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Cloud Technology and Start-up business Growth in India

Moumita Biswas[1] , Nabanita De[2] , Paramita Chatterjee[3]

[1]Dep.of Computer Science, CharuChandra College,University of Calcutta, Kolkata, India
[2]Dep. of Economics, CharuChandra College,University of Calcutta, Kolkata, India
[3]Dep. of Computer Science, CharuChandra College, University of Calcutta, Kolkata, India

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***Abstract*:** Today Cloud computing is not a trend anymore. It has become an important tool for many organisations which helps to outsource their IT, instead from having it in-house. Most of the companies nowadays are deciding for cloud solutions to reduce their costs and overall IT spending. This is a great way to invest more in other initiatives such as customer experience rather than hardware or software. Despite challenges with infrastructure, security and trade policy, India remains a top market for U.S. cloud services exporters due to its large number of consumers with Internet access. India boasts 250 million people with web connected devices; it has already changed both business and everyday life – from consumers who perhaps unknowingly use it to access their favourite music to companies that purposely harness its powerful resources. While much activity and buzz relating to cloud involves its technological capabilities. SMEs usually have bad technological infrastructure. Either they have to resort to buying expensive software designed for large companies or build their own cheap applications that lack functions. This present article describes that the cloud technology is a smart move for any start-up business in India. Cloud offers the flexibility, agility and security required by SMEs at a modest price. The resources that once were limited only to large enterprises are now conveniently accessible as well as affordable. This paper also focuses cloud has the power to fundamentally shift competitive landscapes by providing a new platform for creating and delivering business value and market growth. It has potential to transform internal operations, customer relationships and small industry value chains, security of data protection of the organizations & to develop a new business models that promote sustainable competitive advantage.

***KeyWords*:** Cloud computing (CC), cost effectiveness, Security & trade policy, cloud -based-business, sustainable competitive advantage.

I. Introduction

India has been gripped by an intense wave of start-ups. For the 50 million or more start-ups and small businesses in India, cloud computing is set to be a game changer. Moreover, cloud computing is on the brink of an explosion in India. While there had been reluctance in adopting cloud solutions in the past, the trend is now changing. According to IDC (International Development Corporation), the cloud computing market in India stood at $688 million in 2012& $3.5 billion in 2016. Cloud computing and its services can give a considerable amount of boost to enterprises in terms of technological stability. Cloud computing enables businesses to get up and running promptly because of swift services and professionally-arranged infrastructure. With cloud, SMEs get access to experts doing what they do best. Cloud services are bringing a balance to this field and start-ups can be the harbinger of this technological change [1]. There is an ongoing trend among businesses to put more of their data into the cloud — and as part of that, to bring ever more smart phones, tablets, laptops and other devices on to their networks to create and consume that data. That is driving a lot of traffic to start-ups building smart ways to capture, back up and analyse these increasingly complex network architectures. Today, one of the bigger of these start-ups is announcing a large round of funding. Cloud computing also offers an onramp to new computing advances such as non-relational databases, new languages, and frameworks that are designed to **encourage scalability and take advantage of new innovations** such as modern Web identity, open supply chains, and other advances [2]. The public cloud services market in India is 38 per cent in 2017 i.e. to $1.81 billion, according to Gartner. In India, the space is currently dominated by Amazon Web Services, Microsoft Azure, Google and IBM. All these players have launched their data centres in India over the past two years in a bid to tap into the rapidly growing market here and to leverage the Centre's push towards cloud computing [3]. Having data centres in the country will allow these players to work with the Centre as well as banks since regulations restrict these organisations from storing sensitive data outside the country [4]. Cloud adaptation not only brings down total cost of ownership , lowers risk and promotes innovation, but also offers a protected IT set up with high business continuity and IT talent retention which is most crucial for SMEs today," says Neeraj Athalye, Head, Cloud Business, SAP India Pvt Ltd[5]. India also presents an ambiguous policy setting for cloud services. Some elements of the environment remain

undefined (e.g., India lacks a formal data breach notification rule), while others are clearly positive (e.g., there do not appear to be tariffs on software downloads) and some negative (e.g., government procurement, which though a major source of IT spending is reportedly a complex, multifarious process) [6].

II. Literature review

The concept of Cloud computing was born in the 1960s from the ideas of pioneers like Joseph Licklider who pictures computation in the form of a global network and John McCarthy (1927-2011) draft computation as a public utility (MIT Technology Review, 2011). Institute of Standards and Technology (NIST) definition of cloud computing that has gained universal acceptance across business, industry and research: "a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction." Gartner (2011) states that Cloud computing is the most hyped subject in IT today and it has grown significantly in last 3 years. According to the report (Market Research Media, 2012), Bloomberg (Kharif, 2012) predicts that the Cloud Computing will definitely have an annual growth of 30% over the next 5 years from 2012 to 2020. At the same time, it was reported that Cloud-related business revenue would increase to $1.1 trillion by 2015(McCafferty, 2012). Herlihy (2012,) explains the benefits of cloud computing a "a low-cost way for businesses to obtain the same benefits of commercially licensed, internally operated software without the complexity and initial high cost." Armbrust et al. (2012,) describes cloud computing as "a new term for computing as a utility which has now become a commercial reality."[15]The year 2016 proved to be a booming one for cloud computing in India. Several cloud vendors like AWS, Microsoft and Sales force set up their data centres in the country to lure in more customers, and did so successfully. From just being one of the new kids on the block, cloud has come a long way [10]. "Cloud computing is really a no-brainer for any start-up because it allows to test business plan very quickly for little money. Every start-up, or even a division within a company that has an idea for something new, should be figuring out how to use cloud computing in its plan."(Brad Jefferson, CEO and Co-Founder of Animoto)[11]. Public cloud has gained momentum in India and $800 million market in 2015 end, according to Gartner. "Today, India is predominantly investing in private cloud, but over the last 12 months, we have seen an excitement build up for the public cloud within Indian enterprises," claims Naveen Mishra, research director, Gartner [13]. "Technology is a business enabler. As a result the business heads are making calls when it comes to IT. CIOs are playing the role of an integrator" said Vamsicharan Mudiam, Country Manager, Cloud Solutions, IBM India [24]

III. Objectives

This paper mainly focuses that how cloud technology in India helps to emerge start-up businesses and develop the market of existing small, medium businesses. It also creates new relationship with customers and business entrepreneurs and cost effective and security protection of trade policy for sustainable competitive advantages.

IV. Data sources

This paper is based on secondary data of different international journals, articles, books, and websites and lectures of important head of the institutions and also reports of research institutions of national as well as internationals.

Analysis and Interpretations:

4.1 Concept of Cloud technology and Indian Business: Cloud computing is changing face of IT environment. Enterprises and users can conveniently access on-demand network and computing resources including servers, storage, applications, platforms etc. Businesses can run, develop and operate their applications in the cloud and all these services are delivered through internet. Cloud computing in India has surpassed the early adoption stage of the product adoption lifecycle in 2014. According to research by TechSci, the cloud services market in India is estimated to grow at a CAGR of 22% during 2015-2020. According to the IDC, the cloud adoption rate in India is 67%. Indian companies are adopting cloud computing for strategic purposes like collaboration solutions, disaster recovery, supply chain management etc. despite lingering security concerns. An increasing number of enterprises are prepared to accept cloud-based solutions today due to growing awareness, increasing use of mobile devices and benefit of cloud computing. Since cloud adoption has registered an impressive growth, cloud computing holds a promising future in India [8].

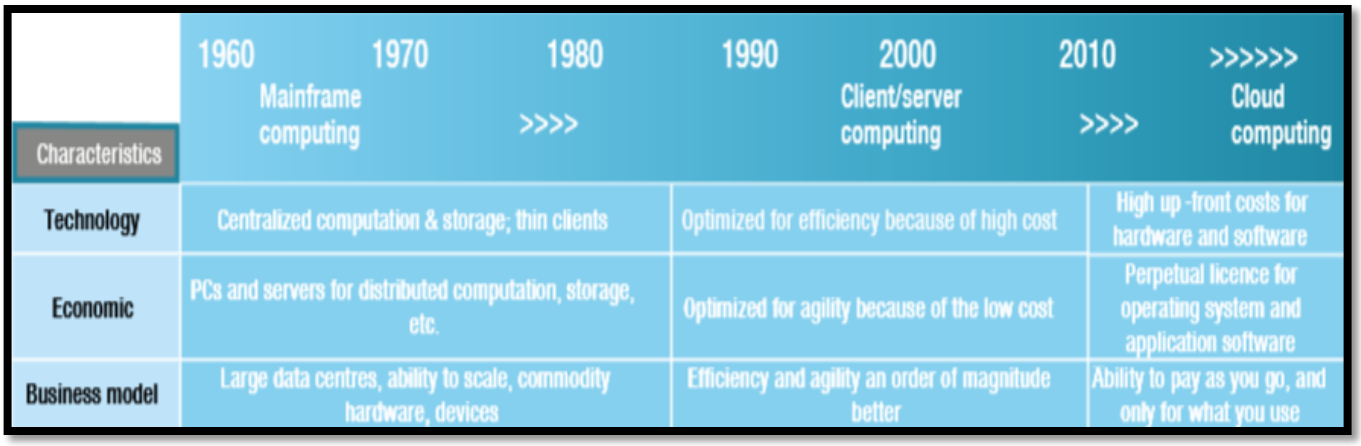


Fig 1: Source: UNCTAD, adapted from (Microsoft, 2010).

In fact, cloud computing holds the potential to dramatically change the businesses that adopt it, even if the technologies are only used internally. **The following ways that cloud computing will change business:**

1. **The creation of modern products and services:** The economics of cloud computing lets innovative companies create products that either weren't possible before or are significantly less expensive than the competition (or more profitable.)

2. **A new form of real-time partnerships and outsourcing with IT suppliers.** Companies that did traditional outsourcing of their IT services a few years ago, a large part of what used to be in-house is now being done somewhere else and changing anything is *hard*. But unlike traditional outsourcing of IT, cloud computing will provide agility and control that traditional outsource cannot match for the most part. For many companies, this will actually be improvement over what they have now and give them choices they perhaps never had when everything required internal execution or to go through the outsourcing supplier relationship.

3. **A new awareness and leverage of the greater Internet:** Most companies are still notoriously critical of Web technologies as "not serious" computing. But the Web has grown up considerably in the Web 2.0 era and the challenges in scale, performance and has created technologies, solutions, and architectures that can address them in powerful way. Though economically many enterprise systems are finding hard to match. When cloud computing is adopted by an organization, they will find themselves backward with the rest of the online world, this is the employment of social tools, SaaS, non-relational databases or a host of other technologies in their new cloud and this will serve them very well and allow many companies to acquire the skills and perspectives required to compete effectively in the 21st century [29].

4. A reconciliation of traditional SOA with the cloud and other emerging IT models.

The advent of cloud technologies will have to be dealt with and somehow encompassed by SOA initiatives that are already looking at their current toolset of heavyweight approaches and technologies with an eye towards seeking an onramp to change and improvement. Web-Oriented Architecture fits very well with cloud technologies which are heavily Web-based and it's a natural, lightweight way of building SOA (Service Oriented Architecture) at virtually every level of the organization.

5. **The rise of new industry leaders and IT vendors:** While we're seeing many of the top players in computing use their existing strengths to create successful cloud computing offerings, there were also be a new generation of companies that businesses generally aren't used to dealing with as suppliers. Amazon and Google are two firms that generally aren't regarded as deeply experienced in the enterprise, and **there are many others.**

6. **More self-service IT from the business-side.** Many cloud solutions, particularly as they relate to SaaS, will require increasingly less and less involvement from the IT department. Business users will be able to adopt many future cloud computing solutions entirely using self-service.

7. **More tolerance for innovation and experimentation from businesses.** With fewer technical and economic barriers to creating new ways to improve the business (Line of Business, marketing, sales, customer service, IT, horizontal services), cloud computing will enable prototyping and market validation of new approaches much faster and less expensively that before.

8. **The slow-moving, dinosaur firms will have trouble keeping up more nimble adopters and fast-followers.** Not adopting cloud computing doesn't spell the immediate demise of traditional companies that aren't good at making technology and cultural transitions (and make no mistake, cloud computing is a big cultural change), but it

will pile onto other recent advancements and make it even harder to compete in the modern business environment.

But gaining competency in cloud computing today by conducting pilots and building skills will server companies well and begin to position them for the future IT landscape. Longer term, cloud computing is increasingly appearing to be a transformative change in the business landscape [7].

4.2 Public Vs Private Cloud: Public cloud, as indicated by the workloads and compute instances growth, is growing faster than the private cloud. As the business sensitivity to costs associated with dedicated IT resources grows along with demand for agility, a greater adoption of public cloud by the businesses, especially with strengthening of public cloud security. Although many mission-critical workloads and compute instances might continue to be retained in the traditional data centres or private cloud, the public cloud adoption is increasing along with the gain in trust in public cloud. **Some enterprises might adopt a hybrid approach to cloud**[28]. In a hybrid cloud environment, some of the cloud computing resources are managed in-house by an enterprise and some are provided by an external provider. Cloud bursting is an example of hybrid cloud where daily computing requirements are handled by a private cloud, but for sudden spurts of demand the additional traffic demand (bursting) is handled by a public cloud. By 2021, there will continue to be more workloads and compute instances (73 percent) in the public cloud as compared to private cloud (27 percent) [9].

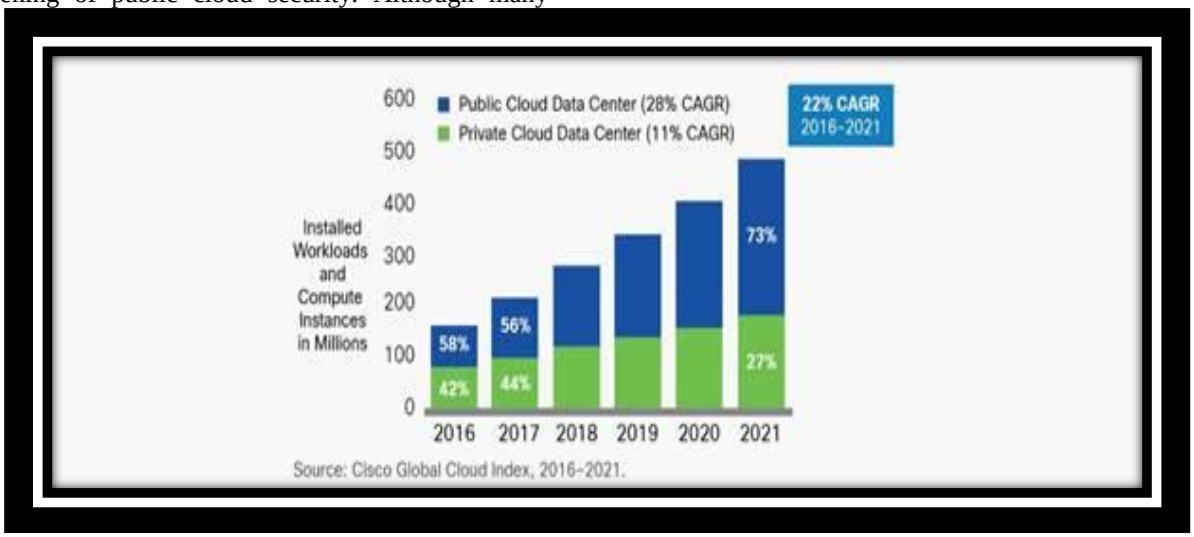


Figure 2:

According to a October 2016 report from Synergy Research Group, AWS had a 45 percent share of the public cloud infrastructure-as-a-service (IaaS) market — more than Microsoft, Google, and IBM combined for Q3 2016 — despite Microsoft and Google having much higher growth rates. Competition was tougher in the public platform-as-a-service (PaaS) market but AWS had a lead over Sales force, Microsoft, and IBM [12].

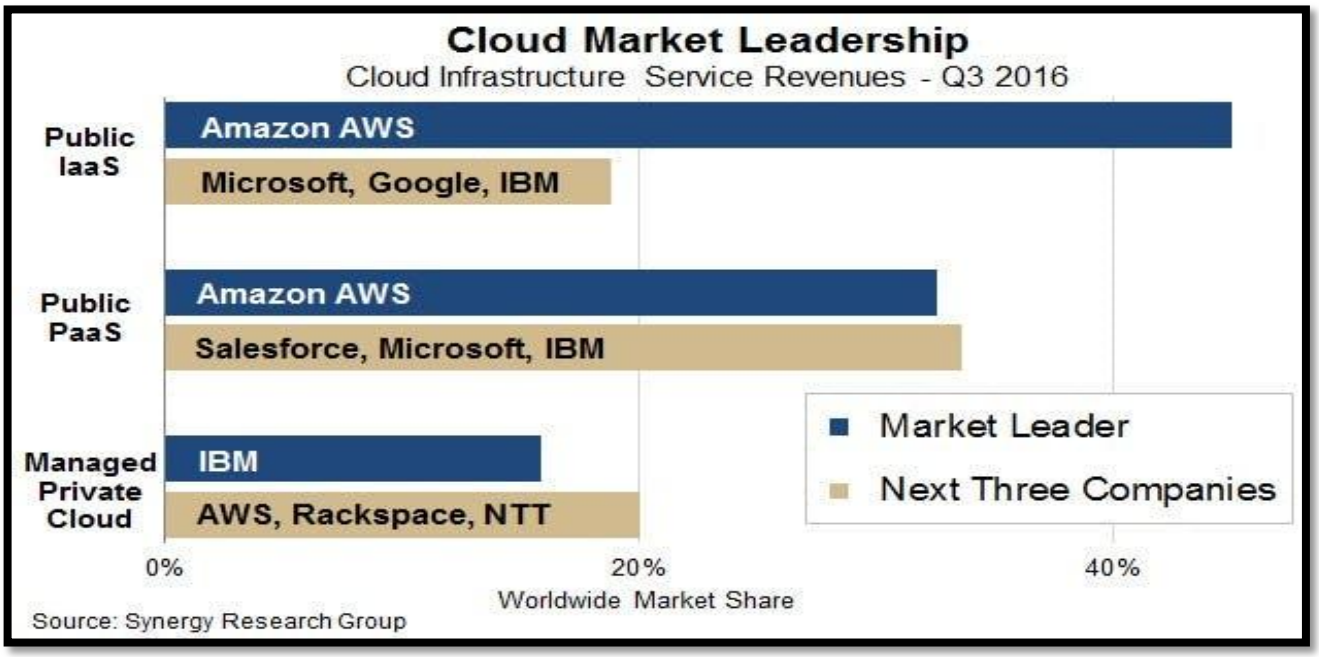


Figure 3:

4.3 Cloud Computing: A delicate balance of risk and benefit: some major risks -- in adopting cloud computing that so-called "edge" computing of minor applications and non-critical business systems. These include security of enterprise data that stored in the cloud, risk of lock-in to cloud platform vendors, loss of control over cloud resources run and managed by someone else, and reliability. Some benefits that can potentially change the game for many firms that are willing to be very proactive in managing potential downside. These include access to completely different levels of scale and economics in terms of the ability to scale very rapidly and to operate IT systems more cheaply that previously possible. Cloud computing also offers an onramp to new computing advances such as non-relational databases, new languages, and frameworks that are designed to encourage scalability and take advantage of new innovations such as modern Web identity, open supply chains, and other advances.

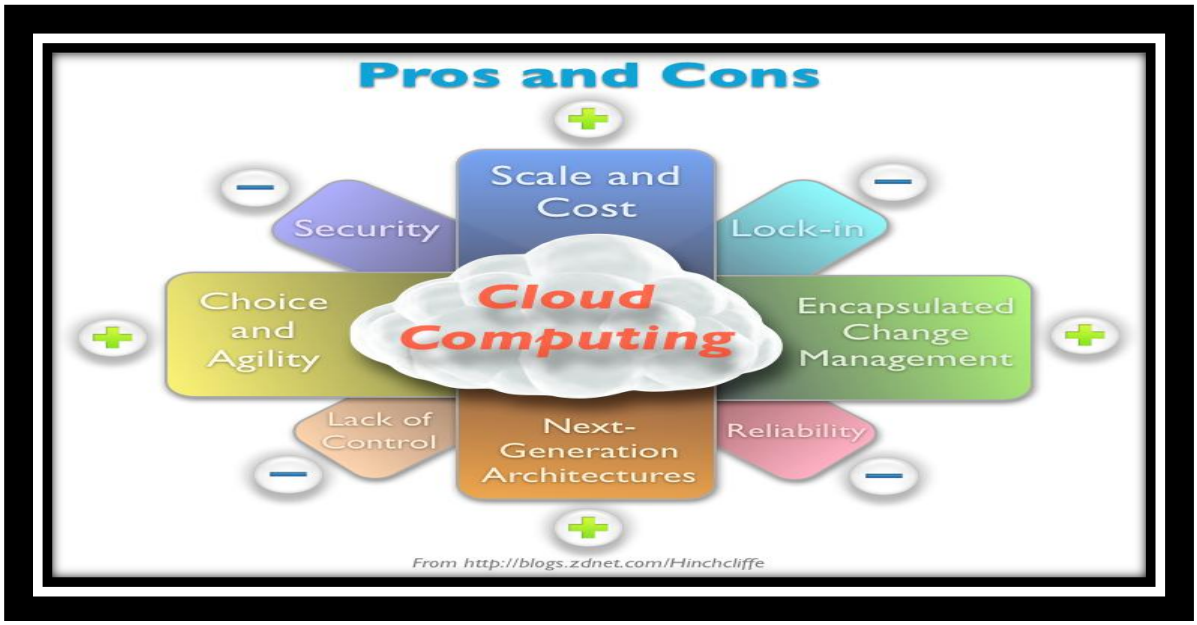


Figure 4:

4.4 Data Management & Storages: There are a number of companies that are racing to fill that market need, the notable thing is that it has built a platform that's aiming to provide several potential services all in one place: "data management as a service," as the company describes it[2]:

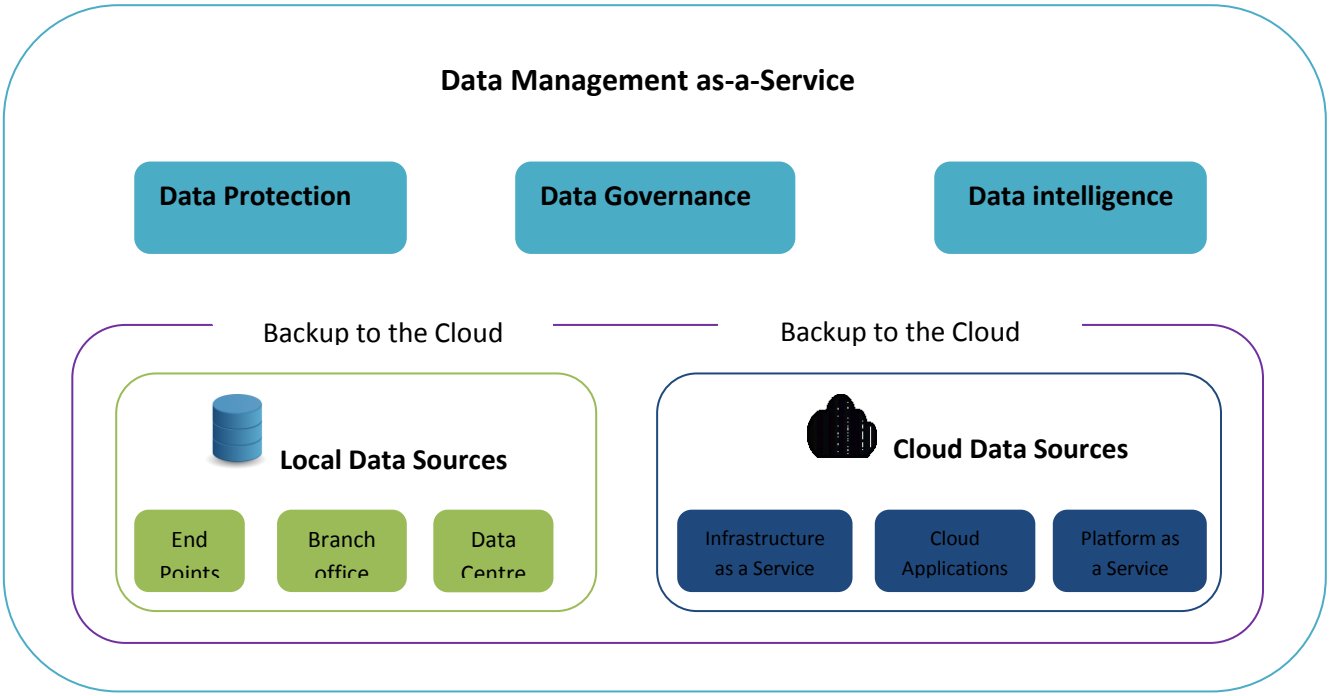
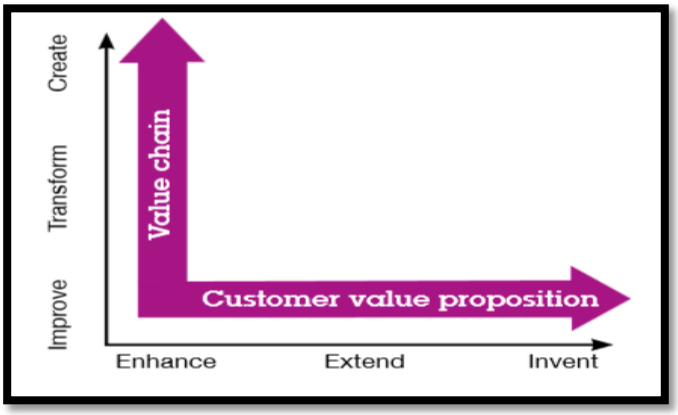


Figure 5:
Source: Amazon Web services/ Microsoft Azure

Synergy Research also notes that while public IaaS is the biggest of the three main cloud segments, public PaaS is growing much more strongly. The database, IoT, and analytics sub-segments within PaaS are all growing by 100 percent or more per year. And these two segments are where the battle lines for 'Cloud Wars 2017' seem to be drawn in India. While AWS has a strong presence among start -ups in India, Microsoft Azure seems to have a strong network of enterprise clients and has also recently signed an exclusive partnership with Flipkart, SBI, and some Indian state governments[12].

4.5 Cloud-enabled business innovation: Cloud business enablers are already driving innovation across customer value propositions and company and industry value chains. Enterprises are applying cloud to generate additional revenue streams by enhancing, extending and inventing new customer value propositions. And cloud is being used to improve, transform and create new organization and industry value chains (see Figure4). This has resulted in shifts in who creates value, as well as how it is created, delivered and captured [23].



Source: IBM Institute for Business Value analysis. 2012.

Figure 6: Cloud business enablers help spur innovation across customer value propositions and across company and industry value chains.

4.6 Business model for cloud providers will change: Cloud market in India is very fragmented, and is divided into three broad segments – data centre services company like Netmagic and Tata Communications; cloud providers like Amazon, Google and Microsoft; and third is telecom players getting into the cloud. "Competing in cloud could be a fairly capex-intensive business, and the return on investment takes 3-5 years [14]. The innovative One Cloud business model simplifies and accelerates the process of providing cloud solutions and reduces the risks that can derail service providers. One Cloud also enables service providers to deliver cloud capabilities in ways that are most suitable for their markets and with the appropriate add-on services, such as resources for networking and mobility applications [27].

Special Programme for start-up business:

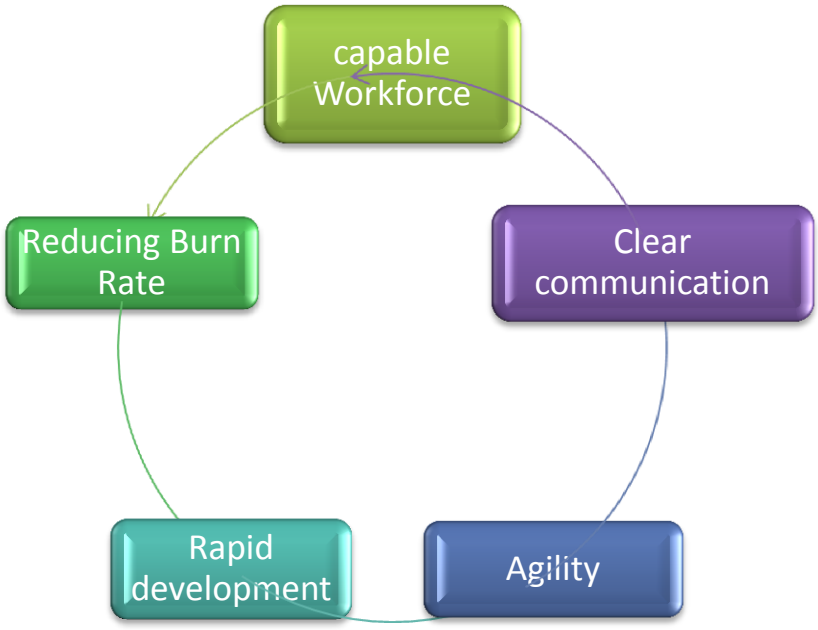


Figure 7:

4.7 Challenges of adoption of Cloud computing in Indian context:

1. **Internet Connection:** The reliability of internet connection plays a crucial while setting up small business on cloud environment. Even the most reliable cloud computing service providers suffer outages. Hence, the internet connection makes a big difference while adopting cloud technology in a business. (Rahmath and Sarwar, 2014).
2. **Security Issues:** Sometimes, companies are not comfortable in putting their data on cloud for security reasons. But for a small business, shifting their business to cloud will improve the security as the small business cannot afford the expense of implementing it own servers. (Rahmath and Sarwar, 2014). Srikumar (2013) also explains that the entire database is outside the control of an organisation. Therefore, it is at risk of losing its database to other organisations. Security is arguably the top concern of companies when considering a move of data or computing resources to the cloud (Hugos and Hulitzky 2011).
3. **Cost:** It is important to evaluate the cost factor before adopting cloud computing. Most cloud providers follows utility based pricing scheme as they charge only for what we use. Many cloud providers' offers to commit a predetermined contract apart from the actual use. So companies need to ensure the cost of different plans and features of each application. (Rahmath and Sarwar, 2014). According to Srikumar (2013) the entire data infrastructure set-up and the system design will be provided by the service provider so this may be a problem for organisations as they will be tied down to the service provider and they will have to use its services at all quoted costs.
4. **Lack of Support:** According to Rahmath and Sarwar (2014) every customer wants their query to be solved in urgent basis so Customer support is an essential feature in Cloud computing. Sometimes, numerous cloud-based apps make it difficult to get customer service promptly.
5. **Limited Resources:** SMEs in India operate in lean environment with limited resources and IT personnel. So

the upfront infrastructure investment is a big challenge for the vast base of SMEs.

6. **Legal Framework:** Cloud computing market is growing by leaps and bounds in India and it is expected to touch a billion USD by 2016. It is a favourable time for start-up companies and SMEs to adopt cloud but there is a lack of legal framework for cloud computing in India is restricting the management team to switch their business to cloud [15].

4.8 Indian government plans for IT in the cloud: Government of India's cloud-computing project promises to cut costs and speed up adoption of IT in government organizations, but challenges remain due to federated decision making**.** The government of India's cloud-computing project has promised to cut costs and speed up the adoption of IT in government organizations, but challenges remain due to federated decision making. This opens up competition in the government IT services sector with a wider variety of suppliers. Government of India will face challenge in implementing cloud-first policy due to diversity in the federal structure and the inclination from various state departments to have control on all aspects of technology infrastructure. "The Ministry of Information Technology will give a guidance to first evaluate state data centres (SDC), and build department technology infrastructure, only if there is some unique requirement that is unfulfilled by SDC [16].

4.9 Indian public clouds spend grows faster than rest of world: According to the latest research from Gartner, India is one of the world's fastest growing markets for public cloud services. "The market for public cloud services in India continues to expand at rates outpacing much of the rest of the world," said Ed Anderson, research director at Gartner. He added that increased demand for the business benefits and cost efficiencies will drive growth across almost all cloud market segments up to 2017. Gartner said from 2013 to 2017, $4bn will be spent on cloud services in India. Software as a Service (SaaS) is expected to be the largest overall segment, followed by infrastructure as a service, with $76m to be spent in 2014 and business process as a service where $73m will be invested in the next 12 months. IT spending on public cloud services in India is expected to reach $1.3bn in 2017. Government of India recently launched its cloud project, GI Cloud or Meghraj as it is known, which promises to cut costs and speed up the adoption of IT in government organizations [17].

5.0 India and the Cloud: Cautious Optimism for Significant Growth: The public cloud market in India was strong in 2013 as businesses of all sizes embraced the cloud's ubiquitous applications and cost-effective nature. Research form Gartner estimated that public cloud services in India grew at a CAGR of 33.6 percent from 2012 to reach $404 million. Infrastructure as a Service (IaaS) – including cloud computing, storage and print services – proved to be a fast-growing segment, growing at 33.9 percent in 2013 to $59.2 million. The question arises why this cloud market grew so rapidly in India, there are two reasons stand out: i) Like in other regions, Indian businesses – from SMBs to large enterprises – are seeing significant cost savings and a wide variety of applications they can get from the cloud.

ii) The Indian economy suffered in 2013, and the rupee was weak against the dollar. With their IT spending capabilities minimized, businesses looked to the economics of the cloud instead of spending on IT hardware.

Indian businesses remain poised to take advantage of the efficiencies and cost savings the cloud offers, and the country has already seen tremendous growth in this area. If the political and economic woes that have gripped India for the past year can be resolved in 2014 and optimism for the future grows, more and more businesses will look to the cloud to help fuel their growth. That makes India a place for other countries to watch, learn from and consider how the cloud could impact their own future [18].

5.1 Overall growth: "The overall cloud market continues to grow. Purely from a consumption perspective, cloud computing has grown in the Indian market," said Praveen Bhadada, a senior director with Zinnov, a technology strategy advisory in India. In Indian rupee terms, the market has been growing at 45% to 50% every year and in US dollar terms it may have grown 35% to 40% annually, Bhadada said. "That clearly tells us, irrespective of what challenges exist in the market, one way or the other, adoption has increased," he said. In the last three to four years, companies have moved beyond the concerns of security risk and are now asking what more can be done on the cloud, and in the coming three years, boosted by the move towards hybrid clouds, adoption will accelerate in India, he said [19].

Conclusion: Although cloud has practically become mainstream in the IT world, its promise extends well beyond technological innovation. In fact, cloud has the power to open doors to more efficient, responsive and innovative ways of doing business [23].India most recently expressed the view of the Internet at the Fourth Asia-Pacific Telecommunity (APT) Preparatory Meeting in August 2014. The Indian delegation stated that the Internet has expanded to "occupy the space of connecting public networks through public networking systems, which is a telecommunications network." India also stressed that global investment in the Internet may remain heavily skewed toward the continued importance of these telecom networks, with 80 percent of investment in telecommunications, only 10 percent in the well-known functions of over-the-top services, and the remaining 10 percent in DNS servers [20]. This international control is a source of anxiety

for India that is heightened by the more than one billion Indians expected to come online in the next decade. The Indian government has argued that Internet Protocol (IP) address management at the national level should make it easier to identify IP addresses by country; international Internet traffic should be routed within that country. This would address many of India's concerns over the possibility of international jurisdiction over data flows that only affect Indians [21].India argues that the Internet's structure as a telecommunications network and its increased intersection with public networks justifies a major role for governments and the ITU in Internet regulation. India must create a justifiable rationale for its ideas, demonstrating that it does not seek to circumvent or dilute the global mood for inclusive multi-stakeholder participation in Internet management, while ensuring equitable ownership and stakes for all in this digital space. For India, transforming the ITU into a more representative forum might achieve that elusive resolution [22].Even as Indian enterprises become more eager to experiment with moving IT to the cloud, the nation itself has fared poorly in its cloud readiness, according to the Asian Cloud Computing Association (ACCA), an industry lobby group whose members include Microsoft, EMC, Rackspace and several other cloud computing, storage and software companies. India dropped to 13th on ACCA's Cloud Readiness Index in 2014 and is higher only than Vietnam. Japan maintained its lead, among the 14 countries ranked in the index on several parameters including privacy, data sovereignty, broadband quality and government regulatory environment [25]. Governments around the globe also use data-driven innovations to better serve their citizens and grow their economies. Modern trade rules are needed to ensure these benefits continue. Innovation continues to move at a tremendous speed with the adoption of new technologies, including large-scale data analytics, artificial intelligence, and block chain. It is important that modern trade agreements include clear, binding, and forward-looking provisions on digital trade. This will allow data-driven innovation powered by cloud computing to continue improving and creating economic growth [26].

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Authors Profile:

1.Smt. Moumita Biswas, Assistant Professor, CharuChandra College, Dept. Of Computer Science (w.e.f :1.1.2016)
2.Smt. Nabanita De, Govt. Approved Part Time lecturer, CharuChandra College, Dept. Of Economics (w.e.f :1.11.2009).Her number of publication is 16 in different UGC Approved Journals including different subjects related Informal sector, Green IT, Cloud Computing,GST,Crony Capitalism
3.Smt. Paramita Chatterjee , Govt. Approved College Full Time Lecturer, Charu Chandra College, Dept. Of Computer Science (w.e.f :7.8.2006). Her number of publication is 10 in different UGC Approved Journals including different subjects related Role of ICT in Informal sector, Green IT, Cloud Computing, GST, Role of ICT in Education Sector, Banking Sector .

