CLOUD - THE WAY FORWARD
# CONTENTS

1. **IT INDUSTRY GOES THROUGH PERIODIC TRANSFORMATIONS** ............................................. 4

2. **CLOUD COMPUTING IS THE 4TH WAVE-A PERFECT STORM** ................................... 5
   2.1 Technology innovation .................................................................................................. 5
   2.2 Delivery model innovation ......................................................................................... 5
   2.3 Business model innovation ......................................................................................... 6

3. **DEFINING THE CLOUD** ............................................................................................... 7
   3.1 Benefits ........................................................................................................................ 7

4. **LOT OF ACTION ON THE SUPPLY SIDE** .................................................................. 8
   4.1 Global trends .............................................................................................................. 8

5. **CIOs INTEREST IS INCREASING EVERYDAY** ............................................................... 9

6. **CLOUD REVOLUTION CAN POTENTIALLY BRING IN NEW COMPANIES FROM INDIA** 10

7. **INDIAN COS. CAN POTENTIALLY DERIVE NEW USE CASES FOR CLOUD COMPUTING** 12
   7.1 Cloud computing in India .......................................................................................... 12

8. **NOT JUST GLOBAL COMPANIES, INDIAN COMPANIES ARE INVESTING IN CLOUD** .... 13

9. **A FEW INDIAN COMPANIES HAVE ALREADY BEEN ABLE TO COMPETE** .................. 14

10. **CLOUD COMPUTING IS GOING TO BE ABOUT A LOT MORE THAN JUST COST SAVINGS** 15
    10.1 Opportunities for Indian Market ............................................................................... 15
CONTENTS

11. INDIA HAS A LEGACY OF JUMPING THE TECHNOLOGY CURVE ........................................ 16

12. BANKING INDUSTRY PRESENTS A HUGE POTENTIAL FOR CLOUD ................................ 18

13. EDUCATION SYSTEM IN INDIA COULD ALSO BE TRANSFORMED USING CLOUD ............... 19

14. HEALTHCARE INDUSTRY IN INDIA DEMANDS END TO END INNOVATIONS ..................... 20

15. SMB SECTOR WOULD REQUIRE LOW COST SOLUTIONS TO ADDRESS UNIQUE NEEDS ......................... 21

16. GOVERNMENT WILL INCREASINGLY INVEST IN CLOUD FOR BETTER CITIZEN SERVICES .............. 22

17. EVERY COMPANY HAS A KEY ROLE TO PLAY IN DRIVING THE INDIAN CLOUD ECO-SYSTEM .............. 23
1. IT industry goes through periodic transformations

- The pace of innovation in the IT industry is always been faster compared to other industries and has resulted in the industry going through a series of transformations over the last 50 years. It started with mainframe computers than moved on to minicomputers, PCs and the web.

- Take the PC revolution for example. It put the power of computing in the hands of people. The smaller form factor and easy availability/usability of software led to the explosion in the number of PCs from 1.5 million PCs in 1980s to over 1.5 billion PCs and net books in 2010.

- The internet had the same effect. The huge global information network helped create new use cases for IT in terms of Search, Collaboration, User-created content and entertainment. There were about 1.4 billion new internet users added just in the matter of last 10 years.
2. Cloud computing is the 4th wave—a perfect storm

The next wave of transformation in the IT industry is cloud computing. There are very few times in history such transformations happened. Many analysts have compared this to industrial revolution which helped improve productivity and standard of living more than any other time in history. This is a perfect storm. It is a huge opportunity for companies. Let us understand why is it a perfect storm.

2.1 Technology innovation

Virtualisation and Service oriented architecture/Web services are 2 key technology innovations of the last 10 years.

Virtualisation technologies pioneered by companies such as VMware has helped abstract the computing resources from the hardware. This has removed the historical constraint of one server per application model and provided the ability to run multiple virtual machines on a single physical machine. This abstraction has allowed companies to increase the throughput of datacenters and forms an integral part of cloud computing.

Service oriented architecture/Web services help organisations access independent building blocks over the internet for performing specific functions. This is independent of platforms and programming languages. If a company doesn’t like their existing business analytics tool they should be able to link up to another tool on the cloud for better results rather than spend a lot of time and money for integration and implementation. This again forms the integral part of cloud computing.

2.2 Delivery model innovation

Cloud computing has enabled an entirely new delivery model for software. Earlier companies had to invest millions of dollars in hardware infrastructure, software license and additionally for implementation. This made it prohibitive for small and medium sized companies to leverage IT effectively. The cost of IT also made large companies continue to use inefficient legacy technology. Cloud computing has changed all of this. It is today possible even for a small retail shop to access complex business analytics tools that were only available for large companies. In some way, the delivery model innovation brought in by cloud computing has created a business leveller between medium and large companies in certain industries.
2.3 Business model innovation

Cloud computing has also opened up a lot of possibilities in terms of business model. It is identical to the shampoo sachet model to IT that will allow customers to pay for services and features that they use and also base it on time or number of transactions and other similar models.

Cloud computing has also allowed access of smaller Independent Software Vendors (ISVs) to customers that they never had through the use of market places. This has allowed smaller ISVs to be based on cloud platforms [Such as Azure, App Engine etc.] and make themselves available to global customers thereby significantly reducing their cost of sales. This has also increased the flexibility for end customers and increased the choice of products and services.
3. Defining the cloud

### Delivery Models in Cloud Computing

**Public Cloud**
- The cloud infrastructure is made available to the general public or a large industry group and is owned by an organisation selling cloud services.

**Private Cloud**
- The cloud infrastructure is operated solely for an organisation. It may be managed by the organisation or a third party and may exist on-premise or off-premise.

**Hybrid Cloud**
- The cloud infrastructure is a composition of two or more clouds (private, community, or public) that remain unique entities but are bound together by standardised or proprietary technology that enables data and application portability.

3.1 Benefits

While there are multiple modes of delivery of cloud services such as private cloud, public cloud or hybrid cloud, in totality, cloud offers a multitude of benefits. First of all it brings a "pay-as-you-go" flavour to the IT purchase in which low initial investments are required and one has to pay for what is being used. Not only it is economical, but it also helps address the fluctuations in user load by providing elastic resources which can be scaled up and scaled down based on the requirements. And this is achieved without having the need to additionally invest in hardware and software to address the peak loads.

One of the key benefits of cloud is its potential to offer rapid implementation in the IT organisation. All one needs is connectivity and they are ready to go live. This completely eliminates the need of going through complex procurement and certification processes.
Cloud computing also offers consistent services and reliability and an immediate on time response to emergency situations.

4. Lot of action on the supply side

4.1 Global trends

- During any major market transition and transformational change, the market opens up for a certain period and results in activities that can be compared to gold rush.

- The high interest among CIOs and enterprises has pushed the IT companies to go full fledged and adopt to cloud computing.

- Every large IT company across any part of the value chain, be it networking companies, storage providers, operating systems vendors, middleware providers or business application vendors-everyone has a point of view on cloud computing. They want everyone to believe that their strategy statements have cloud in it.

- Massive investments in R&D.
- New partnerships and new competition.
- Large number of M&As related to cloud.
- Over 1500 start ups providing cloud products and services.

Software companies CEOs are betting their jobs on cloud.
Many of them have aggressively invested behind their cloud strategy and have done massive acquisitions. This has also resulted in long term partners starting to compete with each other and vice versa. A few of the recent announcements by large companies are a strong proof of the same:

- Cisco’s entry into the server market to compete with HP directly.
- In response, HP has acquired 3COM and compete with Cisco.
- Microsoft’s multi-billion dollar investments in R&D related to cloud.
- CISCO/EMC/VMware partnership for cloud infrastructure.

It is evident that for most of these companies there is no looking back. They are betting their entire companies on cloud.

These changes will also impact the ISVs. If a few large IT companies start running the IT infrastructure for Fortune 500, then whom should the ISVs sell their products to. Will they be forced to sell mainly to the large IT companies? It remains to be seen.

5. **CIOs interest is increasing everyday**

Despite challenges and concerns, CIOs are also getting excited about the opportunities and benefits of cloud computing and related business models. In a recent survey done across 240 CIOs, more than 70% have said to favour cloud computing and will adopt to it in the near future.
The reasons for this paradigm shift are obvious. Cloud computing brings in a host of benefits to the CIOs.

- It reduces the capital investment required for IT deployment and provides scalability and flexibility to the CIOs.
- It also reduces the IT staff requirements to support and manage the infrastructure.
- It also makes it easier for CIOs to view outsourcing a lot more strategically rather than piece meal outsourcing of application development, maintenance etc.
- The business units also have better access to new features and industry best practices as and when they are available rather than waiting for the release of new versions of the product.

<table>
<thead>
<tr>
<th>Cloud Benefits</th>
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<tbody>
<tr>
<td>Reduced Total Cost of Ownership</td>
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<tr>
<td>Reduced IT Staffing/Administration Cost</td>
</tr>
<tr>
<td>Better IT and Line of Business Alignment</td>
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<tr>
<td>Increased Flexibility &amp; On Demand Scalability</td>
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<tr>
<td>Frequent Software Updates</td>
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<td>Better Productivity</td>
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6. **Cloud revolution can potentially bring in new companies from India**

India was a silent spectator during the Mainframe and PC revolutions. We had a few local companies got created during those periods but none had major impact. However, it was not the case during the internet revolution. Riding on the back of the global internet infrastructure built during the dot com era, Indian companies who were focusing on sending consultants to work at the customer site in US on work visas realised that they can do a large part of the work from
their offices in India. They invented the global delivery model and the rest is history.

- Y2K and the Internet revolution gave birth to global delivery models.
- Rise of multi billion dollar Indian IT service providers such as Infosys, TCS, Wipro.
- MNCs such as Accenture, IBM, etc. looked at service delivery from India.

Infosys became a 5 billion dollar company in the span of 10 years. This not only created a new business model but also forced existing IT consulting companies to follow suit.

The same could happen with cloud. Cloud computing and the related business models will become a leveller for Indian ISVs. There are no current market leaders in cloud, the sales and marketing models for cloud are still evolving. More companies are starting to use social media, online advertisement and telesales more to reach to their customers. Most of these could be done out of India. We are already starting to see signals of Indian start ups competing globally.
7. Indian cos. can potentially derive new use cases for cloud computing

7.1 Cloud computing in India

Cloud has not just opened up opportunities for Indian ISVs but also opened up interesting opportunities for large services companies both for traditional services and services that will drive non-linear growth. In terms of traditional opportunities, it has helped Indian services companies to get into areas such as SaaS enablement. Here they work with both the global ISVs who are moving into SaaS as well as with enterprises who want to SaaS enable their traditional applications. Cloud models have also helped strengthen the managed services competency of the Indian companies. Indian companies were traditionally good in remote infrastructure management and were not keen on buying out the datacenters of their customers. The global companies who were willing to take up datacenters had a big upside in competitive scenarios. When cloud models get adopted by large companies, it will put Indian managed services companies in a level playing field with their global competitors.

Large IT companies in India all have over 100,000 engineers. It is scary to even think that they need to add another 100,000 engineers each to double their revenues. This has resulted in these companies looking for non-linear revenue models. Cloud based services provide perfect opportunity for these companies. Many of the Indian companies run the back office functions for their global customers. They will use the cloud model to get into platform based services.
such as the payroll services for example. In this model, each of the process they support their customer with have the capability to scale without adding too many people. Many companies are already investing in platform BPO services. They are also starting to build their own cloud based IP that their customers can use.

The global opportunity that has opened up for Indian companies is exciting. The next few years will be a great journey for all the companies and industry observers.

8. **Not just global companies, Indian companies are investing in cloud**

![Diagram](image.png)

- **Wipro**: Cloud consulting, migration and management. SMB focused cloud products
- **Airtel**: Partnership with thin client providers. Aspiration to become CIO on the cloud
- **8kmiles**: Virtual development environment on cloud. Cloud sourcing to solve SMB IT problems
- **Zoho**: SaaS solutions to almost all IT application workloads. Out innovating global companies

Many of the Indian companies are creating cloud specific strategies as they see it as the next enabler of growth. Many of the large sized Indian companies such as Wipro, TCS, Infosys, Airtel and many others are betting big on cloud services. A plethora of smaller companies are also starting to focus aggressively on cloud technologies. Close to 16% of all software product companies are already selling one or more cloud based products in the domestic as well as global markets. And since cloud offers a level playing field (as it is a nascent phenomenon and evolving technology), Indian companies such as Zoho have been able to compete against some of the large sized global companies in terms of selling SaaS/ cloud based products in the market.
Enterprise level cloud adoption by some of the large companies in India has added to the enthusiasm of these cloud vendors. Companies such as Max Healthcare, Redbus, Dabur, Delhi Public School and many others are starting to adopt cloud based products & technologies and expect these investments to witness further growth in the years to come.

9. A few Indian companies have already been able to compete

Inception Fundamental: A comprehensive offering to compete against established players in a market opportunity of tens of billions of dollars in future.

- Indian SaaS company
- No venture funding
- 10 member team in Silicon Valley
- 600 developers/technicians in India
- Hires people from local colleges & schools

An interesting example is Zoho. Zoho is an Indian company started with no funding and a small team in US. The entire engineering organisation is based out of Chennai. The company doesn’t hire from large technology companies, large companies don’t hire from them as well. Zoho trains and teaches students from economically poor background, taps them at school leaving stage and trains them in their own in-house university.
Zoho not only offers products that match the large companies feature to feature but also at a very low cost as their operating costs are lower than the MNCs, though the MNCs also have development centres in India. Today Zoho has more than 2 million users and most of its customers are SMBs with employees between 40 to 200 employees.

Recently GE evaluated various cloud application providers and selected Zoho over companies such as Google and deployed Zoho on over 400,000 desktops. This is a great example of how a small Indian company was able to win a contract from one of the largest companies in the world using the power of cloud.

We all know that GE along with companies such as Citibank played a critical role in building Indian services companies. This might happen again with cloud based ISVs.

10. **Cloud computing is going to be about a lot more than just cost savings**

10.1 Opportunities for Indian Market

The Indian market is equally exciting if not more. The growth in IT spending is one of the fastest in the world.

- India is the world’s fastest growing mobile market with over 20 million subscribers added every month. Mobile is going to be a key access device for cloud based products and services. The money companies invested for 3G services showcased the belief that the large telecom providers have on data services in the Indian market.

- Over 500 million people belong to the middle class in India. The products and services consumed by them are relevant to other emerging markets as well. This suggests that Indian customers are ideal for cloud offerings.

- Most of the manufacturing output (about 45%) comes from SMBs in India. Indian SMBs in specific lack budgets, want business improvement, lack management bandwidth required to manage internal IT and all are looking for rapid growth in the next few years.
# of companies in Forbes 2000 increasing by 23% every year and will reach 162 by 2015

Fastest growing mobile markets - 20 mn additions per month

500 million people in middle class range earning in the range of $10,000 to $57,000 per year

SMBs account for 45% of manufacturing output and 47% of the total workforce

11. India has a legacy of jumping the technology curve

Wireline & Wireless Penetration (in Million)

- 2003 (India): Wireline 42, Wireless 13
- 2009 (India): Wireline 37, Wireless 520
India has a legacy of jumping the technology curves, precedent exists in the telecom sector and now DTH is also witnessing transformation. We anticipate that cloud would show similar behaviour.

Let us take the telecom sector as an example, in early 2000s, the wireline subscriber base was a significant chunk in the total subscriber base, whereas the US, the trend was the movement to wireless mode of communication. However the actual growth in the telecom industry in India happened in 2005 onwards and subscribers did not go through the typical adoption of wireline first and then move to wireless, instead they straight away started with wireless.

There is a high chance that companies that are not adopting IT today and don’t have major investments in datacenters and server farms will directly move into the cloud model. There are ample opportunities in every industry. Be it retail, manufacturing, banking, education or government. The key themes for most of the opportunities are cloud, mobile, market place, price discovery, collaboration and analytics.
The other key is to look at the ecosystem as a whole and partner with various providers to address the opportunities rather than try to address it independently.

12. **Banking industry presents a huge potential for cloud**

The current banking penetration in India is only 35%. The large public and private banks are growing rapidly. Large banks such as ICICI bank already have best-in-class IT deployments. In many cases they have built their own applications to solve India specific problems. Government is increasing their focus on financial inclusion. Corporate banks and the local chit funds also make up a key part of the banking ecosystem in India.

Even for the large banks, the cost of reaching to the "Bottom of the Pyramid" is prohibitively high and are partnering with Microfinance institutions to reach them. The smaller banks are still to enable their services on the internet, Mobile banking is still a tip in the iceberg.

Microfinance is an interesting model as it is based on self-help groups where people from each of the group should be in physical proximity. Can social media and collaboration models made possible by cloud solutions create new disruptions in the microfinance models and thereby improve financial inclusion in India. It will be an interesting opportunity for a start up company to explore!
13. Education system in India could also be transformed using cloud

<table>
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<th>Low Spend</th>
<th>Huge Cost</th>
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<tr>
<td>$400/student in India as compared to $10,000 in US</td>
<td>Right to education act to ensure education to all</td>
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Cloud can potentially help revolutionise the education system in India

- Online Education
- Teacher Pupil Enablement
- School Management

Education industry can also be transformed using cloud solutions. India currently spends $400/student compared to the $10,000/student in the US. We spend around 4% of the GDP on education services. With the right to Education Bill, there will be a lot of pressure on the government to increase the expenditure on education. Similar to healthcare, the current model will become cost prohibitive.

There are tremendous opportunities for IT in education in India in terms of online education, teacher training/enablement and school management. A few companies are starting to work on some of these areas and have already started to see success.

SchoolMATE [School Management AT Ease] is a CRM (Customer Relationship Management) + ERP (Enterprise Resource Planning) software for Educational Institutions. SchoolMATE helps schools in continuously updating parents about their child’s status and his performance at school over their mobile phones through text messages (SMS) and also through e-mail and Web using a secure mechanism.
The innovation from SchoolMate is to provide the entire product as a service. They figured out that even if they provide the solution on the cloud, there is someone in the school who needs to enter the information into the computer and it was difficult for the school to train the teachers to be able to do this. So along with the software, SchoolMate provides the data entry provider. This way the teachers don’t have to change their current way of working.

The business model is to charge the parents and not the school. The parents are willing to pay for this service as they get to know about their children in real time. Today SchoolMATE has over 70,000 parents enrolled into this programme.

14. **Healthcare industry in India demands end to end innovations**

<table>
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<th>Huge Base</th>
<th>Huge Cost</th>
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<td>50% population with no access to primary healthcare</td>
<td>Healthcare expenditure to increase 5 folds to match global standards</td>
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<tr>
<td>Industry needs fundamental innovations to suffice needs-cloud can potentially help</td>
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Current allocated expenditure for healthcare is ~5.2% of the GDP

Let us look at Healthcare. India spends around 5.2% of the GDP on healthcare. Even at this level of spending 50% of the people don’t have access to healthcare. If India has to provide health care in terms of global standards, it would have to spend 5 times more than the current spend. Even US spends only 16% of the GDP on healthcare. So the current model of providing healthcare is just not going to scale to suffice the need to provide universal healthcare in India. The industry needs to look at fundamental ground up innovations to reduce the cost of healthcare. The innovation needs to happen in a number of areas starting from medical education, medical devices etc. IT can play a key role in some parts of the value chain such as hospital productivity, telemedicine and patient records. Already companies such as Wipro have created India specific healthcare IT solutions.
15. **SMB sector would require low cost solutions to address unique needs**

**Inception Fundamental:** To create a "NANO" in IT

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**ITaaS Stack**

- Business Intelligence
- Custom Applications
- Business Applications
- Email, Office Apps
- Networking Equip
- Hardware
45% of the manufacturing output in India is from SMBs. The existing ERP solutions designed for large companies don’t work for SMBs. They are difficult to use, are not customised for the SMBs needs and are cost prohibitive to buy, deploy and maintain.

An interesting example is TCS who were aggressive enough to leverage the SMB opportunity. It is believed that Ratan Tata wanted to create an IT Nano for the SMBs in India. The TCS team went into action and met with many SMBs across India to understand the pain points and requirements. They found out that many of the SMBs had bought some solution but are not using them as they were not solving their pain area. Many found that they don’t need all the complex features and the products were unnecessarily complicating their processes.

TCS invested in a large team to build a solution specifically focused on SMBs and provide the entire stack as a cloud service. The SMBs have to pay only for the solutions that they enable and based on the size and growth of the SMB, they can add additional layers to the product.

16. Government will increasingly invest in cloud for better citizen services

- **UID**: Largest citizen database in the world (10 times the 2nd largest)
- **RTI**: Timely response to citizen requests for government information
- **IRCTC**: 5.5 Mn hits, more than 100,000 tickets booked per day

Massive infrastructure required to deliver these citizen services
And finally, the opportunities with the government are as huge as one’s imagination. UID is one of the most ambitious IT projects in the world. It will be the largest citizen database in the world. It is at least 10 times compared to the second largest database. UID project is to provide an Rs 15,000-20,000 crore opportunity to computing, database, smartcard and storage vendors, besides systems integrators. It also opens up possibilities for hundreds and thousands of applications. It will revolutionise Indian IT market, attracting not only domestic IT player but global players as well. This will also create many new ventures as well, by providing indirect business. The only limit to the application possibilities would be the creativity and imagination of the companies.

The opportunities are clearly very large in the Indian market. We expect not just product innovations but a number of business model innovations that will be triggered by the cloud opportunity in India. Even though India doesn’t have many large product companies or product innovation across various industries, we have contributed heavily to the business model innovations and currently exporting a number of them to other locations.

17. **Every company has a key role to play in driving the Indian Cloud Eco-system**
As we learnt earlier, many of the innovations for cloud will be based on partnership between firms across the IT value chain. Having realised the immense opportunities, it will be imperative for the companies to come together and enable collaborative innovation to address both India and global market needs.

Large companies should play an evangelist role in the Indian market to encourage the Indian ISVs to move to cloud and look at incubating the next generation entrepreneurs who can create the next generation facebook, salesforce.com and VMware from India.

Key focus should now be on developing the ecosystem. It should include developing the talent for cloud development, connecting start up ISVs with large system integrators, enabling the start ups on the cloud market places and finally influencing government policies to make them cloud friendly.
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