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THE ADOPTION OF CLOUD COMPUTING IN BUSINESS ORGANIZATIONS FOR AN IMMEDIATE TACTICAL ADVANTAGE OR MAKING IT PART OF THEIR LONG-TERM STRATEGIC I.T. PLAN

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Abstract: The Information Technology (IT) business ceaselessly endeavours to enhance regarding deploying products or offering services with the approach of new technology, and cloud computing is quickly moving in the promotion cycle because it will reshape the method of delivering services of data innovation. Decision-makers still have numerous worries that could drop the adoption of cloud computing. This paper will show a systematic literature review to investigate the present situation related to cloud computing adoption. This is done by analysing 25 studies published about cloud computing adoption. The results show that businesses face critical problems before they choose to adopt cloud computing.

Keywords: Cloud computing; Cloud adoption; Computing in developing countries; IT application; Technological innovation

1. Introduction

As per the market rivalry and a significantly changing business environment, firms have still provoked to embrace different best in information technologies (I.T.) to improve their business operations [1]; [2]. As of late, cloud computing concept is the lead of the information technology as its utilization is perceived as a significant area for I.T. innovation and development [3]; [4]; [5]. Cloud computing has set out through the principle territories identified with information systems (I.S.) and technologies, for instance, application, operating systems, technological solutions for firms and software, [3]. [6]characterized a style of computing where hugely versatile IT-related capacities are given as a service of external users customers by using web innovations. [7] Expressed cloud computing as a pool of exceptionally scalable abstracted infrastructure is fit for hosting end-user applications that are charged by utilization. [2] characterized I.T. capacities that are desired conducted, conveyed, and consumed in real-time over the Internet. Many computing models have vowed to convey a utility computing vision, and these incorporate cluster computing, grid computing, and, more as of late, cloud computing [3, 8]. Cloud computing application service like enterprise resource planning (ERP) where a user on the Internet can simultaneously communicate with numerous servers and trade data among themselves [9]. Besides, network technology and telecommunication have been advancing quickly; they contain 3G, FTTH, and WiMAX. Services which are provided by cloud computing provide the users the best technical support that can build up the gigantic possible interest [8]; [10]. In this manner, cloud computing gives the chance of versatility and adaptability to pull in the market on request.Companies are trying to coordinated with the processes of their business and their information systems in order to meet their needs with trading accomplices [5]. In high-tech enterprises, pervasive data transformation practices have gotten one of the essential viewpoints for improving operational effectiveness. developing cloud computing ability is very significant for developing the advantage of competition because the way of sell and buy that industries agreed with clients is not quickly changing; however, it is additionally turning into a progressively necessary piece of undertakings' business strategies [10]. Cloud computing diffusion turns into a vast research subject since it empowers firms to execute information exchanges along with value chain activities, for example (distribution, financemanufacturing, sales, customer service, data sharing and collaboration with trading accomplices [6]; [10]. Cloud computing will be adopted by organizations that are probably going to utilize a progressively hybrid procedure of on-premise, "public "cloud, and "private" cloud services when

fitting [4]. The idea of private cloud computing includes organizations sending key empowering technologies, for instance, virtualization and multi-tenant applications, to make their private cloud database. At that point, individual businesses pay the I.T. department for utilizing industrialized or normalized services following concurred chargeback mechanisms. For some organizations, this methodology is less undermining than a general move to the Public Cloud. It should make it simpler to hand individual services over to trade partner providers in the future [5].

2. Research methods

Analysing the literature is a crucial method that produces a firm foundation for improving knowledge; it helps to uncover areas where research is required. This paper intends to systematically review the literature to describe the current situation regarding cloud computing adoption.

3. Cloud computing and its adoption

What is Cloud Computing as per U.S. NIST (National Institute of Standards and Technology) " Cloud computing is a model for allowing accessible, on-demand network access to a shared pool of configurable computing resources (e.g., servers, networks, storage, services, and applications) that can be quickly provisioned and delivered with minimum management effort or service provider cooperation [11]"

Adoption means the act or process of beginning to use something new or different [12]. Few studies in the past have referred to adoption as task technology fit assessment [13]. Adoption of Cloud has been discussed in various industries, including education, healthcare [14] FMCG and other business processes [15]. About Cloud Computing and for the aim of this research, the adoption of cloud computing is described as business implementing cloud computing in their organization for an immediate tactical advantage or making it part of their long-term strategic I.T. plan.

Considering how the adoption of cloud computing can revolutionize the business scenario in various technological innovations, its facilities and resources could be accessed on-demand [5]. Many previous studies in the field of cloud computing have addressed the areas of new technologies, security requirements, and future expectations in these emerging environments. From the financial point of view, [16] built two sorts of business models that can be utilized for cloud users of the companies who willing to choose cloud computing services. There are business models for firms with an actual I.T. business model and infrastructure for startup businesses. A present survey discovered that the contemporary charging pattern and different determinants of the cloud make it extremely fitting for small- and medium-sized firms [16]. However, the firm size was to influence the distinguished strategic value of cloud computing in innovative technological development. [10] has stated that firm applications typically would be in charge of their localized sets of processes, with the connection of applications to these processes.

Earlier studies have introduced a trade-off comparison that shows which technology can drive to bigger earnings. [16] examined to increase this outlook with a model that not only supports the agreement of a firm for cloud computing by simply following all the factors yet besides attempts to give a particular productivity cost of the advantages with cloud computing. [17] provides an overview of technological research studies that were performed in H.P. labs and that adopted cloud-scale smart environments, for example the smart data center and utility computing. [8] have additionally managed with market-oriented resource allocation of cloud computing by utilizing third-generation Aneka enterprise grid technology.

[18] formed a cloud-based infrastructure that had remained optimized for of the networks and maintained important data mining applications. In summary, we conclude that as mentioned earlier in cloud computing adoption research is twofold:

(1) Although various factors affect cloud computing adoption among prior researchers' findings, all these factors can be classified in technological, organizational, or environmental contexts. Therefore, it is useful to utilize the (TOE) framework to examine the cloud computing adoption matter.

(2) Most of the studies have examined the importance of the technological factors impacting Cloud computing adoption in any matter, the influences of environmental and organizational factors on cloud computing selection vary over various industry contexts. Therefore, it is needful to analyses the factors of cloud computing adoption in various industries to have a bigger perception of cloud computing adoption.

4. Related researches

The main objective of cloud computing is to utilize I.T. resources effectively by combining the distributed resources to gain higher throughput and be able to resolve large scale computation glitches.

Studies show that multiple firms are adopting cloud computing to gain I.T. operational and cost benefits compare to traditional I.T. systems. To reduce significant CAPEX expenditure, the total cost of ownership, and to raise the return on investment, businesses across the world appreciate the speed where the cloud can be deployed with least lead time and implementation duration. Rather than building its in-house ability and capacity to support and run in-house and on-premise I.T. infrastructure and systems, cloud-based applications and services, storage and processing can be provisioned from cloud service providers.

The need for computing facility and storage for Internet Service Providers were rising exponentially after the internet growth began in the early 90s. Technology giant Google developed its data centres to use cheap commodity hardware platforms to meet the growing demand for computing resources. Eventually, various software technologies have developed to achieve on-demand hardware elasticity, which has led three primary cloud computing style based on underlying hardware abstraction technologies, the Amazon-style based on server virtualization pioneered in infrastructure as a Service (IaaS) under the name Amazon Web Services released in 2006-2007 period. Google-style based on technique-specific sandbox provides Platform as a Service (PaaS) called Google App Engine released in 2008. Microsoft Azure works on windows Azure Hypervisor (WAH) as the fundamental cloud infrastructure and .NET application framework [19]. Software as a Service (SaaS) provides software applications to end-user, Salesforce is a leading provider of CRM software platform.

Back in 2011, organizations in the Middle East were not fully aware of the value of cloud and concern about security, data availability, and service level agreements [20]. Even though many organizations in the Middle East have exhibited their interest in cloud computing, the implementation rate is not at par with companies based out of the U.S. or European region. Most of the customers are suffering from cloud confusion as the technology stretches over a wide variety of capacities and not clear about the possibilities and the limitations of cloud computing in a well- organized way (Forrester Research, Inc.).

Most of the commercial data centres and telecom companies in the Middle East provide colocation and managed services. Service providers do advertise the availability of disaster recovery (D.R.) as a service and other infrastructure as a service (IaaS), but on closer inspection, they are not "cloud" services. Specifically, they are not multi-tenant and do not have elasticity and agility automatically built into them. Consequently, any public cloud infrastructure services would primarily be hosted outside the region (except for a few that have their global security operations centre in the region).

As per the recent IDC Energy Insights Survey 2014, 30 percent of oil and gas companies have already implemented a private cloud solution, and 15 percent are currently using public cloud services.

[21] Having a robust ecosystem for cloud computing is not enough for the company to incorporate cloud computing in its strategic roadmap and notwithstanding having a robust ecosystem for cloud computing, there are limits and difficulties in cloud computing which an organization has to defeat before it determines to adopt cloud computing, despite there is a robust ecosystem for cloud computing possible in the UAE, the matters around Legal associations, data security, and derived benefits are affecting an organization's decision on its decision of cloud computing adoption and the sort of model to adopt if it chooses to go for cloud computing.

Cloud computing emphasis its benefits for management sustainability but its impact which can be in the future for this sustainability management idea can be significant.

[22] Introduced the characteristics of business models to produce enough knowledge on the sustainability management idea. Several aspects developed for many business model design methods but their estimation proved related components behind the distinct viewpoints

[23] Cloud computing is discovered easy to learn and take minor time in accomplishing tasks of employees. It classified that the complexity of cloud computing has a negative impact on organizational expectations that lesser the complexity in utilizing cloud computing, more is the improvement in their job performance and the comfort of using it. Furthermore, the security and trust variable was determined to be an essential dimension for cloud computing adoption. Unluckily, this dimension is not well examined by Egyptian law in a form that ensures secured information on the cloud. The copywrites are not absolutely examined in the Egyptian context to be capable to adopt in a secure way to cloud services. Therefore, this is a second function of the government that has to be ideally done by adding and activating rules that limit copywrite and secure

information with the required system to support users of IT services to adopt to cloud computing.

There are many articles and research papers written on the adoption of cloud computing at a global level. There is not enough comprehensive research conducted on analysing the cloud-based ecosystem providers in Syria and its relation to the adoption of various cloud services.

Organizations in Syria are more attracted to adopt cloud computing services to reduce capital and operational expenses over traditional I.T. systems. The reliable, secure, and fast internet data services offered ISPs ensure the cloud is a practical solution for organizations of all sizes.

In today's Information Technology world, service, or product delivery based on cloud computing has become popular. Most of Tier 1 and Tier 2 players in the I.T. industry have their offerings with cloud features or functionalities. These service providers have invested in creating a cloud computing ecosystem, in terms of sales, service (deployment) and support, to enable higher penetration of cloud computing in end-user organizations, that is what some of the developed and developing countries are migrated to the cloud below are some examples:

Cloud Computing in Australia

[24] Australian government's perception is to engage cloud computing in order to match as much as of the government's needs in a cost-effective, secure, flexible, and reliable way. Much study has been done in order to distinctly highlight the advantages and implied risks of cloud adoption nationwide. Government businesses are prompted to make more numerous usage of cloud computing so as to save expenses while conducting more capacity and ability. Additionally, cloud computing has been adopted to improve the government's operation capability by advancing the countries IT effectiveness.

Cloud Computing in China

The government of China is very supportive of cloud computing. The government has introduced a cloud development strategy to launch a national cloud called the China Cloud. Hence, China attempts to finance developing many clouds that are regularly directed on advancing IaaS and PaaS. In 2012, China has begun about 100 cloud-related projects which involve building national data centers [25]Currently, cloud computing is being utilized by the telecommunication businesses to manage a huge number of data and even by the government in order to address online services. Nevertheless, the adoption of cloud computing in national private businesses is staggering behind due to concerns about data security and privacy [26].

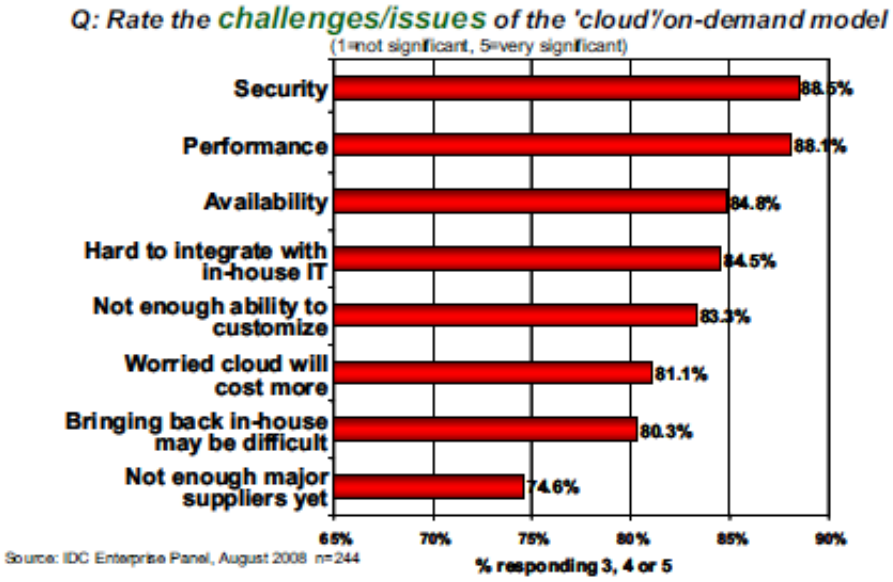

Figure 1. Challenges rate of the cloud on demand model [28]

Cloud Computing in Japan

In 2009, the Digital Japan Creation Project was begun to create new ICT markets to increase the Japanese

economy. The principal focus of this plan is to progress a national cloud called Kasumigaseki Cloud by 2015. The main objective of this cloud is to build a high level of collaboration and to combine hardware and infrastructure between various ministries in order to produce platforms for shared purposes [27].

5. Results of cloud adoption process

As Cloud Computing is still in its beginning, current adoption is associated with numerous challenges. Based on a survey proceed by IDC in 2008, the significant challenges that prevent Cloud Computing from being adopted are recognized by organizations, as shown in Figure 1.

Security

The security issue has played the most crucial role in hindering Cloud computing. Putting your data, running your software at another person's hard disk using another person's CPU seems frightening to many. Notable security issues like data loss, phishing, and cause critical threats to the organization's data and software. Besides, the pooled computing resources and multi-tenancy model in cloud computing has presented new security challenges [29] that need novel strategies to handle with. For instance, the cloud frequently gives progressively reliable infrastructure services so hackers are wanting to utilize it because it is generally lower cost for them to start an attack [29].

Two new security problems are related to the multi-tenancy model. First, shared resources (hard disk, data, V.M.) on the same physical machine invites unexpected side channels between a malicious resource and a natural resource. Second, the issue of "reputation fate-sharing" will seriously damage the reputation of many right Cloud "citizens" who unluckily share the computing resources with their individual tenant - a notorious user with a criminal mind. Since they might have sharing the same network address, any lousy conduct will be referred to all the users without differentiating real subverters from regular users.

Costing Model

Cloud users need to acknowledge the trade-offs amongst communication, computation, and integration. Since moving to the cloud can particularly reduce the cost of the infrastructure, it does raise the cost of data communication, i.e., the expense of transferring an association's data to and from the public and community Cloud [30]and the expense per unit (e.g., a V.M.) of computing resource used is likely to be higher. This problem is particularly prominent if the customers use the hybrid cloud deployment model where the association's data is distributed amongst several public/private (in-house I.T. infrastructure) /community clouds. The argument made by Gray [31] that "Put the computation near the data" still applies in cloud computing Intuitively, on-demand computing makes sense only for CPU intensive jobs.

Transactional applications such as ERP/CRM may not be suitable for cloud computing from a purely economic perspective if cost-savings do not offset the extra data transfer cost. In addition, the cost of data integration can be substantial as different clouds often use proprietary protocols and interfaces.

This needs the cloud consumer to react with different clouds using cloud provider-specific APIs and to develop ad-hoc adaptors so as to spread and integrate heterogeneous resources and data assets to and from different clouds (even within a single organization).

Charging Model

A started up virtual machine has become the unit of expanse analysis as opposed to the implicit physical server. A sound charging model needs to corporate all the above as well as V.M. linked items for example virtual network usage, software licenses, node and hypervisor management overhead, and so on.

For SaaS cloud providers, the expense of creating multitenancy inside their offering can be very significant. These include re-design and re-development of the software that was initially used for single-tenancy, cost of providing new features that permit for quick customization, performance and security upgrade for simultaneous user access, and dealing with complexities incited by the above changes.

Consequently, SaaS providers need to weigh up the exchange-off between the arrangement of multi-tenancy and the cost-savings yielded by multi-tenancy for example decreased overhead through amortization, decreased number of on-site software licenses, etc.

Thus, an applicable and strategic charging model for SaaS providers is critical for SaaS cloud providers' profitability and sustainability.

Service Level Agreement

Despite the fact cloud customers do not have observation over the implicit computing resources, they must make sure the availability, quality, reliability, and performance of these resources when consumers have moved their core business functions onto their contingent cloud. Meaning that, customers need to gain guarantees from providers on service delivery. Typically, these are offered through Service Level Agreements (SLAs) treated between the providers and consumers. The absolute first problem is the definition of SLA particulars so that has an suitable level of granularity, namely the trade-offs between expressiveness and complicatedness, so that they can cover up most of the customer expectations and is generally easy to be weighted, confirmed, assessed, and authorized by the resource allocation mechanism on the cloud.

Besides, different cloud offerings (IaaS, PaaS, SaaS, and DaaS) will need to define different SLA meta-specifications.

This also raises several implementation problems for cloud providers. For example, resource managers need to possess precise and updated information on resource usage at any particular time within the cloud. By updating information, we mean any changes in the cloud environment would fire an event subscribed to by the resource manager to make real-time evaluation and adjustment for SLA fulfillment. Resource managers need to utilize fast and effective decision models and optimization algorithms to do this. It may need to reject specific resource requests when SLAs cannot be met. All these should be done in a nearly automatic fashion due to the promise of "self-service" in cloud computing. Besides, advanced SLA mechanisms need to persistently corporate customization features and user feedback into the SLA evaluation framework.

What to migrate

The result based on a questionnaire that progressed by IDC in 2008 reveals that organizations still have security/privacy concerns in moving their data on to the cloud. Currently, peripheral functions such as I.T. management and personal applications are the easiest I.T. systems to move. Organizations are conservative in employing IaaS compared to SaaS. This is partially as a result of marginal functions are typically outsourced to the cloud, and core activities are kept in-house. The survey also presents that in three years, 31.5% of the organization can move their Storage capability to the cloud. However, range continues to be comparatively low compared to cooperative Applications (46.3%).

Conclusion

This research attempted to manage a systematic review of the present literature on cloud computing adoption by businesses. This entailed distinguishing the present participation of information systems research concerning the Phenom and defining the under investigated problems and the participation of information systems research regarding the Phenom. However, there is still a gap in the available research papers that focus on the relationship between the adoption of cloud computing and how various factors like security concerns, perceived benefits, legal regulation, and functionalities impact the decision making.

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