

# Cloud Adoption by Startups in India - Adoption, Preferred Cloud Models, Challenges and Business Transformation: A Survey Based Investigation and Recommendation

<sup>1</sup>Jipson George Thoomkuzhy, <sup>2</sup>Lokesh V

<sup>1,2</sup>IT Management Professional in a fortune 500 Company, Bangalore, India

## Abstract

There was a time when start-ups had to keep aside a large portion of their capital for their IT infrastructure. It's no secret that the cloud has become a major component of a typical company's IT Planning. Startups neither can afford the money nor time to build their own IT infrastructure as their primary focus should ideally be on their Core Domain - Product or a Service. Cloud computing is emerging as a powerful computing Standard with its aim of efficient utilization and Cost-Effective Solution. Cloud computing is viewed as a significant change in the way future businesses are going to be managed.

The concept of cloud computing is based on the idea that computing resources will reside somewhere other than the Local computer room and that the users will connect to it using the IT resources as and when required. It promises increased flexibility, scalability, and reliability, at the same time offering decreased operational cost and support cost but the research on adoption of cloud computing is at its infancy stage. Many potential cloud users are reluctant to move to cloud computing due to Reliability of the service provider, Support Concerns, unawareness on adaptability, Security issues and so on.

The scale of adaptability may range from fully featured applications, to Software development and Deployment environments and to computer Infrastructure such as Servers, Network, Storage and Processing.

In this paper, we present a survey on Adoption of Cloud computing by start-up companies in India, highlighting the key Cloud concepts, suitable Cloud model for Start-ups, Challenges that Start-ups face in Adopting Cloud and the Business Transformation.

A survey conducted with 150 Indian startups show that majority of the startups are interested in adopting the cloud technology. However startups showed concerns on security, interoperability, Support capability and quality of the cloud service providers. The findings are expected to assist startups in their adoption of cloud computing services.

## Keywords

Cloud Computing, SAAS, PAAS, IAAS, Startups, private cloud, public cloud, community cloud, hybrid cloud, Cost Benefit Analysis

## Research Highlights

- Discussed the preferred cloud models for startups
- Discussed about the challenges in adopting cloud computing
- Discussed about the business transformation for startup companies by adopting cloud computing
- Recommended the cloud service and deployment models

## I. Introduction

Cloud computing has recently emerged as a technology for hosting and delivering services over the Internet. Cloud computing helps

the organizations to eliminate the requirement for users to plan ahead for Provisioning and allows them to start from the small sized infrastructure to a bigger infrastructure on an on-demand basis. Cloud computing offers huge opportunities to various industries but the growth of cloud computing technology is currently at its infancy, with many issues still to be addressed.

This technology has been steadily gathering momentum in many of today's industries, with many of IT's biggest corporations such as Amazon, Google, Microsoft and Salesforce.com etc. pushing for the utilization of cloud technology this year. More and more businesses are starting to understand the cloud with some touting it to be "The fifth generation of computing" [17].

The National Institute of Standards and Technology (NIST) defines cloud computing as a model for Enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing Resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction over the Internet [18].

This paper will discuss the adoption of cloud computing for startup companies in India. This paper discusses about the outcome of survey conducted with 150 startup companies in India. This study found that startups are interested in using cloud technology due to reduced IT cost, scalability and Flexibility. This study also discusses about the interest shown by the startups in adopting cloud computing, Preferred Cloud Computing models, Challenges and the business transformation for Startups.

## II. Background

### A. What is Cloud Computing?

Cloud computing is a type of computing that depends on sharing computing resources rather than having local servers or personal devices to handle applications. In cloud computing, the word cloud is used as a metaphor for "the Internet", so the phrase cloud computing means a type of "Internet-based computing" [1-2], where different computing resources-such as servers, storage, and applications are provided to an organization through the Internet.

Cloud computing represents a convergence of two major trends in information technology — (a) IT efficiency, whereby the power of modern computers is utilized more efficiently through highly scalable hardware and software resources and (b) business agility, whereby IT can be used as a competitive tool through rapid deployment, parallel batch processing, use of compute-intensive business analytics and mobile interactive applications that respond in real time to user requirements [3].

In this paper, we have focused the discussion on startup organizations in emerging economies like India. Basically, firms in emerging economies are said to have low and uncertain revenues [4]. According to [5] information systems installations in developing economies bring in socio-economic developments. This fact is emphasized in literature, as the emergence of Internet facilities, including cloud computing, in developing economies inure to positive socio-economic developments for both consumers and service providers [4-6]. Firms in developing economies are also characterized by massive and rapid developments.

**For eg :** *As a result of Make in India and Startup India-Stand up Indiacampaigns, there is an unprecedented registration large no. of startups with an investment potential of over USD 200 Billion [21].*

## B. Cloud Deployment Models

A deployment model defines the purpose of the cloud and the nature of how the cloud is located. The NIST definition for the four deployment models is as follows [7]:

### 1. Public Cloud

The public cloud infrastructure is available for public use alternatively for a large industry group and is owned by an organization selling cloud services.

### 2. Private Cloud

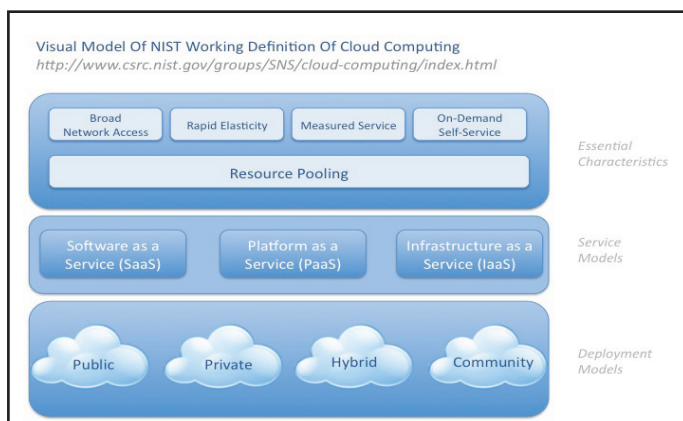
The private cloud infrastructure is operated for the exclusive use of an organization. The cloud may be managed by that organization or a third party.

### 3. Hybrid Cloud

A hybrid cloud combines multiple clouds (private, community or public) where those clouds retain their unique identities, but are bound together as a unit. A hybrid cloud may offer standardized or proprietary access to data and applications, as well as application portability.

### 4. Community Cloud

A community cloud is one where the cloud has been organized to serve a common function or purpose. It may be for one organization or for several organizations, but they share common concerns such as their mission, policies, security, regulatory compliance needs, and so on. A community cloud may be managed by the constituent organization(s) or by a third party.



Cloud Reference Model [20]

## C. Cloud Service Models

This section of the paper describes the various cloud delivery models. Cloud can be delivered in 3 models namely SaaS, PaaS, and IaaS.

### 1. Software as a service

SaaS is software that is owned, delivered and managed remotely by one or more providers and that is offered in a pay-per-use manner [8]

### 2. Platform as a Service

PaaS generally abstracts the infrastructures and supports a set of application program interface to cloud applications. The well-known examples are Google App Engine [8] and Microsoft's Azure Services Platform [9].

### 3. Infrastructure as a Service

IaaS is the delivery of huge computing resources such as the capacity of processing, storage and network etc. Sometimes the IaaS is also called Hardware-as-a-Service (HaaS) [10].

## D. Challenges of Cloud Adoption

Cloud computing is not simply about a technological improvement of data centers but a fundamental change in how IT is provisioned and used [11]. Startups need to consider the benefits, risks and the effects of cloud computing on their organizations and best practices in order to make decisions about the cloud adoption [12]. In any organization, the adoption of cloud computing has a dependency on the maturity of the organizational and cultural processes as the technology [13]. In most of the organizations the cloud computing adoption is not going to happen overnight—some predict that it could take few years before the typical enterprise makes this shift [14]. While these references point to the enterprise organization, the challenges remain the same for startups.

A recent review of the academic research done in cloud computing revealed that there are currently no mature techniques or toolkits available to support decision making during the adoption of cloud computing in the enterprise [12, 14]. In industry, [15] and [16] provide examples of typical offerings from IT consultancies that attempt to fill this gap

Based on our Survey, major areas of concern are Confidence in Vendor, Support Provided by Vendor and Security. Probably for the reason that the customers are concerned about hosting their IT on a Remote Infrastructure sitting in a place that they not even be aware of.

## III. Cloud Computing From Startup Perspective (The Survey)

The survey attempted to explore the major factors influencing the adoption of cloud computing by startup companies in India. The study started by categorizing the major factors which influence the decision making of a startup company. This also talks about the startups view of cloud computing, various cloud deployment and service models preferred by the startups. The paper also includes a study of the startups planning to use cloud computing for their business and on-going operations. This study also reflects the current issues hindering cloud adoption by startups in India.

The methodology used was based on quantitative online survey questionnaire approach. The targeted startups were the companies which started their operations in the last 5 years with an investment potential of less than 25 Lakhs. Participants varied from IT decision

makers to directors of the organization from diverse industry sectors. The major industries which we covered in this survey are from HR, Ecommerce, Logistic, Import Export, Software and IT enabled services, Automation, Consulting, Manufacturing, Information Search, Legal, Research & Development, Healthcare, Pharmaceutical, Education sectors.

Close to 150 startups were invited for this survey and 23 questions were asked to the startup companies, each of the questions were updated with respective information so that the startups can read and acquire the knowledge about the cloud computing. We received responses from 50 companies as part of this study. The response rate of this study gave a satisfactory response rate of approximately 35%. Questions were asked to understand the major factors which would influence the adoption of cloud. The survey also analyzed the major reasons, challenges and the benefits for adoption of cloud computing along with the preferred service and deployment models.

**IV. Tools Used for the Survey**

A website named e-mailmeform.com was used to create an online survey

**V. Results and Discussion**

This section gives a brief summary about the interest of startups in adopting cloud computing, their preferred service and deployment models and the transformation that will bring to the business.

**A. Cloud Adoption by Startups**

The survey analyzed the interest of startups in adopting the cloud technology services. As per the survey (Fig: 1) 76% percent of the companies are interested in adopting cloud services but 16% of the companies are not interested in adopting cloud services due to various reasons. Almost 8% startups are not sure if they will be adopting the cloud service for their business.

**Findings:** The results give us an indication that most of the startups are evaluating the option of hosting their IT on Cloud. This is a huge business opportunity for Cloud Service Providers.

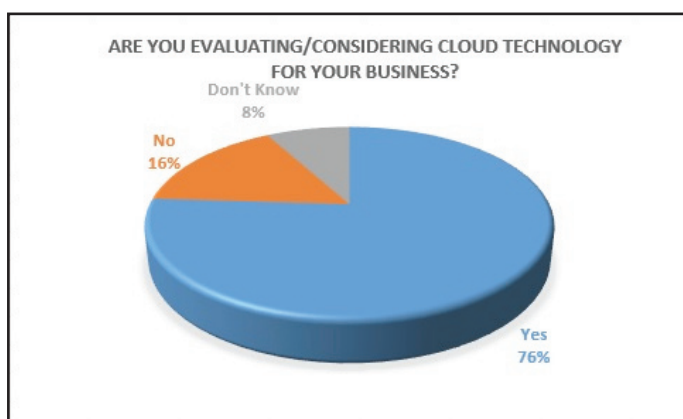


Fig. 1: Survey Results Showing the Interest of Startups Companies in the Adoption of Cloud

**B. Cloud Deployment Model Adoption**

As per the survey (Fig: 2) the 60% of the startups prefer to use public cloud services, 12% of the startups are interested in Private cloud service, 12% is interested in hybrid cloud where are 8% is not interested in adopting cloud services and 8% are not sure about the preferred cloud deployment model for their company.

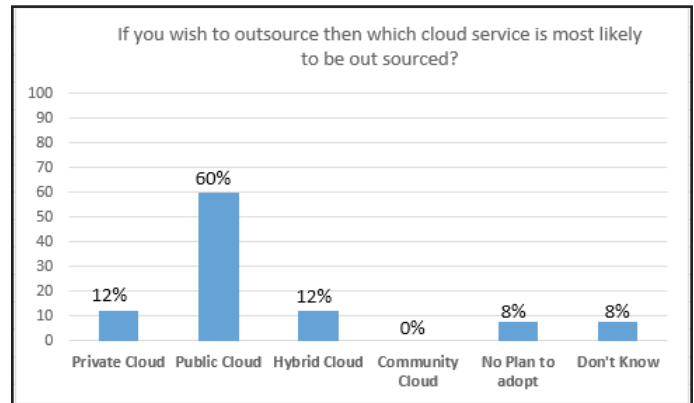


Fig. 2: Survey Results Showing the Interest on Cloud Deployment Models

**Findings:** It is evident from the results that majority of the startups are looking at Public Cloud mainly because of the Cost factor. The cost effectiveness is achieved through high IT resource utilization through Multitenancy option in Public Cloud where the infrastructure is shared with multiple customers.

**C. Cloud Service Model Adoption**

On the survey (Fig. 3) the companies were given an option to select one or more services which they would like to adopt. As per the survey 68% of the companies prefer to use Infrastructure as a service, 44% preferred Platform as a service, 52% preferred Software as a service, 8% of the companies mentioned that they do not have any plans to invest and 12% are not sure about the cloud services which they are going to use.

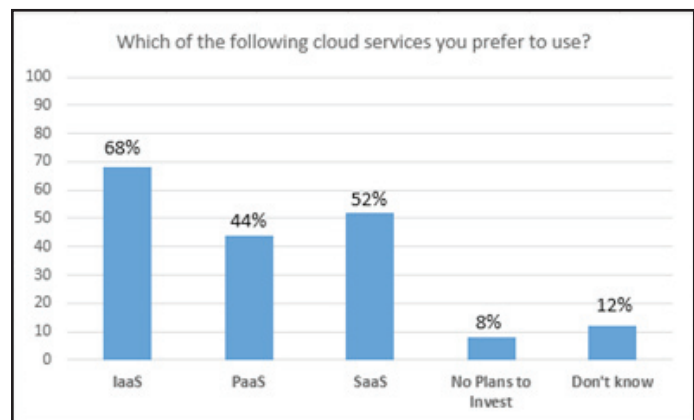


Fig. 3: Survey Results Showing the Interest on Cloud Service Models

**Note:** Some of the startups opted for multiple options, hence the tally is more than 100%.

**Findings:** As we can see in the survey, majority of the startups Opted for Infrastructure as a Service because people are still under the impression that, we get the Platform and we can build IT on top of it. Also some of the knowledgeable startups have opted for PAAS and SAAS as the completed IT maintenance and Compliance would be taken care of by the Cloud Service Provider.

**D. Business Transformation With the Adoption of Cloud Computing**

Cloud-based hosting provides cost advantages over the conventional/locally hosted IT. One important question when considering a move to the cloud is whether it makes sense for 'my'

business to migrate to the cloud. Cloud-based hosting promises several advantages over conventional application deployment/IT.

- Ease-of-management [22]; since the cloud provider assumes management-related responsibilities, the customer is relieved of this burden and can focus on its core expertise.
- Cap-ex savings [22]: it eliminates the need for purchasing infrastructure; this may translate into lowering the business entry barrier.
- Op-ex reduction [22]: elimination of the need to pay for salaries, utility electricity bills, real-estate rents/mortgages, etc. In this study we identify an initial set of key factors affecting the costs of adopting cloud services.

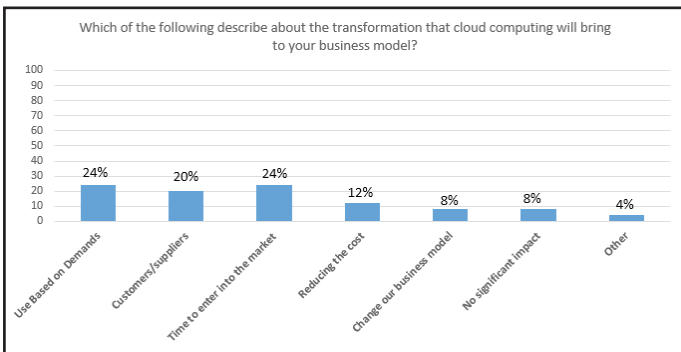


Fig. 4: Survey Results Showing the Transformation on the Business Model

As per the survey (Fig. 4) 24% of the startups mentioned that cloud will help them in using the services on an on demand basis. 20% of the startups mentioned that this will change their interaction with the customers and suppliers. 24% of the startups mentioned that this will help them in reducing the time to enter the market. 12% mentioned that this will help them in reducing the IT budget. 8% mentioned that this will change their business model. 8% of the companies mentioned that there will not be any significant impact for their business and 4% of the startups mentioned that cloud service adoption would provide some other business transformation.

**Findings:** It is evident from the Survey that, time and Cost are of essence for majority of the Startups. Customers expectation is on-the-fly IT provisioning at a competitive cost.

**E. Challenges in Adopting cloud computing**

Although there are several benefits in moving to the cloud, introduction of cloud services in an organization possesses certain challenges. The major challenges are:

- Support provided by cloud vendor: As per the survey (Fig. 5) 36% of the companies mentioned that they have concerns in adopting cloud computing due to the support provided by various cloud vendors.
- Lack of confidence on vendor: As per survey 40% of the startups mentioned that they have lack of confidence on the cloud vendor and that act as a challenging factor for their cloud adoption.
- Lack of clarity of services: 8% of the startups mentioned that they consider the lack of clarity of services as a major factor for the cloud adoption.
- Lack of customization options: 4% of the startups believe that the lack of customization is a major challenge in the adoption of cloud computing.
- Regulatory compliance: It was assumed that even the

regulatory compliance is a challenge for cloud adoption but as per the survey none (0%) of the companies consider this as a factor.

- Vendor Migration: It was assumed that even the vendor migration is a challenge for cloud adoption but as per the survey none (0%) of the companies consider this as a factor.
- Performance: It was assumed that even the infrastructure performance is a challenge for cloud adoption but as per the survey none (0%) of the companies consider this as a factor.
- Lack of fund: It was assumed that even the lack of fund in the initial stages of a startup will be a challenge but as per the survey none (0%) of the companies consider this as a factor.
- Availability of data: It was assumed that even the availability of data is a challenge for cloud adoption but as per the survey none (0%) of the companies consider this as a factor.
- Security of data: 8% of the companies consider security as a major challenge for their cloud adoption.

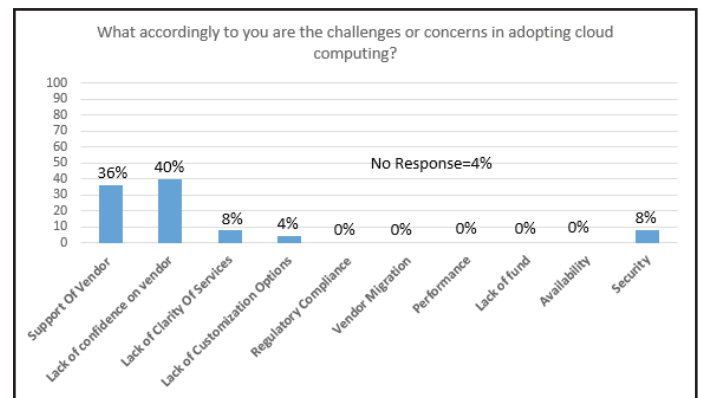


Fig. 5: Survey Results Showing the Challenges and Concerns in Adopting Cloud

**Findings:** We were surprised to see that Lack of Confidence on the Vendor overriding Security concerns. Most of the research papers or search on Google point to Security as the major threat for moving to Cloud. On the contrary, Confidence on the Vendor is a major area of concern. This is a food for thought for all Cloud Service Providers.

**F. Cost Benefit of moving to Cloud based Solution**

Application of Cloud Computing in Start-ups not only relieve the Organizations from the burden of handling the complex IT infrastructure management and maintenance but also lead to huge cost savings. Initial Capital expenditure for any Start-up is always a challenge and the approximate IT spend for Startup is anywhere between 10 to 20% of the overall capital depending on the nature of business. In such a scenario Cloud is one of the viable options.

In traditional In-house IT Infrastructure or data centers, the overall IT utilization commonly averages to 5%-20% when measured annually. In contrast, with Cloud, the Providers target close to 100% Utilization resulting in huge cost savings. Cloud providers are able to achieve this level of utilization of Hardware assets because of Large and heterogeneous customer population and able to provide affordable IT solution through economy of Scale. With this, the startup organizations can use the time and money to focus on their core business. Net-Net Cloud Computing is a Win-Win for All.

Based on our research on Cost Benefit Analysis of moving to Cloud, the cost savings one can expect is anywhere between 80 to 90% over a period of 3 Years. This is based on the Cost calculator from one of the leading Cloud service provider. However, we do not agree with this as the vendor would have calculated the expenses based on high end products and apparently cost would be high. We feel that some or most of software components can be moved Open source based solution which will bring down the cost. Having said that, from our high level analysis, the overall cost of the IT will come down by 50% over a period of three years. To add to this, the Capital Expenditure will be lower during the first year by moving to Cloud when compared with On-Premises hosting.

This is only high level estimate and is out of scope of this paper. We are doing further research on Cost benefit Analysis of Conventional Vs Cloud particularly for Start-ups. In this research we'll be focusing on granular level details.

### **G. Cloud Solution Recommendation for Startup companies**

Deciding what kind of cloud model to adopt will depend on various factors, such as the mission criticality of your applications and data, regulatory compliance obligations, and the scope of your IT budget.

#### **1. Cloud Deployment Model**

Based on our study public cloud would be the cost effective solution for companies which are specifically looking for hosting services with minimal security. In case of Public Cloud, the core infrastructure is shared by many organizations and hosted by a third party. There are many advantages - easy access to computing resources and relatively low costs due to a pay-as-you-go model. However, the public cloud comes with its own concerns around data security and performance slowdowns. So, if you're in a highly regulated or sensitive industry such as banking and financial services, healthcare, or online retail, it might be wise to consider a private cloud.

Private cloud solution can be adopted by companies specifically in the finance and insurance sectors or any industries where the security of their application is more important than the cost savings. You might opt for a hybrid cloud model which combines the best of both public and private clouds. With the hybrid cloud model, you get to keep confidential customer and financial information and high performance applications on the private cloud, while using the public cloud for less mission-critical operations, like e-mails and data backup.

#### **2. Cloud service Model**

Based on our study, infrastructure as a service (IAAS) would be the best solution for startups which are looking for basic IT requirements like hosting, storage or database. This would be more preferable for companies which are not using IT development infrastructure or any specific software for their day to day operations.

Infrastructure as a Service comes with various features like, Selecting the right server setup, Configuring Cloud, installing applications, setup backup and failover, monitoring, day-to-day operations et.

From all practical probability, PAAS is a lot simpler for Startups than IAAS, PaaS offers you management + monitoring platform bringing in various cloud providers and applications. PAAS

comes with Ready to delivery applications, Ready infrastructure to manage, monitor servers and apps, added benefits like backups and disaster recovery, In-short, a complete cloud management platform.

Software as a service (SAAS) would fit for organizations which needs certain readymade software for their day to day operations. Platform as a service (PAAS) would fit for organization which are mainly interested in setting up IT based development environment.

### **VI. Conclusion**

The advancement of cloud computing is drastically changing the way information technology is driving new generation businesses. It is no secret that Cloud has become an integral part of most of the startups. Today, any startup can access the same resources as large corporations through Cloud technology at an affordable cost. So take a long look at your startup's business plan and analyze potential problems and obstacles - they can almost certainly be solved with the cloud.

Cloud turns utility computing into a reality. It provides large benefits to the organizations including the startups however there are many challenges associated with the adoption of cloud computing. However, the research on adoption of cloud computing is at its infancy stage.

The survey results shows that startups companies are highly interested in adopting cloud services that help them to reduce the cost, improve the scalability and flexibility. Most of the startups are interested in adopting public cloud services because of the low cost and flexibility factors. This study also confirmed that the adoption of cloud computing by startup companies would help them in creating business transformation by using the Cloud services on an on-demand basis.

However startups have major concerns in adopting cloud services because of the lack of confidence on the cloud vendor and because of the support provided by cloud vendors. Lack of clarity of cloud services and security also are challenging factors for startup organizations.

Factors to be considered while Opting for Cloud based IT solution.

- Thoroughly analyze your business requirement
- Assess what can be moved to Cloud considering all the Challenges, security being the main concern.
- Chose the right Cloud Service provider (Check factors like Contingency planning, Vendor lock-in etc)
- Reduce Complexity and Chose the right Cloud Solution
- Assess all the hidden costs/factors in Setting up New Infrastructure or migrating to Cloud

In this paper, we have discussed about an overview of the cloud computing, the eagerness of the startups in adopting cloud computing, the major challenges in the adoption of cloud computing and the business transformation that is expected to deliver to the startup companies. In-short, Cloud is not just a Buzz Word, Cloud it a Game Changer for Startups!

### **Reference**

- [1] Jayade, K. G., Gaikwad, C. J, "Cloud Computing for Agricultural Information Management in India".
- [2] Dr. Rajesh Prasad, Sagar B.Jadhav, Shantanu S.Panhale, Chetan S. Mohture, "Review of Cloud Computing and Its Application", IJAR CET, Vol. 2, Issue 1, January 2013.
- [3] Kim W., "Cloud computing: Today and Tomorrow", Journal of Object Technology 8 (1), pp. 65-72, 2009.

- [4] A. Deaton, "Savings in Developing Countries: Theory & Review," In Proceedings of the World Bank Annual Conference on Developing Countries, 1989, 1990.
- [5] E. O. Yeboah-Boateng, "Fuzzy Similarity Measures Approach in Benchmarking Taxonomies of Threats Against SMEs in Developing Economies", Canadian Journal on Computing in Mathematics, Natural Sciences, Engineering & Medicine, Vol. 4, No. 1, February 2013.
- [6] Ellefsen, I.D., S.H. von Solms, "Framework for Cyber Security Structure in Developing Countries", University of Johannesburg, 2012.
- [7] NIST website; <http://www.nist.gov/itl/cloud/upload/cloud-def-v15.pdf>
- [8] <https://Cloudsecurityalliance.org>
- [9] Google, "Google app Engine," <http://code.google.com/appengine/>
- [10] Microsoft, "Windows Azure", <https://azure.microsoft.com/en-us/>
- [11] IEEE, "Hardware as a Service", [http://ieeexplore.ieee.org/xpl/login.jsp?tp=&arnumber=6268616&url=http%3A%2F%2Fieeexplore.ieee.org%2Fxppls%2Fabs\\_all.jsp%3Farnumber%3D6268616](http://ieeexplore.ieee.org/xpl/login.jsp?tp=&arnumber=6268616&url=http%3A%2F%2Fieeexplore.ieee.org%2Fxppls%2Fabs_all.jsp%3Farnumber%3D6268616)
- [12] M. Creeger, "CTO roundtable: cloud computing," Comm. of the ACM, vol. 52, pp. 50--56 (2009)
- [13] A. Khajeh-Hosseini, I. Sommerville, I. Sriram, "Research Challenges for Enterprise Cloud Computing", Unpublished, <http://arxiv.org/abs/1001.3257> (2010)
- [14] W. Fellows, "Partly Cloudy, Blue-Sky Thinking About Cloud Computing," Whitepaper. 451 Group (2008)
- [15] I. Sriram and A. Khajeh-Hosseini, "Research Agenda in Cloud Technologies", Unpublished, <http://arxiv.org/abs/1001.3259> (2010).
- [16] Accenture, "Accenture Cloud Computing Accelerator," [http://www.accenture.com/Global/Services/Accenture\\_Technology\\_Labs/R\\_and\\_I/CloudComputingAccelerat.htm](http://www.accenture.com/Global/Services/Accenture_Technology_Labs/R_and_I/CloudComputingAccelerat.htm) (2009)
- [17] Computer Sciences Corporation, "Doing Business in The Cloud," [http://www.csc.com/cloud/ds/35354-csc\\_cloud\\_adoption\\_assessment](http://www.csc.com/cloud/ds/35354-csc_cloud_adoption_assessment) (2009)
- [18] Rajan, S. & Jairath, A. (2011) "Cloud Computing: The Fifth generation of Computing, 2011 International Conference on Communication Systems and Network Technologies (2011) Volume: 15, Issue: 4, Publisher: Ieee, Pages: 665-667
- [19] Mell, P. & Grance, T. (2011) "The NIST Definition of Cloud Computing (Draft)", Publisher: U.S. Department of Commerce
- [20] [Online] Available: <http://www.csrc.nist.gov/groups/SNS/cloud-computing/index.html>
- [21] [Online] Available: [https://en.wikipedia.org/wiki/Startup\\_India](https://en.wikipedia.org/wiki/Startup_India)
- [22] KOTSOVINOS, E. Virtualization: Blessing or curse? Queue 8, 40:40–40:46.

**Jipson George Thoomkuzhy**, is an IT management professional with over 11 years' experience in the Industry. He holds a Masters in Science in Computer Networks from Manipal University and an MBA in Entrepreneurship and leadership. He holds several industry certifications like Prince-2, ITIL V3, MCSE, MCDBA, CCNA, CCDA, CCDP, HP AIS, JNCIA, JNCIS, JNCIP, CCIE, CCDE

**Lokesh V**, is an IT management professional with over 18 Years' Experience, out of which he's been into Senior Leadership role for the last 10 Year. He is a Bachelor of Engineering in Electronics from University Visveswaraiah College of Engineering and MBA in Systems and Marketing. He also hold several Industry Standard Certifications: PMP, TOGAF, ITIL V3 and Cloud Architect Certifications.