

# INTERNATIONAL JOURNAL OF RESEARCH IN COMPUTER APPLICATION & MANAGEMENT

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**IMPACT OF CLOUD COMPUTING ON INDIAN SMEs: ADOPTION, BENEFITS AND FUTURE SCOPE**

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**ABSTRACT**

*Cloud Computing an emerging technology has its implicit effect in technological advancement and to satisfy the need of Small and Medium size enterprises (SMEs). Innovations in information technology have changed the trend of IT adoption, cloud computing is emerging trend and its popularity and usage is increasing day by day. Services like SaaS, PaaS and IaaS gaining popularity among different sectors of industry. Cost effectiveness is the prime factor in its adoption in addition to ease of operation, scalability, auto up gradation, zero maintenance and time saving. The very recent advancement is the availability of ERP modules in the cloud that will revolutionize the computing world and adoption among the SMEs*

**KEYWORDS**

Cloud Computing, ERP SMEs, PaaS, IaaS, SaaS.

**INTRODUCTION**

 SMEs are defined as businesses that employ fewer than 250 people and are independent from other organizations. However, SMEs are diverse: some are dynamic and flexible, with a great power to innovate and a vast range of diversity, others traditional, based on family involvement, embedded in local business environments, and others are start-ups, fragile organizations striving for life and subsistence. Based on Micro, Small & Medium Enterprises Development Act MSME Act, 2006, in India, SMEs are classified broadly into:

- Manufacturing SMEs engaged in the manufacture / production of goods pertaining to any industry.
- Service industry SMEs, which have been defined in terms of their investment in equipment (excluding land & buildings) and further classified into small enterprises with investment above Rs. 10 lakhs (USD 45 million) and up to Rs. 2 crores (USD 900 million) and medium enterprises- investment above Rs. 2 crores (USD 45 million) and up to Rs. 5 crores (2250 million USD).

Business applications are moving to the cloud. It's not just a fad—the shift from traditional software models to the Internet has steadily gained momentum over the last 10 years. Looking ahead, the next decade of cloud computing promises new ways to collaborate everywhere, through mobile devices. Current research has shown that through the use of information and communications technologies (ICTs), small and micro-enterprises are able to see improved economic outcomes - thus increasing their potential for survival within developing communities. Micro-enterprises play a very important role in generating jobs, developing business skills, and providing needed goods and services to a community. Cloud computing is relatively new technology and still organizations are trying to understand its usage and process of its adoption and its effective utilization, cloud vendors like Amazon, Salesforce etc. providing training in form of seminars and tutorials to the customers . The IT services now known as cloud computing have been around for decades, but they never grew beyond a small fraction of total industry revenue. Now, however, their time has come: over the past few years, a dizzying array of hardware and software available as services over the internet has emerged. Consumers and businesses have embraced a multitude of cloud services, from mature sales force management services to email and photo editing to the latest smart phone applications and the entire social networking phenomenon. Further, researchers project an imminent inflection point in the adoption of cloud services by organizations both large and small.

IT adoption has been defined in several ways depending on the context and objectives, IT provides many benefits to the business by implementing and using IT sellers can access narrow markets segments that are widely distributed while buyers can benefit by accessing global markets with larger product availability from a variety of sellers at reduced costs. Improvement in product quality and the creation of new methods of selling existing products are also benefits. The benefits of IT are not only for large firms, small and medium sized enterprises can also benefit from technology investment.

ERP software brings users economic benefits during a company's operational management. The economic benefits of ERP users are better than the non-users. All the data and information resources are managed by Enterprise Resource Planning Systems in the business organizations. This information is stored in centralized and shared data stores. Nowadays information is a priceless tool for organizations and through this perspective it is important to reach all the data of a company IT system in real time. The key is the mobility of the ERP system. We can use Cloud computing infrastructure & SaaS for low cost working. Here Cloud computing infrastructure is just a web service interface to operating system virtualization

**CLOUD COMPUTING OVERVIEW**

Although cloud computing has been defined by various authors in different ways, standard definition according to NIST "Cloud computing is a model for enabling ubiquitous, 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 management effort or service provider interaction"[1]. Different types of cloud services are as follows:

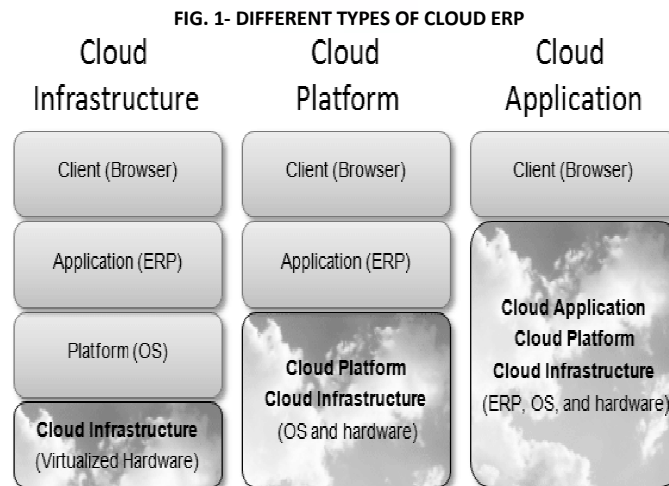
**SaaS (Software as a Service):** Is the most widely known and widely used form of cloud computing. It provides all the functions of a sophisticated traditional application to many customers and often thousands of users, but through a Web browser, not a "locally-installed" [2], application. Little or no code is running on the Users local computer and the applications are usually tailored to fulfill specific functions. SaaS eliminates customer worries about application servers, storage, application development and related, common concerns of IT. Highest-profile examples are Salesforce.com, Google's Gmail and Apps, instant messaging from AOL, Yahoo and Google, and VoIP from Vonage and Skype.

**PaaS (Platform as a Service):** Delivers virtualized servers on which customers can run existing applications or develop new ones without having to worry about maintaining the operating systems, server hardware, load balancing or computing capacity[3]. These vendors provide APIs or development platforms to create and run applications in the cloud – e.g. using the Internet. Managed Service providers with application services provided to IT departments to monitor systems and downstream applications such as virus scanning for e-mail are frequently included in this category. Well known providers would include Microsoft's Azure, Salesforce.com, and Google Maps.

IaaS (Infrastructure as a Service): Delivers utility computing capability, typically as raw virtual servers, on demand that customers configure and manage. Here Cloud Computing provides grids or clusters or virtualized servers, networks, storage and systems software, usually (but not always) in a multitenant architecture. IaaS is designed to augment or replace the functions of an entire data centre. This saves cost (time and expense) of capital equipment deployment but does not reduce cost of configuration, integration or management and these tasks must be performed remotely. Vendors would include Amazon.com (Elastic Compute Cloud [EC2] and Simple Storage), IBM and other traditional IT vendors.

Cloud Computing refers to both the applications delivered as services over the Internet and the hardware and systems software in the data centers that provide those services. The services themselves have long been referred to as Software as a Service (SaaS), so we use that term. The data centre hardware and software is what we will call a Cloud. When a Cloud is made available in a pay-as-you-go manner to the public, we call it a Public Cloud; the service being sold is Utility Computing. Current examples of public Utility Computing include Amazon Web Services, Google AppEngine, and Microsoft Azure. We use the term Private Cloud to refer to internal data centers of a business or other organization that are not made available to the public. Thus, Cloud Computing is the sum of SaaS and Utility

Computing, but does not normally include Private Clouds. Different types of cloud ERP has been shown in fig-1



- a) Cloud Infrastructure (for example: Amazon, GoGrid) delivers an cloud infrastructure where you install and maintain a platform and an application.
- b) Cloud Platform (for example: Windows Azure) delivers a cloud platform where you install and maintain your applications without worrying about the operating environment.
- c) Cloud Application (for example: Salesforce.com) delivers a complete application, all you maintain is your client access program which is frequently a browser.

Virtual machines from several organizations will require to be co-placed on the same physical resources to benefit the cloud computing providers from efficiencies of virtualization. Some of the basic concerns plan that businesses should inform of them when designing their cloud computing deployments are pointed below [4; 5; 6;7;8]. There are four different deployment models of cloud computing:

**Public Cloud:** Public or external cloud is traditional cloud computing where resources are dynamically provisioned on a fine-grained, self-service basis over the Internet or via and or from an off-site third-party provider who bills on a fine-grained basis

**Community Cloud:** If several organizations have similar requirements and seek to share infrastructure to realize the benefits of cloud computing, then a community cloud can be established. This is a more expensive option as compared to public cloud as the costs are spread over fewer users as compared to a public cloud. However, this option may offer a higher level of privacy, security and/or policy compliance.

**Hybrid Cloud:** Hybrid Cloud means either two separate clouds joined together (public, private, internal or external) or a combination of virtualized cloud server instances used together with real physical hardware. The most correct definition of the term "Hybrid Cloud" is probably the use of physical hardware and virtualized cloud server instances together to provide a single common service. Two clouds that have been joined together are more correctly called a "combined cloud".

**Private Clouds:** Private clouds describe offerings that deploy cloud computing on private networks. It consists of applications or virtual machines in a company's own set of hosts. They provide the benefits of utility computing -shared hardware costs, the ability to recover from failure, and the ability to scale up or down depending upon demand.

**CLOUD COMPUTING IN INDIA**

Cloud computing is still in its infancy in India, but as economic and institutional factors improve, it could greatly accelerate India's digitization and transform how cell phones are used. If industry and the government can develop products that meet local needs and address issues such as low bandwidth and security concerns, the cloud might serve as an important catalyst in driving economic and social progress and development in India. As one of the fastest growing economies in the world, India seems to be at the forefront of most technological developments and cloud computing is no exception. Indian Enterprises have been faced with ebbs and flows in workflow for the past few years and this trend is expected to continue for the foreseeable future. For this reason, cloud computing has a particular advantage for a growing economy like India. First, it balances the ebbs and flows in the workflow without significant impacts to the company's bottom line. Second, the cloud allows an enterprise to focus on its core competencies by allowing the cloud provider to deal with all of the hassles involved with the development, maintenance, storage, and upgrades of business applications. For these reasons, experts predict that the cloud computing market in India will grow at a compound annual growth rate of 40 percent by 2014. The adoption rates of cloud computing technologies in India are fast, and are based on much of the good work that the Telecom Regulatory Authority of India (TRAI) has completed by promoting strong broadband policies. One recent article in Dataquest hailed cloud computing as one of the most significant and important areas for investment in India, citing a Gartner study that states that cloud computing will account for 5 percent of the total investments in India by 2015. Indian mid-sized companies, with a rapid rate of growth, are serving a sizable and rapidly growing domestic market. There is a definitive Indian opportunity; according to Microsoft CEO Steve Ballmer cloud computing would generate 300,000 jobs in India. Adding weight to his estimate, technology research firm IDC has now projected that revenues from cloud services in India will grow to over \$3 billion by 2015 from the \$534 million expected this year. During the same period, the global revenues from cloud services will grow from \$29 billion to over \$70 billion, it said, projecting revenues from cloud computing in India to grow at a compounded annual growth rate (CAGR) of 56% to hit \$3.164 billion by 2015.

"SMEs and the individual user will drive cloud growth in the coming years," according to, vice president, technology at Tech Mahindra. "Large enterprises still have security concerns with cloud computing." Infosys has launched Finacle Lite for rural and semi-urban banks. Tata Consultancy Services (TCS) has "iON" exclusively for SMEs. TCS expects to make iON a \$1 billion business in five years. Infosys did not disclose cloud revenue projections, but according to Vishnu Bhat, its vice president (systems integration and cloud), "We see cloud computing and its offerings as a big growth engine."



The notion of computing perception determines understanding, sense of value, attitude and adaptability related to computing, and the computing knowledge indicates the knowledge of computing solutions and systems [23]. While migrating to cloud computing, especially IaaS, of course, firms would require special skills as they have to spend more efforts on the integration of services with existing infrastructure and to perform business operations effectively [9; 10; 11]. Thus, while dealing with cloud IaaS, expertise in electronic business procurement, contract negotiation, and managing vendor relationships should be deployed [12; 13]. Several studies depict that presently there exists lack of awareness among firms pertinent to cloud computing [9; 10].

## ADOPTION FACTORS

There are various factors to be considered by the SMEs for the adoption of cloud computing.

### A) LOW COST INCURRED IN THE INFRASTRUCTURE AND MANPOWER MANAGEMENT

Implementing the cloud technology helps the organization to reduce its infrastructural expenditure. By doing so the organization will not have to set up its own extended physical infrastructure, because the cloud offers Infrastructure-as-a-Service (IaaS) that include resources like hardware, core networking components, UPS, CPU, data storage, etc. Hence on the other hand usage of cloud reduces the labor cost as it is not necessary to have a large number of staff to maintain the setup. It requires only a few people capable of handling the apps and to co-ordinate with the cloud for its management.

### B) EFFECTIVE DISASTER RECOVERY

An organization needs to design its own disaster recovery strategies as a part of data security. But when the organization is collaborated with the cloud, data security is reserved under the responsibility of cloud. The disaster recovery services provided by the cloud will be more secure and automated which basically simplifies the task to be performed by the organization.

### C) EASY SCALABILITY

When there is a sudden increase in the requirements, the organization needs to adjust itself according to the demands. This procedure will be simplified when the company's application is hosted by the cloud infrastructure. So at times of increased demands, the organization has to only request for the extra resources that are necessary. The required resources may comprise of facilities such as, computing power, storage, software, hardware, processing power etc.

### D) IDENTIFY THE CORRECT CLOUD SERVICE TO BE IMPLEMENTED

Cloud computing offers several different types of services to compensate the emerging requirements that differ from one organization to another. So it is very crucial for the organization to primarily select the correct kind of service that is necessary to them. Cloud computing eases the task of deciding the right choice of service by allowing the organizations to try the service before purchasing. Some of which provide free trials whereas others being completely free.

### E) INCREASED SCOPE FOR MOBILITY

Adopting the cloud technology helps the organization to develop a mobile environment for itself. The employees of the organization need not chain themselves to their desk, but instead they can gain access to information from any location and at any point of time as long as they have access to the internet. This serves as one of the major plus points to the organization's growth as the employees can view and edit the documents simultaneously and irrespective of location.

### F) INCREASED STORAGE

Cloud storage means storing the data in an off-site server and the management of the server is handled by the service provider. The cloud computing technology facilitates the organization to achieve larger storage areas when compared to the storage areas available in private computer systems. Cloud computing also enables the organization to adjust itself to the altering storage requirements. Therefore cloud storage is very flexible as it can be accessed from anywhere and anytime.

### G) HIGHLY AUTOMATED SERVICES

Automated services provided by cloud allow the organization to shift their focus on other important issues as they no longer need to update the software themselves. The responsibility of performing vital tasks like server update and software updates are to be under taken by the service providers.

## FUTURE OF CLOUD COMPUTING

SMEs in India are on the lookout for an agile and secured infrastructure and Cloud Computing can be the safest bet, as currently only 8% of the Indian population are using Smartphone and the number is expected to go up to over 25% by 2015, which will drive the growth of Cloud technology and services, these days that it is hard to understand what exactly it is. However, with businesses demanding cost effective, scalable and robust infrastructure, the future of IT is in the cloud. The challenge for enterprises, especially startups and SMEs in India is to run a business without actually owning anything. By leveraging the cloud, this is truly possible as smaller players can cut down their maintenance costs and save a lot on the operational expenses. The impact of cloud computing for SMEs in India can be tremendous and with an increased number of companies embracing the cloud, there has been a major paradigm shift and an optimistic road ahead.

## CONCLUSION

SMEs need to seriously look at the economics of dealing with data on priority. Cloud computing offers long term cost saving measures besides providing flexibility than earlier data handling models. Cloud also offers opportunity to the SMEs to try out IT applications which traditionally have been the preserve of large business houses and prohibitive licensing cost had deterred the SMEs from trying out. The other major benefit of cloud is the portability of the application and provides an individual to access application from anywhere anytime. This can be very useful for SMEs as they typically have fewer people to manage business and absence of an employee can affect the functioning of the organization. Anytime anywhere access can be boon to employees on travel or on long absence from work place. By subscribing to cloud company can free its IT team from performing updates, installing patches or providing application support. The decision to move to cloud by the SMEs would require push from the owner manager and is a decision worth trying.

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