



Variance of Increasing Cloud Computing Technology on SMEs in India

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Abstract: *Cloud computing has been a major focus of a quantity of businesses and government agencies in developing economies. on the subject of the prospective and collision of cloud computing in the developing world, findings and conclusions drawn from surveys, studies and experiences of companies are inconsistent. We review dispersion of cloud computing in developing economies and examine some developing country-based firms in the supply side of the cloud to present a structure for evaluating the pleasant appearance of this technology in the contexts of developing needs, capabilities, and competitive positions of increasing countries. We examine how various determinants related to development and structure of related industries, externality mechanisms, and institutional legitimacy affect cloud related performances and impacts to the local economy.*

Keywords: CAGR, NRDC, AXA, VNTT

I. CLOUD COMPUTING IN INDIA

Gartner Says Indian Public Cloud Services Market Will Reach \$731 Million in 2015 Analysts To Explore Industry Trends at Gartner Symposium/ITxpo 2015, November 2-5 in Goa, India Public cloud services revenue in India will reach \$731 million by the end of 2015, an increase of \$176 million over 2014 revenue of \$555 million, according to Gartner, Inc. In 2015, public cloud services revenue is driven by high growth rates in key market segments, such as cloud infrastructure as a service (IaaS), cloud management and security services, and software as a service (SaaS).

Spending on IaaS will total \$100 million in 2015, an increase of 25 percent over last year. Spending on cloud management/security will grow 36.6 percent to \$82 million, and SaaS will grow 33.4 percent to \$302 million this year. Gartner predicts high rates of spending on cloud services in India to continue through 2019 when the market is expected to reach \$1.9 billion.

“The forecast for cloud services vary based on local factors, including supply and demand within the local markets, country-specific economic conditions, currency exchange rates, and other global market factors,” said Sid Nag, research director at Gartner. “The explosive growth of IaaS and SaaS in the India market is an indication that enterprises in India are moving away from building their own on premises infrastructure, as well as migrating from the traditional software licensing model, to a SaaS model served up by cloud providers.”

A recently released TechSci Research report reveals that the growing adoption of cloud technologies in SMEs and government agencies in India will drive the demand for cloud services in India. Rising availability of cloud services at economical price models and the ease of implementation are the major growth drivers for cloud services in India. In addition, increased government spending on new e-governance projects based on cloud technology is likely to drive the market for cloud computing services in India over the coming years. Software-as-a-Service (SaaS) emerged as the leading market segment holding majority market share in 2014 in India, said the report.

“Wide range of cloud solutions bundled with innovative pricing models covering private, public as well as hybrid cloud are contributing to the adoption of cloud services in India. Growing spending on cloud services within government and IT/ITeS segment is also expected to drive the market over the coming years”, said Karan Chechi, Research Director, TechSci Research. Chechi stated that application hosting and e-mail remained the leading services to utilize cloud technology extensively in India. Growing at over a CAGR of 50 percent, private cloud dominated cloud computing ecosystem in India during 2010-2014. Improved data security features and exclusive control remain the key factors contributing to growth of private cloud in India.

However, private cloud adoption is largely restricted to large enterprises in present times. This is due to the fact that higher initial investment discourages small and medium enterprises to opt for private cloud deployment. Moreover, public cloud adoption is plagued by data security and reliability issues due to which hybrid cloud has been gaining traction in India. The report also throws light on key roadblocks that restrict the growth of overall cloud services in India such as growing concerns over data security, reliability and surveillance. In addition, dearth of quality IT infrastructure further hampers widespread adoption of cloud services in India, the reports stated.

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are moving away from building their own on premises infrastructure, as well as migrating from the traditional software licensing model, to a SaaS model served up by cloud providers.”

According to Gartner’s latest cloud adoption survey, 61 percent of respondents in India indicated that they are currently using cloud services, and additional 31 percent plan to use cloud services by the end of 2015. Cloud computing refers to a pay-per-use model of computing where applications and software are accessed over the Internet and not owned by users. IT companies can save huge costs on these products as they would not have to invest in purchasing them, resulting in reduced IT costs.

Some organisations, especially larger ones, set up a cloud-like infrastructure in their own data centre to secure data, which is called a private cloud.

Public cloud refers to providers such as Amazon, Google and Salesforce.Com, whose shared services are available to all., Its focusing on cities such as Bangalore, Gurgaon and Mumbai and is taking measures to create cloud awareness. Salesforce.com’s clients include big companies such as Bharti AXA General Insurance, eBay India, Sify Technologies, Polaris Software Labs, Lodha Group, Servion, Maytas Properties, HCL, Sasken Communication Technologies, Ocimum Biosolutions, and state owned National Research Development Corporation (NRDC) (Srikanth 2014). The Indian offshoring industry is probably the prime example of an industry that is likely to feel the impact of cloud computing. The demand for cloud related services is especially high in the offshoring industry and technology hubs such as Bangalore and Delhi (Economic Times 2015).

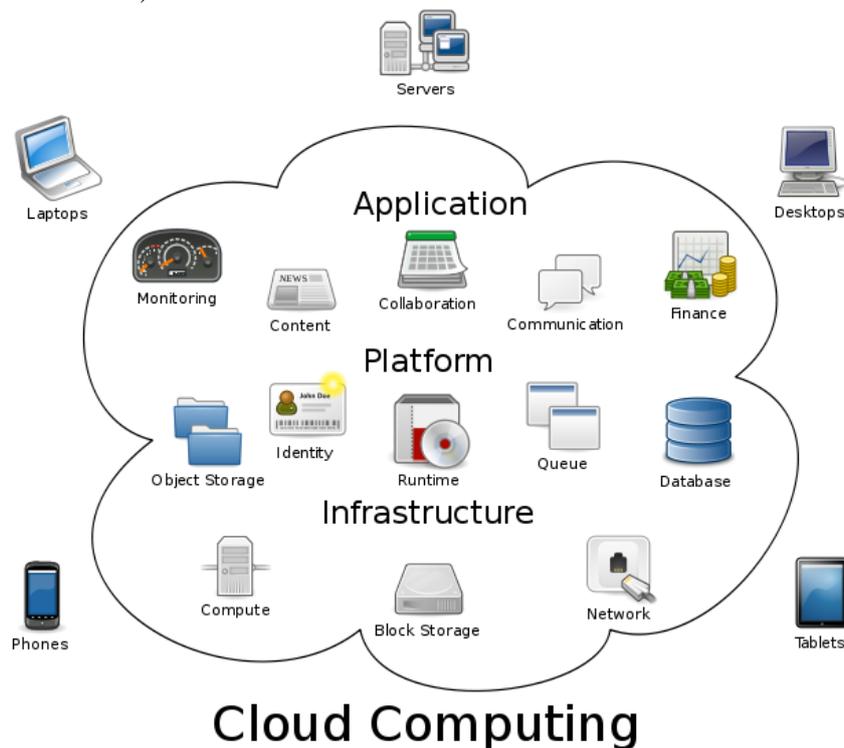


Figure- 1.1 Logical Diagram of Cloud Computing

II. IMPACT OF CLOUD COMPUTING

➤ **Security Enhancement :**

Most organizations in the developing world have weak defense mechanisms. In 2012, North America accounted for 58% of the global IT security market (Europemedia 2012). An estimate suggested that in 2015, about 10 million of Brazil's SMEs lacked anti-virus software in their PCs (Business Wire 2015). Likewise, 60% of Kenyan banks reportedly have insecure systems (Kinyanjui 2014). The cloud thus has a possibility to enhance security for these companies. In this regard, the concept of “hollow diffusion” of ecommerce can be helpful in understanding weak defense. Many companies in developing countries arguably lack technological and human resources to focus on security. “Hollow diffusion” can take place in human terms (lack of skill and experience) as well as in technological terms (failure to use security products). Some ISPs in industrialized countries reportedly block contents originated from problematic networks in developing countries (Garfinkel 2012). The cloud’s economies of scale allow a business model in which third parties can provide a cost-effective security for smaller companies by integrating security applications into cloud services (Grossman 2014). Delivery of security on the cloud can address some of the human (e.g., problems to install and maintain software) and technological issues and may strengthen the defense mechanisms.

➤ **Improvement of New Products and Services :**

The cloud has also helped some developing world-based firms develop new products and services. Zoho’s applications are used by hospitals and banks in India to develop new products. As another example of cloud use to develop new products and services, consider the Computational Intelligence Research Group at the University of Pretoria. As noted earlier, students in the university use the cloud to develop new drugs.

➤ **Operational Efficiency :**

Operational efficiency is related to the costs of accomplishing corporate functions. Anecdotal evidence from developing countries such as China, India and South Africa indicates that adoption of the cloud may lead to productivity and efficiency gains. As noted earlier, cloud has enabled some South African call centers to increase productivity by 20% (Firth 2009). The Indian cloud Provider, Netmagic reported that the company’s cloud services helped its clients cut costs by 25-30% (Abrar 2009). Microsoft claimed that its cloud services offered in India would help reduce IT costs by 10 - 50% . Likewise, the cloud-based model has helped Chinese software start-ups access to infrastructures and data centers and utilize virtualized computing resources, which has led to a reduction of the upfront investments and product development costs.

➤ **Exports of Cloud Related Services :**

There has been some achievement on the export of cloud related applications and services. Unbelievable as it may sound some developing world-based technology companies such as AdventNet have been exporting cloud -based applications.

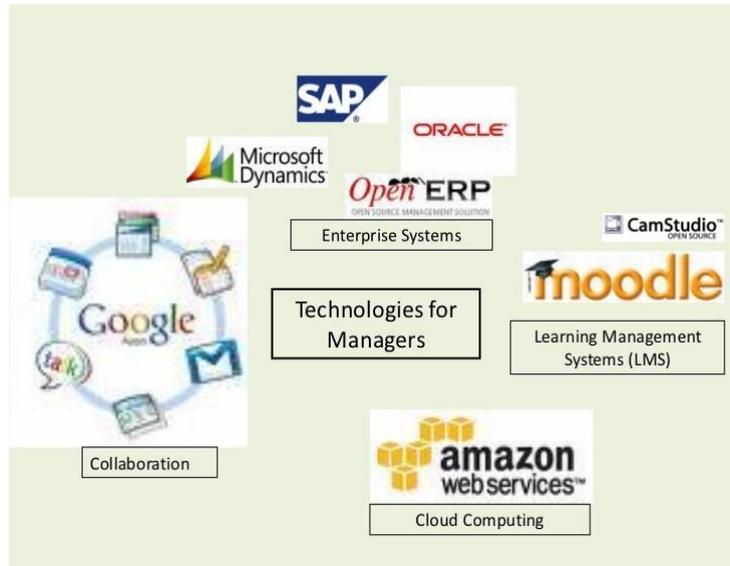


Figure- 1.2 Logical Diagram of Cloud export of cloud related services

➤ **Extending Market Reach Ptc’10 Proceedings :**

The cloud can also extend market reach of SMEs. Consider for instance, healthcare offshoring industry. Industrialized world-based healthcare providers are increasingly offshoring services related to medical transcription, billing and insurance claims teleimaging and telepathology to India. Most of these are currently dominated by big players such as Wipro and Teleradiology solutions. Cloud computing is likely to open the door for small Indian players to participate in the global healthcare off shoring industry. Availability of web-based applications such as those offered by Zoho reduces the up-front investments for small Indian offshoring companies.

III. PERFORMANCE OF CLOUD COMPUTING

➤ **Availability of Cloud Related Services :**

The distribution of cloud in most developing economies has been hindered by the lack of availability of businesses supplying such services. Cloud computing has proven a boon to businesses—especially small businesses, for which it hits a particularly sweet spot. With cloud services, small businesses reap the benefits of not having to deploy physical infrastructure like file and e-mail servers, storage systems or shrink-wrapped software.



Figure- 1.3 Availability of the Cloud Services

Plus, the "anywhere, anytime" availability of these solutions, means hassle-free collaboration among business partners and employees using the ubiquitous browser. Cloud services also provide entrepreneurs, SOHOs, and mom-and-pop outfits access to sophisticated technology without the need of an IT consultant or tech worker on the payroll. A primary reason why the usage of cloud has been vanishingly small in most developing economies is that there is likely to be a "hierarchical pattern" in the diffusion of new technologies such as the cloud. These countries lack market and infrastructures that control the availability of the cloud and thus multinationals such as IBM and Google are likely to enter much later in these countries (Brown et al 1976).

➤ **Distribution of Cloud:**

Distribution measures the extent to which the cloud has been dispersed or distributed among organizations. It can be measured by the penetration level of the cloud or the number of organizations that adopt this technology. It can also be measured with specific cloud application. Cloud computing, a rapidly developing information technology, has aroused the concern of the whole world. Cloud computing is Internet-based computing, whereby shared resources, software and information, are provided to computers and devices on-demand, like the electricity grid. Cloud computing is the product of the fusion of traditional computing technology and network technology like grid computing, distributed computing parallel computing and so on. It aims to construct a perfect system with powerful computing capability through a large number of relatively low-cost computing entity, and using the advanced business model like SaaS (Software as a Service) to distribute the powerful computing capacity to end users' hands. To address this longstanding limitation by building a multi-tenant system. Our system provides the environment for the user to perform his tasks, but with very high security, such as number of users of Zoho's productivity tools or IBM's Pangoosky platform.

➤ **Width And Depth of Cloud Computing Adoptions :**

A higher cloud performance is achieved by wider and deeper adoption of the cloud. Following Gatignon and Robertson (2015), the width of cloud adoption can be defined as the number of different uses. Similarly, the depth of cloud adoption can be defined as the amount of usage of the cloud by businesses (e.g., frequency of software download from the cloud, amount of data stored on the cloud, etc.). At the firm level, the concepts related to width and depth of cloud adoption can be further elaborated. For instance, a higher width of cloud usage is associated with greater number of employees in a company using the cloud for performing a particular function, and overall depth, which is related to the total cloud usage. Currently about 30% of total IT spending in India comes from Small enterprises and substantial investment is expected from this segment in cloud computing as well. With legacy infrastructure in place and existing investments in enterprise software licenses, the migration path in terms of cloud delivery and deployment models for large enterprises will be different from SMEs. Research indicates IaaS as cloud delivery model will witness higher adoption rates amongst Small Indian enterprises, with the IaaS market set to grow at 30% CAGR between 2011 and 2015. Enterprises belonging to Manufacturing, BFSI, Healthcare, ICT, Government & Education sectors are expected to be major cloud adopters driven by higher IT spending and increasing need for cloud-based services. The report details total IT and cloud spend of each of these sectors for the year 2011. The report also has case studies on cloud adoption by some of the small enterprises spanning across various sectors

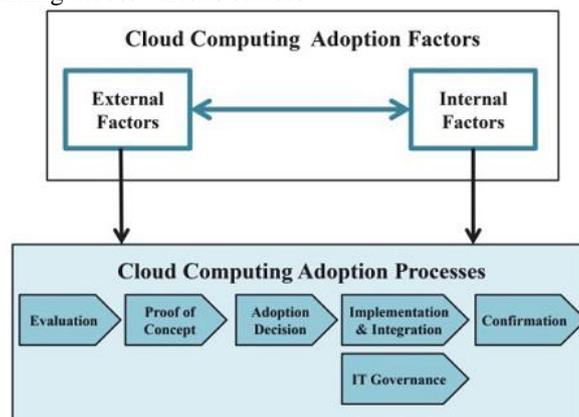


Figure- 1.43 Cloud Computing Adoptions Services

Enterprise studies include Sterlite technologies, Siva group, Narayana Hrudayalaya, Bajaj Autofinance, Essar group, Hexaware, Dabur, Godrej properties with details on their business case for cloud deployments, delivery model adopted and benefits achieved and references on various cloud vendors such as Salesforce.com, Amazon, Microsoft, IBM , HCL and Wipro The report also covers how government and education sector are leveraging the cloud citing cloud implementations from J&K Government, Orissa and Tamil Nadu Government and educational institutions like IIT delhi, AICTE and IIM Bangalore.

Awareness of the Cloud Computing:

Awareness is the first step in the cloud adoption process. As noted above, there has been a lack of awareness of cloud computing, even among large enterprises in the developing world. Adoption of cloud computing among the small

and medium enterprises (SMEs) in India. Using accounting practitioners - both in the audit and commercial fields - as the sample, this study investigates as to whether they are aware of this emerging technology, the extent they utilize the technology.

IV. DETERMINANTS OF CLOUD COMPUTING

In examining the factors that can help the cloud industry thrive (high performance and high impact), one would do well to recall the comment by Adams (1996): “like fire technology depends on its environment to flare or die”. A technology’s ecosystem and environment are influenced by numerous factors. First, the diffusion of a technology is influenced by the nature of domestic demands and inputs (Linder 1961; Vernon 1966) such as consumer preferences, income, input, infrastructures, government regulations and technological economies of scope (a function of experience with previous generations of technology). Second, the importance of industry structure has been emphasised in the prior literature (Bain 1956; Porter 1990). Of special interest to this paper is the development of related and supporting industries such as broadband and PCs. Competition level, size and distribution of cloud suppliers, as well as the nature and structure of related industries fall under this category. Finally, transfer and export conditions such as trade policy, export orientation of firms, strategic regulation, and market size also affect an industry’s growth.

➤ Development And composition of Related Industries

Development and diffusion of the cloud are tightly linked to the forward linkages (demand), backward linkages (supply) and horizontal or inter-sectoral linkages.

The strength of forward linkages between the cloud and the rest of the domestic economy plays an essential role in determining the development of the cloud industry. For instance, in the VNTT example above, a lack of strong demand from companies in construction and real estate industries would limit deployment of the company’s cloud applications. Availability of e-governance services and solutions for businesses and citizens such as healthcare and education, permit, drivers' licenses, bills payment, land records and registration, e-tendering, e-tax file return, benefits determination and distribution would strengthen forward linkages. In China and India, the strong demand has helped create strong forward linkage for global and local cloud providers.

➤ Externality Mechanisms

Firms’ technology-related behaviors have self reinforcing effects. IT firms may generate externalities by making cloud-related specialized inputs and services available, forming a specialized “labor market”; and facilitating the exchanges and spillovers of information and technology. These externalities, which originate from other firms in the same industry, are called MAR externalities. MAR externalities represent the positive role of specialization on growth through knowledge spillovers. There is also a possibility of “inter industry knowledge spillovers”, which are referred as Jacobs (1969) externalities.

Local firms’ technological capability

Technological capabilities of some developing world-based firms have generated positive externalities to the local economy. Technological capabilities combined with low cost and experiences in serving the home market may allow them to develop valuecreating strategies and realize significant share in the cloud market, especially in the home countries.

Indian IT companies such as TCS, Infosys and Wipro are among leading global IT players. Their specialization in IT sectors has generated Jacobs externalities for the cloud. Some even argue that India was an early cloud as the country’s software companies had huge data-processing center that big companies around the world used for on-demand computing. In this case, the externalities can be considered as MAR externalities.

➤ Institutional authenticity of Cloud

All economic phenomena have institutional components and implications. Institutionalists have recognised that the success of an innovation is tightly linked to the context provided by institutions in an economy. By institutions, we mean ‘the macro-level rules of the game’, which can be formal (e.g. laws and regulation) as well as informal (e.g. social norms and culture). Institutions provide the ‘cognitive, normative, and regulative structures’ that determine institutional preference for an innovation such as the cloud.

Government’s support

The development of an industry such as the cloud is a function of the level of government priority MeghRaj: Government of India Cloud In orderto utilise and harness the benefits of Cloud Government of India has embarked upon an ambitious “GI Cloud” which has been named as ‘MeghRaj’. The focus of this initiative is to accelerate delivery of e-services in the country while optimizing ICT spending of the Government.

This will ensure optimum utilization of infrastructure and speed up the development and deployment of eGov applications. The architectural vision ofGI Cloud encompasses a set of discrete cloud computing environments spread across multiple locations, built on existing or new (augmented) infrastructure, following a set of common protocols, guidelines and standards issued by the Government of India.

Two Policy reports viz., “GI Cloud Strategic Direction Paper” and “GI Cloud Adoption and Implementation Roadmap” have been prepared by DeitY. Tamil Nadu Chief Minister J. Jayalalithaa today launched Microsoft India's cloud computing services, an official statement said.

In a statement issued in Chennai, the state government said Ms Jayalalithaa launched the cloud computing services of Microsoft India from the state secretariat through the company's hyper scale data centre set up here - one of the three set up in the country. According to the statement, Microsoft India had signed a memorandum of understanding (MoU) with the state government at the recently concluded Global Investors Meet.

As per the MoU, Microsoft India will offer entrepreneurs selected by the Tamil Nadu government its software development platform free of cost for three months. The company will also train the entrepreneurs on cloud computing and mobility technology.

V. CONCLUSION

Cloud computing is in the preschooler stage of development. Relatively than viewing cloud computing as a self-contained recognizable fact, it must be seen against the environment of economic and institutional realities in front of the developing world. In theory, there are many achievable uses of cloud and several channels and mechanisms from side to side which developing economies may benefit. In practice, however, serious problems related to the “determinants” box stand in the way of accomplishment and practical results. Cloud-based innovations and industry models are yet far from inclusive of SMEs in the developing world.

At this time, cloud usage has been small-minded, narrow and vanishingly small in most developing economies. Except for South Africa, the cloud's use in Africa is limited to e-education in a few economies. Small increasing economies lack infrastructures and economies of scale for a wide and deep adoption of the cloud. It would thus be difficult to deal with to expect that the cloud would help the developing world catch up with the West in one big leap. On the other hand, as economic and institutional factors improve in the mounting world, the cloud certainly holds a promise to bridge the digital divide.

Some impacts of the cloud in the developing world consist of productivity gain, development of inventive services (e.g., personalized insurance), and efficient supply chain management, implementation of B2B e-commerce and development of a skilled workforce.

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