammad Yamin*

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. Introduction of Cloud Computing has created a technological storm, similar to the internet and mobile communication technology enabling eCommerce in the first decade of the 21st century. Cloud Computing has provided a great opportunity to new as well as existing businesses by significantly improving the financial abilities of the corporations and businesses and hence is destined to impact national economies. The cloud computing is redefining usage methods and patterns, having huge reduction in the capital to start a new or sustain and expand established businesses, and hence making it easier to many entrepreneurs to start their dream business. We introduce the term Cloud Economy to define this phenomenon. In the last two decades, many leading organizations of the developed countries have outsourced many of their functions, especially to off-shore countries. With the advent of Cloud Economy, the outsourcing is likely to increase in the coming years, especially in the developing countries like Saudi Arabia.

JEL Codes: A12, D83, D84, F01, O32, and O53

1. Introduction

Cloud Computing provides an opportunity to start new businesses with very little capital and also a way forward for existing businesses to expand and reorganise their functions by taking the advantage of this new trend and technology. Cloud Computing has emerged as an alternative way of starting businesses in the same way as eCommerce was evolved, which required very little capital. Using Cloud Computing, new as well as exiting businesses can rent data storage, software and systems, and maintenance and services for a fee. Offshore and onshore outsourcing has been helping organisation to make savings and doing business with less capital and infrastructure. When Cloud Computing is combined with outsourcing, we can expect reorganisation of not only the existing businesses but also the outsourcing provider companies. In the near future, the Cloud Computing combined and/or merged with outsourcing would grow exponentially. Thus we can expect some readjustment in the definition and role of outsourcing. The Cloud Computing paradigm is very attractive to the business, as is evident from its adoption by businesses and the individuals alike, and is likely to affect economies of many countries. We attribute the concept of cloud computing affecting national economies as Cloud Economy. This concept was first introduced by Yamin and Tsaramirsis in a conference paper presented to Fourth Annual American Business Research Conference, New York, 2012.

As the readily available rental option for infrastructure, systems and services eliminates the need for a huge capital investment, the Cloud Economy is significantly improving the financial abilities of the corporations and businesses and hence is

*King Abdulaziz University, Saudi Arabia. Email: myamin@kau.edu.sa

expected to affect the economies of many developed and developing countries alike. The cloud computing is redefining usage methods and patterns, having huge reduction in the capital to start a new or sustain and expand an established business.

Many entrepreneurs, who couldn't start their dream business due to lack of capital for investing in IT and database technology and infrastructure, now are in a position to fulfil their dreams – thanks to Cloud Economy. The most attractive feature of Cloud Computing is its affordability, an aspect which small businesses are eager to embrace. It is expected that many new IT organizations would be born in countries like India and China – thanks to the Cloud Economy. In the last two decades, many leading organizations of the western world have resorted to the path of outsourcing, especially off-shore outsourcing. This trend is likely to increase because the outsourcing is likely to become more competitive as IT services providers will make savings due to Cloud Economy. Thus cloud computing is likely to impact world and national economies significantly. It is envisaged that initially the cloud providers, and hence the large corporations of the developed countries and their economies will benefit. But as the technology expends its base, the third world countries like India are likely to make significant gains due to perceived increase in the outsourcing business which they are likely to pick up. The Cloud Computing is also likely to increase in countries like Saudi Arabia. To support our argument, here we present results of a survey of Cloud Computing awareness amongst the businesses and corporations in Saudi. The connection of Cloud Computing with outsourcing and their impact on national economies giving rise to Cloud Economy, to the best of author's knowledge, hasn't been studied previously.

According to The US National Institute of Standards and Technology (NIST), as cited by Peter Mell and Timothy Grance (2011), "Cloud Computing is a model for enabling 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 and four deployment models. The Essential Characteristics of Cloud Computing includes on-demand self-service, broad network access, location-independent management effort, or service provider interaction." The NIST model promotes availability and is composed of five essential characteristics, three delivery models resource pooling, rapid elasticity and measured service. Cloud delivery models include Software as a service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). In this paper we shall carry a survey of private clouds, community cloud, Public clouds and hybrid clouds. We shall also discuss contents, extent and usefulness of cloud computing and its implications to global economy. Details of Cloud Architecture are discussed in Cloud Computing Architectural Framework (2012).

Government Reform, as discussed by Yusuf Mansuri 2011, is about making it easier for people to do business with government at a time and in a manner that suits their circumstances. People get better quality services and more intensive help and support at times in their lives when they need it. They get service from government that ensures they receive the benefits and support they are entitled to in ways that work for them. It is relatively easier for the private sector to make use of this new paradigm. Some of the reasons for this are their limited handling of sensitive and security data, less bureaucratic environment and zeal to succeed against many odds. However this paradigm cannot be sustained without the government initiatives and supports, especially in many of the developing countries including Saudi Arabia.

Saudi Arabia, like many developing countries, has a large number of private-sector small businesses, which, from this new paradigm, are likely to immensely benefit. Many Saudi business women and men, including expatriates, are set to reap the benefit by starting or extending their businesses with a small capital, something which was unthinkable few years ago. With the help of results of survey conducted for many Saudi Arabian businesses and corporations, we shall discuss the spread of Cloud Computing in Saudi Arabia and the Saudi Cloud Economy, including concerns and challenges for the Saudi Government.

Considerations of data security and privacy can constrain the storage, management and sharing of data, particularly when it comes to trans-border sharing and storage of data. As discussed in Security and Resilience in Governmental Clouds (2009), this has significant implications for the use of cloud databases to manage private and sensitive data. Thus, one of the main considerations for many corporate and government organizations, especially in the western world where security and privacy attain very high priority, is whether to host the sensitive and private data as cloud database. The sensitive data may include defence, security and personal data. Some applications like those which run only periodically, the ones involving only database development and testing, data mining, database backups and off-site disaster recovery are regarded as safe and can be managed and stored through clouds. These considerations would be very critical for any government organisation including those of the Saudi government sector. Despite some privacy and ethical issues, the Cloud Computing is also, slowly but surely, becoming popular in the government sector, especially in their eCommerce and eBusiness activities. We shall discuss some of the privacy and security issues concerning Cloud Computing, especially in the case of Saudi Arabian businesses.

In the next section, we carry out literature review, in section three, we discuss methodology and models of the Cloud computing, in section four we present our findings, in section five we present Summary and conclusions followed by references in the sixth section.

2. Literature Review

Cloud computing combines many technologies and services which are provided on demand to businesses for a fee as shown in figure 1 (Wikipedia 2012). This alleviates need for the businesses to acquire an elaborate IT infrastructure, systems or service personnel. Many details and framework of the Cloud Computing can be found the following reports of European Network and Information Security Agency (ENISA): Cloud Computing Information Assurance Framework (2009), Cloud Computing Risk Assessment (2009), Security and Resilience in Governmental Clouds (2009), A guide to monitoring of security service levels in cloud contracts (2009), Survey and analysis of security parameters in cloud SLAs across the European public sector (2009), and Cloud Computing - SME Survey (2009). The businesses can now, with the help of Clouds, acquire almost all systems and services including the data holding facilities, virtually rendering organizational infrastructure virtually to workstations and internet. In doing so, cloud computing creates an environment of collaboration to a greater scalability, and is believed to be agile. All of this translates to a huge cost reduction in operating costs for the business world. Cloud computing is a cost effective not only to the new but also the existing businesses which are outsourcing some of their functions to cloud

computing. Various definitions of cloud computing are summarized in Visual Model of NIST Working Definition of Cloud Computing, (2010) and some of them are given below.

The types of cloud computing models include Private, Hybrid and Public Clouds, which are described as follows: The Private Cloud is an aggregation of IT activities/functions which are provided "as a service," over an intranet, within the enterprise and behind the firewall and the key features include: Scalability, Automatic/rapid provisioning, Chargeback ability and Widespread virtualization. The Hybrid Cloud is the one where internal and external service delivery methods are integrated, with activities/functions allocated on security requirements, criticality, architecture and other established policies. In the Public Cloud, IT activities and functions are provided "as a service," over the Internet and the key features include Scalability, Automatic/rapid provisioning, Standardized offerings, Consumption-based pricing and Multi-tenancy. It is the Public Cloud which is the focus of the business world. According to Ken E. Stavinoha (2010), Cloud describes the use of a collection of services, applications, information, and infrastructure comprised of pools of compute, network, information, and storage resources. Further, these components can be rapidly orchestrated, provisioned, implemented and decommissioned, and scaled up or down; providing for an on-demand utility-like model of allocation and consumption. The details of how Cloud Computing works are described by Patrick Battmann (2010).
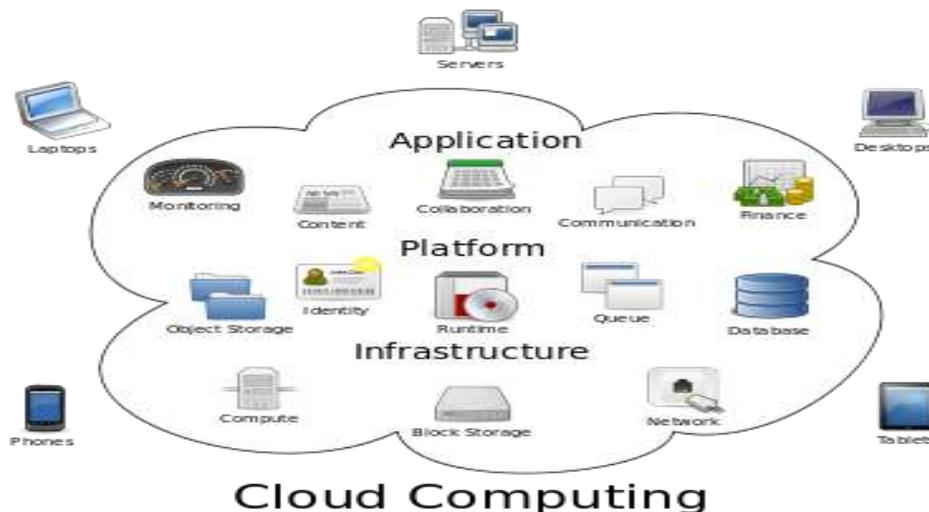

Diagram 1: Cloud Computing Logical Diagram

Leading Cloud Computing providers of 2011 as can be found in the Top 10 cloud computing providers of 2011 (2011), in order of the volume of their sales from large to small were Amazon, Verizon, IBM, SalesForece.Com, CSC, Rackspace, Google, BlueLock, Microsoft and Joyent. The Australian Telecommunication giant, Telstra, is an example of a large corporation to have switched on to Clouds for gaining access to infrastructure, software as a service, and communication and collaboration tools for part of its business enabling Telstra Cloud Services taking away the capital risk of owning and investing in infrastructure as can be seen in . Telstra Connected Clouds (2012). Another example of Cloud Computing is the email services of the King Abdulaziz University (KAU), Saudi Arabia, provided by Google for the thousands of as a Cloud through KAAUNET. Google also provides an online suite of office applications which offers the business-world a word-processor, a spread sheet

creator and a presentation or publishing platform sitting on your computer to work online instead of having all of these and other utilities and tools on your computer.

The case of Europe outlined in various European Reports can serve as a guideline to any region or country and Saudi Arabia is not an exception. In the context of Saudi Arabia, as a further refinement, Private Cloud model as outlined in EMC report should be the first step onto the journey to the Cloud Computing. During this transformation, a key enabling technology such as Virtualization and Federation, would help improving the efficiency and agility of data centres and would enable companies to build the VDC (Virtualized Data Centre.) It was suggested that a phased approach should be adopted to get to a full Private Cloud environment. In a first phase, IT production applications are virtualized leading to improved efficiency and higher simplicity. This phase is characterized by lower costs of IT as compared to traditional IT. In the second phase, Business product applications are virtualized leading to improved scalability and continuity. This phase is characterized by improved Quality of Service as compared to traditional IT. In the third phase, Standardization and Automation are the enablers for reaching IT-as-a-Service. This phase is characterized by high-level of IT agility enabling IT to be run as a business.
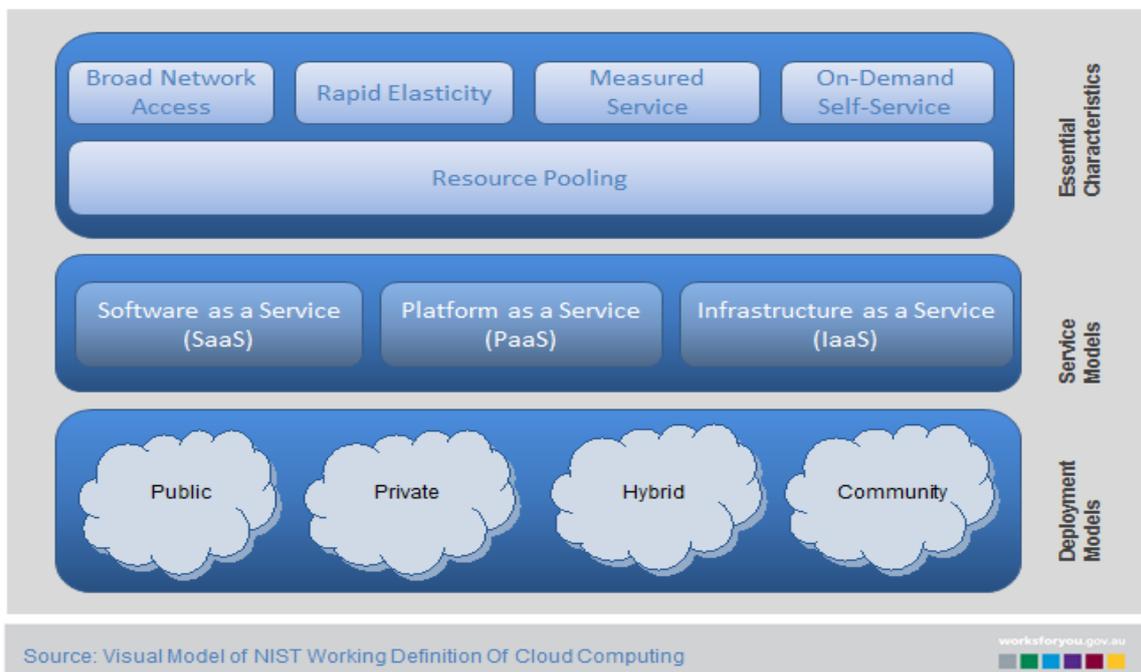

Figure 2: Definitions

The Concerns of privacy and security in Australian public and private sector isn't isolated. In fact the privacy and security concerns all over the world are hampering the spread of Cloud Computing, especially in the western world. Many organizations such as the Department of Human Services of Australia, which is the main IT department for the Australian government service delivery, holds very sensitive data about people such as social security details, family details, account details and so on. The Department of Human Services of Australia maintains huge infrastructure. It is ranked in top ten data holding organizations in the world. In order to meet its server demand, the organisation makes use of several robotic arms in the computer

centres spread over a number of locations in Australia. Like many others, Department of Human Services of Australia is in real need to reduce its huge infrastructure budget and expedite the processing. However, due to sensitivity of its data and concern of its security, the department in the short term might only consider cloud computing option for a select group of services. On the contrary, the IBM Report asserts that cloud computing is secure and the privacy is maintained. But still there are doubts in the minds of many business women and men. According to Chris Clifton, privacy regulations can constrain how data is managed, particularly trans-border sharing and storage of data. This has significant implications for the use of cloud databases to manage private data.

Although there have been discussions, seminars and workshops on Cloud Computing in Saudi Arabia but we find no systematic study on extent and spread of the use of Cloud Computing in Saudi Arabia and its impact on the national economy. Thus we decided to study these aspects in this research and answer some of the relevant questions.

3. The Methodology and Model

We decided to study the spread of the Cloud Computing from two different points of views namely, the provider's aspects and those of the consumers. For we decided, to conduct a survey of many provide and consumer companies of the private and public sectors. The aim of the survey was to study the impact and extent of the adoption of Cloud Computing by the Saudi business as well as the readiness of the providers. In order to test our hypothesis, we have conducted an empirical study of submissions from as many as 83 officers of the private and public sector firms and organisations of Saudi Arabia in2011 and 2012. The confidential surveys were conducted by approaching businesses through a designated website and also via emails by providing them with anonymous survey forms to be sent to an office responsible for compiling survey results without compromising privacy and secrecy of the officers concerned.

Economic consideration is the driving force in adopting or rejecting new business models. From the recent developments in Europe, it is evident that the Global Economy is critically dependent on national economies and the national economies are dependent of the financial health of the business organizations. Today business organizations are in the process of changing from client/server to the cloud computing, which not only promises savings in their infrastructure budget but also brings an easier, faster, flexible and effective way of dealing with IT needs. This change of paradigm will affect the world and national economies in a significant way. Clouds operate on economies of scale which allow them to have multiple subscribers and runs infrastructure more efficiently by pooling users to share applications. In this manner, the cost of managing the applications is split between the subscribers. Cloud computing, which still is in evolutionary stage, is playing a significant role in the national and world economies. Let us survey some of the results and statistics of the computing infrastructure and services associated with the Cloud Computing.

From the various reports of reports of European Network and Information Security Agency (ENISA), we gather that by the end of 2011, the internet connected devices were expected to be 1 trillion; compare this to 500 million in 2006. Spending on servers in 2005 was 200 billion which has steadily risen to 250 billion in 2010. Server

and storage costs are huge for many organizations. In fact many of them struggle to manage and meet the huge server utility demands and in many cases have to invest huge amount of money to extend their infrastructure for example, using robots to expedite the delivery of the secondary storage files to the server. In order to meet the server, storage and operational costs, many organizations are seriously considering using cloud computing, at least for portion of their business. A survey conducted in 2011 by IBM found that 77% CIOs thought that Cloud Computing would cut cost, 72% thought that Cloud Computing provides Faster Time to Value, but only 50% thought that it improves reliability. The survey outlined numerous Enterprise Benefits from Cloud Computing. For example, the jobs, which up until now were being done in weeks and months (e.g. Release Management), are with Cloud Computing now being done in minutes. Standardization has been a big problem in the past but with Cloud Computing this issue doesn't arise as storage and application servers in a cloud conform to the same standard. Further details of the strength of Clod Computing can be found in Cloud Computing Information Assurance Framework (2009).

Europe is advancing on building a cloud economy more rapidly than some parts of the globe. According to an article of Jacqueline Vanacek (2011), it is estimated that European companies could save 20-50% of their total Information and Communication Technology (ICT) costs, to reinvest in new business models that generate revenue. Cloud computing alone is expected to contribute about 0.1-0.2% growth in GDP, and a cloud economy would significantly stimulate Europe's labor market across all industries, with potentially significant job growth. These and other details are the parts of a report by SAP and are included in Roland Berger (2011), which discusses as to how Europe could build and benefit from a cloud economy. The report also included four success factors for European Cloud Economy.

The kingdom of Saudi Arabia is a leading economy in the Middle East and African region. The kingdom has a sound IT infrastructure and is represented by all major companies IT companies including HP, Microsoft, Hewlett Packard, Sun Microsystems, SAP and Oracle. In other words, the kingdom's business world is in a position to implement the new models and emerging technologies including the Cloud computing. The economic implications of Cloud Computing in Saudi Arabia appear to be huge. Saudi Arabia is currently the largest ICT market in the Middle East and expectations for the next twelve months indicate this will continue. To measure the awareness and impact of Cloud Computing and apprehensions which might delay the use of Cloud Computing in Saudi Arabia, we conducted a survey of 33 private and government organisations. The questions asked in the anonymous survey were as follows. .

1. My organization is aware of the benefits of cloud computing
2. My organization considers cloud computing as an inevitable way of future computing
3. My organization is already using software, hardware or services from clouds?
4. My organization considers security and privacy concerns as obstacles in using cloud computing
5. My organization considers clouds as an ultimate paradigm for future computing and management needs
6. My organization thinks that the Cloud computing is an efficient method of computing

7. My organization thinks that the Cloud computing is an effective method of computing
8. My organization thinks think that the Cloud computing is an economic method of computing
9. My organization is considering using cloud services in near future?
10. My organization thinks that the cloud computing would result in staff redundancies in my organization

The responses for these questions were sought on a 7-scale, 1 standing for absolute disagreement, 4 for neutral, and 7 for absolutely agreement. The personal details of the participants were suppressed for the purpose of analysis.

The author hasn't found any empirical studies conducted on measuring the acceptance levels, knowledge, spread and adoption of Cloud Computing in Saudi Arabia. Cloud Computing, being a relatively new platform in the kingdom of Saudi Arabia, participants identified as representatives of the consumer organisations in this empirical study haven't demonstrated any knowledge of having participated in any such study previously. So, we do not find anything on which we can refer to or improve upon. Hence our study is first of its kind in Saudi Arabia.

4. The Findings

The findings followed by and conclusions from the completed survey are as follows. The communication sector including the leading mobile companies namely, government owned STC and private company Mobily indicated mature and strong awareness of clouds and their benefits. They also indicated that their organisations intentions to increase the use of clouds. The Energy sector of the government including the Electricity and Gas also indicated a reasonable awareness of the technology and their advancement to adapt the technology. Several private sector small organisations demonstrated their keenness towards adopting the technology. The large private sector companies also demonstrated a good awareness of the development but were not decisive to take advantage of the technology. The banking sector showed very little awareness of cloud computing and didn't expect any revolutionary steps to make use of the clouds as storage or service. Amongst all, the banking and government sector expressed their concerns about the security and privacy concerns. There were no surprises except for the banking sector showing almost ignorance about Cloud Computing. Most of the results are somewhat in line of what we already know from the following reports. According to the latest research from HP Report in collaboration with Coleman Research Group, 85 per cent of Saudi Arabian organisations will adopt cloud technologies in 2012. The study also reveals that almost 40 per cent of those looking to implement cloud computing are keen to do so prior to 2012. According to Saudi Gazette, the estimated growth of Saudi Arabia's IT sector will worth SR4.6 billion by 2014. Moreover, the new trend in Saudi Arabia is that of cloud computing. "The Saudi business, particularly the small and medium enterprises (SMEs) in 2011 have already started showing interest in cloud computing. With the start of 2012 many SMEs and entities in the public sector will start implementing cloud computing. The HP Instant-On Enterprise Conference has also seen the launch of HP Advance Scalable Cloud Computing with the integration of Utility Storage device that offers the clients in Saudi Arabia to optimize cloud service delivery and simply their data storage management. A big trend for virtualization is emerging in the Saudi market with lots of investments coming in this

field. Some of the companies have even started working on automation of their businesses, which is the next step after virtualization. The benefits of cloud computing for instance for enterprises such as banks and oil and gas companies the technology helps reduce dramatically the operation cost, time to administer servers and storage data because of its full automation.

5. Summary and Conclusions

From the forgoing discussion and survey of results, it is amply clear that the Cloud Computing is here to stay despite some concerns and reservations. Similar apprehensions, if not stronger, apprehensions were witnessed in the early stages of eCommerce and eGovernment. The economic savings in Cloud Computing are huge and hence, the spread of their use cannot be resisted for long. The brighter side for the software deployments industry in the use of cloud environment would be that incidents of piracy of software would likely drop off significantly. The cloud computing will significantly change the landscape of the affordability of computing power and infrastructure of the third world nations. For, many new businesses will be born which otherwise wouldn't have started due to high cost of IT infrastructure. It is likely to boost the third world economies in a similar manner as they benefited by offshore outsourcing. A lot of time and efforts of organizations are spent in designing, developing, acquiring and maintaining suitable hardware, software and hiring and training personnel for operating them. With the Clouds, this will be significantly reduced for businesses. For example database storage allocation and monitoring requires around the clock operations. Many a times, businesses commit more resources than they use, which results in wastage of resources. These and other functions, when hosted with clouds, can be effectively and efficiently discharged in an economical manner. The countries which resist this change are likely to lag behind in their IT and services delivery and may incur greater costs in catching up at a later stage. The government agencies including those in Saudi Arabia should facilitate this change of paradigm. Eventually, it will reduce the amount of imports required and hence will result in huge national savings.

References

A guide to monitoring of security service levels in cloud contracts: http://www.enisa.europa.eu/activities/application-security/test/procure-secure-a-guide-to-monitoring-of-security-service-levels-in-cloud-contracts, Retrieved 10/04/2013.

Chris Clifton, Freeing Cloud Databases from Privacy Constraints, Seminar Lecture at ANU Australia, 28/11/2011, http://cecs.anu.edu.au/seminars/more/SID/2967.

Cloud Computing Architectural Framework, Retrieved 4th April 2012 <https://wiki.cloudsecurityalliance.org/guidance/index.php/Cloud_Computing_Architectural_Framework>, Retrieved 10/04/2013.

Cloud Computing Information Assurance Framework, 2009, http://www.enisa.europa.eu/activities/risk-management/files/deliverables/cloud-computing-information-assurance-framework, Retrieved 10/04/2013.

Cloud Computing Risk Assessment: http://www.enisa.europa.eu/activities/risk-management/files/deliverables/cloud-computing-risk-assessment, Retrieved 10/04/2013.

Yamin

Cloud Computing - SME Survey: http://www.enisa.europa.eu/activities/risk-management/files/deliverables/cloud-computing-sme-survey, Retrieved 10/04/2013

EMC highlights cloud computing benefits in Saudi Arabia, http://www.bi-me.com/main.php?c=3&cg=3&t=1&id=53903, Retrieved 10/04/2013.

HP Report, Saudi Arabia IT Sector worth 4.6B by 2014, March 2011, http://www.gulfinthemedia.com/index.php?m=economics&id=545360&lim=320&lang=en&tblpost=2010_12&PHPSESSID=, Retrieved 10/04/2013.

IBM Report, Security and high availability in cloud computing environments, <https://www14.software.ibm.com/webapp/iwm/web/signup.do?source=gts-AE-CloudSecurity>, Retrieved 4th April 2012.

Jacqueline Vanacek, 2011, Is Cloud the Answer for the European Economy? http://www.forbes.com/sites/sap/2011/12/06/is-cloud-the-answer-for-the-european-economy/, Retrieved 14/04/2012.

Ken E. Stavinoha, 2010, What is Cloud Computing and Why Do We Need It?, http://isacahouston.org/documents/WhatisCloudComputingandWhyDoWeNeedIt.pdf, Retrieved 10/04/2013

Patrick Battmann, IBM Cloud Computing, IBM Corporation 2010, http://www-05.ibm.com/fr/events/st_cloud_computing/Strategie_IBM_P_Battmann.pdf, Retrieved 10/04/2013

Peter Mell, Timothy Grance, The NIST Definition of Cloud Computing, NIST Special Publication 800-145, September 2011, http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf, Retrieved 10/04/2013

Saudi Gazette, 85% of Saudi firms eyeing cloud computing solutions, http://www.saudigazette.com.sa/index.cfm?method=home.regcon&contentID=20111204113143, Retrieved 10/04/2013

Saudi Arabia IT Sector worth 4.6B by 2014, HP Report, March 2011, http://www.yahind.com/saudi-arabia-it-sector-worth-4-6b-by-2014-hp-official_33697.html

Security and Resilience in Governmental Clouds, November 2009, ENISA, < http://www.enisa.europa.eu/activities/risk-management/emerging-and-future-risk/deliverables/security-and-resilience-in-governmental-clouds>, Retrieved 10/04/2013

Survey and analysis of security parameters in cloud SLAs across the European public sector: http://www.enisa.europa.eu/activities/Resilience-and-CIIP/networks-and-services-resilience/cloud-computing/survey-and-analysis-of-security-parameters-in-cloud-slas-across-the-european-public-sector, Retrieved 10/04/2013

Telstra Connected Clouds, 2012, http://www.telstraenterprise.com/productsservices/networkcomputingservices/Pages/CloudComputing.aspx?inref=C1C3, Retrieved 10/04/2013

Top 10 cloud computing providers of 2011, http://searchcloudcomputing.techtarget.com/feature/Top-10-cloud-computing-providers-of-2011), Retrieved 10/04/2013

Visual Model of NIST Working Definition Of Cloud Computing, 2010, http://theuniverseiswinning.blogspot.com/2010/05/nist-visual-model-of-nist-working.html, Retrieved 10/04/2013.

Wikipedia, Cloud computing, http://en.wikipedia.org/wiki/Cloud_computing, Retrieved 10/04/2013.

Yamin

Yamin M & Tsaramirsis G, Cloud Economy & Its Implications for Saudi Arabia, Proceedings of Fourth Annual American Business Research Conference, New York, 2012, http://www.wbiconpro.com/208-Yamin.pdf, Retrieved 10/04/2013

Yusuf Mansuri, Exploring databases in the Cloud, Seminar Lecture at CSIT, ANU, Australia, August 2011.