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Impact of Cloud Computing on Today's Market: Facilitating the Move from Local to International Business

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ABSTRACT

Cloud computing is a new era in internet technologies that aims to store information on servers and this information will be provided as service based on on-demand to the clients. Cloud computing technology basically is a way of offering business infrastructure as a service. In other words, integration initiatives based on cloud computing has the chance to provide the user with an immediate results, as they do not use a time-consuming infrastructure build-up process. The most important feature that the cloud computing offering is the consumers are charged per use thus they don't need major software and hardware investments upfront. The cloud services or web-based software systems that are provided by cloud computing technology have great impact not only on decentralizing the business model but these systems take the Customer Relationship Management (CRM) and its communications to more than the desired level which has effective and tangible impact on sales and marketing initiatives. This study presents the cloud computing structure, benefits and challenges and the impact of cloud solutions on business.

Key words: Cloud computing, business, cloud services, resource, marketing, sales

INTRODUCTION

The rapid growth of market place and competition require the companies to take big moves in their way of providing services and products. The need of following the other companies and take place in the competition require the companies to keep watching the technologies development and adapt any new technology. At the same time, each new technology comes to provide a fundamental contribution to promote growth and competition (Alford and Morton, 2009).

The growth of market structures approach has been discussed Etro (2007, 2009) where the technologies show high impact on the business. The cloud computing comes to provide great impact on business as it aims to minimise the cost and maximise the revenue (Rappa, 2004). The cloud computing is the term that is used to refer to both the software that being delivered as internet-based services and the hardware (Agarwal and Lucas, 2005). The services themselves have long been referred to as Software as a Service (SaaS).

The cloud computing is a new paradigm in computing and the latest technology in IT industry developed as a result of the meeting of several new and existing technologies. The cloud space takes move from large software systems that require a lot of skills, space, advanced hardware and cost to services that can be used in any platform and even by unskilled users while the company has to pay per use (Agarwal and Lucas, 2005). All these provide the companies a good chance to provide a service while other uses these services. Its new era of supply chain where the companies now

become a service oriented and the market need for services more than earlier. Cloud computing comes into focus when we think about the needs of information technology department which is a way to increase capacity or add capabilities on the fly without investing in new infrastructure, special training for the employee for each new system or licensing new software (Buyya *et al.*, 2008). Cloud computing encompasses any subscription-based or pay-per-use service that, in real time over the internet, extends IT existing capabilities.

The cloud computing essentially are based on the aim to provide a service to clients who need not view, use and interact with systems interface they only need simple web-browser and connection to the internet, thereby eliminate the need for extra software or hardware use of the personal computers. In international level businesses, the cloud computing improve the way in which the business is conducted as it adopt the decentralized business model where all the communications, information processes and streamlining are significantly enhanced. The inferences on international business are also extensive. With superior communications and decentralized businesses, processes are able to expand and being adapted by other markets and passes on information with ease provide a high chances to move from local to international business and improve the profit margin for the company.

This study presents the impact of the cloud computing technology on business and markets. Basically, there are two kinds of impact; the first one where it provide a new business places by providing the cloud resource and services while the second impact how will that the companies use those services and pay per use without taking the risk of building their own software and avoiding the high cost of training, equipments, employees and buying software licence.

LITERATURE REVIEW

Cloud computing is new branch of larger improvement towards higher vision of society to have the computing delivered as a utility (Zhang *et al.*, 2010). Buyya *et al.* (2009) presents the 21st century as the computing is improved to commoditized services that is provided and distributed as ordinary utilities like electricity and water. Carr (2005, 2008) discussed the movement from standard business to the internet-based computing and the in-house internet-based computing development year after the other and compares it to the climb of electric utilities in the early 20th century. With all the huge visions about the cloud computing there are still some have argued that the cloud computing is just another way of commoditization of IT services (Yeo *et al.*, 2009). While the expectations of cloud computing capabilities still sky-high. However, still there is no exact vision on what the cloud exactly is, it seems to be widespread agreement that the information technology field and industry will be highly effected and major changes will be on all levels. Anonymous (2008), an economist wrote a report on how the cloud computing technologies will make big movement in the information technology industry which will led to undoubtedly change the way that people work and the operations of the companies processed.

Despite that the cloud computing is “the coming big thing” or not, it has received vast attention in the industry (Tai, 2010). In 2009, the cloud computing become the name of that year (Lin *et al.*, 2009) where all the information technology vendors have proposed new approaches to take advantage of cloud computing technologies. The “builds from this cloud base” was the new vision of the giant information technology leader “Microsoft”.

The new business opportunity that is based on cloud computing technologies expected to be gigantic. IT research and advisory firm Gartner reported the cloud computing services and markets to be more advance and influential than e-business. The \$68.3 billion and \$148.8 billion are the

cloud computing market's revenue for 2010 and (as expected) for 2014, respectively. These numbers and expectations appeared in recent. While IT research and advisory firm IDC expect the total cost and spending for the cloud services will be \$42 billion by 2012.

Currently, there are enormous numbers of cloud services available. For example, the currently developed and available services such as Microsoft Windows Azure operating system, Google Docs productivity suite and Salesforce's Force.com service development platform, all working on the cloud. A real-life example of service that work on the cloud is the Amazon Web Services that provide computing infrastructure such as storage, memory and processor capacity and sells it as services using the self-service portal on the web and charge the clients on the base of pay per use mechanism. However, Buyya *et al.* (2009) remind that the cloud computing technology has just begun few years ago and there are still a lot of improvements required and new concepts and services will be available.

A survey conducted in 2009 by IDC targeted the information technology executives and Chief Information Officers (CIO) within Asia/Pacific (except Japan) have reported that 41% of the respondents evaluating the cloud services that can be adopted by their own businesses. While recently the IDC reported that about 60% of the European CIOs are using the cloud solutions (Cooter, 2010).

The developed countries started plan to have a national wide cloud computing solutions like United State and Japan (Qian *et al.*, 2009). At 2009, United Kingdom announced that all information technology purchases should be "consistent with cloud computing" (Hunter, 2009). In fact only 10% of companies have plan to employ the cloud for critical information technology services as presented by the Information Systems Audit and Control Association's (ISACA) IT Risk/Reward Barometer survey (Wade, 2010). While 45% of all information technology experts say the risk behind using the cloud computing overweigh the benefit of using it. As mentioned earlier in this paper, the main goal behind using the cloud solutions is reducing the total cost by using the web services as indicated by 50% of respondents to IT research and advisory firm IDC study. Khajeh-Hosseini *et al.* (2010a), conduct study to prove that the use of cloud infrastructure which will replace the in-house data center would gain only 37% saving out of total cost in 5 years. While the researches on cloud solutions still at its early stages of modeling and structuring the cost and benefits of using the cloud (Tai, 2010).

Khajeh-Hosseini *et al.* (2010b) states that the current research have mainly focused on technical issues and only few have been written regarding the challenges from an companies or enterprise point of view. The cloud computing from the service provider point of view has been reported in limited number of researches; makes some difficulties to measure the economic risks of providing the cloud services (Li *et al.*, 2009).

However, the main aspects of using cloud computing and develop new and innovative services is to gain higher revenue out of it giving the fact that the service will be available 24/7 and it will cost nothing as soon as you get it done except for minor maintenance. Planning for adequate profits models and using price scheme for cloud solutions is usually referred to it as a critical challenge because the organizations and the companies want to assure that the service will worth what is paid for building it (Bhargava and Sundaresan, 2004; Klems *et al.*, 2009). On the other hand, the actual cost of building a cloud solution appeared to be even less covered than pricing. Li *et al.* (2009) reported that there are no systems prepared to give the proper cost of developing a cloud service that make it unfeasible for companies to plan to build a new service. Additionally

(Durkee, 2010) noted that the analysis of the actual price of providing a service on the cloud is even more critical and the author claimed the profit margin out of providing a cloud-based service is even less than the actual price of providing it.

CLOUD COMPUTING AND ITS FRAMEWORK

The cloud computing is the term that aim to move the services, computation, information and data from in-house servers to an external public storage that will be called as cloud. The main goal of this process is to minimise the total cost of using a software systems that the business requires and replace it by using a public service that is available in the cloud by some other companies and pay per use. At the same time my data can be stored at the cloud to make it available all the time and ready for use, it can be accessed in more simple way and universally which offer much lower cost, maximizing the data value by enabling opportunities for enhanced collaboration, integration and analysis on a shared common platform. The cloud computing can be seen as internet-based systems that offers remote data access to manage the data, information and applications. Basically, cloud computing considered as the technology that facilitates more efficient and practical use of resources such as storage space, processors, memory and bandwidth. The cloud computing platform and its logical presentation is shown in Fig. 1.

The main characteristics of cloud computing can be formulated and summarised in four terms including resource pooling, availability, remote network access and pay per use. Since the service provider's computing resources are joint to supply multiple clients who have different access, devices and resource. While the clients have no control or information about the physical location of the provided service or resource but in some cases the clients may know up to certain level of abstraction the location of the resource such as the country or the province. And this is the reason why resource is pooled.

While the availability refers to the real-time that the service is available and ready to use. The service or the resource in cloud computing is meant to be available in all the time even where there is a maintenance to be performed the provider will be able to use a temporary resource for the clients while maintain the resource which will allow the consumers continue accessing the resource at all the time.

The most sensitive and positive point of cloud computing is the remote network access where the same service and data can be accessed using thin or thick client platforms (e.g., notebook, PDAs,

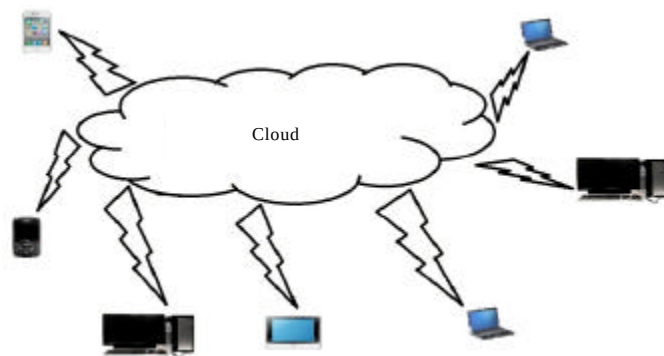


Fig. 1: Logical presentation of cloud computing

desktop computers and smart phones). There is no need to provide different software or system for different platform while only the actual bandwidth of the platform itself will be the only constrain of using different kind of devices.

The clients are able to select and pay for their actual needs of resource such as storage and the still have the ability to extend and expand their quota at any time they need without constrains on the availability of extension or physical space on-site.

Vaquero *et al.* (2009) studied twenty-two cloud computing definitions as reported by expert summarise them in ten major features provided by cloud computing such as user friendly, scalability, resource optimization, internet centric, virtualization, variety of resources, Service Level Agreement (SLAs), infrastructure SLAs, automatic adaptation and Pay per use.

On the other hand, analyzes of the key capabilities afforded by cloud computing presented by (Iyer and Henderson, 2010). Study of over 50 cloud computing definitions has been conducted by the researchers including the scholars, websites of cloud services providers, blogs and reports. They come up with seven capabilities that the cloud computing has such as controlled interface, ubiquitous access, virtual business environments, location independence, rapid elasticity, sourcing independence and addressability and traceability.

Youseff *et al.* (2008) discussed the importance of cloud computing ontology as it offer ease understanding of different cloud components inter-relationships which allow for new systems composition or integration of current systems that is demonstrate the reuse of current cloud solutions to form new solutions and gain another revenue rather than start from scratch. The researchers in cloud computing field mostly categorize the cloud computing solutions and services according to three models (Durkee, 2010; Lin *et al.*, 2009). The three models are reveal different interfaces or abstraction of cloud computing (Iyer and Henderson, 2010; Nurmi *et al.*, 2009). From the architect point of view on these three models, the three models can be seen as layers where each layer has a service and the higher layer's services build on the top of services in lower layer. The logical layers of the three models presented in Fig. 2.

Duncan *et al.* (2009) presented a four layer architecture and the proposed study discuss what each layer may contain and how it work practically as shown in Fig. 3 where the lowest level has the physical resource such as datacenters, databases, clusters and computer machines to the highest level which contains the end-user application.

The three cloud service models can be summarized as:

- **Infrastructure as a service (IaaS):** This service model can be considered as the lowest layer of the architecture that contains the physical resource as mentioned earlier. The IaaS contain and supply the memory, storage space, computing, processor and network bandwidth (transfer

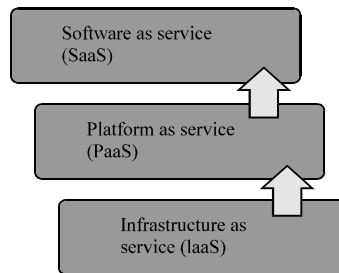


Fig. 2: Three layers of service models

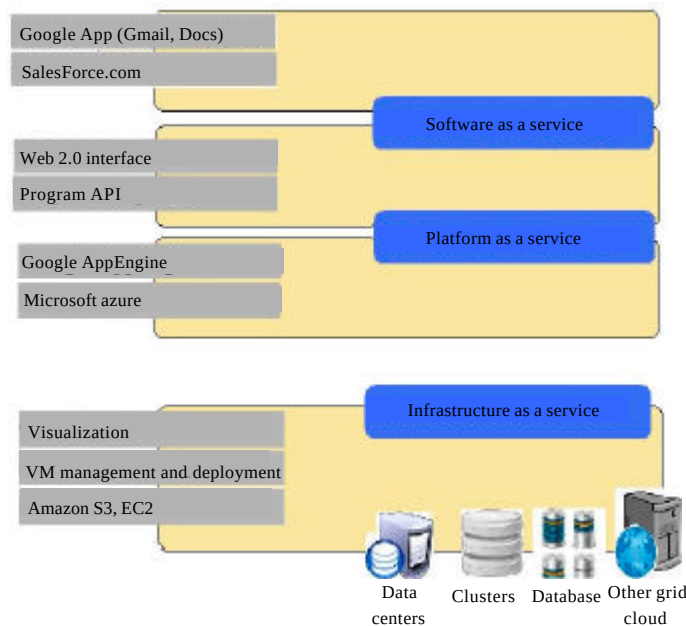


Fig. 3: Cloud computing layered architecture (Duncan *et al.*, 2009)

capabilities). At this layer the client has no control over the actual underlying hardware infrastructure. The Amazon Web Service (aws.amazon.com) is a good example on this cloud service model where Lin *et al.* (2009) suggest that the infrastructure providers and administrators are the targeted group of this cloud service model

- **Platform as a service (PaaS):** It is represent the middle layer in the cloud architecture where it considered the deployment environment for developing new services. This layer contains the platform for developing applications such as the required programming languages, APIs and tools to enable the clients build their new services. The Google App Engine (code.google.com/appengine), Microsoft Azure are a good examples on this cloud service model while Lin *et al.* (2009) suggest that Internet application developers are the targeted groups for this cloud service model
- **Software as a service (SaaS):** The top level of the layered architecture of cloud computing where the web applications and services take place in the cloud. This layer contains the applications and service that is accessible anytime and from anywhere. These web applications and services are accessed by end-user interface (e.g., web browser) through different kind of devices (e.g. smart phone, PDAs, notebooks or workstations). The Google Documents (docs.google.com), Salesforce.com (CRM) are a good example on this cloud service model while Lin *et al.* (2009) suggest that the application and information technology users are the targeted group for this cloud service model

The cloud computing characteristics and features make the technology more feasible and recommended to both service providers and service consumers. The proposed study will discuss the technical advantages and challenges of using cloud computing technology later in this study.

IMPACT OF CLOUD COMPUTING ON BUSINESS

The innovation of new technologies comes with new chances to start new business opportunities and aims reduce the cost by employing those technologies. The technologies usually move towards improving the markets and helps the business owners, the best example in the literature, the authorship and copyright issues that costs the producers millions of dollars as reported by (Al-Frajat *et al.*, 2010; Hmood *et al.*, 2010a-c) have been resolved by the watermarking and steganography techniques.

The cloud computing technology is an evolution of Internet technologies and employing the cloud solutions in business considered as extending the business model for delivering new IT-based solutions.

Zhu *et al.* (2009) discussed the emerging business model of cloud computing that distinguish it from other technologies that been developed earlier which makes a remarkable commercial value in international markets. While the business model has a great impact on the performance of different firms where (Malone *et al.*, 2006) argue these business models impacts by studying the business model for more than 10,000 US firms.

Business model is the term that being used in diverse domains and it's been used widely in academic, managerial and discussions. The term is still young as it starts to be used in late 1990s (Osterwalder, 2004). It is the term that is closely related to information technology industry where Osterwalder and Pigneur (2002) studied the business model term with stock market data and demonstrate how the internet help in advent the business world.

The business model as a term is still not well understood and there is much uncertainty in the concept (Osterwalder and Pigneur, 2002). In the literature, there are some papers that refer to the way that the company perform their business as a business model while others highlight the conceptual model aspect. However, there are researches that agree to refer to the business model as the conceptual and theoretical layer between the business strategy and processes (Rajala and Westerlund, 2007). The business logic triangle where the business model is referred to as architectural model which comes between implementation and planning level revealed in Fig. 4.

The business model has been described as the means of creating value to customers by (Rajala and Westerlund, 2007). While Osterwalder (2004), used the similarities of a diverse business model conceptualizations to presents a single reference model. In this model, the author composed the cost structure and revenue model which is the financial aspects element to be presented as blocks and these blocks are used together to determine the business model's profit/loss-making logic.

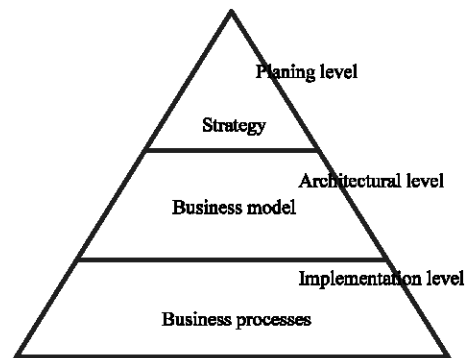


Fig. 4: Business logic triangle (Osterwalder and Pigneur, 2002)

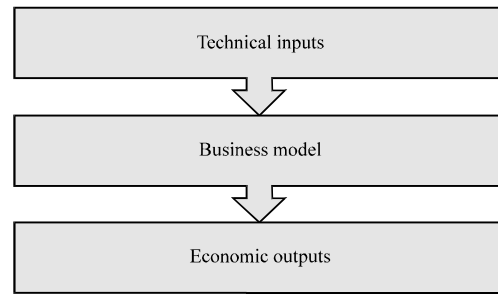


Fig. 5: Business model as converter (Chesbrough and Rosenbloom, 2002)

Other point of view to the business model as it takes its value from an innovation has been discussed by (Chesbrough and Rosenbloom, 2002). The technologies in general are considered as a type of innovation, we can look at the business model as the tool that captures the economic value from these new technologies. This presentation of business model places it in the middle between technologies and economic (Chesbrough and Rosenbloom, 2002). The study defines the business model as converting the technical inputs (e.g., performance and feasibility) to economic outputs such as profit, revenue and price as shown in Fig. 5.

The cloud computing services and resources providers are seeking for make highest revenue with lowest cost possible. The revenue out of providing service is the first financial aspect in business model where all researches on cloud computing concerns about the pricing of cloud computing; they only mentioned and discussed the pay per use charge schema. The pricing and charges of using cloud services is the most critical aspects for the firm in either make use of new technology services or keep using the existing one (Harmon *et al.*, 2009). On the other hand, Weinhardt *et al.* (2009) discussed how the charging schema of using cloud solutions affects the commercial success of cloud computing technology.

Osterwalder (2004) argue that the pricing schema could be the stimulus oh transmitting the value of service that a firm produce into income revenue stream while it can have multiple revenue streams which all have different pricing schema. The pricing schema of cloud services should have a strategic plan to consider increases the revenues of the provided services.

Osterwalder (2004) considers three kind of pricing schemas where:

- Fixed pricing schema based on:
 - **Pay per use:** The consumer pays only for usage of specific service either depending on time or quantity
 - **Subscription:** The consumer pays flat rate in order to use services regardless time or quantity
 - **List of prices:** Based on service specific price, where the user pay different price for use different services
- Differential Pricing schema based on:
 - **Customer characteristic dependent:** The pricing of service may vary from one customer to another depending on customer characteristic
 - **Volume dependent:** The pricing of services may vary depending on customer usage
 - **Service feature dependent:** The prices of services are varying depending on the service itself. The importance, features and the need of the service

- **Value-based:** The price is depending on the customer's valuations of the service
- Market pricing schema based on:
 - **Auction:** The final price is increasing increments depending on buyers bid on service
 - **Reverse auction:** The final price is decreasing decrements depending on sellers bid on service
 - **Yield management:** The final price is depending on real-time value and demand of service
 - **Bargaining:** The final price is set depending on agreement between the two parties on the price of provided service
 - **Dynamic market:** The buyers and sellers provide their preferable price but individual sellers are not able to provide the service for this price

In the literature, there are some researches discussed the pricing schema presented above. Yeo *et al.* (2009) discussed the most feasible for cloud computing solutions pricing schema which is pay per use. This pricing schema considered as the right schema for cloud solutions as the user pays according to fixed price according to his usage of service which may vary from few gigabytes to hundred terabytes storage space or few to hundred thousand transactions per day at the same time the cloud service provider is able to control the required resources.

Yeo *et al.* (2009) present an advance pricing schema. Where the service will be provided for prepaid mechanism with associated constraint such as the bought resource or service should be consumed in specific timeline and an overcharge will be enforced when the user exceeds the quota.

Additionally, Youseff *et al.* (2008) discuss the subscription pricing schema mentioned earlier where the consumer subscribes to service and pay a periodic fixed amount for the service. This type of pricing is widely used with Software as a Service (SaaS) while the pay per use is mostly used with Infrastructure as a Service (IaaS) and Platform as a Service (PaaS).

On the other hand, the cost of provided services is the second financial aspect in business model. As mentioned earlier by Li *et al.* (2009) there is no tool available tool or software to calculate the actual or even approximate cost of providing service. According to Osterwalder (2004), the cost of providing service can be found by considering the structure of income statement there are three main costs attribute; the Cost of Goods Sold (COGS), Selling, General and Administrative (SG and A) and Research and Development (R and D). the Selling, General and Administrative (SG and A) in turn has two subcategory; the Sales and Marketing (S and M) and General and Administrative (G and A) as shown in Fig. 6.

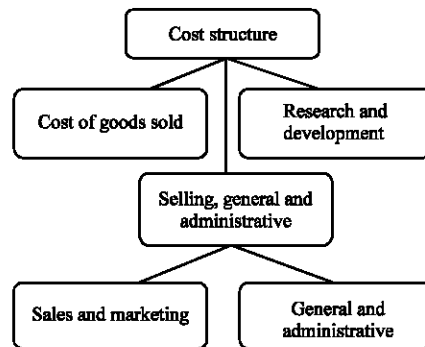


Fig. 6: Cost structure and categories

The typical cost that could be applied to the information technology services and products which are resources (software and hardware) that are used to produce the service, people who are developing the service, accommodation such as offices and utilities, external resource and services such as outsourcing services or training and transfer where the firm pays for internal cost centers.

On the other hand, Li *et al.* (2009) proposed new cost structure by identifying eight categories in the cost structure. The researchers assume that the cost of service could be computed from server cost, software cost, network cost, support and maintenance cost, cooling cost, power cost, facilities cost and real-estate cost which are the eight categories in their new structure. While Greenberg *et al.* (2009) argue that the cost structure should contain four categories of cost only which are the servers, infrastructure, power and network by assuming that the cloud contains 50,000 highly equipped and qualified servers.

Recent studies by Armbrust *et al.* (2010) found the server utilization rate is the key factor of making a cost effective cloud resource where the author found currently average utilization of servers is only 5-20%. The study argued increasing the server utilization rate in order to have a profitable cloud services, they suggest a simple solution to overcome the current limitation of low utilization rate by hosting multi servers in one physical machine while at the same time other factors will draw down such as power, maintenance, etc.

DISCUSSION

The cloud computing facilitates the use of information technology resources and service while dropping down the cost of using such services if they are built in the firms independently (Buyya *et al.*, 2008). The cloud computing technology still at its middle (if not early) stages it is not fully-established and trusted by users. The cost, revenue and risk of consuming or providing a service are the main challenges in cloud computing (Harmon *et al.*, 2009; Anonymous, 2008). The cloud clients still uncertain on how the cloud services will change their way of using the information technology resources. The adoption of the cloud solutions will be slow as the firms still not ready to change all the information technology resources and systems they have and trust.

The cloud computing found new business opportunities and high competition that helps in fast development of other related aspects such as marketing, pricing schema and sales strategies (Zhang *et al.*, 2010). The cloud solutions provided by several companies which may be not well-known or established companies where this may reflect the fear of using cloud services as the clients will put their data and information at risk by uploading it to public cloud that belongs to some other firms. The cloud computing has new qualities that encourage the use of cloud resource such as virtualization or multi-tenancy (Tai, 2010). It provides the platform for developing new services and the ability to combine two services or the opportunities of subscribing to different services from different providers which provide a better way to employee services from their best source company (Youseff *et al.*, 2008). It can be considered more a new approach to create, deploy and deliver information technology solutions than any earlier technology driven technologies. The cloud computing aims to provide the fastest, cheapest, easiest, widest and the more flexible way to deliver the information technology services (Osterwalder, 2004).

However, the structure of cloud computing as pool of resource allows more effective way of developing platforms and services on top of it. The big advantage of using cloud services is that the same service will be available at all times in any place worldwide and any device platform (i.e., smart phone, PDA or workstation). The cloud computing offers new solutions to the consumer that have not been developed or found before and it may help in continuing producing and innovation

of services on the top of the old ones (Cooter, 2010). It will allow the organization to sell bundled service packages instead of selling isolated services and increase the revenue opportunities.

Yet, more researches should be conducted on security, availability, performance, portability, accessibility, cost and reliability of cloud computing services and resources to the consumer and provider gain more trust and confident on what the cloud solutions could facilitate their business and increase their revenues while the risk remain at its lowest level possible.

CONCLUSION

The cloud computing technique opens new opportunities for new business at the same time provide more chances for other companies to use the cloud solutions instead of buying new equipment and pay for using licensed software at higher price while training the employee for each new technology or service the company needs. The financial challenges and the pricing and revenue structures has been discussed for the purpose of justify the adoption of cloud solution. The cloud computing business model is a way of transferring the cloud solution to customer value. The developing of cloud service will continue making new revenue as long as new client subscribe to cloud solutions which reflects on decreasing the price of using the service as the exact same service being used by multiple users.

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