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INDIAN SMEs MAKE THE MOST OF CLOUD – A SURVEY BASED ANALYSIS ON CLOUD USAGE

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ABSTRACT

Cloud computing is an internet-based computing which lets users acquire knowledge, products and services they need for business. In developing countries, SMEs (Small and Medium-sized Enterprises) are the nurturing grounds for entrepreneurs and major contributors of economic growth. Indian enterprises are gradually changing their perception of IT (Information Technology) by adopting the flexible and global way of accessing data anytime and anywhere. This paper investigates the usage of cloud computing by SMEs in India. The study involves quantitative techniques for collecting and analysing data from 120 SMEs that have adopted cloud computing as their business strategy. These SMEs belong to various sectors including finance, education, government, healthcare, IT, etc., from 6 cities of India. The findings reveal that majority of SMEs demand services of cloud. But at the same time, it is also found that SMEs are more worried about security, interoperability and vendor lock-in issues of cloud as these services are accessed over internet. As cloud computing evolves, more SMEs in India may adopt it as a default method of IT delivery and consequently remove the barriers of the digital divide in developing countries.

KEYWORDS: Cloud Adoption, Cloud Computing, Cloud Usage, Indian SMEs.

I. INTRODUCTION

Cloud computing is changing the face of IT environment and has redefined the way IT infrastructure is designed. Large capital investments in hardware and software are no longer the requirements for enterprises of the new age. Cloud computing is a technology model that offers services, such as, networks, servers, storage, and applications in context with computing via internet. These services are widely implemented among organizations for business in almost all the developed countries, and at the same time it is observed that developing countries are attractive markets for cloud services since they provide huge opportunities for industries to grow.

India, one among a few developing nations, offers a great potential for cloud computing as it is emerging with innovations in IT, creating more employment opportunities. In this regard, cloud computing could be vital particularly for the SMEs. The Indian government defines MSMEs (Micro, Small and Medium Enterprises) based on their investment in plant, machinery and equipment for enterprises providing or rendering services (MSME Act, 2006). In India, SMEs are the organizations whose capital investment is in the range of rupees 2.5 million to rupees 100 million and manpower is upto 400 persons (Venkataramanaiah and Parashar, 2007). Cloud computing can enhance business potential levels in a way that SMEs cannot accomplish otherwise. SMEs can focus on their core business without spending too much effort on software licenses, software updates, hardware installations and maintenance. Cloud Computing also gives SMEs the ability to scale up quickly with minimum resources and has helped them to develop cost effective business models. Such models facilitate SMEs to elevate their business in a successful and cost efficient way since the enterprises need to pay just for the services they use. The greatest advantage of using cloud computing model is that it eliminates the cost associated with developing and operating in-house applications as the capital investment, security, backup and server maintenance are all the provider's responsibilities. Around 8.11 crore people have been given employment by the SMEs of India which marks an increase in CAGR (Compound Annual Growth Rate) of 5.29% (Indian SME market, 2013). These enterprises prove a boon to the Indian community as they grow to be the largest employment generator in the country. A huge percentage of cloud clients are from industrial sectors like e-commerce, technology and telecommunications.

Many enterprises are facing tough time in understanding cloud adoption issues. The present work is an attempt to find out how SMEs of India perceive cloud computing and what motivates them for the adoption of cloud-

based services. A survey is conducted on the usage of cloud computing among the SMEs of India. The study gives many significant focal points to the stakeholders of cloud system. For example, service providers can figure out how to tune systems. Potential customers of cloud can learn and decide the approach to be used to access cloud services effectively. Also, researchers and consultants can classify and compare different scenarios. This paper is organized as follows. Section 2 is an overview of various service and deployment models of cloud computing. Section 3 presents the related work and section 4 projects the state of cloud computing in India. Section 5 highlights the research methodology used. Section 6 is a discussion on the key findings from the survey. The conclusions are presented in Section 7.

II. CLOUD COMPUTING MODELS

Cloud offers its services according to different service and deployment models available. This section provides an overview of these models.

Service Models

IaaS (Infrastructure as a Service) offers access to computing resources in the form of virtualized hardware like server space, storage and networks. The customers get the advantage of using all infrastructural facilities from the provider while using their own platforms and applications. Instead of purchasing equipment for their hardware requirements, clients pay for IaaS on request. Depending upon processing and storage needs the infrastructure provided by the service provider can be extended or reduced. This service saves expenses of purchasing and maintaining client's own equipment. Google Compute Engine, Microsoft Azure, Amazon EC2 and Rackspace are a few popular cloud infrastructural services.

PaaS (Platform as a Service) offers an environment which allows clients to develop, manage and execute their applications without investing in software development tools. The clients can subscribe to a set of preconfigured features which are suitable for their tasks. The service providers take the responsibility of managing security, software licenses, operating systems, server software, and backups. They facilitate collaborative work environment regardless of the possibility that some of the users may work remotely. Microsoft Azure, Google App Engine, AWS Elastic Beanstalk, Heroku, Red Hat's OpenShift and Apache Stratos are some examples of platform services on cloud.

SaaS (Software as a Service) gives its clients an access to vendor's cloud-based software. Since the applications are hosted on cloud, they can be accessed from any location without the need of installing software on local devices. The clients need to subscribe to the software rather purchasing it and pay the service provider as per usage. The cloud providers take responsibility of managing, installing or upgrading the software on client's devices. Usage of resources can be scaled up and down depending upon the service requirements. The applications are accessible from any device which is virtually connected to internet from any part of the world. Google Apps, Microsoft Office 365, Salesforce, Workday, Concur, Citrix GotoMeeting are some of the examples.

Deployment Models

Public Cloud is a cloud hosting model where the service provider renders services and infrastructure to different customers over a network for open utilization. The clients do not have any knowledge and control over the location of data centers. Public cloud is suitable for businesses which require online document collaboration, storage of non-sensitive content and webmail. This model is efficient due to low capital overheads and ultimate scalability. The provider may offer the service free or charge as per usage. As the infrastructure is shared by all, public cloud benefits the clients more by accomplishing cost reduction. Google is an example of public cloud which offers free services.

Private Cloud also known as internal cloud, offers services in a secured environment, protected by a firewall under the governance of IT department. Private cloud allows only authorized clients and hence gives a direct control over their data and information. Organizations that have changing or unexpected requirements, critical jobs, security concerns, management demands and uptime requirements are the ones which are better suited for private cloud. Unlike public cloud, private cloud access data from distinct computers which are hosted internally or externally via secured networks.

Hybrid Cloud is integrated with other types of clouds. Two or more cloud servers, i.e. private, public or community cloud can be arranged in a way so that they are bound together yet remain individual entities or clouds. It allows clients to customize the services with another cloud package or service. Through hybrid cloud arrangement one can jump into the services of private and public cloud anytime as per the requirements of the task demanded by users. Organizations that have more demand for security can implement hybrid cloud as a powerful business methodology but if security is not a priority then public cloud can be considered since it is

more economical. Hybrid cloud model can be used for processing big data as it can hold sales, business and different types of information and can process analytical queries over the public cloud. Security, flexibility and scalability are a few advantages of hybrid cloud.

Community Cloud is a multi-tenant setup that is commonly shared between many organizations belonging to a specific group or community. The members of the group share similar concerns like security, compliance, jurisdiction, etc. A community cloud can be managed internally by the members or by a third party provider and can be hosted internally or externally. The main advantage of using community cloud is that the cost is shared by specific organizations within the community. Hence, it has cost saving potential to some extent. This type of cloud is suitable for organizations that work on joint ventures, tenders or research.

III. RELATED WORK

With the evolution of ICT (Information and Communication Technology) solutions such as cloud computing, SMEs are able to face some of the challenges in business. Several studies have highlighted the importance of cloud computing solutions in order to enhance the potential of SMEs which in turn affects the overall economic growth of the country. Walsham (2010) addressed the question as to what development goals have been achieved in India till date by the use of ICTs beyond the export-oriented ICT service industry. The work also examined the extent to which ICTs have benefitted Indian citizens. The analysis reflected a positive response upon the usage of ICT based tools.

The impact of using SaaS on narrowing down the digital divide of the country was examined by Le Roux and Evans (2011). The work identifies education sector as an important area where cloud computing plays a major role in the growth of South Africa. Nuseibeh (2011) proposed a conceptual model with research hypotheses for future empirical testing. The work also investigated organization's tendency to adopt cloud computing services. It highlighted factors to be considered in terms of benefits and risks which are involved in adoption of cloud. The study conducted by Begg and Caira (2011) projected that SMEs make a huge contribution towards the economy of the country. They highlighted the need to recognise importance of data governance to survive in the digital world especially when the amount of data is increasing because of the usage of IT technologies and e-business systems.

The study of Portuguese SMEs by De Abreu Duarte (2012) revealed that around 40% of SMEs are using cloud computing services consciously and 33% of SMEs are using cloud services without being aware of it. In fact, 27% of SMEs do not use any kind of cloud computing services. Moreover, majority of the companies focused on IaaS and private cloud solutions. It was also suggested that if the managers of the companies are aware of cloud computing concepts, the sustainability and growth of SMEs can be improved to a greater extent. Millham (2012) believed in enabling legacy systems for migrating to cloud computing.

An exploratory study of Irish SMEs by Carcary et al (2013) found that almost half of the respondents had not shifted to the cloud environment. Further, many SMEs who shifted to cloud did not assess their readiness for adopting cloud computing technology nor adopted in-depth approaches for managing their engagements with cloud. The findings concluded implications for academic research and national policies which can be strategized for the successful adoption of cloud computing technology among the SMEs. According to Dominic and Ratnam (2013), healthcare sector of Malaysia is greatly influenced by the IT resources of cloud. Through the approach of factor analysis, the study concluded that efficiency and collaboration between healthcare providers and health insurance providers can be improved with the adoption of cloud services. Rahimli (2013) carried a case study on Malaysian SMEs and evaluated the factors influencing the adoption of cloud computing from the management's perspective. The results showed a positive impact.

Findings from the case studies of SMEs of South Africa (Mohlameane and Ruxwana, 2014) revealed that most participants have limited knowledge and understanding of cloud computing concepts which is the cause for the slow adoption rate of cloud computing. The study proposed that cloud computing solutions can resolve a portion of the difficulties that SMEs are confronting. Abubakar et al (2014) projected that SMEs of developing regions in Sub-Saharan Africa are positive about using the potential services of cloud. These SMEs are from various sectors in Nigeria. The emergence and adoption of cloud computing was analysed using qualitative techniques and it was found that contrary to the literature on cloud computing adoption in northern regions of the world, these SMEs are least bothered about challenges like security, privacy and data loss. Stieninger et al (2014) discussed the relevant factors influencing the intended and actual usage of public cloud services in the organisations and aimed at the reconceptualization and operationalization of those factors. Babu and Chakravarty (2014) argued that cloud computing technology is one of the opportunities sought by SMEs of today which are benefitted immensely due to its flexibility and pay-as-you-go cost structure. Vashisht and Sharma (2014) conducted a survey on thirty manufacturing industries situated in Faridabad and Gurgaon cities of India and concluded that such industries are not using cloud services effectively as they are not well aware of

it. Small sized industries believed that confidentiality and security of data is a big threat and cloud computing is not a cost-effective solution, whereas medium sized industries were in favour of the technology. According to NTT (2014), a trusted cloud partner should be selected with a holistic cloud approach. Such a partner can help in ensuring cloud needs, including strategy and roadmap development, implementation, integration, migration, custom development, ongoing management, support, and hosting services. According to Devasena (2014) SMEs are highly influenced by factors like ease of use, improved security and privacy, cost reduction services of cloud, but are concerned about cloud downtime and dependency on devices within their physical proximity for backup, storage, etc. To provide a model which will focus on cloud computing end-user success, Flack and Dembla (2014) reviewed applicable theories which were utilized during previous major IT shifts as well as investigated key user perspectives. The study proposed key metrics for the enterprise to consider in the successful adoption of cloud computing.

One of the major challenges faced by the SMEs of Nigeria is the infrastructural issue like inadequate and unaffordable internet facilities and unstable power supply (Ofili, 2015). A few more factors are lack of knowledge about the advantages of cloud computing and heavy cost of bandwidth. The study depicts that regulations regarding enforcement of data protection laws and other intellectual property rights should be adequately enforced which lowers the barrier for SMEs of Nigeria to adopt cloud services. Mashandudze and Dwolatzky (2015) investigated seminar results, surveys and publications to study about South African organisations. A qualitative approach was used to examine small group industry executives. It was evident that apart from the challenges in cloud computing, many organisations are still adopting it. The benefits realised in the adoption of cloud computing were also addressed. Gide and Sandu (2015) analyzed the benefits and challenges of adopting cloud based services by Indian SMEs which helped them to decide whether to adopt cloud based services or not.

An insight on the conceptualisation of digital divide, the use and appropriation of ICTs in developing countries and the policy and practitioner implications is detailed by Dey et al (2016). A critical review of the ICT for development and the role of structuration theory in ICT for research is done. The situations in Swaziland, China, South Africa, Bangladesh and India are also examined in their work. Ray (2016) reviewed and consolidated the diverse literature on cloud adoption. Two existing frameworks were critiqued to highlight their strengths and limitations. A holistic check list based on the cumulative findings was provided to examine business implications of moving to cloud.

IV.   CLOUD COMPUTING IN INDIA

SMEs have embarked a remarkable growth in Indian economy by contributing 45% of the industrial output and 40% of exports. Also, the production of more than 8000 quality products has taken the employment market to new heights as they offer more than one million jobs every year (Times of India, 2015). Not only traditional big vendors are investing immensely in cloud solutions, new vendors are also launching competitive markets in India. The TechSci Research report (2015) predicts that during 2015-2020, the Indian cloud computing market will grow at a CAGR of over 22%.

As per the Telecom Regulatory Authority of India (TRAI, 2016), Jammu & Kashmir is the first state to adopt cloud computing for e-governance. It is using cloud services for issuing birth or death certificates, etc. At present, SWAN (State Wide Area Network) is operational in 30 states of India. Uttarakhand government is in the process of putting SDCs (State Data Centres) which will provide a single window access to the information and services of the state government at all levels. In the state of Tamil Nadu, the government launched Microsoft's cloud computing services. Maharashtra state government has already implemented the cloud based platform known as MahaGov, in partnership with companies such as VMware Inc. and Microsoft India Pvt. Ltd. The initiative is successful in reducing the cost drastically while increasing the IT capacity with maximum flexibility. Not only the government organizations, but also huge software organizations have shown great interests in the markets of India. Microsoft announced its collaboration with FKCCI (Federation of Karnataka Chambers of Commerce and Industry) to help about 200,000 SMEs across the state and increase the usage of cloud based services to boost their revenue growth.

IBCC (Indian Banking Community Cloud) is the first community cloud initiative for banking industry in the country. Indian manufacturing units have also started adopting cloud models. Applications like CRM (Customer Relationship Management), supply chain, HMI (Human Machine Interface), BI (Business Intelligence) and BA (Business Analytics) have adopted cloud model and are now able to handle large amounts of data. The OSS (Operation Support System) and BSS (Business Support System) in Indian telecom industry are currently deploying SaaS to eliminate their capital and operational expense. Big data solutions and analytics for OSS/BSS in Indian telecom companies are easily complemented by cloud owing to its scalability.

Railways are utilizing the cloud technology for freight management and passenger reservation system. Strategies have already been implemented to use cloud for GIS (Geographical Information System) management in railways, for e-ticket bookings and for automated surveillances of railway premises and storage of video logs in cloud data centres. The most important sector in India i.e. education, has implemented cloud-based e-Learning system (eSikshak) to a SaaS model. Such services relieve institutions from the burden of installation, maintenance, and management of the e-learning application on-premise. Apart from this, IIT (Indian Institute of Technology) Delhi, IGNOU (Indra Gandhi National Open University) and other universities have deployed their own cloud environments. Department of Electronics and IT of the Government of India has initiated an extensive project termed as 'GI Cloud'. It is the cloud computing environment that will be used by government departments to follow a set of common protocols, guidelines and standards issued by the Government of India. Usage of cloud for health services is also gaining popularity at a fast pace. It aims to incorporate HIE (Health Information Exchange) mechanisms which allows stakeholders associated with health data to appropriately access and securely share a patient's vital medical information. India has the fastest developing SaaS market in Asia Pacific region. IBM has propelled SaaS cloud computing centers in Bangalore.

V.   RESEARCH METHODOLOGY

This survey examines and analyses the requirements and concerns of cloud computing for SMEs in India. A quantitative research approach through utilization of an online questionnaire was followed. Such a survey method is considered as a valuable resource as it has a higher response speed, lower respondent error and no interviewer bias. A detailed review of literature work gave an insight to frame the questionnaire's constructs focussing on the reasons and concerns for adopting cloud technology. The questionnaire was prepared using 5 point Likert scale method ('1'-poor, '2'- below average, '3'- average, '4'- good and '5'- very good) and included closed and open-ended questions. closed-ended questions helped to generate and gather information quickly. In situations where markings on the scale of 1–5 were not enough, open-ended questions aided in recording the comments of respondents. Few telephonic interviews were also conducted to reach out places where getting online answers was tough. Questionnaires and telephonic interviews formed up the primary data of survey. The secondary data was collected through annual reports published by government organizations, relevant case studies and research journals papers which included white papers and articles.

A purposive sampling technique was applied and the e-mail based questionnaire was sent to 120 SMEs who have already adopted cloud computing services. These enterprises had a maximum of 400 employees and were situated in the six major cities of India – Bangalore, Hyderabad, Chennai, Mumbai, Pune and Delhi. Participants were selected based on their current role in SMEs, such as, IT decision makers and managers. The survey started by investigating the driving factors that encouraged them to migrate to cloud computing services. Further, the factors inhibiting SMEs to adopt cloud were explored. Table 1 provides the percentage of each sector, based on socio-demographic profile of the organisations to whom the questionnaire was sent.

*Table 1. Socio-Demographic Profile of SMEs*

Organisation Size	Percentage
1 – 25	15%
26 – 50	45%
51 – 200	27.5%
201 – 400	12.5%
Total:	**100%**
Organisation Sector	**Percentage**
Government	10.8%
Healthcare	15%
Finance	5.8%
Manufacturing	4.2%
Trade	7.5%
IT	36.7%

Education	12.5%
Others	7.5%
Total:	**100%**

It is observed that the sample is marginally dominated by SMEs sized between 26 and 50. Major sectors in the study were from government agencies, healthcare centers, educational institutes, finance, manufacturing, trade and IT companies, etc.

VI.   FINDINGS AND DISCUSSIONS

The data collection process generated 97 usable responses out of 120 SMEs. Figure1 shows the percentage of respondents who participated in the survey. It is observed that 18.6% of the respondents were having employees between 1–25. Majority of the responses (38.1%) were from enterprises having 26–50 employees. The firms with employees between 51–200 formed up 27.8% of the responses and the least score (15.5%) was from firms having employees between 20–400.
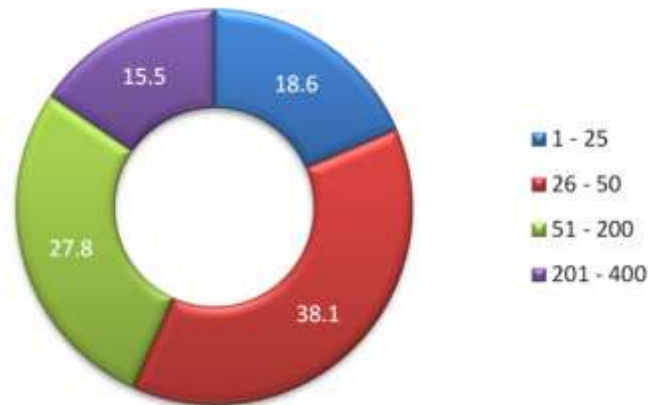
Figure 1. Respondents Profile by Firm-Size

Further, various respondents belonging to different sectors were segregated. Figure 2 shows the respondents profile by sector.
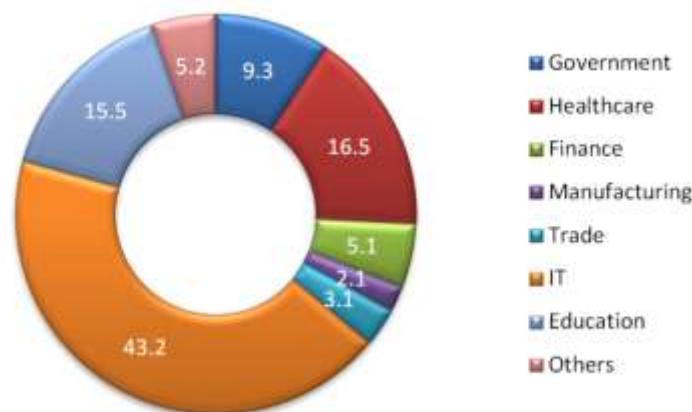

Figure 2. Respondents Profile by Sector

Majority contributors of the survey were from IT, healthcare and education whereas, the minority of respondents were from government, trade, manufacturing and finance sectors. The following sub-sections discuss the findings of each survey question.

Importance of Cloud Services in Business

Among the SMEs which have subscribed to cloud, many have realized the benefits of implementing this technology in their business. The participants were asked if *"cloud computing plays a significant role in business"*. On a Likert scale of 1 to 5, 6 in every 10 SMEs evaluated the significance of cloud as at least 4. A keen interest is observed among the start-ups to launch all their applications on the cloud, while more established firms might decide on switching to the cloud environment gradually. Figure 3 illustrates the statistics.
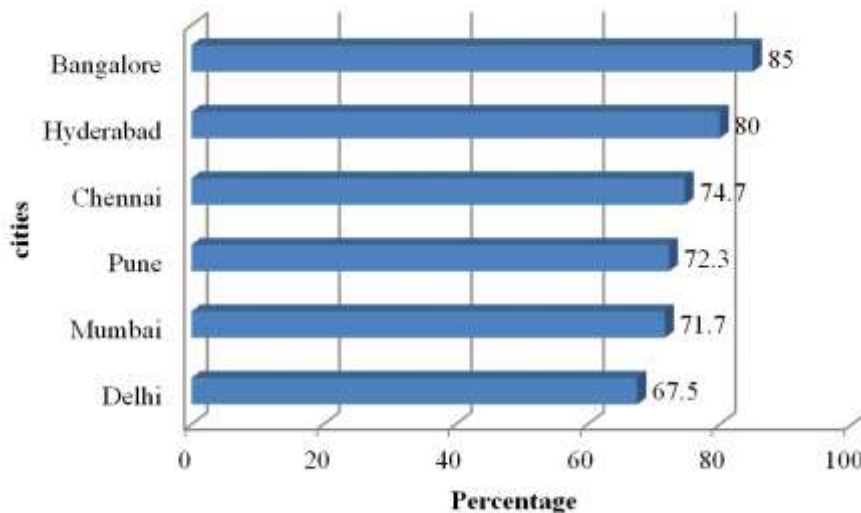
Figure 3. Importance of cloud services

It is seen that Bangalore tops the rating by gaining 85 % of usage of cloud. Hyderabad (80%) and Chennai(74.7%) also revealed a high interest in cloud, whereas Pune (72.3%) and Mumbai (71.7%) are the markets which are slowly picking up this technology. The percentage of cloud usage in the SMEs in Delhi was found the least (67.5%) among other cities.

Driving Factors to migrate to cloud-based services

In order to examine the key driving factors responsible for motivating SMEs to adopt cloud-based services, the participants were asked the *"reasons to switch over to cloud"*. Figure 4 presents an analysis of the driving factors perceived by SMEs of India. The findings reveal that 87.8% of respondents consider cost reduction as a top priority, followed by anywhere access (84.7%), dynamic scalability (82.3%) and easier maintenance (78.7%). This indicates that SMEs are interested to access its data and applications from anywhere, on-demand through cloud service providers. Therefore, cloud is best suited for such businesses as it provides benefit to scale up or down the operations and storage needs, allowing flexibility as the needs change. This in turn brings a major cut in hardware and software expenses as resources of cloud can be used effectively. So, cost reduction is considered as the major benefit. Factors like greater efficiency and agility (73.8%), allowing business focus (70.3%) also emerged as important reasons as organizations can adapt to the changes in no time without losing momentum or business focus. With a massive pool of redundant IT resources, cloud computing is substantially more dependable and reliable than in-house IT framework. This marks reliability and backup (67.6%), less complexity (64.7%) and Green IT (52.7%) as notable factors which impact the decision of SMEs to shift to the cloud.
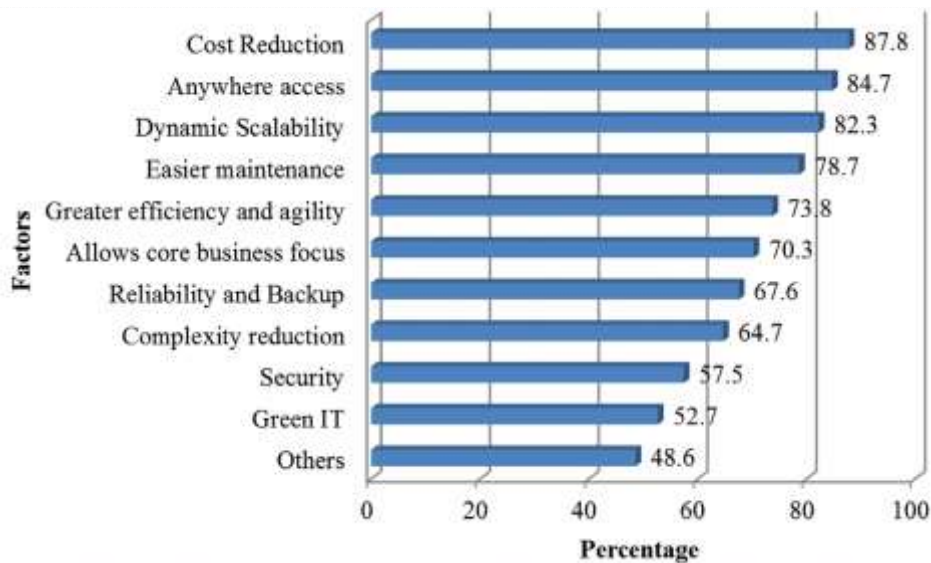
Figure 4. Key Driving Factors

Apart from all the benefits, it is observed that security (57.5%) still remains a question for cloud adoption. This comes from the fact that no matter how best the security standards are, one needs to ensure that the most reliable service providers are approached, who can keep the organization's data absolutely secure.

Usage of cloud-based services

The cloud concept provides many services. To explore which type of cloud-based services SMEs intend to use, the participants were asked to rate the *"services which they are currently using or planning to use"*. Figure 5 depicts the cloud-based services which are in demand by the SMEs.
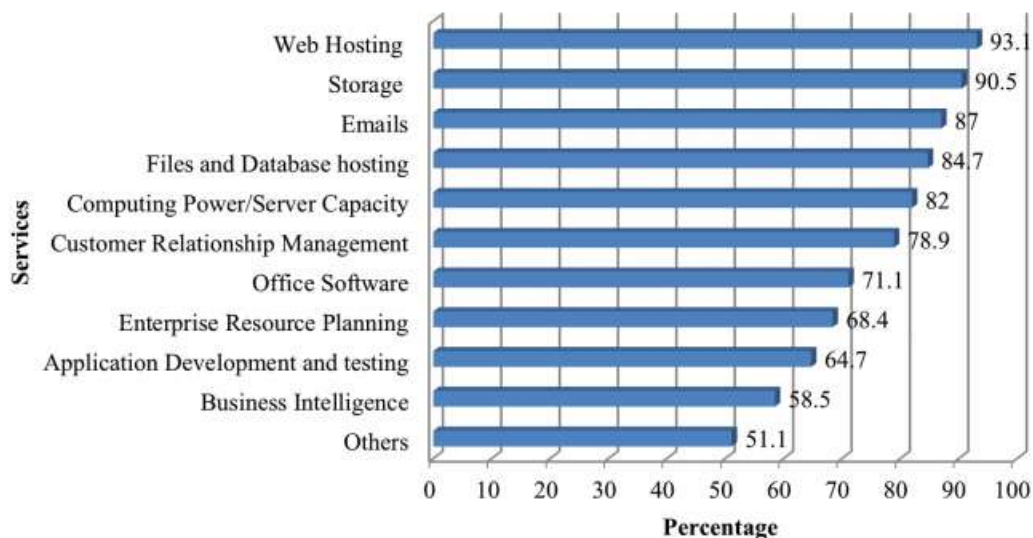
*Figure 5. Services in Demand*

It can be clearly seen that SMEs are attracted towards the following cloud-based offerings: web hosting (93.1 %), storage (90.5%), emails (87%) and files/database hosting (84.7%), computing power (45.6%). This signifies a high interest of SMEs in infrastructural based services. Since cloud providers offer cost effective solutions, SMEs need not worry about the complexities of underlying infrastructure required by their business. Hosting of applications on virtual servers can avoid redundancy which is otherwise created by a vast network of physical servers. The clients can take advantage of hosting services based on the demands of their website, and can pay for it as per the usage. The storage services offered by cloud providers have motivated SMEs to a greater extent, as the providers' take responsibility of data availability, accessibility and security. The users can store data on cloud and access it from anywhere, anytime without carrying physical storage device along. With this facility, collaboration becomes much more feasible as organizations can access data through any web service or API (Application Program Interface). Also, the email-server on cloud takes away the efforts of maintenance

and hence allows organizations to access it from anywhere. Other services like Customer Relationship Management (78.9%), Office Software (71.1%), Enterprise Resource Planning (68.4%), Application Development and Testing (64.7%) and Business Intelligence (58.5%) also signifies a high interest amongst SMEs to find efficient solutions in cloud for improving the performance.

Cloud Vendors in demand
Until few months back, there are quite a number of cloud computing vendors in the market. Based on the answers of the respondents to *"preference of cloud vendors"*, Figure 6 shows popular vendors among SMEs of India.
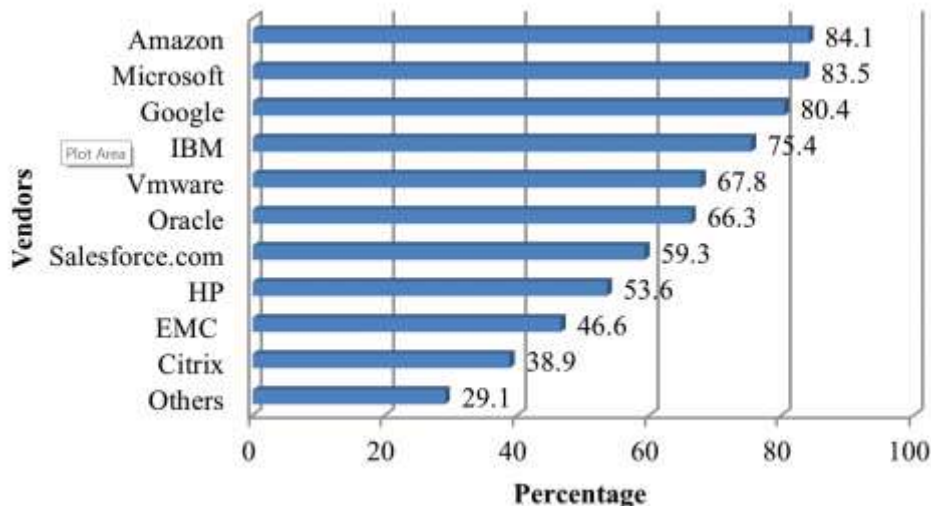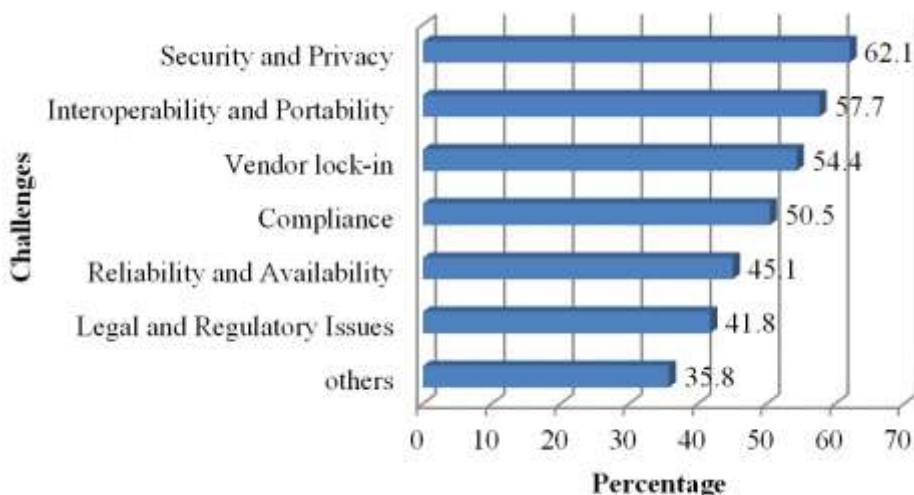

Figure 6. Vendors of cloud computing

It reveals that Amazon (84.1%) and Microsoft (83.5%) have a marginal lead over Google (80.4%). Vendors like IBM (75.4%), VMware (67.8%) and Oracle (66.3%) are gradually rising in the market. Other vendors like Salesforce (59.3%), HP (53.6%), EMC (46.6%) and Citrix (38.9%) are also in use.

Concerns of Cloud Computing
With a goal to figure out which issues influence the adoption of cloud computing, the study further investigated SMEs' concerns of cloud-based services. Figure 7 shows *"the challenges faced by SMEs"* which in turn hinders the adoption rate of cloud computing.

Figure 7. Concerns of cloud computing

Security and privacy of data (62.1%) remains the topmost concern among the SMEs of India as these issues are relevant to both hardware and software in the cloud architecture. Loss of data can severely impact businesses, brand reputation, customers and suppliers trust. The data on cloud becomes vulnerable to attacks since it passes

through a network of virtual machines and hence gives way to unauthorized access. In most cloud service scenarios, clients have no idea of where their data is stored which requires careful considerations because the physical location of data centers determines the set of laws that governs the management of data. With the increase in cloud providers in the market, organizations consider Interoperability and Portability (57.7%), Vendor lock-in (54.4%) and Compliance (50.5%) issues also as a major concern for sectorial growth. The computing needs of the organization vary with time and to optimize their business requirements the customers should have the freedom to switch between different clouds and cloud providers. Many regions of India are still suffering through unreliable power supply and low bandwidth, causing reliability and availability (45.1%) a challenge for SMEs. Other factors like legal and regulatory (41.8%) issues associated with industry were also raised.

VII. CONCLUSIONS

In this paper, the usage of cloud computing services by SMEs of India is explored. The outcome of the survey of 120 SMEs in India shows that cloud-based services are in high demand. The advantages perceived by SMEs as the key driving factors for adoption of cloud-based services are reduced costs, improved flexibility and scalability. Inspite of all the benefits, SMEs have also raised issues concerning security and privacy, availability and reliability of data and vendor lock-in. Consequently, these concerns act as hindrances in the adoption of cloud computing which needs to be addressed. Cloud vendors are expected to provide the details of their security policy and segregation of systems in a multi-tenant environment.

It is also concluded that majority of cloud-based services which are popular among the SMEs in India are the infrastructural services. IaaS offers organizations to reduce IT cost, stretch capabilities of infrastructure, geographical flexibility while maintaining high security at the same time. Moreover, IaaS solutions are usually designed with built-in redundancy, system replication, and service resilience. Hence, the challenges faced by SMEs for the adoption of cloud-based services can be resolved to a greater extent.

Indian SMEs make the most of cloud in their business strategies. Cloud computing certainly provides a platform for SMEs to grow fast and focus on their business rather than the underlying infrastructure and platform, but organizations should have a good business sense to adapt and reap its benefits.

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