



**Full Length Review Article**

**A STUDY ON EXPOSURE TOWARDS CLOUD COMPUTING IN INDIA**

**\*Dr. N. Venkateswaran**

Department of Management Studies, Panimalar Engineering College, Chennai 600 123

**ARTICLE INFO**

**Article History:**

Received 05<sup>th</sup> March, 2014  
Received in revised form  
07<sup>th</sup> April, 2014  
Accepted 19<sup>th</sup> May, 2014  
Published online 25<sup>th</sup> June, 2014

**Key words:**

Newsorthy,  
Abstraction,  
Technology,  
Cloud Computing,  
Opportunities.

**ABSTRACT**

The Cloud is not about technology, it is the abstraction of technology for delivering pure services. The Cloud has finally led to the civilization of services because, in the case of Cloud computing, what you pay for is what you get. The reliability of Cloud services is so much greater that, on those rare occasions when it's not perfect, it is considered newsworthy. This paper acknowledges that "A powerful set of catalytic forces is accelerating the speed of social change throughout the world. Cloud Computing – and indeed the whole concept of "Software as a Service" – is continuing to grow in India as popularity. They include a rapid rise in levels of education, high rates of technological innovation and application, ever faster and cheaper communication that dissolves physical and social barriers both within countries and internationally, greater availability and easier access to information, and the further opening up of global markets. By 2020, the people of India will be more numerous, better educated, healthier and more prosperous than any time in our long history. The paper, first understand and deliver the importance of Cloud computing to India. Thereafter try to assess the impact of the Cloud on service providers, areas like telecom, mobile services, Indian firm initiatives, market and job opportunities, future directions and usage of cloud computing networks in Indian scenario. This paper also explains how cloud computing and mobile devices combine present and future new imperatives and challenges for India. Because the mobile phone and devices user market is too big to be ignored, cloud service providers, in collaboration, with mobile service providers have deployed hundreds of cloud-enabled applications and are continuing in their cloud venture to provide an endless range of products.

Copyright © 2014 Dr. N. Venkateswaran. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

**INTRODUCTION**

India, the 2<sup>nd</sup> fastest growing economy has mesmerized the world with its stunningly high economic growth rate since last 2 decades. A World Bank report has projected that in 2010, the rate of growth of India's economy would be faster than the currently fastest growing economy (i.e. China). Over the past 5 years Indian companies have on a buying spree, resulting in acquiring many big & small overseas companies. In brief, Indian companies, sitting on a huge cash piles, are ready to rapidly scale up in their niche. India will be one of the leading adopters of cloud services in the world in just three years. Growth in cloud services is being driven by new cloud computing as well as the migration of traditional IT to cloud alternatives. Indian IT industry had established a global model that was viable and offered better services to IT companies across the world but Indian companies are yet to take to cloud computing in a big way.

Unlike smaller businesses, most large companies in India already use IT, and it's relatively easy for them to embrace the cost savings and efficiencies that cloud-based systems offer. The market for cloud computing in India already doubled between 2009 and 2011. The relative novelty and exploding growth of cloud computing makes it an exciting area for research. Competition is getting tougher for every business to tread on the internet. Traditional web hosting services are hardly capable to match the immense pressure and survive successfully. Cloud Computing Services in India are the answer to all these futile problems. India is no longer a laid back place for advanced technologies. India Cloud Computing has reached a soaring height in the global market with well managed clouds that offer, round the clock web hosting services in India and across the globe. Services to citizens such as banking, insurance, healthcare, education and governance are increasingly moving to the cloud, mainly because it is cheaper, had infinite storage capacities and ensures mobility. The growth in cloud computing market is attributed to the increased maturity of Indian enterprises towards cloud computing and the chief executive officer / chief information

*\*Corresponding author: Dr. N. Venkateswaran*  
Department of Management Studies, Panimalar Engineering College,  
Chennai 600 123

officer mandate for an enterprise-wide cloud strategy. It adds that with the overall environment of cloud adoption fast evolving in India, cloud computing will account for a significant share in the total IT spend of small, medium and large enterprises. Companies in India will increase the adoption of cloud computing technology over the next five years. Today, companies are under-skilled in addressing cloud computing implementations. It recommends companies to invest in competency building internally to take advantage of cloud computing technologies. It was estimated that the skilling and re-skilling market in India will grow fast as cloud computing becomes critical to IT strategies. Leading public and private educational institutions, along with IT enterprises are expected to play a key role in enhancing workforce skills to match the industry demand for cloud computing. Cloud computing will reshape the Indian IT market by creating new opportunities for IT vendors and driving changes in traditional IT offerings.

It generally continues to grow at rates much higher than IT spending. Research firm Gartner forecast that the Indian market will among the fastest growing in cloud computing. Cloud computing in India is capable of harnessing the best features one needs with a web hosting service provider. At the service provider's end, maintaining a central server would resolve any software issues in a cloud computing environment, rather than spending time with individual computer within the organization. Apart from that cloud computing itself is efficient to handle server issues, by transferring load to other servers over the same cloud. It helps the websites hosted across that cloud to run smoothly without any interruption, during network issues or server downtimes. Public cloud services are rapidly gaining popularity in the country. Of the USD billion of cloud services spending estimated in India from 2013 through 2017, spending on public cloud services is expected to reach USD 1.3 billion by 2017. Undoubtedly, will both hear of a number of US companies making large investments in the Indian market as well as seeing some Indian firms become powerful global cloud providers.

### Cloud Computing Providers

Not only research analysts are forecasting an impressive future for cloud computing in India, several large US companies like Google and Symantec are already taking aggressive steps in leveraging the Indian market. Few big names which recently joined the Google cloud are Indian Youth Congress, India mart and Punj Lloyd - a large engineering and design company. We have 87,000 companies using IT across the world. The growth rate of information technology development in India is four times the global average. The absolute numbers are still catching up, but the adoption is rapid. India is free to adopt the Cloud because it has less of a legacy to take care of. A cloud user needs a client device like desktop computer, laptop computer, smart phone, pad computer or any other computing devices with a web browser to access the cloud system through the internet. Top six Cloud Computing Companies who are the providers for the Indian market are: Zenith InfoTech, Wolf Frameworks, Orange Scape, TCS, Cynapse India and Wipro Technologies. Hence cloud computing service providers in India always make sure to stipulate with designs that burn less power for the clouds. Advanced hardware and software are efficient enough to save unnecessary power and make the cloud computing

services India to be more productive. The entire world is going to see as many people enter the labor force in India in the next 20 years as the entire US labor force is today. These people represent a vast opportunity for companies present in India to create India-based brands and to build these into global brands.

### Literature Survey

Cloud computing is big news, promising unlimited capacity and pay-as-you-go economics, plus connections to an always-on world. Enterprises are excited about cloud computing but little of it is ready to use yet. Clouds present security risks, and many enterprise applications have to be completely rewritten to run on scalable clouds. Forward-thinking business leaders are using the cloud within their enterprise data centers to take advantage of the best practices that cloud computing has established, namely scalability, agility, automation, and resource sharing. For example, cloud computing is enabled by grid computing, virtualization, utility computing, hosting and software as a service (SaaS). Virtualization is driving a fundamental shift in how we think about data center environments. It is lowering capital and operational costs, enabling IT agility, underlying Green IT initiatives and fuelling the cloud. As it is often being said lately-mobile, social, big data and cloud are going to be the next big thing in the sphere of technology. According to a study, conducted by Forrester and commissioned by TCS, these disruptive technologies will be the key drivers to revolutionize the retail industry status quo but retailers are not staffed or structured adequately to take full advantage.

According to IDC, digital data in India is expected to be around 40,000 petabytes in 2010 and this number is projected to shoot up to 2.3 million petabytes in 2020. This slowly leads to an information explosion with cloud in the middle, as more and more Indian companies are looking to leverage the cost advantages of the cloud. Talking about the funding scenario, Bangalore based Numerify raised USD 8 million this quarter. Chennai based IT firm, Sify Technologies has also recently announced to invest in or partner with technology startups focusing on cloud, security and managed services. This involves a major amount of INR 30 Crores for initial investments, and INR 120 crores for future investments in this field. Some other names to be look forward for new innovations in cloud this year include BSNL, Tata Communications, British Telecom, Open Xcell, HP etc. According to a survey conducted jointly by Cisco Consulting Services and Intel on cloud computing and how it has altered the information technology landscape for large and mid-size enterprises globally revealed that IT leaders in emerging nations like India, Brazil and China are more upbeat about cloud computing. According to other industry forecasts, the Cloud Computing India market size is expected to grow up to \$4.5 billion by 2015 at a CAGR of 40 percent by 2014. Cloud computing will push the Indian ICT market (software, services and hardware) and businesses in India would generously spend on various IT and Cloud. IDC projects, the overall IT spending India will reach to \$44.8 billion in 2014. This growth is on the sidelines of the worldwide IT spending projected to \$3.8 trillion in 2014. The estimated worldwide IT spending is said to exhibit an increase of 3.1 percent from 2013 figures (\$3.7 trillion). Cloud computing also promises to provide better performance, reliability and scalability. There is some

evidence that these are being delivered. From an environmental standpoint, owing to the advanced electrical and cooling systems used by its centralized data centres, cloud computing has promised to bring low environmental cost and high energy efficiency, compared to the traditional scattered enterprise data centres. All in all, these seductive promises have drawn drastically increasing attention of a worldwide scale.

### Indian Firms Initiatives Towards Cloud

India has probably embraced government IT, or e-governance, as much as any other country. The government's plans for cloud computing are important because it can invest in it at a huge scale. Over the next few years, India can expect a total government technology investment equivalent to millions of dollars. Since past 10 months in India this year, witnessed a lot of activities undertaken by Indian industries in this segment. Many brands and entrepreneurs have forayed into this category some existing ones also attracted significant investments from the angels and venture capitalists.

- Freshdesk, provides a cloud based personal accounting solution.
- Bookyourtable, the online table reservation service came in news for using cloud services to provide real time booking options for restaurants.
- Popular brands like Oracle and Dell which acquired Bigmachines and Enstratus to gain technological advantage in their sectors.
- Indian Government has recently taken an initiative to launch a national cloud, known as Meghraj to accelerate delivery of e-services in the country

The focus of the initiatives will be to evolve a strategy and implement various components including governance mechanism to ensure proliferation of cloud in government. Formulation of the cloud policy is one of the primary steps that will facilitate large scale adoption of cloud by the government. Infosys has cloud computing-based solutions for the auto sector. And others such as HCL Technologies, Tata Consultancy Services and even Bharti Airtel (with its network PC) aren't far behind. They will no doubt have stiff competition from global majors. Sensing the huge opportunity in India, IBM has already set up a cloud computing center in Bangalore. Oracle is getting its act together, while Verizon launched its cloud computing service in India in August 2009.

### Market and Job Opportunities of Cloud in India

- Cloud computing will become the bulk of new IT spend by 2016. From 2012 through 2017, across all segments of the cloud computing market, cloud services revenue is projected to have a CAGR of 33.2%, with SaaS and IaaS growth rates projected to be 34.4% and 39.8% respectively.
- The highest percentage of new jobs will occur in emerging markets especially China and India, which together are expected to produce nearly 6.8 million cloud-enabled jobs between 2011 and 2015.
- More than one-third of cloud-enabled jobs will occur in the communications and media, banking, and discrete manufacturing industries.

- With higher rates of SaaS adoption, by 2017, USD 4.2 billion will be spent on cloud services in India, USD 1.8 billion of which will be spent on software as a service (SaaS).
- Public cloud computing in India is forecast to grow 36% in 2013 to total USD 443 million, up from USD 326 million in 2012. The Indian IT-BPO vendors can develop their social media, mobility, analytics and cloud computing (SMAC) strategies and cross the USD 225 billion mark by 2020.
- Cloud computing will generate some 14 million new jobs worldwide by 2015, and India alone will create over 2 million jobs.
- India would require at least 100,000 professionals in private cloud alone by 2015.

### Factors Favoring the Growth of Cloud in India

- **Rising computer penetration:** The past decade has seen the increasing acceptance of the internet as a medium of communication for businesses. Computers and internet connectivity are the pre-requisites for the adoption of the Cloud. Growing penetration of computers is resulting in an increase in the demand for affordable computing solutions.
- **Innovations in commodity server market:** There has been a significant improvement in the quality of servers that are now available, with faster and powerful processors in place. These servers have become more efficient and less expensive making them more viable for the Cloud. Moreover, innovations in interconnect technology have made the use of servers in clustered environments and application execution more feasible and efficient.
- **Improvements in storage technology:** The growing need to share data between various applications in units as big as terabytes is increasing the demand for networked storage - a shift away from direct attached storage. Capabilities of servers to run multiple applications and increased relevance of virtualization have further acted as an impetus for the growth of network storage

### Mobile Applications VS Cloud

India has the highest rate of adoption for Mobile. And the adoption drove the big players in the local and international market to have their presence in the Indian Mobile Operators space. In a similar way you will soon see various service providers for Cloud Computing emerging and it is going to be the next big wave after the Mobile era. Mobile cloud computing is one of the mobile technology trends in the future what India is looking in future since it combines the advantages of the integration of both mobile computing and cloud computing, thereby providing optimal services for mobile users. The applications supported by mobile cloud computing including mobile commerce, mobile learning, and mobile healthcare and other areas. Technological advancements such as the introduction of high-speed broadband, 3G and 4G technology (long term evolution), high-efficiency blade servers, network optimization solutions, etc. could enable the IT industry to provide dynamic and value-driven services and solutions. Businesses now demand more

flexibility, scalability, cost-efficiency and ease of use from the IT solutions and services used by them. Cloud computing applications run through a browser, the actual mobile operating system has no impact on the program, which means that they will be usable with any application that has a suitable browser. Due to the rapid improvement in mobile browsers thanks to Apple and Google during the past couple of years, almost every mobile can have a usable browser. This greatly extends the market for developers, allowing them to bypass the restrictions placed by mobile operating systems. A cloud application needs a stable connection which could prove to be the Achilles heel for the cloud computing movement. But as mobile network capabilities continue to improve, it is likely that fixes to this particular problem will become apparent. As mobile web capabilities reaches levels of usability to PCs and Macs, cloud computing is likely to become a very popular method in developing, distributing and using mobile applications. Several operators like Orange, Vodafone and Verizon have started to offer cloud computing services for companies. Developing programming languages like HTML 5 are already giving a solution by enabling data caching on a mobile device, which allows a cloud application to continue working is a connection has been momentarily lost. Network providers also give security services for cloud networks, which shows another new opportunity presented by cloud computing. These services allow companies to outsource their IT infrastructure, forgoing huge capital investments using high end hardware. These cloud services allow businesses to pay resource costs like data storing or program hosting. The network operators charge subscription fees for such services.

### Key Findings from the Study

- In India, more than four out of five respondents from the firms believe that cloud will positively impact their organizations.
- It was found that cloud providers in India are well positioned today, though they must be prepared to operate in an increasingly demanding marketplace. They will need to offer end-to-end solutions while orchestrating an ecosystem of partners.
- Security and privacy issues are top of mind with Indian users and seen as a clear inhibitor to cloud growth.
- Robust security and data protection capabilities are also seen as the most critical factors for cloud service providers.
- It is interesting to see that a number of cloud adoption decisions are being initiated by the business heads. IT departments need to increasingly remodel the way in which they partner with business.

### Future Directions of Cloud Applications

In future Indian governments would own fewer and fewer of IT assets, its focus on IT would be more about the management of information and not really about seeing through the mechanics of IT systems. Over time government CIOs would become Chief Strategy Officers (CSO), as focus shifts away from technology, and the trend moves to less hands-on technology and more governance. However, industry experts have a view that India can still become a hub for global cloud computing. Indian firms have reached a maturity in the total outsourcing space, taking away entire IT needs of

large organizations end-to-end. In the cloud scenario they will take this story forward, forming new partnerships and new business models. Thus, it's pretty clear that India has a high potential to offer much better opportunities in Cloud. Also, the way both the private and government players are taking initiatives, and the pace at which the IT professionals and entrepreneurs are making use of this technology, the scope in the future is going to be immense.

### Conclusion

While the Cloud promises several benefits, migration to the Cloud needs to be meticulously planned. Depending on business and technical considerations, organizations need to select the appropriate applications and infrastructure for migration, as all applications and infrastructure are not suited for the Cloud. Cloud computing have several benefits over traditional (non-cloud) environment and have capability to handle most sudden, temporary peaks in application demand on cloud infrastructures. The Cloud is a game changing phase of IT that is not only impacting the way computing services are and will be delivered but also the way in which users will use IT. The Cloud promises several benefits in commercial and technical terms but the challenges too need to be considered when planning for Cloud adoption. Businesses will also need to redefine their business models to better reflect changing trends in the use of IT i.e. Cloud services. As such, the roles of the leadership will also change to better reflect the realities of the Cloud. On the whole, the IT solutions and services industry may significantly change in order to accommodate this new service offering. Businesses have and would continue to adopt the Cloud in order to stay ahead of the curve. The Cloud is not just a passing phenomenon but a reality that has just begun to realize its potential.

### REFERENCES

- Bittman, T.J. 2009. 'Cloud Computing Inquiries at Gartner,' [Online], [Retrieved April 10, 2014] [http://blogs.gartner.com/thomas\\_bittman/2009/10/29/cloud-computing-inquiries-at-gartner/](http://blogs.gartner.com/thomas_bittman/2009/10/29/cloud-computing-inquiries-at-gartner/)
- Foley, J. 2008. 'Private Clouds Take Shape,' Information Week, August 9, [Online], [Retrieved April 10, 2014], <http://www.informationweek.com/news/services/business/209904474>.
- Mell, P. and Grance. T. 2011. 'The NIST Definition of Cloud Computing,' National Institute of Standards and Technology, Special Publication 800-145.
- Open Source Initiative, "Open Source Licenses", In: <http://www.opensource.org>. 2011, Accessed 28 April 2011, D. Ogrizovic, B. Svilicic, and E. Tijan, "Open Source Science Clouds", IEEE MIPRO Proceedings of the 33<sup>rd</sup> International Convention pp. 1189 – 1192, 2010.
- OpenNebula, "The open source toolkit for cloud computing", In: <http://opennebulla.org>, 2011,
- Thomas, P.Y., 2011. 'Cloud Computing: A Potential Paradigm for Practicing the Scholarship of Teaching and Learning,' The Electronic Library, 29 (2), 214-224
- Voorsluys, W., J. Broberg, and R. Buyya. 2011. 'Introduction to Cloud Computing. Cloud Computing: Principles and Paradigms,' John Wiley and Sons, 1-41 [http://www.cio.com/topic/3024/Cloud\\_Computing](http://www.cio.com/topic/3024/Cloud_Computing) [accessed on 10 April 2014].