Cloud Computing: "The Silver Lining"

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ABSTRACT
In the last few years, the emergence of cloud computing has been receiving quite some attention. A typical business question deals with how to equip your requirements to utilize the full potential of the market without taking any risk or over-investment in wrong choices. That is why a cloud model solution needs appropriate focus and opportunity in the Indian market. It can also be seen that cloud-based applications are generally becoming a trend in the development of information systems. Cloud computing has revolutionized small and medium businesses for various reasons. This paper aims to demystify cloud computing from the business perspective in India, both in the current scenario as well as in the near future. The objective of this paper is to provide the reader with a look at how cloud computing has rapidly evolved with its effective applications. It begins with a look at how cloud computing has become an integral part of IT strategies for all organizations. This paper focuses on the growth opportunity potential that this amazing technology possesses, to impact a complete positive turnaround for the Indian businesses. We then examine the notion of cloud computing being "on demand", by using SWOT analysis of the services offered by cloud today. This paper also discusses few real life case examples of businesses that transitioned to the cloud by analyzing their requirement as well as the resultant impact of the adopted cloud solution.

General Terms
Cloud computing.

Keywords
Cloud Computing, SaaS, IaaS, PaaS, Globalization, Deployment Model, IT Service.

1. INTRODUCTION
Cloud computing gets its name from the network diagrams found in textbooks and research papers where a cloud is represented as a metaphor for the Internet. The cloud icon represents "everything else" that makes the network work. It also typically means an area of the diagram or solution that is managed by someone else. In essence, cloud computing is a technology that allows access to applications that actually reside at a location other than the user's computer; most often, this will be a geographically distant data center. A more formal definition of Cloud computing is "a cloud is a type of parallel and distributed system consisting of a collection of interconnected and virtualized computers that are dynamically provisioned and presented as one or more unified computing resources based on service-level agreements established through negotiation between the service provider and consumers" [3].

Cloud computing describes a new delivery and consumption model for IT services based on Internet protocols. It typically involves the provision of dynamically scalable and often virtualized cost effective resources. It provides software, hardware, data access, and storage services that do not require the user's knowledge of the physical location and configuration of the system that provide these services. The applications are delivered via the Internet, which are generally accessed from software's like web browsers, desktop applications and mobile applications. This typically means that a third-party hosts the user's application (or a suite of applications) and they handle the costs of the server hardware, storage, software updates and the physical infrastructure required to maintain these servers. Users can typically reconfigure these resources according to their infrastructures for optimum utilization. Infrastructure providers typically charge clients for the usage of resources by means of a pay-per-use model. Let us now take a look at the typical characteristics of modern cloud computing.

1.1 Characteristics of Modern Cloud Computing
Topologically, a cloud computing solution is made up of three components: the client, the datacenter, and distributed servers. These components together form a typical cloud computing solution [1]. Let us take a look at each of these components.

Client: Clients in cloud computing architecture are nothing but the end-user devices like desktops, laptops, tablets, mobile phones or other devices used to access the cloud. The end users interact with clients and use them to manage their information on the cloud. Clients generally fall into three categories:

Mobile: Mobile devices include laptops, tablets and smart phones, like a Blackberry OS, Android, or an iOS based device.

Thin Clients: Thin clients are computers that do not have internal hard drives, but rather depend on the server to do all their work, and typically just display information.

Thick Clients: Thick clients are regular computers, with their own hardware, using a web browser like Firefox or Internet Explorer to connect to the cloud.

Datacenter: The datacenter is a collection of servers where the application to which the user subscribes, is located. It generally includes redundant or backup power supplies, data communication infrastructure, environmental controls (e.g. air conditioners, storage racks for servers) and security devices. It is necessary to provide a reliable infrastructure for IT

operations in order to reduce any chances of service disruption. A growing trend in the IT world is server virtualization. In virtualization, special softwares can allow multiple instances of servers (virtual servers) to be created on a single physical device.

Distributed Servers: Distributed servers consist of multiple computers that communicate through a computer network. These computers interact with each other in order to achieve a unified goal. In distributed computing, a task is divided into various smaller tasks, each of which is resolved using one or more of these computers. They do not have to be placed at the same physical location. Often, they are at geographically disparate locations. As far as the end users are concerned, these servers act as if they are at the same location. This gives the service provider more flexibility in options and security. Another important characteristic of cloud computing are deployment models.

1.2 Deployment Models

There are many considerations for the IT department personnel to ponder on, when moving from a standard enterprise application deployment model in a typical data center to the one based on cloud computing. Organizations may decide to deploy applications on public, private, hybrid or community clouds, each of which has its own trade-offs.

Public clouds: A Public cloud is a model in which a service provider provides resources such as applications and storage to everyone over the Internet. Public cloud services are usually offered on a pay-per-usage model. They are generally run by third parties, and various applications are likely to be interlaced together on the cloud's servers.

Private clouds: A Private cloud is a model which is built for the exclusive use of one user, providing the utmost control over data, security, and quality of service. The user generally owns the infrastructure and has control over how applications are hosted on it. Private clouds may be deployed at the user's data center, or at a common facility.

Hybrid clouds: A Hybrid cloud is a model which can be termed as a composition of a private cloud and a public cloud. A hybrid cloud is a special environment in which the user provides and manages some resources in-house, and outsources the rest.

Community clouds: A Community cloud is a model that typically refers to a special purpose cloud computing environment, shared and managed by a number of related entities participating in a common agenda. It can be managed internally or by a third-party and hosted internally or externally. As business requirements change drastically, there is a need for managing applications in an enterprise more effectively and efficiently. The following section discusses the change that the businesses are going through in today's scenario and hence the need for cloud based solutions.

2. THE CHANGING WORLD: FOR SMART BUSINESSES

Businesses around the world have always benefited from technology. In fact, technology is one of the key ingredients for the expansion and growth of a business. In this section, we take a look at how the various aspects like globalization, competition and knowledge sharing are impacted by businesses, and hence, the need for cloud based solutions.

2.1 Globalization and Competition

It is a well known fact that in order for a business to excel in the global market, a long term adaptability strategy focusing on service is essential. Assessing the current strengths of the organization in line with the new strategy is important during the planning phase. This requirement or need for building a strategy is based on the several volatile forces that drive the market, like changing customer needs, intensified competition and changing business environments. Nowadays, one of the more widely adopted generic strategies by businesses is cost differentiation. Businesses try to gain an edge over their competitors with the virtue of reducing their overall cost in today's dynamic market. Hence, cost reduction becomes one of the most important aspects of a business strategy. Cloud computing is like a shot in the arm for businesses using this strategy to attain a competitive edge in the market [18]. Let's take a look.

The amount and variety of hardware and software required to run a business in today's computer dependent world is daunting. A whole team of experts is required to install, configure, test, run, secure, and update technology. Even today, companies are using capital expenditure for their IT infrastructure, which needs constant upgradation. This infrastructure, procured with huge investments, when not used to its full potential, can lead to losses for the organization. With the evolution of cloud computing methodology, organizations don't need to invest in technology as capital expenditure. Rather, they can choose to invest in it as an operational expenditure [19]. Cloud computing offers a simple operational expense rather than a capital expense and prevents capital from being sunk on depreciating assets that are used to build a traditional datacenter. With cloud computing, IT solutions can be deployed extremely quickly, and managed, maintained, downgraded and upgraded remotely. Moving applications and infrastructure to cloud can free up precious time, effort and budgets to focus on the core competency of an organization, resulting in significant monetary benefits. With the help of cloud computing, customers can benefit from the economies of scale enjoyed by the service providers. The providers run large-scale datacenters, operating at high efficiency levels, and support a multi-client architecture, sharing their physical resources among many different customers. This model of IT provision allows the service providers to pass on their savings in cost to their clients. The advantage from the service consumer's perspective is that the supervision of the cloud and maintenance of network performance along with other IT infrastructure is taken care of by the service providers equipped with skilled IT staff. The

overall cost to run and operate the systems is minimized greatly. The service is provided as a pay-as-you-go business model, allowing companies to scale up and down in response to their real-time needs, rather than having to pay up front for infrastructure. Being an internet based service; it provides organizations with a number of benefits like, seamless integration of applications across geographical boundaries, software upgradations, scalability and reduction of unnecessary cost overheads [18]. All these benefits help the company to achieve its long-term cost based strategy.

2.2 Knowledge Sharing

In today's business scenario, working on a single project spread across geographically disparate areas spanning half way across the globe, is a common phenomenon. One of the primary reasons for this is an infinite spectrum of knowledge and experience spread across the world with people from different countries bringing a huge amount of varied experience to the project. This type of collaborative computing is the driving force behind the concept of the cloud [5]. In order to succeed in any project, people should be able to contribute in a more effective, efficient and collaborative way. This generally takes place by technologies like the instant messaging platform, white boards, audio / video conferencing or electronic mails. In addition to this, users should be able to share files and have multiple users work on the same project simultaneously. Cloud computing takes into account these requirements and proves itself as an adequate solution to counter the problems arising due to geographical barriers. The difficulty level of communication in working for a team dispersed across geographical boundaries, is almost non-existent with the advent of cloud computing. Work-desks have become mobile and businesses have become more agile, flexible, competitive and innovative [11]. The sophistication to have company-wide knowledge at the finger tips of the managers to take judicious, spontaneous, and accurate decisions has not only become the de facto standard, but the most important feature of the “business survival guide”.

While businesses accepted the fact that cloud based solutions would benefit them, they also desired tailor made solutions. It is well understood that no business prefers to shift focus from their core competency, to invest in time and technology where they lack expertise. The cloud solution providers understood this need, and created generic service models for various businesses, which could be adopted as per their requirement [22]. The next section discusses the current trend in these service models.

3. TRENDS IN CLOUD COMPUTING BASED BUSINESS SERVICE MODELS

The clouds are distinguished based on business model services. The term “services” in cloud computing is the concept of being able to utilize reusable components offered by a provider. Hence, in terms of the services offered by cloud computing today, they can be divided into three broad areas, namely, Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). Let us take a look at each of them.

3.1 Software as a Service (SaaS)

Software as a Service (SaaS) is a model in which an application is hosted as a service to customers; via the Internet. Multiple users or organizations use the same application via a web browser. When the software is hosted off-site, the user doesn’t have to maintain or support it. On the other hand, it is out of the user's control when the hosting service decides to modify it. The idea is that the customer uses the software out of the box, where it does not require a lot of changes or integration with other systems. It is also referred to as on-demand software. SaaS has become the most popular delivery model for most business applications, including accounting, customer relationship management (CRM), enterprise resource planning (ERP), human resource management (HRM) and service desk management. Unlike traditional software which is conventionally sold as a permanent license with an up-front fee, SaaS applications are charged using a subscription fee, most commonly a monthly or an annual fee. Consequently, the initial setup cost for SaaS is typically lower than the equivalent enterprise software. SaaS vendors typically price their applications based on the following:

Pay periodically: This means charging the user on a regular basis

Pay for each user: Charge the user based on the number of users.

Pay for the resources: Charge for the computing resources like CPU/hour, GB, Bandwidth, etc.

Pay for the features: Charge for the number of features in the solution they need.

Following Table 1 is a SWOT analysis for the SaaS model to understand its practical applicability for a business.

Table 1: SWOT Analysis of the SaaS model

Strengths	Weaknesses
• **Smaller staff:** The ability to outsource applications reduces the need for IT staff. • **Customization and flexibility:** SaaS applications are easy to customize and do not require modification of the application code as compared to older applications. • **Better marketing:** With SaaS, the entire world is open to the providers for marketing. • **Reduced cost of operations:** The cost of availing of the cloud services is much cheaper than having a data center and developing in-house applications [16].	• **Specificity:** An organization that has a very specific computational need, might not be able to find the application available through SaaS. • **Internet dependency:** Although the quality of service rendered may be good, network and internet outages are an issue with regards to continuous availability of the SaaS service.
Opportunities	**Threats**
• **Familiarity with the World Wide Web:** Most workers have access to a computer and know how to use the World Wide Web making the learning curve for using SaaS applications much smaller. • **More bandwidth:** Bandwidth has increased greatly in recent years and quality of service improvements are helping data flow. • **Expansion and growth:** With access to data being available anywhere, companies can expand globally by crossing the physical geographical boundaries, while at the same time; stay connected by creating a virtually integrated business.	• **Open source software:** If companies are inclined, they can put their open source applications on hardware that performs better and costs less than SaaS. • **Security:** Since the service makes extensive use of the internet to host data and applications alike, the threat of security remains the topmost concern for the service consumers.

3.2 Platform as a Service (PaaS)

PaaS is a model which facilitates deployment of applications without the cost and complexity of buying, managing and supporting the underlying hardware or software. From the perspective of the business, PaaS focuses on the provision of value-added services, which makes it easier for the business to move its applications to the cloud without worrying about the effects of the growing or shrinking usage of applications [6]. A major disadvantage of PaaS is that, if the provider goes out of business, its applications and data will be lost. Following Table2 is the SWOT analysis for the PaaS model to understand its practical applicability for a business.

Table 2: SWOT Analysis of the PaaS model

Strengths	Weaknesses
• **Total Cost of Ownership:** PaaS reduces TCO as there is no need to buy infrastructure to deploy the application. • **Savings in Development Efforts**: The application development time and effort is reduced considerably due to a drag and drop configurations of PaaS. • **Testing and QA Efforts:** The drag-and-drop configurations are quality assured, making it easy for deployment. • **Operations:** By having web based architecture via PaaS, there are substantial savings in operations.	• **Vendor "Lock-in":** A customer might pay a provider to use an application, but once they do, they may be unable to port that application to a new vendor or a hefty fee may be charged for the same. • **Dependency:** The customer is totally dependent on the know-how of the service provider and is limited by the capabilities of the service provider.
Opportunities	**Threats**
• **Work flow management:** PaaS can help in the rapid construction of applications in the cloud by providing the necessary elements that are essential to the creation of business applications.	• **Portability:** Since the service provider takes care of the entire life cycle of the application, porting at another location may be cumbersome. • **Vendor shutdown:** The vendor who handles the PaaS service may suddenly go out of business and shut shop. This would create a highly volatile situation for the consumer availing of the PaaS service.

3.3 Infrastructure as a Service (IaaS)

IaaS is a provision model in which an organization outsources the equipment used to support operations, including storage, hardware, servers, CPU work cycles and networking components. The service provider owns the equipment and is responsible for hosting, running and maintaining it. The user typically pays on a pay-per-use basis. The infrastructure can be dynamically scaled up or down, based on the application resource needs. Further, multiple tenants can be on the equipment at the same time. Infrastructure as a Service is sometimes referred to as Hardware as a Service (HaaS) [2]. IaaS involves several elements:

Service level agreements: This is an agreement for a certain minimum level of performance from the system.

Computer hardware: These are the components whose resources will be rented out

Computer Network: This includes hardware for firewalls, routers, load balancing, and other networking requirements for ease of user connectivity.

Para virtualization environment: This allows the user to choose and run the virtual machines with the configuration they require.

Utility consumption billing: Customers are billed based on how much system resources they use.

Following Table 3 is the SWOT analysis for the IaaS model to understand its practical applicability for a business.

Table 3: SWOT Analysis of the IaaS model

Strengths	Weaknesses
• **SME Advantage:** IaaS is a boon to SME's as they do not have to invest much for their IT infrastructures and focus on their core competencies. • **Reliability:** The entire IT infrastructure is managed by a highly skilled team providing a 24x7 service, which results in almost zero down time [16]. • **Bottom Line:** IaaS is mostly attractive as it requires minimum investment and offers more productivity thus resulting in a significant improvement in the bottom line.	• **Complexity:** The company has to make the tough decision on how much can they afford to store their sensitive data at a physically distant location. • **Integration:** Even though most of the hardware is online, the firm would require a few components like printers, local network devices, USB, etc, to be at the company premises. The integration of these devices with IaaS is cumbersome
Opportunities	**Threats**
• **Flexibility:** Systems can be changed and modified without harm to the entire IT system. • **Management:** With IaaS offerings, IT management can be provided as part of the service for a much lower fee.	• **Security:** Data must be secured, and so must the sites hosting the data. • **Integrity:** It may be difficult to maintain the integrity of a database if it is too complex or changes too quickly.

4. CURRENT INDIAN MARKET ANALYSIS

For businesses of all sizes, the cloud represents a tremendous opportunity. Till now we have seen both the advantages and disadvantages for the business to transition to the cloud using different service models. Cloud computing is expected to be the next biggest shift in the IT sector wherein more and more companies will outsource their IT operations through cloud computing. Low capital investment and greater scalability of cloud persuade business firms to embrace cloud computing. In India, the market size of the industry was estimated at INR 18.2 billion in 2010 and is expected to witness an exponential growth at a CAGR of approximately 54%, to reach an astounding INR 159 billion by 2015. In 2010-11, the cloud computing space was dominated by SaaS, with a share of 60% while IaaS and PaaS combined held a share of the remaining 40%. [15]. SaaS market in India is also expected to rise with the growing interest amongst telecom service providers such as: Bharti Airtel, BSNL and Reliance communications.

The cloud offers access to the latest technologies at cheaper costs and a negligible set-up time which makes it more desirable amongst small and medium businesses (SMB). In India, small and medium businesses account for nearly 40% of the total manufacturing output and show higher growth rate in comparison to large companies. The major advantage of SMBs is its employment potential at low cost. SMBs usually lag behind when it comes to adopting technology [17]. On an average, a company spends about two-thirds of its IT budget for maintaining its IT infrastructure. Cloud adoption nullifies the need for the real estate required for IT infrastructure, electricity for running the systems and the need for IT staff required for maintenance and up gradation of systems [12]. If the infrastructure and the applications are moved to the cloud and used as-and-when-needed, the capital expenditure for the SMBs becomes more reasonable. The resultant cost savings can then be channelized for focusing on core competencies.

5. REAL LIFE SCENARIOS

Various benefits such as greater cost savings, better scalability and ability to move from Capital expenditure to Operational

expenditure is boosting the overall cloud market in India. While Indian firms are still not completely convinced and open-minded to the cloud, a lot of firms are adopting this technology as they realize its practical benefits of it being an integral part of their long term growth strategy. Let us take a look at some of the case studies of businesses who have already transitioned to the cloud, and are reaping its benefits.

5.1 Case 1 [9]

Introduction: ABC Ltd. is one of the largest developer, publisher and distributor of the Indian film industry content in the world. It is also the leader in the Mobile Entertainment and Value Added Services (VAS) in India as well as Asia. It has captured close to 75% of all mobile entertainment content in India. It also owns game studios, search engines, social media, marketing applications and online stores for Indian and International music. ABC also develops, manages, and hosts websites and portals for external clients. They also have successfully executed award winning promotion campaigns and marketing solutions for its partners in India and abroad.

Requirement: With a large diversified online business, growing at a rapid rate, the company's traditional IT infrastructure was reeling under pressure and was unable to handle the load. Addition of new servers at the local datacenter was expensive, as well as inefficient as the latency began increasing. This resulted in delays of projects, which in ABC's line of media business; where time is of utmost importance; was unacceptable. Also, due to the ever changing dynamics, the life cycle of the newly installed servers was of a limited period, thus creating redundancy and leading to an increase in the capital expenditure. ABC Ltd. concluded that, to manage such a large volume of storage, a flexible option was needed. It was no longer feasible to keep on purchasing storage and servers, as it added to time, space and cost pressures. An infrastructure was required to roll out products and services quickly to the market.

Solution: Infrastructure as a service (IaaS)

Implementation: After months of research, ABC Ltd. finalized Amazing Web Services as their cloud solution provider. An initial round of training and familiarity with the cloud system was conducted. A separate network was set up to rectify bandwidth issues. This network was a system of computers that contained copies of data, placed at different points in a network. It maximized the bandwidth for accessing the data from the internet. Also, due to its huge original digital copyrighted content, a security layer was provided with encrypted credentials and the location of the server on which the data was stored was cloaked.

Impact: ABC successfully implemented most of its in-house digital content on the cloud. The flexibility and elasticity of the cloud provided ABC the much needed scalability, without investing in systems or storage. The cloud platform helped the company scale up its business to support customers around the world. The payment model was based on pay-per-use, which reduced cost. Moreover, the system was online 24x7 and maintained by a team of thorough professionals. Thus, the company converted its capital expenditure to operational expenditure and reduced maintenance costs by 50%. Due to centralized storage, the content was organized and structured. The cloud solution also reduced the inception-to-delivery cycle of its services and thus met the time sensitive demands for deliverables more efficiently. Now ABC Ltd. concentrated on its core competency in delivering solutions, and added value to its offerings, thus gaining a competitive edge.

5.2 Case 2 [10]

Introduction: XYZ Ltd is a Life Insurance company with a joint venture between the public sector banks and a privately owned firm in India. Approximately 50 million customers of nationalized Indian banks in the partnership provided a strong potential customer base to the company for cross-selling and up-selling of their insurance products. The banks had a strong brand association, and commanded a high level of trust among their customers. The powerful network of offices and the brand promise were some of the factors that resulted in the exponential growth of the company. XYZ is one of the top ten insurance providers in the world. Its strong domain expertise is supposed to be the key ingredient in propelling the business forward and obtaining a fair share of India's Life Insurance market.

Requirement: In 2010, the Insurance Regulatory and development Authority of India (IRDA) asked XYZ Life Insurance to set up a disaster recovery site within two months. This was a grave problem for XYZ as it had started its operations just around a year back, and had a small IT team. This, along with a large capital required to build a disaster recovery site, made the deadline a dangerous entity. The traditional datacenter model would not work, as this meant more funds for procurement of servers and hiring of staff for the management of the IT infrastructure, thus increasing the capital expenditure. Also, since XYZ was an insurance company, data security was of the utmost importance. Moreover, cloud computing was in a very nascent stage in India during that period.

Solution: Platform as a service (PaaS)

Implementation: The head of the IT department of XYZ had a chance meeting with the managing director of OPD Technologies, a cloud solution provider, where he learnt that the cloud computing platform was the solution to his problem. Since, back then most of the companies were reluctant to move to the cloud for their data requirements, XYZ was also skeptical of the cloud's performance, and hence decided to do a site visit to study OPD's infrastructure and systems. OPD had all the hardware which met the standards, with relevant support. The center was a Tier – III datacenter. Once the cost-benefit analysis was done by XYZ's management, the system was deployed. The entire solution was worth INR 0.98 million and was implemented in ten days.

Impact: The deadline set by IRDA was met. A cost of INR 2 million was saved as compared to the implementation of a

datacenter based solution. The desired security was provided by OPD.

5.3 Case 3

Introduction: A general grain and provision stores, situated in Andheri, Mumbai, PMG stores was started in 1956 by Mr. Bhatji. Having humble beginnings, Mr. Bhatji grew his business slowly and steadily to the current three branches spread across the Marol area. With these three branches strategically placed, PMG stores covers the entire Marol area, right from Ashok Nagar, to Military road and Marol Village. The three shops get their daily supply from a godown located at Vashi, Navi Mumbai. All kinds of regular household items can be bought at these stores. Currently the stores are handled by his grandson, Mr. Yatin.

Requirement: Around 2005, large format retail stores like Big Bazaar, Food Bazaar, D-mart, Hypercity etc. made their foray into the Indian market and changed the way the Indian shopper purchased goods for the household. Over the years, with the booming business sectors, especially IT, the earning capacity of the urban middle class grew and it gave rise to more disposable income. This increased their desire to demand more from products and services, than just meet basic requirements. Shopping in malls, comprising of a huge product variety, as well as quality goods with discounts and offers along with better service, and above all, convenience became the order of the day. Thus, the population slowly broke ties with the local *Kiranawaala*. With the lack of a huge facility, and capital, PMG stores struggled to keep pace with the retail giants. Inadequate variety of products, inability to meet huge orders, lack of bulk discounts and offers, lack of simple convenience like using credit or debit cards made consumers switch to huge retail giants.

Solution: Software as a service (SaaS)

Implementation: The marketing department of OnlineShop approached Mr. Yatin in September, 2011. Mr. Yatin saw the opportunity of providing convenience to the customer availing of free home deliveries, by just logging in online and ordering the required goods. Moreover, the three shops owned by PMG gave it the advantage of speeding the deliveries, as the store nearest to the order location could cater to that particular order. The OnlineShop registration was without any charges. PMG Stores was then listed on the OnlineShop website after an evaluation. Customers could shop on OnlineShop from the various categories of goods and hundreds of brands. Once the order was placed, PMG stores received an SMS and an e-mail with the details of the order. The order was then delivered and cash was collected on delivery. Since the payment was on delivery, exchanges and return of goods was possible, which generated some amount of trust in the system by the consumer. A cloud-based environment and incessant in-house app development based on stakeholder feedback, constantly modified OnlineShop systems to be capable and scalable. The shop workforce had to be provided with special training to use the system. Since refunds are a nightmare on order cancellation with online payments, they were scrapped for a robust and simple system of payment on delivery

Impact: The registration process was free, which was considered a positive sign by PMG Stores as they did not want to spend on the same. “While the sales are yet to pick up as expected, we are glad to have taken the first step to provide one more channel of convenience to the consumer. Thanks to the training, the entire process from placing an order to the delivery is very smooth, and it does not cost us anything, as I already own a GPRS enabled device”, says Yatin. He has already started informing his regular customers about OnlineShop, who are finding it quite interesting. Now with the advent of the FDI row in India, he also plans to notify the rest of his customers in his periodic advertisement pamphlets and is in conversation with OnlineShop about area-wise advertising with the help of flyers containing a list of franchisees in that particular area.

6. CONCLUSION

With the rapid growth of the Internet, and easy accessibility to it using various portable devices like laptops and mobile phones; businesses have now moved almost all of their daily functions online. Also, the computing capabilities to manage huge terabytes of daily data along with a robust hardware to handle that kind of data, has rendered a typical datacenter system incapable of meeting the needs of enterprises. In this aspect, cloud computing service offerings become lucrative to organizations who want to maintain their competitive edge in the current market. Most of the end users have unknowingly used the cloud in the form of services like GoogleDocs or the more recent iCloud. Yet, because of the foggy definition of the cloud, and the limited understanding of information systems, most of the users were apprehensive to adopt this technology. But, slowly and steadily as companies are beginning to adopt cloud computing and realize its positive effect on the business, they are beginning to become increasingly aware and gain confidence in the technology.

As aforementioned, the number of advantages that a cloud computing system provides, like complete outsourcing of the IT infrastructure and services, impact on cost, and profit maximization, have already started attracting the IT heads of many organizations. Further, efforts to address the obvious pitfalls like security issues should be undertaken by the cloud service providers so that organizations can instill faith in the cloud. Nevertheless, as observed during the research of this paper, the IT heads in India are realizing the power of cloud computing and the advantages that it provides, based on testimonials provided by peer groups adopting the innovation [20].

7. THE FUTURE OUTLOOK

Micro, small and medium enterprises are expected to boost the cloud computing industry as they realize its potential and power. The small and medium business segment is largely unaddressed by the domestic cloud service providers, which account for around 60% of the potential market in India. According to recent news, HP has tied-up with Bharti to offer

cloud service to SMBs in tier I and II cities. It is expected that 70% of the applications used by SMBs in few years from now will be cloud based. A major amount of demand for cloud computing is predicted to be from Indian government organizations, provided that the important issues like data security, compatibility, policy management and disaster management are resolved before implementing cloud computing in e-governance[8]. The government is currently in talks to roll out e-governance services by using cloud-based technologies. If this is implemented, India will be the first country to offer e-governance services to its citizens using this emerging technology. This will open a new market for major cloud service providers. The Aadhar UID project, started by the government of India, to provide a unique recognition to every citizen of India, based on eye scans and fingerprint identification, is expected to use cloud computing to meet its data requirements [13]. This will significantly boost the confidence of private organizations who hesitate to move to the cloud.

For optimum growth of adoption of cloud computing technology in India, the cloud providers should make efforts to create and offer innovative and customized business models and solutions for organizations to resolve compatibility issues. Industrial collaboration and government support are important factors that would help organizations trust this technology and help mitigate the subjective risk outlook involved. Organizations should make careful analysis and in-depth comparison of the services of various cloud providers before finalizing the type of solution best suited for their requirements. Erroneous and failed examples will make the industry shy of adopting cloud solutions, along with hampering the growth of these organizations. Also, the choice of the deployment model should be made meticulously. The organizations involved should make a thorough analysis of which solution will meet the organization's aim of maximization of profit and growth. One of the most important aspects that surfaced during the research was regarding the inhibitions of the IT departments of organizations, with regards to security [14]. Cloud service providers should address security issues on priority and provide active demonstrations and testimonials, to instill faith of the Indian businesses in the cloud-based system.

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