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A Study on the Role of Cloud Offerings in the Success of Digital India Program

Satyendra Singh Rawat, Rachana Rana, Harshita Rawat

Assistant Professor, Dept. of CIS. HSET, Swami Rama Himalayan University, Jolly Grant, Doiwala, Dehradun, India

Assistant Professor, Dept. of CIS. HSET, Swami Rama Himalayan University, Jolly Grant, Doiwala, Dehradun, India

Assistant Professor, Dept. of CIS. HSET, Swami Rama Himalayan University, Jolly Grant, Doiwala, Dehradun, India

ABSTRACT: The Government of India has launched the*Digital India Program* with a vision to transform India into a digitally empowered society and knowledge economy as well as to change the entire ecosystem of public services through the use of information technology. Most governments are looking at exploring Cloud Computing as a new model of delivering services and improving efficiency of its Information and Communication operations. This paper recalls how cloud computing is used to reduce the cost, time, and effort invested in achieving the objectives of Digital India Program run by the Government of India.

KEYWORDS: Cloud Computing, Cyber Security, Digital India Program,GI cloud.

I. INTRODUCTION

Digital Technologies that include Cloud Computing and Mobile Applications have emerged as catalysts for rapid economic growth and citizen empowerment across the India. Vision of Digital India program is to empower every citizen with access to digital services, knowledge and information through Information Technology. How these services and information are acquired easily, secure, and at minimum cost? The answer is 'Cloud Computing'.

The section 2 of the paper is the introduction and objectives of Digital India Program, section 3 describes Cloud Computing, section 4 discusses how government can be benefited if Cloud computing is adopted , Cyber security and policy have been given in section 5, and Conclusion in section 6.

II. DIGITAL INDIA PROGRAM

In order to transform the entire ecosystem of public services through the use of information technology, the Government of India has launched the*Digital India Program* [1]with the vision to change India into a digitally empowered society and knowledge economy.

The "Digital India" initiative aims at availing digitizing of various individual projects of the central government and ministries like education and health and other services, that can be delivered to citizens using Information and Communication Technology (ICT) by joining all the areas of India including the Gram Panchayats at high speed internet through broadband connectivity, in order to focus on the e-governance till 2019. It can also be viewed as the next step of already running National e-Governance Plan. In this program government will prefer to adopt Public Private Partnerships (PPP), wherever feasible, for execution of this initiative.

The Digital India Program is centred on three key areasas shown in Fig. 1.Thekey components [2] of Digital India are: Digital Infrastructure as a Utility to Every Citizen, Digital Governance & Services on Demand, and Digital Empowerment of Citizens.

- Digital Infrastructure as a utility which seeks to provide every citizen with high speed internet facility, a cradle to grave internet identity, mobile phone and bank account, access to common service center, sharable private space on a public cloud and safe and secure cyberspace.

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- This vision will provide single window access to every individual. Every government services or information is available online and on mobile platforms with a single touch.

- Under this vision, every citizen will empower through digital literacy and universal access to digital resources. All documents and certificates to be available on cloud and in Indian languages.

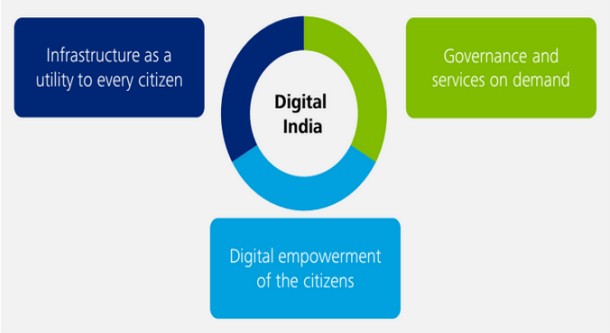

Fig. 1 Key areas of Digital India Program [1]

These visions are supported by the nine pillars of this program, shown in Fig. 2.Digital India initiative will provide broadband in 2.5 lakh villages, universal phone connectivity with the help of NOFN, Net Zero Imports by 2019. Also, 400,000 Public Internet Access Points as well Wi-Fi in 2.5 lakh schools, all universities; Public Wi-Fi hotspots for citizens will be provided. 1.7 Cr IT, Telecom and Electronics Jobs will be created by training citizens as well 8.5 indirect jobs. E-Governance & eservices will be provided across government. IT use in services like health, education, and banking will make India a leader country. Citizens will be digitally empowered by using public cloud and internet access. The Digital India once implemented will be executed eff actively as there are already 173 million mobile Internet users in India in December, 2014 and Internet users in India is expected to reach 213 million by June 2015, as per a report Mobile Internet in India 2014 released by IAMAI and IMRB International launched at an event.

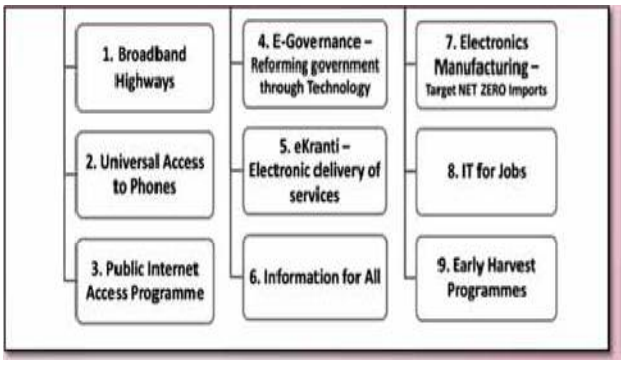

Fig.2 Nine Pillars of Digital India [3]

The 22 initiatives [3] launched under the Digital India Program include projects in the areas of digital infrastructure, digital empowerment, on-demand government services and promotion of industry.
Various approaches and methodologies [4] have been adopted to build up these pillars.

A. *Impact of Digital India by 2019*

- Broadband in 2.5 lakh villages, universal phone connectivity.
- Net Zero Imports by 2020.
- 400,000 Public Internet Access Points.
- Wi-fi in 2.5 lakh schools, all universities; Public wi-fi hotspots for citizens.

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- Digital Inclusion: 1.7 Cr trained for IT, Telecom and Electronics Jobs.
- Job creation: Direct 1.7 Cr. and Indirect at least 8.5 Cr.
- E-Governance & E-Services: Across government.
- India to be a leader in IT use in services - health, education, banking.
- Digitally empowered citizens - public cloud, internet access

B. *Challenges in the success of Digital India Program*

Hon'ble Prime MinisterNarendraModi launched his 1.13 lakh crore Digital India initiative with a vision to digitally empower each and every citizen of the country. Though the plan is ready to be implemented, yet there are various challenges [5, 6] before the grand mission of making India adigitally empowered country is recognized.

Our current government has taken the initiative to digitize India in a way that has never happened in the past. Yes, the promise of 'Digital India' is indeed a big dream but with it comes challenges which need to be overcome. An initiative of this scale has never been conceived before and apart from little availability of skilled manpower, execution has been a challenge. Hence, the vision cannot be realized without tackling such looming challenges.

Digital India vision is going to be imperative to propel the country into its next phase of growth. While the government is trying to connect remote areas/ villages via high-speed Internet services to digitally empower people, it has to deal with multiple issues [7].

Digital India [8, 9, 10] is an agenda that differentiates this government from its predecessor, which failed to deliver the National Optical Fiber Network to every part of India and left many of India's 600,000 villages and 250,000 panchayats wanting in terms of broadband connectivity.

III. CLOUD COMPUTING

Cloud computing [11, 12], often referred to as simply "the cloud," is the delivery of on-demand computing resources—everything from applications to data centers—over the Internet on a pay-for-use basis.

This cloud model promotes availability and is composed of five essential characteristics - three service models (Cloud Software as a Service (SaaS), Cloud Platform as a Service (PaaS), Cloud Infrastructure as a Service (IaaS)) and four deployment models (Private cloud, Community cloud, Public cloud and Hybrid cloud). The key enabling technologies include the following: (1) fast wide-area networks, (2) powerful, inexpensive server computers, and (3) high-performance virtualization for commodity hardware.

IV. HOW GOVERNMENT CAN BENEFIT FROM CLOUD COMPUTING

A major focus of the Digital India Program is on the extensive use of the facilities of cloud computing. In fact, the program envisages the portability of all entitlements through cloud [13]. The program further envisages all documents and certificates to be made available on the cloud. It stipulates with coming up of a shareable private space on a public cloud. For effective implementation of the same, it is absolutely essential that the appropriate legal challenges that have been raised by cloud computing need to be appropriately addressed.

Put simply, cloud computing [14, 15] is a new way of looking at how people and organizations buy, consume and pay for IT. Traditionally, if an individual or organization wanted to buy an external hard disk drive for storing data such as files, pictures and videos, they would make a one-time payment, just like for any other product , use the disk until it was full and then go buy another one and so on. In the cloud computing model, they can pay a third-party provider for storing their data and pay according to the amount of storage required and the length of time for which data needs to be stored.

Cloud computing is thus a comprehensive solution that delivers IT as a service and simplifies IT infrastructure without sacrificing customization and integration capabilities. Computers in the cloud are configured to work together; the various applications use the collective computing power as if they are running on a single system.

In other words, cloud computing is a category of computing solutions in which a technology or service lets user's access computing resources on demand, as needed. These resources may be physical, virtual, dedicated or shared and may have different ways of being accessed (via a direct connection, local area network or LAN, the Internet, etc.). The cloud is often characterized by self-service interfaces that let customers acquire resources as long as needed.

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The Government of India has implemented a number of ICT initiatives under the National e-Governance Plan (NeGP) [16], including creation of ICT infrastructure both at the Centre and State levels. The infrastructure thus created will provide the basis for adoption of cloud computing for the government with the objective of making its optimum use, re-use of applications, efficient service delivery to the citizens and increasing the number of e-transactions in the country, thus helping achieve the ultimate goal of NeGP.

The GI Cloud [17] is envisaged to consist of multiple National and State Clouds. The agencies responsible for operating and managing the National and State Clouds may engage Managed Service Providers (MSPs) for managing the respective cloud computing environments.

These cloud computing environments will utilize the existing network infrastructure such as the SWANs, NKN, NOFN integration hubs as well as the internet.

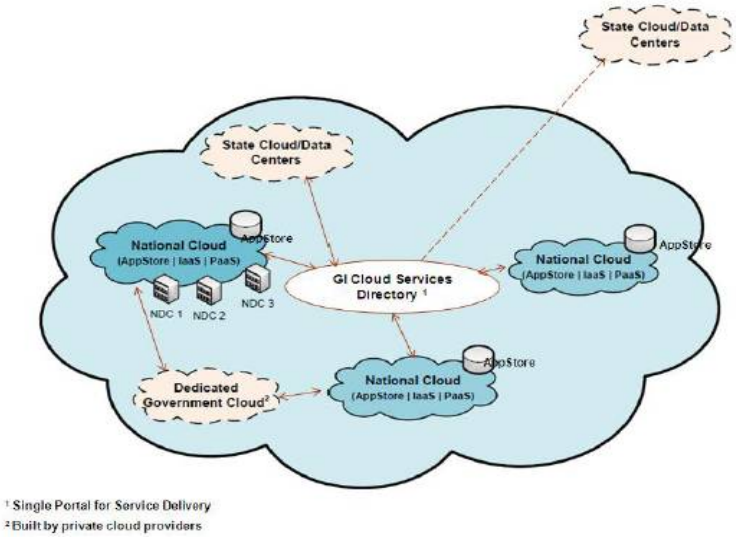

Fig. 3 GI Cloud Environment [17]

Fig. 3 depicts an overview of the GI Cloud consisting of cloud computing environments at the national and state levels termed as 'National Clouds' and 'State Clouds' respectively.

Government of India's objectives [18] in adopting a cloud computing strategy is as follows:

- Optimum utilization of infrastructure
- Speeding up the development and deployment of e-Governance applications
- Easy replication of successful applications across States to avoid duplication of effort and cost in development of similar applications
- Availability of certified applications following common standards at one place

By adopting a cloud-based IT strategy, governments can fundamentally change the way IT services are delivered and consumed while at the same time realize tangible operational and financial benefits like reduced costs, improved organizational agility and transformation in service delivery. Government agencies using cloud computing can optimize legacy IT infrastructure while adding new services, decrease software/application maintenance, decrease project roll out timeframe & administrative costs as well as improve asset utilization up to 60-70% .

A. *Advantages and Disadvantages of Cloud Computing*

There is no doubt that businesses can reap huge benefits from cloud computing. However, with the many advantages, come some drawbacks also. One must take time to understand the advantages and disadvantages of cloud computing [19, 20], so that one can get the most out of their business technology, whichever *cloud provider* they choose.

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Advantages-

Following are the important advantages of cloud computing:

- *Flexibility*- Cloud-based services are ideal for businesses with growing or fluctuating bandwidth demands.
- *Disaster recovery*- Businesses of all sizes should be investing in robust disaster recovery, but for smaller businesses that lack the required cash and expertise, this is often more an ideal than the reality.
- *Automatic software updates*- The beauty of cloud computing is that the servers are off-premise, out of sight and out of your hair. Suppliers take care of them for you and roll out regular software updates.
- *Capital-expenditure Free*- Cloud computing cuts downthe high cost of hardware. You simply pay as you go and enjoy a subscription-based model that is kind to your cash flow.
- *Reliability*-With a managed service platform, cloud computing is much more reliable and consistent than in-house IT infrastructure.
- *Manageability*- Cloud computing provides enhanced and simplified IT management and maintenance capabilities through central administration of resources, vendor managed infrastructure and SLA backed agreements.
- *Competitiveness*- Moving to the cloud gives access to enterprise-class technology for everyone. It also allows smaller businesses to act faster than big, established competitors.
- *Document control*- When you make the move to cloud computing, all files are stored centrally and everyone sees one version of the truth.

Disadvantages-

Due to handling of too many clients each day, the cloud service provider may not continue to remain very useful or efficient. As a result of this, the business processes may be temporarily suspended. Additionally, in the absence of an Internet connection, one will not be able to access any of their applications, server or data from the cloud. Certain other disadvantages are:

- *Security*- Although cloud service providers implement the best security standards and industry certifications, storing data and important files on external service providers always opens up risks.
- *Vendor Lock-In*- Organizations may find it difficult to migrate their services from one vendor to another.Hosting and integrating current cloud applications on another platform may throw up interoperability and support issues.
- *Limited Control*- Since the cloud infrastructure is entirely owned, managed and monitored by the service provider, it transfers minimal control over to the customer.
- *Downtime*- As *cloud service providers*take care of a number of clients each day, they can become overwhelmed and may even come up against technical outages.

V. DIGITAL INDIA& CYBER SECURITY

The focus of the Digital India Program is on creating safe and secure cyberspace. For the same, it is imperative that appropriate legal frameworks need to be put in place which can help safeguard the protection and preservation of safe and secure cyberspace. The Government of India has notified National Cyber Security Policy [19] in this regard.
Minister of State for Home KirenRijiju, in his inaugural address at ASSOCHAM (Associated Chambers of Commerce & Industry of India) 7th Annual Summit on Cyber & Network Security [20], stated that the Government of India is committed to fulfill the dream of Digital India where cyber security becomes an integral part of this national challenge.

VI. CONCLUSION

The Digital India Program is just the beginning of a digital revolution. Once implemented properly, it will open various new opportunities for the citizens. It is one of the most highly ambitious programs of Indian government, and is directly monitored by Hon'ble Prime Minister of India. Indeed, cloud computing can be the foundation on which governments can create a more trusting environment for e-governance, while reaping the benefits of huge cost savings and efficient, easy delivery mechanisms. Besides the above, cloud computing can help governments resolve many more challenges related to efficient, timely and massive delivery of services to citizens in every geographical part of a country.

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Abbreviations

ICT Information and Communication Technology
MSPs Managed Service Providers
NeGP National e-Governance Plan
NKN National Knowledge Network
NOFN National Optical Fibre Network
PPP Public Private Partnerships
SLA Service Level Agreement
SWANs State Wide Area Networks

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BIOGRAPHY

Satyendra Singh Rawat is working as an AssistantProfessor in the department of Computer and Information Sciences, Himalayan School of Engineering & Technology, Swami Rama Himalayan University. He received his Master of Technology (Computer Science & Engineering) degree in 2012 from RGPV, Bhopal and Bachelor of Engineering (Computer Science & Engineering) degree in 2005 from MITS, Gwalior, India.

Rachana Rana is working as an AssistantProfessor in the department of Computer and Information Sciences, Himalayan School of Engineering & Technology, Swami Rama Himalayan University. She received her Master of Technology (Computer Science & Engineering) degree in 2013 fromGBPEC, Ghurdauri,Pauri and Bachelor of Technology (Computer Science & Engineering), from DIT, Dehradun, India.

Harshita Rawat is working as an AssistantProfessor in the department of Computer and Information Sciences, Himalayan School of Engineering & Technology, Swami Rama Himalayan University. She received her Master of Technology (Computer Science & Engineering) degree in 2013 fromGBPEC, Ghurdauri,Pauri and Bachelor of Technology (Information Technology), from UIT, Dehradun, India.