IMPACT OF CLOUD COMPUTING ON SMALL AND MEDIUM ENTERPRISES IN INDIA

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ABSTRACT
Small and Medium Enterprises seek opportunities to rationalize the way they manage their resources. Information technology had a great impact in all aspects of life and the global economy is currently undergoing fundamental transformation. Information technology has very real impact in most of industries and in all aspects of economy, while businesses and enterprises continue to undergo considerable changes. Usage of these technologies is revolutionizing the rules of business, resulting in structural transformation of enterprises. Modern businesses are not possible without help of information technology, which is having a significant impact on the operations of Small and Medium Sized Enterprises (SME) and it is claimed to be essential for the survival and growth of economies in general.

It is argued in this article that cloud computing is likely to be one of those opportunities sought by the Small and Medium Sized Enterprises (SME) in these difficult times and could prove to be of immense benefit (and empowering in some situations) to them due to its flexibility and pay-as-you-go cost structure (Pay-per-use: You pay for cloud services only when you use them, either for the short term (for example, for CPU time) or for a longer duration (for example, for cloud-based storage or vault services). Cloud computing is an emerging new computing paradigm for delivering computing services. This computing approach relies on a number of existing technologies, e.g., the Internet, virtualization, grid computing, Web services, etc.

Cloud computing is an emerging area that affects IT infrastructure, network services, and applications. The term "cloud computing" has different connotations for IT professionals, depending upon their point of view and often their own products and offerings. As with all emerging areas, real-world deployments and customer success stories will generate a better understanding of the term.

The provision of this service in a pay-as-you-go way through (largely) the popular medium of the Internet gives this service a new distinctiveness. In this article, some aspects of this distinctiveness will be highlighted and some light will be shed on the current concerns that might be preventing some organizations from adopting it.

KEY WORDS : Cloud computing, Web services, Virtualization, Grid computing, Small and medium enterprises (SMEs)
INTRODUCTION:
Cloud computing is a new general purpose Internet-based technology through which information is stored in servers and provided as a service and on-demand to clients. It can provide a fundamental contribution to promote growth and competition, and it can help the economy to recover from a severe downturn.

“The cloud” can be implemented to varying degrees. Cloud computing in its simplest form involves moving data storage from in-house servers to a third-party service provider with centralized servers for many clients. It can also involve moving entire operating systems and software to “the cloud” so that users can connect via an internet connection to the application they want.

Cloud computing is an emerging new computing paradigm for delivering computing services. This computing approach relies on a number of existing technologies, e.g., the Internet, Virtualization, Grid Computing, Web Services, etc. The provision of this service in a pay-as-you-go way through (largely) the popular medium of the Internet gives this service a new distinctiveness.

Providing software as a service is not a new computing practice. Some companies, known as Application Service Providers (ASPs), were providing businesses with software programs as a service via the medium of the Internet during the 1990s. However, such attempts at “utility computing” did not take off. This was largely attributed to lack of sufficient bandwidth. During that period, broadband was neither cheap nor plentiful enough for utilities to deliver computing services with the speed and reliability that businesses enjoyed with their local machines (Carr, 2009). Then came Web services (especially those based on the XML-based SOAP message protocol) that represented a model of software delivery based on the notion that pieces of software applications could be developed and then published to a registry where they can be dynamically discovered and consumed by other client applications over different transport protocols (e.g., HTTP, TCP/IP, etc.) irrespective of the language used to develop those applications or the platforms (e.g., Operation systems, Internet servers) on which they are implemented. This was a dramatic improvement over the SOAP is an XML-based and open source message transport protocol. It stands for Simple Object Access Protocol services provided by ASPs which relied on proprietary (and hence un-portable) software.

The advent of Web services promised many exciting possibilities. Some of these promised possibilities initially received a great deal of attention and were a frequent subject of media discussions and futuristic scenarios (sometimes amounting to “hype”) such as the ability to automate the process of discovery, binding, and invocation of Web services on the Internet without human intervention (Manes, 2004; Nakhimovsky & Myers, 2004). One technology analyst and author (David Chappell) in 2003 even doubted if there was a business case for Web services (Chappell, 2003). However, Web services are nowhere near achieving the full potential that was hoped for. Nevertheless, the technology is being implemented successfully (and commercially) by many of the big players such as eBay, Amazon and Google (Iskold, 2006 ). Furthermore, the technology has also created the foundation for a new Enterprise Application Integration (EAI) paradigm known as Service-Oriented Architecture (SOA). The extensible XML-based nature of SOAP has enabled many organizations to expose some of their legacy and disparate systems as Web services in order to achieve total integration of their systems (Clark, 2007; Flinders, 2007; Mohamed,2007). Most importantly, SOAP-based Web services are now being used in the delivery of some aspects of a new computing
paradigm (namely cloud computing) which not only promises to deliver software remotely but also other computing-related functionality thanks also to other relatively new technologies such as virtualization and grid computing.

Firms will be able to adopt this service on demand, so as to avoid large up-front costs (that are currently necessary for hardware and software equipment) and spend in ICT according to their production necessities - Dubey and Wagle (2007) and Armbrust et al.(2009) for early reviews of the topic. This will have a large impact on the cost structure and through it on the production possibilities of all firms, especially small and medium size enterprises (SMEs). Cloud computing allows enterprises to get their applications up and running faster, with improved manageability and less maintenance, and enables IT to more rapidly adjust resources to meet fluctuating and unpredictable business demand. Application of cloud computing is going to reduce drastically the fixed costs of entry and production, turning part of them into variable costs related to the production necessities. This will have a positive impact on entry and competition in all. But for many organizations, in a short period of time may not be possible to make the transition to cloud computing, particularly as the cloud market is so new. Longer term, cloud computing is increasingly appearing to be a transformative change in the business landscape. Cloud computing is becoming part of the enterprise more and more. Customers every day are considering the cloud as a way to drive new business opps and it's becoming a reality for many. Though cloud computing is the best thing for small business since the invention of the stapler. But that doesn't mean that every small business should immediately throw out all their servers and software and conduct all their business operations in the cloud. Small business owners have different needs and different comfort levels. It may be more advantageous for them to use cloud computing only for certain applications. Cloud computing is a great opportunity for small businesses to off-load the hassle and costs of IT management.

One approach might be to start cloud computing slowly; choose one or two of business applications to replace and see how it goes. Hopefully over time it will become more comfortable and able to reap even more. Security issues related to having their business data 'out' on the Internet seem to be the number one concern of small business owners.

WHAT IS CLOUD COMPUTING?
There seems to be many definitions of cloud computing around. A study by McKinsey (the global management consulting firm) found that there are 22 possible separate definitions of cloud computing. In fact, no common standard or definition for cloud computing seems to exist (Grossman, 2009; Voas & Zhang, 2009).

According to National Institute of Standards and Technology (NIST) definition:
"Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (for example, networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction."

It is a service, a platform, and even an operating system. Some even link it to such concepts as grid computing -- which is a way of taking many different computers and linking them together to form one very big computer.

Cloud computing can mean a lot of things, but essentially, it refers to any service in which data is stored in a remote virtual environment instead of on your business’ premises. Generally, these services are subscription-based, and may be billed on a monthly basis, with rates dependent on the amount of data you’re storing remotely, or in “the cloud”.

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A basic definition of cloud computing is the use of the Internet for the tasks of performing on computers. The "cloud" represents the Internet. Beyond just being used as a place to store and share information, cloud computing can be used to manipulate information. For example, instead of using a local database, businesses could rent CPU time on a web-based database. The major drawback of using cloud computing as a service is that it requires an Internet connection. So, while there are many benefits, some times it may cut off from the Web.

**HOW CLOUD COMPUTING WORKS:**

![Diagram of cloud computing](image)

Although cloud computing is an emerging field of computer science, the idea has been around for a few years. It's called cloud computing because the data and applications exist on a "cloud" of Web servers.

For an executive of a large corporation responsibilities are more. Among all other responsibilities, particular responsibility includes providing the employees the right hardware and software they need to do their jobs. Buying computers for everyone isn't enough – they also have to purchase software or software licenses to give employees the tools they require. Whenever a new hire, they have to buy more software or make sure that current software license allows another user. It's so stressful for executives.

As such there is an alternative available for executives. Instead of installing a suite of software for each computer, they have to load one application. That application would allow workers to log into a Web-based service which hosts all the programs the user would need for his or her job. Remote machines owned by another company would run everything from e-
mail to word processing to complex data analysis programs. It's called cloud computing, and it could change the entire computer industry.

In a cloud computing system, there's a significant workload shift. Local computers no longer have to do all the heavy lifting when it comes to running applications. The network of computers that make up the cloud handles them instead. Hardware and software demands on the user's side decrease. The only thing the user's computer needs to be able to run is the cloud computing system's interface software, which can be as simple as a Web browser, and the cloud's network takes care of the rest.

For example, an e-mail account with a Web-based e-mail service like Hotmail, Yahoo! Mail or Gmail, then they have some experience with cloud computing. Instead of running an e-mail program on your computer, you log in to a Web e-mail account remotely. The software and storage account doesn't exist on computer -- it's on the service's computer cloud.

Some of the companies researching cloud computing are big names in the computer industry. Microsoft, IBM and Google are investing millions of dollars into research. Some people think Apple might investigate the possibility of producing interface hardware for cloud computing systems.

CLOUD COMPUTING IN INDIA

Gartner estimated that SaaS market in India was US$27 million in 2007. According to a study by Springboard Research, the Indian SaaS market would experience a CAGR (compound annual growth rate) of 77% during 2006-2010 and will reach US$165 million in 2010 (IANs 2008). According to a study by India’s National Association of Software and Services Companies (NASSCOM) and Mckinsey, remote infrastructure management will be a US$15 billion industry in India by 2013.

In September 2008, IBM opened a cloud center in Bangalore, which targets mid-market vendors, universities, government bodies and microfinance and telecommunications companies (Channelworld 2008). Indian universities are banking on the cloud to develop innovative research and education activities. The Indian Institute of Technology (IIT), Kanpur and other academic institutions use the cloud (MacMillan 2009; Raghu (2008). In November 2009, Microsoft India announced commercial availability of cloud services such as e-mail, collaboration, conferencing and productivity starting US$2 per user per month (HT 2009). These services are mainly targeted to SMEs. India also has a number of local cloud providers

In July 2009, VM ware opened a cloud center in Pune (eeherald.com 2009). Likewise, the U.S. Company, Parallels announced a plan to establish cloud operations in India (Desai 2009). The SaaS vendor, Salesforce.com, which started its operations in 2005, is focusing on cities such as Bangalore, Gurgaon and Mumbai and is taking measures to create cloud awareness. Salesforce.com’s clients include big companies such as Bharti AXA General Insurance, eBay India, Sify Technologies, Polaris Software Labs, Lodha Group, Servion, Maytas Properties, HCL, Sasken Communication Technologies, Ocimum Biosolutions, and state owned National Research Development Corporation (NRDC) (Srikanth 2009).

The Indian offshoring industry is probably the prime example of an industry that is likely to feel the impact of cloud computing. The demand for cloud related services is especially high in the offshoring industry and technology hubs such as Bangalore and Delhi (Economic Times 2009).
SME’S AND IMPORTANCE OF INFORMATION TECHNOLOGY IN ITS FIELD:
Small- and medium-scale enterprises (SMEs) occupy an important and strategic place in economic growth and equitable development in all countries. The post-liberalisation era in the Indian economy has enhanced the opportunities and challenges for the small industries sector. Constituting as high as 90% of enterprises in most countries worldwide, SMEs are the driving force behind a large number of innovations and contribute to the growth of the national economy through employment creation, investments and exports. Their contribution to poverty reduction and wider distribution of wealth in developing economies cannot be underrated. With their dynamism, flexibility and innovative drive they are increasingly focusing on improved production methods, penetrative marketing strategies and management capabilities to sustain and strengthen their operations. They are thus poised for global partnership and to absorb latest technologies in diverse industrial fields.

According to the newly enacted Micro, Small and Medium Enterprises Development Act 2006, which will come into effect from October 2, 2006, enterprises are classified into Micro, Small and Medium according to the following criteria:

- **Micro enterprise** Does not exceed 25 Lakh rupees.
- **Small enterprise** More than 25 Lakh rupees, but does not exceed 5 Crore rupees.
- **Medium enterprise** More than 5 Crore rupees but does not exceed 10 Crore rupee.

The common definition of the Organisation for Economic Cooperation and Development [OECD, 2002], which is based on employment figures. The widely accepted definition points to Small Sized Enterprises with between 1 to 49 employees, while Medium Sized Enterprises are firms with between 50 to 100 employees [Mustafa & Gashi, 2006]. OECD noted that SME are fundamental for the economic growth in member countries and constitute over 95% of enterprises.

The factors – strengths coupled with opportunities – that work in favour of Indian SMEs include their high contribution to domestic production, significant export earnings, low investment requirements, operational flexibility, location wise mobility, low intensive imports, capacities to develop appropriate indigenous technology, import substitution, contribution towards defense production and competitiveness in domestic and export markets.

While we look into new approaches to strengthen them effectively, one has to understand the limitations of SMEs, which include low capital base, concentration of management functions in one/ two persons, inadequate exposure to international environment, inability to face impact of WTO regime, inadequate R&D and lack of professionalism. Besides these, the most formidable problem faced by the SMEs has been in accessing technology and maintaining competitiveness. The reasons for the inability of SMEs to identify their technology needs are;

- Poor financial situations and low levels of R&D
- Poor adaptability to changing trade trends;
- Desire to avoid risk;
- Non-availability of technically trained human resources;
- Emphasis on production and not on production costs;
- Lack of management skills;
- Lack of access to technological information and consultancy services;
- Isolation from technology hubs.
One of the main factors that influences in the success or failure of enterprise is technology. The best use of technology no doubt enables enterprise in reducing cost of production, maintain consistency in quality, improve productivity and finally develop the competitiveness of the enterprise.

*A lot of the technology they have is old, so it’s time for a refresh.*

Technology had a great impact in all aspects of life and the global economy is currently undergoing fundamental transformation. Technical applications have very real impact in most of the industries and in all aspects of economy, while businesses and enterprises continue to undergo considerable changes. Usage of these technologies is revolutionizing the rules of business, resulting in structural transformation of enterprises.

Modern businesses are not possible without help of any sophisticated technology, which is having a significant impact on the operations of Small and Medium Sized Enterprises (SME) and it is claimed to be essential for the survival and growth of economies in general. SME is drawing attention in developed and developing countries as well as in transition countries. It is generally recognized that SME play a key role in the revitalization and development of national economy in many countries and particular in the context of India. It is encouraging the development of SME and the role that SME sector can play in promoting economic and social development by creating opportunities for employment.

Several theories elaborate on connection between information technology, economic development and social change. Almost all agree on the importance of information and communication technology adoption in SME, while the importance of SME as engines to economic growth is well acknowledged worldwide. Information technology, particularly the Internet is having a significant impact on the operations of SME and it is claimed to be essential for the survival and growth of nations economies in general and SME in particual. Especially information technology are changing the economy and traditional business become more dependent on new technologies. Compared with traditional business new technologies facilitate an increased interactivity, flexibility, cheap business transactions as well as improve interconnection with business partners and costumers. Information technology is having a significant impact in sector of Small and Medium Sized Enterprises (SME), especially where industries are in decline or when unemployment levels are high. In the last part of the twentieth century, the Internet and mobile phones not only changed the face of communications, but also gave the impetus to economic growth.

Globalization of world economy and technological developments in the two decades of twentieth century have transformed the majority of wealth creating work from physically based to knowledge based and has greatly enhanced the values of information to business organisation by offering new business opportunities. While, for the last two hundred years, economics has recognized only two factors of production: labour and capital, this is known changing. Information and knowledge are replacing capital and energy as the primary wealth creating assets.

Information has become a critical resource, a priceless product and basic input to progress and development. Information has become synonymous with power. Therefore, accurate, rapid and relevant information are considered to be essential for SME [Combs, 1995:67].
SME would need as well as effective information systems to support and to deliver information to the different users. Such information systems would include those technology that support decision making, provide effective interface between users and computer technology and provide information for the managers on the day-to-day operations of the enterprises. Information is needed for various purposes and serve as an invaluable commodity or product. Information is very important aspect of decision making in all levels of management in enterprises [Hicks,1993:648], especially in competitive business environment and managers utilize information as a resource to plan, organize, staff administer and control activities in ways that achieve the enterprises objectives.

The ability of SME’s to realize their goals depends on how well the organisation acquires, interprets, synthesizes, evaluate and understands information and how well its information channels supports organizational processes. Combs [1995:124] noted that information technology is one of the most important factors of any production activity and technological changes can have profound consequences. This technology will continue to enable the growth of global work, where SME operate across national boundaries. Today, new technologies, especially Internet technology are changing the global flows of information, trade and investment and the competitiveness.

IS CLOUD COMPUTING GOOD FOR SMALL BUSINESS?
Cloud computing refers to software applications and data storage services that are delivered in real time over a network, usually the Internet. These services include basically anything that you can do on a PC: e-mail, data storage, and communications and productivity applications. The benefits of cloud computing may include lower costs, greater mobility and enhanced collaboration.
Cloud services may be considerably less expensive than the comparable desktop software and user licenses. Prominent IT companies offer free suites of productivity applications as well as the more feature-rich subscription services. The subscription services are pay for usage, but they offer priority customer support and premium features. Additionally, by leveraging cloud services small business can reduce the need for in-house exchange servers and IT staff, thereby potentially reducing operation expenditures.
Having such productivity applications and storage “in the cloud” enables access to your files anytime and anywhere there is a network connection. It can also make it easier for colleagues to collaborate on projects regardless of time zone or location.
One area where the results of cloud computing is mixed is reliability. On the upside, commercial cloud service providers need to have very solid data back-up systems. With cloud computing it is unlikely that your data will be lost as service providers will typically have data recovery systems in place. However, a more frequent problem is accessibility. While 24-7 access is one of the promises of cloud computing, the reality is that outages do occur. From time to time even major providers have services go offline due to system failures or maintenance. Additionally, you will need stable internet access at your end in order to ensure your access to the available services.
Still, as every computer user knows, physical in-office systems and networks also fail. When considering moving to the cloud, a question you have to ask is: “how often do your own office systems go offline?” Assess your tolerance to the risk of network outages. If a cloud-computing system’s stability is consistent with your needs, cloud computing might be advantageous to your operations.
A bigger consideration is security. By taking your data and workflow into the cloud, you are trusting a third party with your data. As well, by increasing access points to your data – for instance by allowing employees to access data from remote locations – you run a greater risk
that third parties could access it. Although switching to cloud computing may be a good choice for some businesses, it is also likely to be a growing practice in the future, and something that all businesses may ponder.

Most major computer firms are heavily investing in cloud offerings; therefore it is likely that some of the services you already use will be moved to the cloud (if they haven’t been already).

A FRAMEWORK FOR CLOUD RELATED INDICATORS IN DEVELOPING COUNTRIES

(Fig.2)

Source: Cloud Computing In Developing Economies: Drivers, Effects and Policy Measures
Nir Kshetri

How Small Businesses Can Use Cloud Computing:

**Document storage.** Many cloud document storage services allow you to store and access Word files, PDFs, audio files, spreadsheets, and other data through your Internet connection, so you can access your files from any computer as long as you can get online. A typical provider allows up to one gigabyte of free storage per account; if your business needs more space, it can be purchased on a per-unit basis.

**Website hosting.** Instead of purchasing a physical server to host your website, many users have now switched to “cloud hosting,” which operates on one or more connected servers online. This means that you can quickly scale up or down if your bandwidth needs increase or decrease. It’s also far more cost-effective than a dedicated server, as you only need to pay for the amount of computing power you’re using, instead of paying the full cost of running an entire server. On the downside, because you are not physically in control of your data storage, there are some security risks as far as cloud hosting is concerned. Nonetheless, it’s a great option for many small businesses.
Accounting and billing. If you and your employees need to keep track of your hours, expenses, and invoices, one way to make sure everything’s in order is to use an accounting system that’s hosted in the cloud, so users can access the service from anywhere. Many accounting services even offer programs that let you track your time as you are working, and monitor how timely your clients are with paying your invoices.

Project management. If you’re managing a team of workers who frequently need to upload files for feedback and editing, it makes a lot of sense to switch from an internal project management system to one that’s hosted online. This is particularly useful if you have employees who work remotely or travel for business, or if you’re managing a project that involves freelance contractors. In addition to file sharing, such systems can be used to send messages within a group, and to set up milestones and email reminders.

Web analytics. You could track your own server logs for data about who’s visiting your business website, but many cloud-based web analytics platforms offer far more advanced solutions for tracking and parsing your data than you could do independently. There are a number of popular free analytics options that allow you to track measures including browser type, country, referring link, and conversion rate (i.e., completing a desired action). If you’re willing to pay a small monthly fee, you can even sign up for real-time reporting services that let you track what users are doing on your site at this very second.

Where to get Cloud services or Cloud Offerings:
Cloud computing is not just a concept technology that promises to deliver many exciting things. It is already a reality and there are many commercial implementations of it. For example, Amazon’s Elastic Compute Cloud (EC2) offers a variety of services and it represents a virtual computing environment that allows users to use Web service interfaces in order to launch instances with a variety of operating systems, load them with customers’ custom application environment and manage customers’ network’s access permissions. Amazon’s other cloud, known as S3 (or simple storage service), provides a Web services interface that can be used to store and retrieve any amount of data, at any time, from anywhere on the Web. It provides developers with access to “the same highly scalable, reliable, fast, inexpensive data storage infrastructure that Amazon uses to run its own global network of Websites”, according to Amazon’s description of this service. A number of clouds serving different needs are also provided by Google. One popular service is Google Apps. Google Apps is a collection of Web-based messaging (e.g., Gmail, Google Talk, and Google Calendar) and productivity and collaboration tools (Google Docs: text files, spreadsheets, and presentations).

IBM has a number of cloud products under its Smart Business portfolio. They include Smart Market (a portal service to compare and manage different business applications that run in IBM’s cloud environment), Smart Cube (an all-in-one appliance that has networking, storage, and office software built in), Smart Desk, (a dashboard software package that enables users to manage applications and services from the Market and Cube clouds). IBM is also trying to address the concerns of IT staff who claim that their top challenge is finding enough available resources to perform tests before moving new applications into production. IBM response was the introduction of Smart Business Test Cloud (designed, according to IBM, to reduce costs to organizations substantially) which includes a pre-integrated set of services, from planning through management, for a test environment implementation. Delivered through hardened services methods for the design and deployment of integrated cloud solutions, this
Cloud can leverage existing investments in hardware, software, storage, and virtualization management, or utilize the newly announced IBM Cloudburst (a complete IBM service management package) as the infrastructure solution.

Like other major vendors, Microsoft is also investing heavily in this new computing service delivery model and has introduced Azure, as its cloud offering. Azure has three components: Windows Azure (which provides developers with on-demand compute and storage to host, scale, and manage Internet or cloud applications), SQL Azure (which extends the capabilities of Microsoft SQL Server into the cloud as a Web-based distributed relational database) and Azure Net Services (which include a set of Microsoft hosted, highly scalable, developer-oriented services that provide key building blocks required by many cloud-based and cloud-aware applications). The above examples are intended to provide an impression of the type of cloud services on offer by some of the major players in this field.

There is no space here to list the many other cloud services that currently exist. However, some Web sites and blogs maintain a list of those suppliers which can be found easily by “google-ing” one’s search. This, no doubt, is a manifestation of the growing number of cloud providers and vendors.

India’s CRL and AdventNet are among the high-profile Indian cloud providers. Other Indian IT companies such as TCS and Wipro have plans to enter the cloud market. Wipro has built a "private cloud" for its internal use. The company is also considering other services: public cloud, hybrid cloud, and helping independent software vendors design and implement SaaS (Foley 2009). Likewise, TCS is exploring the possibilities of cloud through pilot projects (Morgan 2009). Other IT players such as HCL Technologies and Bharti Airtel have also embraced the cloud.

As noted above, the Indian company Advent Net’s Zoho division operates a popular suite of web-based applications (Economist 2008a). Likewise, Hyderabad-based Pressmart provides SaaS based e-publishing and digitization services to the print industry. Pressmart solution can help firms deliver contents across multiple platforms such as Web, mobile, RSS, podcasts, blogs, social networking sites, articles directories and search engines (Sanyal 2008). In 2008, Pressmart received VC investment from Draper Fisher Jurveston and NEA-IndoUS Ventures.

CLOUD-RELATED ENTREPRENEURSHIP OF DEVELOPING WORLD-BASED FIRMS
Table-1

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<th>Company</th>
<th>Country</th>
<th>Description</th>
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| Infosys             | India   | • Partnered with its major clients in cloud research
• Provides cloud computing-based services for the auto sector |
| Computational      | India   | • March 2008: Yahoo signed a research pact with CRL to support cloud research. |
| Research            |         | |
| Laboratories (CRL) |         | • A lab run by the Tata Group
• CLR would provide EKA supercomputer, which was the world’s fourth fastest in March |
| AdventNet           | India   | • Zoho division operates a popular suite of web-based applications
• Zoho had over 1.5 million users in March 2009, 2 million in September 2009 (400,000 users, 20% of total in India and China) |
|                     |         | • The ICICI bank’s insurance arm uses Zoho’s applications to develop innovative services such as a personalized insurance for diabetes. Premiums are adjusted depending on how well policyholders stick to a fitness plan |
|                     |         | • Provides cloud computing-based services for the auto sector
• Provides cloud computing-based services for the auto sector |

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IMPACT OF CLOUD COMPUTING ON SME’S:

Operational Efficiency: Productivity and Efficiency Gains:
Operational efficiency is related to the costs of accomplishing corporate functions. Anecdotal evidence from developing countries such as China, India and South Africa indicates that adoption of the cloud may lead to productivity and efficiency gains. As noted earlier, cloud has enabled some South African call centers to increase productivity by 20% (Firth 2009). The Indian cloud Provider, Netmagic reported that the company’s cloud services helped its clients cut costs by 25-30% (Abrar 2009). Microsoft claimed that its cloud services offered in India would help reduce IT costs by 10-50% (HT 2009). Likewise, the cloud-based model has helped Chinese software startups access to infrastructures and data centers and utilize virtualized computing resources, which has led to a reduction of the upfront investments and product development costs.

Security Enhancement
Most organizations in the developing world have weak defense mechanisms. In 2002, North America accounted for 58% of the global IT security market (Europemedia 2002). An estimate suggested that in 2006, about 3 million of Brazil's SMEs lacked anti-virus software in their PCs (Business Wire 2006). Likewise, 60% of Kenyan banks reportedly have insecure systems (Kinyanjui 2009). The cloud thus has a possibility to enhance security for these companies. In this regard, the concept of “hollow diffusion” of e-commerce can be helpful in understanding weak defense (Otis & Evans 2003). Many companies in developing countries arguably lack technological and human resources to focus on security. “Hollow diffusion” can take place in human terms (lack of skill and experience) as well as in technological terms (failure to use security products) (Otis & Evans 2003). Some ISPs in industrialized countries reportedly block contents originated from problematic networks in developing countries (Garfinkel 2002).

The cloud’s economies of scale allow a business model in which third parties can provide a cost-effective security for smaller companies by integrating security applications into cloud services (Grossman 2009). Delivery of security on the cloud can address some of the human (e.g., problems to install and maintain software) and technological issues and may strengthen the defense mechanisms.

Development of New Products And Services
The cloud has also helped some developing world-based firms develop new products and services. Zoho’s applications are used by hospitals and banks in India to develop new products. As another example of cloud use to develop new products and services, consider the Computational Intelligence Research Group at the University of Pretoria. As noted earlier, students in the university use the cloud to develop new drugs.

Extending Market Reach
The cloud can also extend market reach of SMEs. Consider for instance, healthcare off-shoring industry. Industrialized world-based healthcare providers are increasingly off-shoring services related to medical transcription, billing and insurance claims teleimaging and telepathology to India. Most of these are currently dominated by big players such as Wipro and Teleradiology solutions. Cloud computing is likely to open the door for small Indian players to participate in the global healthcare off-shoring industry. Availability of web-based applications such as those offered by Zoho reduces the up-front investments for small Indian off-shoring companies.
Exports of Cloud Related Services
There has been some achievement on the export of cloud related applications and services. Unbelievable as it may sound some developing world-based technology companies such as AdventNet have been exporting cloud-based applications.

ADVANTAGES OF CLOUD COMPUTING
Cloud computing offers numerous advantages both to end users and businesses of all sizes. The obvious huge advantage is that one has to support more for infrastructure or should have the knowledge necessary to develop and maintain the infrastructure, development environment or application, as were things up until recently. The burden has been lifted and someone else is taking care of all that. Business are now able to focus on their core business by outsourcing all the hassle of IT infrastructure.

As with any major business decision, if you are considering the use of a cloud-based system in your organization, you should carefully evaluate both its advantages and disadvantages to ensure it is in line with your business goals and specific network needs.

Advantages:

1. **Easy Implementation:** Cloud hosting allows businesses to retain the same applications and business processes without having to deal with the backend technicalities. Readily manageable by the Internet, a cloud infrastructure can be accessed by enterprises easily and quickly. Another advantage is a lesser cost for in-house IT infrastructure maintenance. While a backup can be an extra cost, it can be worth it in the event of a technical failure within the cloud.

2. **Accessibility:** A major advantage of cloud storage is the ability to access data from any location. Offices in two or more locations can access the same files. For companies with people telecommuting or working out of multiple locations, it provides continuity and effectiveness. Business travelers can also access data from anywhere in the world. An internet cloud infrastructure maximizes enterprise productivity and efficiency by ensuring the application is accessible from any place anytime, allowing collaboration and sharing among users in multiple locations.

3. **No Hardware Required:** A physical storage center is no longer needed as it is hosted in the cloud. Again, a backup could be worth looking into in the event of a disaster that could leave the company's productivity stagnant. Recovering from a disaster is easier with this data storage configuration. Any company can retrieve data when needed, assuming that cloud storage provider wasn’t effected. This option helps with disaster recovery planning efforts. If any company is hit with a disaster, it’s highly likely that the data remains safe on the third-party servers. It can be the difference between a company coming back from disaster or closing its doors. It is not unheard of for businesses to fold following the failure of an inadequate data storage solution.

4. **Cost Per Head:** Overhead technology costs are kept at a minimum with cloud hosting services, enabling businesses to use the extra time and resources for improving the company infrastructure. Costs are usually lower with cloud computing. The company pays a monthly or annual fee for a certain amount of storage space. That fee is much lower than the initial cost of hardware backup solutions and expertise to configure and manage them.
5. **Troubleshooting, installation and configuring**: Cloud hosting provides easy, optimal utilization and management. In addition to 24x7x365 monitoring, Stratosphere Networks will install, troubleshoot and configure the cloud software and handle any customization and upgrades the enterprises.

6. **Flexibility for Growth**: Flexible storage requirements are easy with cloud storage. Instead of adding extra hard drives when storage needs change, company has virtually endless storage available in the cloud. Renting space in this manner allows a company to scale cost against storage and pay for what they are actually utilizing.

7. **Efficient Recovery**: Cloud computing delivers faster and more accurate retrieval of applications and data. With less downtime, it is the most efficient recovery plan.

**DISADVANTAGES OF CLOUD COMPUTING:**

1. **Security**: If you use the Cloud Computing, then be clear in mind that you are sharing your important files with the cloud service provider. You are relying on a third party to effectively secure your data. There may be security issues later on and your private or crucial files may get accessed by Cloud service provider. It is important to thoroughly check the security features offered by any cloud storage provider you are considering, read reviews and compare providers before making choices. Although, it’s a big risk to use the Cloud technology for your files’ storage but you can put an end to this fear by opting for the most trusted service provider than going with any new or unknown provider. The choice is yours and extent of risk depends on your choice only.

2. **Technical Problems**: Well, don’t forget that at last it’s another sort of technology and technology faces issues as well. This may be downtime issues or may be any other like hack etc. So it’s quite possible that you may also have to suffer from it, while using the Cloud technology. Nothing can be more wired than the situation, when you need to access your files stored in the Cloud urgently and at the same time, your service provider is facing some technical issues. In such situations, you can’t do anything but just can wait for your service provider to solve all the issues. Well, who knows that how much time it’s going to take.

3. **Access**: To access your cloud storage, you will need an Internet connection up and running, or choose a provider with offline sync (which has its own drawbacks). In areas with no internet connectivity, be it 3G or POTS retrieving this data could be impossible, you would also need to think about connectivity failure scenarios too.

4. **Control**: You give up some control when you place your data on a third-party solution. You do not control the servers. You do not control where those servers sit, and you always run the chance of having your cloud storage company go out of business. Choosing a company with a good track record and a reliable client base is very important for this reason.

5. **Bandwidth**: Constraints limit the amount of data exchange that happens, when you’re in an office with a local server the cables or wifi can (usually) pass data much faster than traditional internet connections, if you transfer large files and have a slow connection then cloud storage is probably not an option for you right now.

6. **Swapping**: providers can be very difficult. Your company would need to download all data to your local network then upload it again to the new provider, which would require
TO WHAT EXTENT ARE SMALL & MEDIUM-SIZED BUSINESSES MAKING USE OF CLOUD COMPUTING? – A SURVEY REPORT OF THE GFI SOFTWARE SME TECHNOLOGY

Only 10% of senior business decision makers in Small and Medium-sized enterprises (SMEs) claim to fully understand what cloud computing means. 62% have never heard of cloud computing. A further 13% have heard of it but don’t know what it means.

24% of IT professionals have either never heard of cloud computing or don’t know what the term means.

Security fears are not the main concern for organisations considering cloud computing. Although security is the second highest perceived disadvantage (after vendor lock-in), only 12% cite it as a main reason for not actually pursuing cloud computing.

Over half of all respondents (56%) will not pursue cloud computing because their needs are met by the current in-house set-up.

Despite the IT industry’s emphasis on the financial benefits of cloud computing, 44% of respondents cite ‘too expensive’ as a reason for not adopting.

The top three perceived benefits of cloud computing are: expertise of service provider, lower costs and accountability.

There is growing resistance to the on-premise and hosted polarization. SMEs are increasingly embracing a hybrid model that mixes and matches services to reflect business needs and existing IT skills/infrastructure.

SUGGESTIONS:

Businesses should consider the following hints and tips when selecting a cloud service provider:

- Proceed with caution. This may mean that a move to “the cloud” will take longer than expected but the outcome may be better.

- Look for a provider you have a business relationship with – don't just go for price.

- Look for good governance arrangements, for example, will the provider’s client manager meet regularly with the business?

- Do a full cost-benefit analysis to determine what it costs to have in-house IT. You may find that it costs more than you think.
• Consider the jurisdiction the contract is signed in. For example, if you have a dispute with your cloud service provider, the dispute may only be able to be resolved getting Judiciary help.

• Be conscious of your privacy risks. Your data may be stored offshore and there may be consequences under privacy laws.

• Make sure that data is backed up as part of the service. Do not assume it is part of the service.

• Ask about the level of security provided.

• Make sure you have a Service Level Agreement (SLA) and that you read the terms carefully to understand the limitations to the service. The SLA should have clauses on response times, business continuity and disaster recovery.

• Do your due diligence on your preferred cloud service provider. For example, look for any certification they have, such as Information Technology Infrastructure Library Certification, do online searches of the service provider and look at the track record and scale of the service provider.

• Ask what happens to your data if you choose to leave a service provider, such as deletion of data.

• Do not make your decision on your preferred service provider based on cost. A large reputable service provider may cost you more but may provide you the level of service you require and it can help mitigate some of the risks highlighted in this document.

• Run trials to test whether the cloud solution meets your needs.

• When starting out in “the cloud”, do not outsource important business-critical software, outsource general software such as “point of sale” software or email.

• Advise your clients where and how their data is stored. It may also be necessary to amend your agreements with clients to allow you to store confidential client information in “the cloud”.

• Be aware of the different types of services cloud service providers can offer. These services are generally grouped into the following categories:

• Infrastructure as a Service (IaaS) – this lets you relocate your servers to the cloud computing service provider, but you remain in control of, and responsible for, your software and data.

• Platform as a Service (PaaS) – this lets you relocate your servers and operating system, while you remain responsible for your data.
- Software as a Service (SaaS) – this is the full cloud package, where the applications you run, your data and the server is managed and operated offsite by your cloud service provider. A good quality cloud solution can provide your business, regardless of size, with greater IT flexibility at a lower cost.

A good quality cloud solution can provide your business, regardless of size, with greater IT flexibility at a lower cost.

CONCLUSION:
Cloud computing can be good for small business. It is cheap, easy to set up and requires little maintenance at the end. However there are risks associated with it in terms of security and stability. If you are not processing large amounts of personal or financial data about your customers, or if the work you are doing in the cloud is not business critical, then these may not be major considerations. Many business use a hybrid option, running software on their own computers for some services, running others in the cloud. Whatever way you choose to run your IT systems you always need to make sure that you have a backup plan if things do go wrong.

Like everything else, cloud computing too has its pros and cons. While the technology can prove to be a great asset to your company, it could also cause harm if not understood and used properly. \
Despite its disadvantages and the fact that it is still in an infant age, cloud computing remains strong and has great potential for the future. Its user base grows constantly and more big players are attracted to it, offering better and more fine tuned services and solutions. We can only hope that the advantages will further grow and the disadvantages will be mitigated, since cloud computing seems to have made IT a little bit easier.

The high rate at which IT technology changes will continue to place a great deal of pressure on organizations’ budgets. Continuous upgrades of software and hardware have become important items on many of those organizations’ resource meetings and will continue to put pressure on the budgets of those organizations. This situation is likely to be made worse in the current difficult economic conditions.

Cloud computing is an Internet-based network model that enables on-demand access to a shared pool of computing resources such as networks, servers, storage, applications and services provided by a third party. It is becoming a standard method of software and hardware systems operation and provides several advantages including potential cost savings for many businesses. Recently though, as witnessed with the Amazon cloud outage that rocked the IT world in April and knocked several popular websites offline including Qurora, Foursquare and Reddit, the risks and disadvantages associated with cloud computing were highlighted. For many, this incident called the cloud’s overall reliability into question.

This article introduced the still-evolving area of cloud computing, including the technologies and some deployment concerns. Definitions and standardization in this area are a work in progress, but there is clear value in cloud computing as a solution for several IT requirements.
Sources: