IMPACT STUDY OF CLOUD COMPUTING ON BUSINESS DEVELOPMENT

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ABSTRACT

The entire world focuses on the consumer marketing allegations of the hastily evolving convergence of dynamically scalable multi-client computational power, use of storage services and databases made obtainable through a network or the Internet. On the whole development is also known as "Cloud Computing". Public services linked with Cloud Computing grew from $9 billion to $40 billion over the last five years. This convergence is aggravated by the increased usage of e-Commerce, social media and smart phones and mobile commerce. This empirical impact study emphasizes the consequences of adopting Cloud Technology in business organizations (micro, Small Medium Businesses (SMBs) and Small Medium Enterprises (SMEs)) and how it affects business development, from various research literature.

1. Introduction

Cloud computing is an enhanced technology to run businesses. Instead of running the applications on a PC or a LAN, they run on a shared multi-tenant. It is self-service oriented; to use any application that runs in the cloud, just logged in, customize it according to the customer need, and start using it. More Businesses are running all kinds of applications in the cloud nowadays, like CRM, accounting, HR, and custom-built applications. Cloud-based applications cost less, since the customer doesn't need to pay for all the hardware and software, facilities, or extensive configuration and maintenance of a full technology stack, to run them. Cloud provides more scalable, more reliable and more secure service. And over, upgrades are periodically completed by cloud providers to facilitate new features, security, performance enhancements automatically. Cloud technology follows pay-as-you go model. Finally, cloud applications and Adaptation of Cloud Technology, doesn't eat up the valuable IT resources of any company. And adopting Cloud, allows the customer to focus on deploying more applications, new projects, and innovation. Cloud computing is a modest idea, but it can have a huge impact on any business.

2. Characteristics of Cloud Technology

The characteristics of cloud technology are as follows [1]:

1. **On-Demand Self Service:** A customer can avail any contracted computing resource such as processing power, storage space, or application programs from a service provider without human interaction.
2. **Broad Network Access:** The computing resources can be accessed anywhere, anytime with any standard device which can access the web.
3. **Resource Pooling:** The computing resources of a provider are assembled to provide the confined service. The pooled resources may be geographically spread across multiple data centers. The computing resources of a provider are shared by several customers. The resources are dynamically assigned to customers depending on the demand.
4. **Rapid Elasticity:** Computing resources may be availed elastically by customers. A customer may request more resources when needed and release them when not required. From a customer's point of view the resources are unlimited. The customer pays only for the total resources used.
5. **Measured Service:** Cloud computing systems are adaptive systems. They automatically balance loads and optimize the use of resources. A user is permitted to monitor and control resource usage, thereby providing transparency in bills.

3. Cloud Technology Service Models

There are three basic categories of cloud service models are used. They are as follows [1]

1. **Software-as-a-Service (SaaS):** Instead of installing software on the client's machine and updating it with regular patches, frequent version upgrades etc., applications like Word processing, CRM (Customer Relationship Management), ERP (Enterprise Resource Planning) are made available (hosted) over the internet for the consumption of the end-user.

2. **Platform-as-a-Service (PaaS):** Instead of buying the software licenses for platforms like operating systems, databases and middleware, these platforms and the software development kits (SDKs) and tools (like Java, .NET, Python, Ruby on Rails) are made available over the Internet.

3. **Infrastructure-as-a-Service (IaaS):** This refers to the tangible physical devices (raw computing) like virtual computers, servers, storage devices, network transfer, which are physically located in one central place (data center) but they can be accessed and used over the internet using the login authentication systems and passwords from any dumb terminal or device.

4. Cloud Deployment Models

Cloud service deployment can be in any one of the following [1]

1. **Public Cloud:** It is available from a third party service provider through the Internet and is very cost effective for SMBs to deploy IT solutions. For example, Google Apps.

2. **Private Cloud:** It is managed within an organization and is suitable for large enterprises (managed within the walls of the enterprises).

3. **Community Cloud:** It is used and controlled by a group of enterprises, which have shared interests.

4. **Hybrid Cloud:** It is a combination of public and private cloud.

5. Reasons for the emergence of Cloud Technology

Even though, there are numerous reasons for the emergence of Cloud Technology in the technical side, the major reasons for cloud emergence are [1],

1. **Rapid growth of computer and communication technologies:** Technological growth in computing and computing devices, and in the data communication lead to the tremendous growth of cloud technology.

2. **Changes in management philosophy:** Decades ago, most of the organizations used to keep their data manual or stored their data in on premise infrastructure. But to meet the global competency, most of the organizations want to utilize their time to improve the business, and ready to outsource their IT requirement.

3. **Availability of excess computing capacities** with giant corporations such as Amazon and Google.

6. Advantages of Cloud Computing

Cloud computing provide more benefits to micro businesses, Small Medium Businesses (SMBs) and Small Medium Enterprises (SMEs). They are given below [2]:

- **Flexibility:** Cloud-based services can rapidly meet the business demand of any organization by providing various services.
- **No Up-Front Cost:** Cloud computing services are typically pay-as-you-go, so there's no need for upfront cost of infrastructure. Since cloud computing is much faster to deploy, businesses (SMEs) have marginal project start-up costs and expectable ongoing operating expenses.
- **Increased collaboration:** Cloud computing upsurges collaboration by allowing all employees to synchronize up and work on documents and shared applications simultaneously from their own place. It even allows them to follow colleagues and records to receive critical updates in real time.
- **Automatic software updates:** Cloud service providers do the server maintenance including software upgrades, security updates, freeing up their customers' time and resources for different other tasks.
- **Document control:** If a company doesn't use the cloud, workers have to send files from side to side over email. This means only one person can work on a file at a time and the same document will be duplicated in millions of formats and names.
- **Security:** Businesses storing everything in the cloud, can access the data even anything happened to the machine.
- **Work from anywhere:** Cloud computing allows employees to work from anywhere. This elasticity positively affects knowledge workers' work-life balance and productivity.

- **Environmentally friendly:** Businesses adopting cloud computing uses only the server space they needed, so it decreases their carbon footprint and saves the environment.
- **Disaster recovery:** When companies start trusting on cloud-based services, they need not have to device complex disaster recovery plans, because cloud service providers take care of most issues in a very fast manner.
- **Competitiveness:** The cloud technologies grant SMEs access to enterprise-class technology by providing various ERP solutions. It also allows small and medium businesses to act faster than established, big competitors.

7. Limitations of Cloud Technology

Even cloud technology has several advantages, the organization adopting cloud has to keep aware of following limitations.

1. Failure of communication will cut off a cloud service.
2. Sending data on a publicly accessible communication system have the danger of eavesdroppers tapping the communication line and stealing or corrupting data or stealing it from disk storage.
3. Deterioration of the quality of service of a cloud provider or a provider ceasing operations due to bankruptcy.
4. Complex legal problems may arise if providers' servers are in a foreign country and an organization's program and data are corrupted or stolen. An organization must clarify what laws apply while signing the Service Level Agreement with a cloud services provider.
5. A recent problem is the clandestine surveillance of data traffic on the Internet by the intelligence agencies of UK and USA. As cloud providers' infrastructure is spread throughout the world, so it may not be wise to use those services, particularly if the data to be processed or the program is sensitive.

8. Impact study of adopting Cloud Technology in Business Organization

There are some major consequences of adopting cloud in Business. They are Ease of use and convenience, Cost reduction, Reliability, Security and privacy, and Sharing and collaboration. The literature support of these impacts is summarized below.

1.Ease of use and convenience: Small business employees often work outside the actual office location and hence having easy access to their data (using their mobile devices) is a big plus [2] and [12]. This need for employees to have access from remote locations as well as the increasing number of online transactions necessitates a cloud computing solution [7]. Accounting and finance work has been outsourced to the cloud, leaving more time for small business executives squander on strategic work and initiatives [8]. Accountants are using cloud

technologies for their SMEs clients for a convenient monthly fee [13]. The Cloud approach helps eliminate administrative overhead and permits access from any geographical location, any device, and from any organization [4]. Less powerful devices (smartphones, netbooks) are able to make

the most of the company's backend IT systems via a simple web-based interface like AWS Management console [3].

2. Cost reduction: Due to the subscription model, there is a huge cost savings for small firms [2]. The access cost for small firms utilizing business analytics and intelligence, which needs lots of computing power consumption, has been lowered [3]. A 70% cost reduction has been observed since adopting AWS (Amazon Web Services) as the cloud vendor. AWS has also reduced their prices a couple of times, in the past three years, in spite of the absence of competitive forces [4]. European SMEs, who are more risk averse, compared to USA SMEs, appreciate this reduction of fixed IT assets cost as well reduction of maintenance costs of IT assets, resulting in lowering the entry barrier [5]. Due to the per user revenue model, small businesses could afford enterprise applications like CRM (Customer Relationship Management) or SCM (Supply Chain Management) tool [6] and [7]. Computing power is nowadays considered as an article of trade, due to the entry of various players, providing it at an inexpensive cost [3]. Small businesses and startups can now afford applications such as ERP (Enterprise Resource Planning), CRM (Customer Relationship Management), SFA (Sales Force Automation) and SCM (Supply Chain Management) due to economical subscription fees [8]. Immediate access to hardware and software resources is available with no upfront capital investments resulting in faster time to market, with IT become an operational expense (instead of capital expense) [3] and [9]. Adoption of IaaS reduces capital expenses and IT costs [10]. Elasticity in ramping up (scalable infrastructure) and disposing of cloud capacity when not needed, is extremely budget friendly [11]. For risky business models, if the demand rises piercingly in ad-hoc manner, scalability of resources provided by Cloud service providers (operational excellence) becomes a huge competitive advantage [7].

3. Reliability: Since the cloud is available round the clock, it is more reliable. Employees can even call up the cloud center (if needed) instead of depending on the in-house IT staff [2]. Data redundancy is built-in by cloud storage solutions so that the files are always obtainable, even in times of network downtime, power failures, etc. [14]. This built-in redundancy helped Netflix to stay buoyant online, regardless of AWS failure in 2011[4]. Even in 2010, Gmail had an uptime of 99.984%, which is 32 times more reliable than a typical widely used email system. On the contrary, for SMEs, the reliability of cloud services is definitely important, but not as crucial as for large companies [15]. Sultan adds that portability of end-user data to another cloud provider (in case of failure of the primary provider) is extremely important. Lack of interoperability is an issue prevailing across the cloud computing landscape [16]. Also, reliability gets impacted because of the downtime of various commercial cloud solutions like Salesforce.com, Amazon, Gmail and Google Docs, resulting in setting up of failsafe cloud systems. Needed reliability level has to be observed in spite of low prices of cloud services [11]. In [11] it is further stated that quick phone support is needed under SLAs by commercial enterprises providing automatic disaster recovery and back up provides confidence. Efforts are underway by the FTC (Federal Trade Commission) and the Cloud Security Alliance to improve the reliability of these cloud providers [7].

4. Security and Privacy: Organizations talking about cloud security are actually more concerned about having their own control (something like a private cloud) than any other serious issue [18]. Cloud security is good, as risks get minimized due to authentication and encryption [7]

and [12]. Security is heightened by, for example, monitoring activities, tracking transactions, providing selective access to users, and utilizing strong password. In [15] it is reported that 75% of the CIOs reporting are concerned about cloud security and argues that Google does not encrypt

data on their servers [15]. On the other hand, in [15] also stated that 66% of USB drives are lost; hence the cloud is more secure. Installation of security patches can be avoided in this manner days and months are saved. There may be some elasticity depending on the cloud solution chosen, for example, Google Apps allows certain users to stipulate the location of data storage to meet the Federal guidelines [7]. Improved security is possible due to economies of scale as well as affordability of excellent security experts [19]. Even if data security is the main issue for SMBs, they still utilize public clouds, because a public cloud provides standard services at reasonable cost [20].

5. Sharing and collaboration: With the proliferation of social media and smart phones (mobile devices), startups and small companies have improved collaboration within their companies [8]. Cloud file storage allows various SMBs stakeholders to share information and data (via emails, shared web-links, IM-instant messengers), store and retrieve information with each other [12] and [14]. Google Apps, box and Jive are very good examples of sharing content and collaboration among stakeholders [4] and [15]. Large data are being shared and collaboration with other CSE (Computational Science and Engineering) research groups is enabled [17]. Collaboration becomes easier with IMs (instant messaging) and video conferencing, enabled via the cloud [18]. Document sharing and editing of the same document by several people at the same time (via Google Docs) and collaboration (via Skype, Google chat) is compelling for users to adopt cloud computing [3].

9. Conclusion

Cloud computing is definitely making effect with micro as well as SMBs or SMEs and is slowly sneaking into their business strategy formulation and accomplishment now and in the near future. SMEs or SMBs are not diffident to integrate cloud into their business strategy in-spite of the few concerns being cited by industry specialists. As per this research review, the convenience and ease of use is the impact cited by SMEs to espouse cloud. The second impact to use and support Cloud Technology is privacy and improved security. The third impact for practicing and taking up of cloud is cost reduction. This means that SMBs or SMEs find the cloud easy to use, convenient, sufficiently secured for their business, their business privacy is well protected and lastly but not the least is that the Cloud helps SMEs to depose their cost in a significant way. The fourth impact, reliability is not an important factor for SMEs to adopt and use cloud technology. SMEs are concerned about cloud downtime and rely more on their physical devices within their physical proximity for backup, storage etc. The fifth and the last impact is sharing and collaboration which indicates that SMEs have a higher need for sharing and collaboration, instead of preferring face to face meetings, phone calls, business travel, possessing physical devices etc. for their business needs, can go for cloud, since cloud provides the same effect in less cost. The study perceived that adoption of Cloud Technology has positive impact on business development.

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