

# **Project Dissertation**

**On**

## **AN ASSESSMENT OF CHALLENGES IN THE ADOPTION OF CLOUD COMPUTING IN THE INDIAN TEXTILE INDUSTRY**

Submitted By:

Himanshu Gulia 2K15/MBA/28

DSM, DTU

Under the guidance of:

Dr. Vikas Gupta



**DELHI SCHOOL OF MANAGEMENT**

**Delhi Technological University**

**Bawana Road, Delhi 110042**

**JAN- MAY 2017**

**CERTIFICATE FROM THE INSTITUTE**

This is to certify that the Project dissertation titled '**AN ASSESSMENT OF CHALLENGES IN THE ADOPTION OF CLOUD COMPUTING IN THE INDIAN TEXTILE INDUSTRY**', is a bona fide work carried out by Mr. Himanshu Gulia, of MBA 2015-17 and submitted to Delhi School of Management, Delhi Technological University, Bawana Road, Delhi-42 in partial fulfilment of the requirement for the award of the Degree of Masters of Business Administration.

Signature of Guide

Signature of Head (DSM)

(Dr. Vikas Gupta)

(Seal of Head)

Place:

Date:

## **DECLARATION**

I, Himanshu Gulia, student of MBA 2015-17, of Delhi School of Management, Delhi Technological University, Bawana Road, Delhi-42, declare that the dissertation report on 'Cloud Computing Adoption', submitted in partial fulfilment of Degree of Masters of Business Administration, is the original work conducted by me.

The information and data given in the report is authentic to the best of my knowledge.

This report is not being submitted to any other University for award of any other Degree, Diploma and Fellowship.

Himanshu Gulia

Place:

Date:

## ACKNOWLEDGEMENT

I am using this opportunity to express my gratitude to everyone who supported me throughout the course of this MBA project in '**AN ASSESSMENT OF CHALLENGES IN THE ADOPTION OF CLOUD COMPUTING IN THE INDIAN TEXTILE INDUSTRY**'. I am thankful for their aspiring guidance, invaluable constructive criticism and friendly advice during the project work. I am sincerely grateful to them for sharing their truthful and illuminating views on a number of issues related to the project.

I express my warm thanks to my guide **Dr. Vikas Gupta (Asst. Professor, DSM)** for his support and guidance in the accomplishment of this dissertation and for all his deep ideas and concepts which helped me a lot in carrying out this dissertation in an effective and constructive manner. I would also like to provide my heartfelt gratitude to all the people who provided me with the facilities being required and conducive conditions for my dissertation.

I would also take the opportunity to thank the **PhD Scholars** especially **Mrs Meenu Chopra** for her guidance and invaluable inputs in the development of this dissertation and guiding me as and when required. She also explained to me intricacies of the dissertation.

In the end, I would like to extend my gratitude to my family and friends for their support and cooperation during this project.

Himanshu Gulia

2K15/MBA/28

## **EXECUTIVE SUMMARY**

Information Technology (IT) utilization in the world is now at its peak and is also the most vital technology for any firm to prosper and grow, but this also leads to wastage of resources both human and technological at times by underutilizing or non-optimal utilization of IT resources. A new technology which is still in developmental and growing stage has gained popularity and momentum in recent year's viz. Cloud Computing. This has been adopted by a number of developed and developing countries as well. This has played a big role in reducing overall hardware expenditure and software implementation and scaling. However many risks and challenges such as Security, Data breach, Vendor locking etc, resulting into questioning of reliability and credibility this further resulted to lower investment from big companies.

The aim of the research is to find concrete reason for implementation, non-implementation and recommendation for cloud computing Use of an amalgamation of Qualitative, Quantitative and Exploratory research is extensively used for data collection and analysis. Primary data has been taken via the method of Interviews and Questionnaire both from Top level IT experts and Secondary was taken from various research papers and reports.

The main objectives of the research are:

- To find the perceived benefits and advantages of cloud computing in organizations which motivate them to adopt Cloud in their own organization.
- To find the risks and challenges associated with the cloud computing which in turn demotivates them to adopt cloud computing.
- Suggestions to overcome risks pertinent to cloud computing. Interview and case study methodology has been

used by finding parameters to reach to the conclusions and to provide suggestions.

Interviews were conducted from firms whose product is not IT based but use IT for their functions. The Industry of choice is Textile. The selection of respondents was Senior IT Executives of organizations (Average work experience is > 20years) to gain a clear insights as they possess the expertise and review from subordinates as well. The research pointed towards most significant benefits of cloud being :

- Flexibility
- Ease of data access(Remote data access)

The Risks most significant are:

- Vendor Locking
- Security and data breach

Suggestions for reducing risks in implementing cloud computing:

- Vendors shall provide options to switch from one vendor to another.
- Better and clearer SLA's could be defined
- Opting for On premises private cloud if more security is needed
- Change management best practices should be used at the time of implementation.

## Table of Contents

<b>Chapter 1 Introduction</b>		<b>1-5</b>
1.1	Background	1-3
1.2	Objectives of study	4
1.3	Significance of Study	4
1.3	Time Plan of the Work	5
<b>Chapter 2 Review of the Literature</b>		<b>6-15</b>
2.1	Review of Literature	6-7
2.2	Cloud Computing	8-10
2.3	Types of cloud computing services	10-11
2.4	Concepts of Cloud Computing	11-13
	2.4.1 Type of cloud computing based on type of services	11-12
	2.4.2 Types of cloud computing based on Deployments	12-13
2.5	Benefits of Cloud Computing	13-20
2.6	Risks in Cloud computing	20-30
<b>Chapter 3 Methodology of Research</b>		<b>31-33</b>
3.1	Research Design	31
3.2	Research Methods	32
3.3	Data Collection	33
<b>Chapter 4 Research Analysis</b>		<b>34-39</b>
4.1	Preliminary research analysis	34-37
4.2	Interview Analysis	37-39
<b>Chapter 5 Conclusion and Recommendations</b>		<b>40-41</b>
<b>Chapter 6 Scope for Future Study</b>		<b>42</b>
<b>Bibliography</b>		<b>43-47</b>
<b>Annexure 1 : Questionnaire</b>		<b>48-51</b>
<b>Annexure 2 : Profile of Experts and organizations</b>		<b>52</b>

## LIST OF FIGURES & CHARTS

<b>FIGURE</b>	<b>PAGE NO.</b>
Figure 2.1 View on main aspects of cloud	11
Figure 2.2 Types of Cloud Computing on basis of service	12
Figure 3.1 Research Framework	31
Figure 4.1 Benefits of cloud	35
Figure 4.2 Risks of cloud	36



## LIST OF TABLES

<b>TABLES</b>	<b>PAGE NO.</b>
Table 1.1 Time Plan of Work	5
Table 4.1 Benefits According to Experts	37
Table 4.2 Risks According to Experts	38
Table 4.3 Suggestions According to Experts	39

## CHAPTER I

### INTRODUCTION

#### 1.1. Background

Worldwide trade in textiles and outfit has an important role in the development of many countries and has also enabled their incorporation in to the world economy. In the Developed Countries, the process of industrialization commenced with the automation of textile manufacture in the early 19th Century. In the Developing Countries, the sector has come to occupy an important place in terms of its contribution to national output, employment and exports. Developing countries as a group. Account for more than one half of world exports of textiles and clothing.

The textile industry in India traditionally, after agriculture, is the only industry that has generated huge employment for both skilled and unskilled labor in textiles. The textile industry continues to be the second-largest employment generating sector in India. It offers direct employment to over 35 million in the country. The share of textiles in total exports was 11.04% during April–July 2010, as per the Ministry of Textiles. During 2009–2010, the Indian textile industry was pegged at US\$55 billion, 64% of which services domestic demand. In 2010, there were 2,500 textile weaving factories and 4,135 textile finishing factories in all of India. According to AT Kearney's 'Retail Apparel Index', India was ranked as the fourth most promising market for apparel retailers in 2009.

The textile and garment industry used to be single most export earner for India, now Information Technology (IT) and Information Technology Enabled Services (ITES) companies have taken that place pushing textiles to number two. In the world, India is known for both these industries. The combination of these two can create synergy, if properly used. The application of IT in textile and garment industry can help them in

improving the overall performance. In country like India it is very important that textile industry remain strong and grow continuously as it is the provider of highest jobs after agriculture. Many big textile units have already adopted IT in their companies in various forms. They use machineries with latest technology available in the world and these machines utilize IT in many areas such as production monitoring, quality monitoring and control, etc. Also, these companies are using Enterprise Resource Planning (ERP) in various levels.

In simple terms an ERP system organizes all the information of a company into one centralized system. In India a large number of textile and garment companies are small in size and falls under SME sector. Due to their size and facilities available the decentralized and small companies confront five major challenges. In order to meet these changes, manufacturers will need to communicate intensively with retailers and implement the necessary communications network, which are usually supplied by retailers.

Cloud computing is the recent product of Information Technology (IT), with a huge potential to integrate the best features of software and hardware components. Regarded as the most beneficial IT innovation, cloud computing currently is set out to transform the IT and IT enabled services across the globe.

Cloud computing has systematically showcased tremendous benefits, and the benefits of cloud can be distinctly categorized as economic, architectural and strategic. Pay-as-you go, pay-as-you go without any capital expenditure are the economic benefits of cloud. Simple abstract environment for development and usage is the architectural benefit of cloud, and focus on core business due to third party ownership is the strategic benefit of cloud computing (Ghalimi, 2010). The economic, architectural and strategic elements of the cloud provide flexible on-demand storage service at lower costs, enable the easier development of new services, and link the disparate services while increasing performance and scalability (Coombe, 2009).

Currently, cloud computing is adopted by Small and Medium Businesses (SMBs) Selective large enterprises, U.S. government and certain developing countries across the globe. Largely cloud services are currently being utilized by SMBs, followed by certain large enterprises. The potential savings of cloud computing has attracted the attention of Ex-President Barack Obama, who has lead the United States government towards adopting cloud services. Developing nations such as sub-Saharan Africa are strongly poised to adopt cloud. Countries such as China, India, Vietnam, and Brazil are all set to reap the benefits of cloud with the support of companies such as IBM, Microsoft etc. (Graham, 2011).

Despite the high benefits, cloud is often criticized due to data segregation, confidentiality and availability, and software licensing (ENISA, 2009 & iDefense, 2009). The data in cloud computing is stored and maintained by a third party. This affects the confidentiality of data. Data is not specifically segregated in cloud computing, and is dependent on the availability of network. Network failures affect the reliability and quality of the service. Ultimately, unverified Service Level Agreements (SLAs) with the cloud providers could affect the smooth functioning of the organization (Chandran & Angepat, 2010).

Relevant research strategies have been adopted by eminent organizations across the world, with respect to technical and non-technical aspects of cloud computing. Technical topics pertinent to scale and elastic scalability, trust, security and privacy, data handling, programming models and resource control, and systems development and management have been successfully stipulated. Non-technical topics pertinent to economic and legalistic issues are in the research pipeline. The research outcomes are expected to benefit the telecommunication and business organizations, all over the world ("European Communities", 2010).

## 1.2 OBJECTIVES OF THE STUDY

To assess the challenges in adoption of cloud computing in the textile industry in India and to provide suggestions in order to overcome those challenges and finally develop a framework for further research we need to achieve the following objectives

- To Identify the challenges and Risks associated with cloud computing.
- To Identify the Benefits and advantages which motivate the organizations to adopt cloud computing
- To provide suggestions based on interviews and secondary analysis of the literature.

## 1.3 SIGNIFICANCE OF THE STUDY

Cloud computing has grown tremendously in the previous years but still its implementation has been under question by many and either they had not agreed to implement it or they had implemented it in a partial manner. This leads us to understand that the cloud computing needs more research in the various types of organizations..

## 1.4 TIME PLAN OF THE WORK

DATE	Key activity	Task
5 <sup>th</sup> Feb 2017	Finalization of topic	The topic for research was finalized

25 <sup>th</sup> Feb 2017	Literature review Finalization	The study of the topic in depth by the use of resources both in research papers published and online was completed and a good understand of the topic was built.
7 <sup>th</sup> March 2017	Benefits and Risks Identification	Benefits and Risks were Identified from the secondary research through the literature reviewed  The target segment for interview was selected to be top and top – mid management of IT in Textile industry.
10 <sup>th</sup> March 2017	Interview is Questionnaire Prepared	A questionnaire with both interview and objective questions is prepared.
12 <sup>th</sup> March 2017	Started contacting the Experts for participating in research interview	Started contacting the Experts in order to get the responses via various meads.
29 <sup>th</sup> March 2017	Started the interview process	The data and contact details were collected and interview process began via online medium and through telephonic conversation
08 <sup>th</sup> April 2017	Responses were collected	The responses from 6 Respondents were collected and interview was recorded
11 <sup>th</sup> April 2017	Interview responses were assessed and analyzed	The responses were assessed and were converted to valuable insights and based on it suggestions were written
28 <sup>th</sup> April 2017	The conclusion was completed	The conclusion and finalization of report was completed.

---

Table: 1.1 Time Plan of The work

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 REVIEW OF LITERATURE

This section shows the review of literature of cloud computing. For the in depth understanding of the subject. An In depth study of literature was done in order to build concepts and understanding regarding this technology of cloud computing in order to understand the interview responses and to form the questionnaire and preliminary result on the basis of literature review.

##### **2.1.1 Evolution of IT and Computing**

Human civilization has symbolically ameliorated itself, from the age of stone to the age of Information and Technology (IT).

Technically, IT can be defined as *“the use of manmade tools for the collection, generation, communication, recording, re-management and exploitation of information. It includes those applications and commodities, by which information is transferred, recorded, edited, stored, manipulated or disseminated”* (Anyakoha, 1991). IT that we see and use today is the result of constant ramifications in the field of research and development, which have sublimely reformed communication, sharing and exchange of information, resources and data. The history of IT serves as a conviction for this aspect; for, IT has evolved from its simplest algorithmic logic to the complex software and hardware network and synthesis.



The logical symposium of algebraic functions has served as a fundamental tool for the software and hardware processes (Mitchell, 1998). Further research to employ automated problem solving techniques with the help of algorithms proved beneficial, for Charles Babbage's proficient attempt resulted in the simulation of analytical engine to compute small calculations (Moschovitis et al. 1999).

Future research and development on the analytical engine, resulted in the birth of a novel device called computer, which has invariably reform the technological world today. World War II marked intense inventions and discoveries in the field of technology, and the convergence of digital technologies and data accumulation methodologies intensified the growth of computing technologies (Edwards, 1996). Following the World War II, commercialization of computing devices, reformed not only the technological commuting of the world, but also reformed the socio-economic aspects of business organizations. The knowledge management systems, financial and human resource IT planning packages, computer-mediated-communications have replaced traditional organizational systems. Many empirical studies indicate that *"IT is valuable, offering an extensive menu of potential benefits ranging from flexibility and quality improvement to cost reduction and productivity enhancement"* (Melville, 2004). The combination of IT resources and managerial deployment of IT has created a competitive advantage to organizations (Melville, 2004). Resultantly, organizations all over the world have impeccably reaped potential benefits from IT applications and solutions across their various sectors. Thus, it can be claimed that IT has become customary not only for technological enhancement, but also for the efficient functioning of an organization. And, the historical augmentation of IT has produced multifarious paradisiacal computing services, which have invariably become part and parcel of everyday life.

## 2.2 CLOUD COMPUTING

IT can be defined as “the use of man-made tools for the collection, generation, communication, recording, re-management and exploitation of information. It includes those applications and commodities, by which information is transferred, recorded, edited, stored, manipulated or disseminated” (Anyakoha, 1991). IT that we see and use today is the result of constant ramifications in the field of research and development, which have sublimely reformed communication, sharing and exchange of information, resources and data. The history of IT serves as a conviction for this aspect; for, IT has evolved from its simplest algorithmic logic to the complex software and hardware network and synthesis.

Cloud computing is the latest creation of Information Technology (IT), with a massive potential to incorporate the best features of software and hardware mechanisms. Viewed as the most valuable IT invention, cloud computing presently is set out to change the IT and IT enabled services throughout the globe.

According to the National Institute of Standards and Technology (NIST)

“Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction” (Mell&Grance, 2011).

Five elements of cloud can be mined from the above explanation. Cloud computing is an:

- On-demand service, it is delivered to individuals on demand, through a clutter free set up process.
- Omnipresent network access, which works in the presence of devices with internet enabled in them.
- Location independent resource sharing, which does not require dedicated infrastructure to allocate resources.

- Rapid elasticity, a characteristic constituent that enables the end users' to change the capacity according to requirements.
- Pay per use, which charges the end users' a nominal fee based on their usage.

Cloud computing is provided by various large and small organizations and major players of IT have delved into it resulting in a very advanced level of services. The major players of cloud computing are Amazon, Google, Microsoft, Rackspace, Force.com etc.

Cloud computing is the next big trend which seems vague, but when it is valued from the point of services it provides; it's the next fashionable and prominent computing system offered through internet. This computing system is providing various useful services in textile and apparel industries. There are some special management systems to simplify various business operations in the apparel and textile industry.

Cloud computing is in a stage of progress wherein applications, business course of action, computing infrastructure can be delivered as a service to the end user whenever and wherever it is needed. Cloud computing is not a new thing in the IT world. It has existed since 2005 but it has been recognized and widely used for over last three years.

For a layman, the term cloud computing can be termed as delivering applications or business infrastructure as a service through the internet. It is an internet based computing technology wherein the user does not need any software, server or infrastructure to use them. Just an internet connection is all that one needs to access this service and it can be operated from any corner of the world.

With the arrival of this new pattern of computing system, people believe that textile firms, apparel industry or any organizations will no longer need to invest in maintaining assets like servers, internal software and storage systems. These can be readily availed as and when required on rent. This would considerably reduce the IT investments cost and save valuable business time.

There are specially designed computing systems that would make the business working simple and easy in the garment industry. There are many functions like

production planning, raw material management, costing, processing the orders, sampling, monitoring the preparation of order and final delivery of the product. All this is made available through this internet based technology. It can be accessed from anywhere, at anytime, easy to install, flexible applications which promotes the efficiency of the company and is the right tool to survive in this competitive industry.

Augmented Reality (AR) can be regarded as one such computing system which is widely used in the apparel and fashion industry. It gives the user a virtual view of actual environment through computer generated applications. AR application can be acquired with the help of camera and Internet. Many such applications can be introduced by Cloud computing in the future.

### **2.3 TYPES OF CLOUD COMPUTING SERVICES**

There are three types of computing services-

- Cluster computing “A cluster, is a type of parallel and distributed system, which consists of a collection of inter-connected stand-alone computers working together as a single integrated computing resource” (Buyya et al. 2009).Despite the fact that bunch figuring increased moderate force, the potential focal points of group are "low-passage expenses to get to supercomputing-level execution, the capacity to track advancements, incrementally upgradeable framework, open source improvement stages, and merchant autonomy". Today, group applications are distinctive in the field of innovative work of science, building, business and industry applications Despite the fact that cluster figuring increased moderate force, the potential positive aspects of cluster are “low-entry costs to access supercomputing-level performance, the ability to track technologies, incrementally upgradeable system, open source development platforms, and vendor independence””(Yeo et al. 2006). Today, cluster computing applications are distinctive in the field of innovative work of science, Engineering, business and industry applications.
- Grid Computing: “is a type of parallel and distributed system that enables the sharing, selection, and aggregation of geographically distributed `autonomous’

resources dynamically at runtime depending on their availability, capability, performance, cost, and users' quality-of-service requirements”(Buyya et al. 2009).It is used to solve high volume resource intensive tasks across globe.

- Cloud computing: There has been a great evolution in cloud computing in past years as compared to other two of three technologies. The R&D of cloud computing are growing in a positive direction.

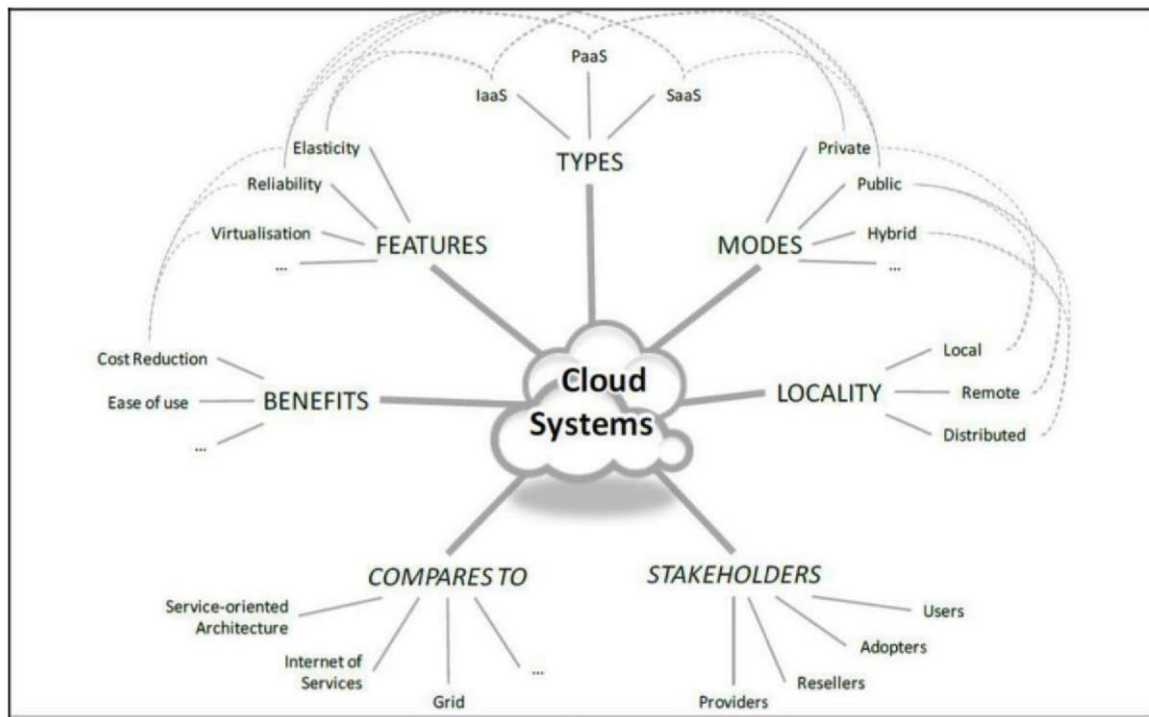


Figure 2.1 Non-exhaustive view on the main aspects forming a cloud system ("European Communities", 2010)

## 2.4 CONCEPTS OF CLOUD COMPUTING

### 2.4.1 Types of Cloud computing based on the type of service

Cloud computing when viewed in the context of services it provides can be divided into 3 types

- IaaS(Infrastructure –as-a-Service): This type of cloud computing service is utilized by the administrators of computers as they just use the data storage locations and remote servers and works according to their own will on those servers and data storage mediums, some of the providers of IaaS are : AWS(Amazon),Rackspace etc
- PaaS (Platform-as-a-Service): This is mostly used by developers who use the platform they need for their development via the PaaS, where they are provided just the work environments like Databases, Operating systems and programming language environments etc. Eg Microsoft Azure, Google app engine etc
- SaaS (Software-as-a-Service) Here the users directly accesses the software applications on which he has to work at the end and the platform and infrastructure are automatically selected by the provider according to the service he needs. This is the least customizable type and used mostly by the end users eg. : Gmail, Google Docs , CRM's.

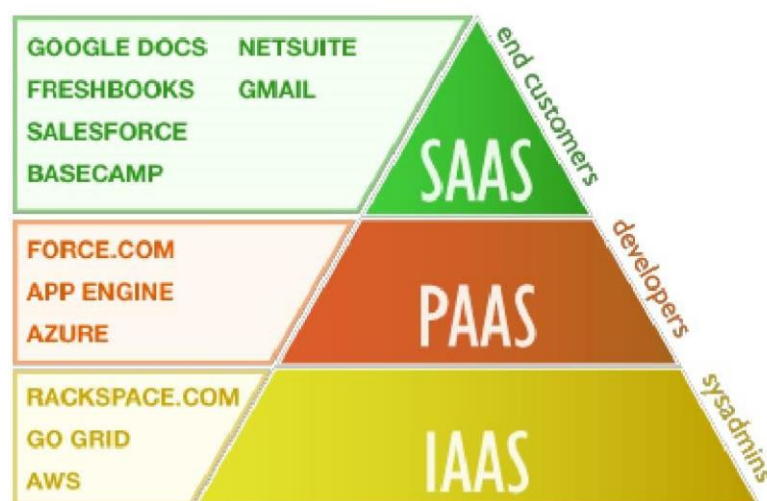


Figure 2.2 Types of cloud computing on the basis of services(Globaldots.com)

#### 2.4.2 Cloud computing based on their type of deployment

Cloud computing based on their Deployment can also be divided into 3 types:

- **Public Cloud:** These types of cloud can be accessed and are available for public and are available for any organization with pay per use model eg. Salesforce(CRM)  
Its major advantages are :
  - Users do not need to worry about hardware resources or availability of internet bandwidth
- **Private Cloud** This type of cloud is used for accessing by the single organization only and not any other end customer it can still be located remotely but there is a choice of doing it on premises too which turns out to be a costly alternative but it provides better control over the hardware infrastructure too. Company's such as banks have to use this kind of structure
- **Hybrid Cloud:** This kind of service is an amalgamation of both private and public clouds here public can be used for end customers and keeping backend part on private cloud.

## **2.5 Benefits of Cloud Computing.**

The Morgan Stanley (2011) report indicates the trending of cloud computing in positive direction. Currently, basic needs such as reduced IT expenditure, efficient hardware infrastructure and the ability to strategically gauge the future, with respect to storage and server capacity demand and centralized data, has compelled the organizations to switch from traditional computing to cloud computing (Pandey et al, 2010). A review of cloud literature propels numerous advantages of cloud. Cloud computing is a promising endeavor, since it has both technical and non-technical benefits for the organizations that deploy it. The technical and the non-technical advantages of cloud computing are inter-connected, for enhancements in the technicalities of cloud computing, result in the enhancements in non-technical benefits. Cloud computing lowers infrastructure costs

**A typical IT infrastructure comprises of data center, network connectivity, operating systems, storage devices, transaction processing facilities, databases, middleware, and IT performance management tools (Pitman & Fuller, 2006). And, the costs that are involved in setting up the IT infrastructure are referred to as infrastructure costs. Pitman & Fuller (2006) also claim that, IT infrastructure has "become the single largest component of enterprise IT cost, often eating up more than 40% of the budget". Moreover, traditional infrastructure requires huge capital expenditure (CAPEX) and operational expenditure (OPEX) (Pandey et. al, 2010). The primary benefit of cloud computing is its minimal infrastructure costs. In the simplest sense, the initial set up costs of cloud infrastructure and data centers is highly low in comparison with traditional computing (Chandran & Angepat, 2010).Secondarily, numerous advantages of OPEX functionality can be outlined. OPEX enables uncomplicated decision making process and the smooth adoption decisions in comparison with CAPEX. Consequently, the risks are lower and the degree of strain over external financial funding is considerably less (Petri, 2010).**

Petri (2010) elaborates the above aspect and clarifies that, *"if one could buy and install an application with the certainty that it will be used intensively for the next ten years, then that would be the right capital expenditure to make. But suppose the implementation works out badly and the use is discontinued after two years. In those - not unimaginable - circumstances, sourcing it via the cloud will of course be cheaper and less risky."*

Thus, cloud computing becomes lucrative prospect for the IT organizations, since it involves only OPEX with respect to the deployment, development of IT applications, help desk support and human resources (Pandey et. al, 2010). This aspect has invariably attracted small scale businesses today, which have reaped huge returns without any upfront capital investments in cloud computing (Chandran & Angepat, 2010).

### 2.5.1 Scalability



Scalability in the simplest sense can be defined as the degree of suppleness. With respect to computing services, scalability is the ability of the platform to expand and contract automatically based on capacity needs (Smyth, 2009).

Importance: In traditional computing, IT requirements and infrastructure is based on the strategic planning of organizations. IT requirements are aligned with the strategic goals of the organizations. In addition, the estimates of IT resources are calculated through Business Intelligence applications, at the end of the month, based on which IT organizations calculate and build their IT infrastructure. However, issues arise when the predicted capacity of IT resources do not match the demands for IT requirements (Petri, 2010). Unmet requirements can result in potential loss of revenues, customers and competitive market (Coombe, 2009).

In this manner, traditional computing systems suffer when the requirements for hardware and software services fluctuate. When the demand for IT resources increases, the IT organizations face simultaneous pressure in procuring and meeting the needs, and when the demand decreases these organizations continue to pay for unused resources, since they are bound by long contracts and agreements (Smyth, 2009).

Thus, *“when an organization has outgrown its solution and they start to spend time trying to make the solution fit a need, or they’ve reached scalability capacity, not only does the business owner need to consider the infrastructure expense or capital investment but also the costs associated with maintenance”* (SMB Suite, 2011). Contrastingly, *“the cloud computing environments are easily scalable”* (Chandran & Angepat, 2010). Cloud computing enables the organizations to increase or decrease their capacity depending on the need of the hour.

*“Cloud computing provides resources on-demand for many of the typical scaling points that an organization needs including servers, storage and networking. On-demand nature of cloud computing means, as your demand grows (or contracts) you can more easily match your capacity (and costs) to your demand” (Smyth, 2009).*

With the cloud computing infrastructure, the peaks and the troughs in the required capacity can be managed eloquently. This invariably is one of the major benefits of cloud computing (Petri, 2010); for, this feature of cloud computing, not only ensuring the availability of resources with the increase in demand, cloud computing also ensures the payments for used data only (Educause, 2009). Moreover, with the flexibility in capacity, IT organizations would not require to provision for peak levels in cloud computing, which is another potential benefit of scalability; for, the organization only pay for the services used by them (Coombe, 2009). With the option to increase and decrease resources based on the immediate need, in combination with being cost-effective, small businesses can significantly adopt cloud computing. Smyth (2009) claims that, *with easy access to a cost effective, flexible technology platform small competitors can punch well above their weight in terms of application capacity and scalability and can quickly turn into significant adversaries (Smyth, 2009).*

Collectively, it can be stated that, cloud computing provides the necessary suppleness by not only providing the required IT resources, but also reduces cost in a great manner. For, IT organizations that deploy cloud, they need not worry about paying for unused resources and making high provisions for peak levels. *“This is especially true for B2B e-Commerce storefronts that need to scale during seasonal peaks” (SMB Suite, 2011)*

### 2.5.2 Efficient Data Recovery and Ease of Use

This section explain the major benefits in disaster recovery and ease of use in cloud computing.

### 1. *Data Recovery*

Data recovery is the recovery of data that has been lost due to perpetual shut down of IT infrastructure. In traditional systems data recovery *“often requires dedicated, specific hardware for data storage and remote applications operation”* (Coombe, 2009). This invariably is a lengthy and time consuming process. However, with cloud computing, especially the Infrastructure as a Service (IaaS) platform which is offered by the cloud, efficient and immediate back-up and recovery of data is possible (Chandran & Angepat, 2010).

Furthermore, the immediate recovery of data in cloud computing is the task of cloud providers who usually have built-in disaster recovery and back-up sites. It has been estimated that, *“with a cloud-based model, true disaster recovery is estimated to cost little more than one times the costs, a significant saving. Additionally, because cloud service providers replicate their data, even the loss of one or two data centers will not result in lost data”* (Smyth, 2009).

### 2. *Ease of Use*

With respect to ease of use, it has been estimated that, traditional organizations

*“require months to integrate and then implement the resource”* (Pandey et al, 2010). Moreover, in traditional systems which contain application servers that are locally present in the place of business, routine maintenance schedules need to be planned in order to obtain optimal performance (SMB Suite, 2011). However, with cloud computing it is not only relatively easy to implement the resources for

it requires only one requirement, the selection of correct vendor, but also easy of resource management, since the end users or IT organizations

*"need not worry about upgrades, patches or staffing resources"* (SMB Suite, 2011), for the cloud provides features such as flexibility and scalability of resources.

### 3. Efficiency

Definition of Efficiency: Efficiency of cloud computing is calculated based on attributes such as high automation, rectification and business agility, flexibility and timeliness (Chandran & Angepat, 2010). Each of these aspects is elaborated in the following paragraphs.

### 4. Automation and Rectification

Cloud computing is highly automated as virtualization of the physical servers and the automatic maintenance and recovery of data ensures the efficiency of cloud computing. Moreover, in cloud computing immediate hardware rectification in case of failure can be easily accomplished. In addition, data assessment can be done *"any time and is highly beneficial for the IT industry in reducing workloads"* (Chandran & Angepat, 2010).

### 5. Agility

**Cloud computing according to Pandey et al (2010) is, "better, faster and more relational interactions with customers, suppliers and partners as**

**systems that can interoperate and are more agile in nature". Business agility is a crucial feature that decides the survival rate of organizations in today's competitive market. Business agility with respect to cloud can be outlined as quickness of clouds to respond and active role it plays in providing efficient information to the end users (Smyth, 2009).The above aspects can be further elaborated to gain appropriate understanding. To thrive in a fundamentally competitive market, cloud computing contains a vital element to add additional storage, network bandwidth, memory, computing power etc. rapidly and often instantaneously. This freedom is offered by cloud computing and ensures the robust and efficient running of the processes across the organizations at a relatively low operating cost (Smyth, 2009). Cloud computing provides higher added value than traditional applications, proclaims Petri (2010). The main reason provided is the efficient extra information provided to the end users, which the users were expected to create themselves (Petri, 2010).**

An example can be outlined regarding to this thesis. *LinkedIn is a constantly up-to-date database that offers profiles of virtually every current, former and prospective employee in the world. Many HR departments are now already using systems like LinkedIn, Plaxo and Xing alongside their in-house systems to look up details of their employees because the LinkedIn profiles are often more up to date than the details in their own system (Petri, 2010).*

## 6. Flexibility

Another feature that has scaled the cloud computing benefits to a transcendental level is 'flexibility'. Flexibility in the context of cloud computing can be defined as the ease of accessibility. Cloud computing provides reliable virtual data storage centers that can be accessed from disparate locations. Thus, narrowing the differences in geographical boundaries, cloud systems provide services that resemble the end users applications, documents and services, when accessed

through an internet-connected computer, from any corner of the globe (Coombe, 2009).

In addition, many organizations have gained the potential benefit from the flexibility feature of cloud computing. Flexibility allows the organizations to purchase and process new service requests at relatively low costs. Apart from the cost benefit, cloud computing has encouraged IT organizations and providers to “increase standardization of protocols and processes so that the many pieces of the cloud computing model can interoperate properly and efficiently” (Educause, 2009). Thus, it can be stated that cloud computing services are flexible in comparison with traditional computing, which fails to offer such diversity in flexibility.

## 7. Time Efficiency

The common issue that traumatizes the traditional IT organizations is the long deployment times, and the appropriate value received for investment in time and money (SMB Suite, 2011).

**One of the biggest advantages that Cloud computing technologies provide from their on-premise counterpart is the ability to deploy quicker. This is especially advantageous to small and mid-size business owners that need a fast time to value in order to achieve lower total-cost-of-ownership (SMB Suite, 2011). Moreover cloud computing provides relevant value for investment in time. Studies have shown that Cloud solutions deliver lower total-cost-of-ownership (TCO), time to value and quicker ROI than on-premise solutions if the technology maps directly to the business need (SMB Suite, 2011).**

### 2.5.3 Ease of Data Access

"In traditional approach an organization needs to set up large servers, storage devices and lot of other equipment to support the business" (Pandey et al, 2010). Data is usually locked in the sever locations. And, the organization, *typically* runs its own applications (built or purchased) on a permanently available infrastructure. If an application is running on a specific server today, chances are high that it will be doing the same tomorrow (Petri, 2010). The feature of access to data anywhere and everywhere is consequently absent in traditional organizations. On the other hand, organizations that employ cloud computing need not worry about accessing information from a particular location in cloud computing. On the other hand, "staff can access data or information anytime without sitting on their desk"(Jamil & Zaki, 2011).

In cloud computing provisions are made for organizations to have their own data storage centers without any physical/ geographical boundaries with respect to the data storage centers. Thus, the data centers are usually dispersed in different cities or different countries, which accomplish two objectives. Virtual data storage reduces infrastructure costs associated with IT resources, and allows the end users to access the data or use their preferred site over their network (Jamil & Zaki 2011, Chandran & Angepat 2010).

Thus, independent of device and location, cloud computing is already "enabling greater device independence, greater portability, and greater opportunities for interconnection and collaboration" (Smyth, 2009). The fundamental reasoning behind the efficiency and ease of accessibility is the presence of networking feature in cloud computing. In order to access data in cloud, end users' require a working network with minimum hardware components. Thus, "teleworkers can be quickly brought online, remote offices can be quickly connected, temporary teams can be easily set up on site, mobile access can be easily enabled" (Smyth, 2009).

**Consequently, without being locked in to any environment or application, cloud computing systems are easily portable. The portability feature of**

**cloud computing ensures easy movements in the change of business needs, which nevertheless is absent in traditional systems (Linthicum, 2009). Thus, it can be claimed that, cloud computing allows "every member of the organization instant internet mobility and access to their business data 24/7, no matter the location" (SMB Suite, 2011).**

## **2.6 Risk of Cloud Computing**

Cloud computing is not free of risks and disadvantages. In order to create awareness among the users of cloud computing regarding the serious threats and vulnerabilities involved in cloud computing environments, a study on various risks is imperative.

In the sections below, the risks of deploying cloud computing is discussed. The risks of cloud computing revolve around data security and confidentiality, data segregation, data availability, reliability and Service Level Agreement (SLA).

Each section below provide relevant information pertinent to the risks of cloud computing.

### 2.6.1 Data Security

Data security in general can be defined as protection of data from unauthorized access and leakage. In cloud computing data security is protection of data that are stored in virtual servers (Petri, 2010). Cloud computing security issues arise for different forms such as, XML Signature element wrapping attack, Null Prefix Attack, Malware Injection Attack and Flooding Attacks (Jamil & Zaki, 2011) due the "fact that clients are typically able to connect to cloud computing via a web browser or web service" (Jamil & Zaki, 2011).



## 1. XML Signature element wrapping attack

It is the most common form of attack in the web world. Here, *an attacker is able to manipulate a SOAP message by copying the target element and inserting whatever value the attacker would like and moving the original element to somewhere else on the SOAP message* (Jamil & Zaki, 2011). Thus, confidential data of the users are perpetually compromised.

## 2. Null Prefix Attack

**Cloud computing services offer its users appropriate encryption keys to log in and use the systems, through appropriate XML Signatures and XML Encryptions. Null Prefix Attacks are undetected man-in-the middle- attacks against SSL/TLS implementation. As a result of this, attackers are able to perform this technique in order to requests services from cloud systems without a valid authentication (Jamil & Zaki, 2011), which invariably compromises the security of cloud systems.**

### ***Mal-ware Injection Attack***

Malwares are malicious services that compromise the computing systems. Similarly, cloud malware injection is the attack that attempts to inject a malicious service, application or even virtual machine into the cloud system depending on the cloud service models (Jamil & Zaki, 2011). This issue may compromise not only the user's account, but also the entire cloud environment.



### 3. Flooding Attacks

Flooding attack "basically, is an action of sending a large number of nonsense requests to a certain service" (Jamil & Zaki, 2011). This invariably affects the cloud systems, when an attacker continuously sends requests to a particular server. The server on realizing the increase workload begins to perform rigorously in order to meet the increasing speeds. This could nevertheless result in system outages, for the attacked system "might consume all of the resources on the cloud system and be not able to provide services to normal requests from users" (Jamil & Zaki, 2011).

### 4. Confidentiality

ENISA (2009) defines confidentiality in cloud computing is the secret information and 'know-how' that may be processed in clouds. ENISA (2009), elaborates this aspect and explains that,

Know-how is defined as a body of information that is secret, substantial and identified in any appropriate form. The term 'secret' means that the know-how package as a body, or in the precise configuration and assembly of its components, is not generally known or easily accessible. The term 'identified' means that the know-how is described or recorded in such a manner as to make it possible to verify that it fulfills the criteria of secrecy and substantiality. To this purpose 'substantial' means that the know-how includes information which is of importance for the whole or a significant part of:

- I. A manufacturing process, or
- II. A product or service, or

For example, the Health Information Portability and Accountability Act (HIPAA) of 1996, requires personal health and identification information to be protected and encompasses protecting it from unencrypted transition over open networks or from downloading to public or remote computers. HIPAA also requires security controls, including access control and audit policies. One cloud storage provider claims to offer a solution that meets all HIPAA requirements for privacy and security (Coombe, 2009). The most important aspect that needs to be considered with employing such services is regulatory requirements; for access to such data, would result in breach of privacy. Consequently, legal penalties and compensations could be imposed on such customers (Coombe, 2009).

### 2.6.3 Data Segregation

**Definition: Data segregation in the simplest sense is data seclusion. In cloud environments the data is not specifically segregated. It is distributed throughout the cloud network and causes problems when specific data needs to be segregated (Chandran & Angepat, 2010).**

The basic principle of cloud computing is the presence of a commodity hardware that dynamically allocates resources, depending on the perpetual demands. Thus, catering to a large number of consumers across the globe, cloud computing enables the service provides cost-effective solutions, which otherwise would require large investments in in-house servers and infrastructure. Resultantly, the possibility of data being stored on the same physical system is relatively high. This nevertheless poses a problem, when multiple consumers try to access the data stored in the same computer; for, the data segregation solutions used by service providers will fail at some point (iDefense, 2009).

Although the system of data segregation is ideal, the possibility of another customer's data being exposed in the service providers' data center is present, which shakes the foundation of data isolation in cloud computing. Google Docs experienced a similar failure due to a caching system error in 2008 (iDefense,

*Customers collectively ran to the PC store to install a package on their local PC* (Petri, 2010). In addition, high dependency on network would pose as a problem when migrating existing applications to the cloud infrastructure; for, issues pertinent to latency could suffice, since the existing applications on the traditional systems are not built to suit the networking architecture of the cloud (Smyth, 2009).

Trading applications that require near-zero latency will probably be run in-house for many years to come. One of the key problems with putting these applications in the cloud is that latency on the Internet is highly variable and unpredictable. There are many cloud computing commentators who claim that the cloud will never be able to support these types of applications (Smyth, 2009). These aspect invariably question the reliability of cloud computing.

#### 2.6.6 Service Level Agreement (SLA)

**The service level agreements (SLA) are agreements between providers and customers, and are a familiar part of almost every computing or information processing service arrangement (Meyer, 2011). And, "the SLA is supposed to provide a customer with two kinds of protections: An incentive for the provider to perform as promised, giving it skin in the game and some compensation for the customer's losses from a failure"(Meyer, 2011). Similarly, Service Lease Agreements (SLAs) in cloud computing are the agreements made with the service providers that control the varied equipment in the cloud network. These agreements should be carefully verified before entering into a contract of service. The quality of service is a key factor that determines the efficiency of a cloud network. A reliable service provider providing desired quality of service may be difficult to source and the process set-up could turn out to be time consuming (Chandran & Angepat, 2010).**

**However, organizations that deploy cloud, currently view SLAs in unsatisfactory forms of protection that weigh heavily in the provider's favor.**

the risk points has "an immediate and devastating impact on a consumer's ability to perform critical business functions related to cloud-based services" (iDefense, 2009). For example a failure of service provider's resources and connected to the Internet could result in latency and redundancy of resources. A similar exploitation could be provided to the customer's internal infrastructure. With respect to cloud computing high dependency on internet and ISP's, detailed explanation is provided in reliability.

**With respect to the impact of failure of DNS infrastructure, a brief explanation can be provided. If the DNS infrastructure were to fail due to attack or misconfiguration, the consumer would be unable to access the service provider's resource. Failure of the DNS infrastructure is a very real risk<sup>33</sup> that consumers should consider when evaluating the use of cloud-based services overall and not just for a single service provider (iDefense, 2009). Thus, lack of viable data in each of these points poses a threat to the cloud services, for the business could incur huge financial losses (iDefense, 2009).**

### **2.6.5 Reliability**

Reliability with respect to risks associated with cloud computing can be defined as the dependency of cloud computing on network connectivity. This is another key concern in cloud that has constantly questioned its reliability. As established, one of the key requirements for cloud computing systems is the presence of an internet connection. This dependency on network can prove fatal and "can result in loss to the company by causing extensive time delays" at the time of network failures (Chandran & Angepat, 2010).

For example, *a two day Internet breakdown in the north of the Netherlands resulted in a flood of cancellations for a local 'bookkeeping as a service' supplier.*

## CHAPTER 3

### METHODOLOGY OF RESEARCH

The research methodology used is highlighted in ` of interview, survey and qualitative analysis.

The following framework was used for interview analysis and analysis of survey .

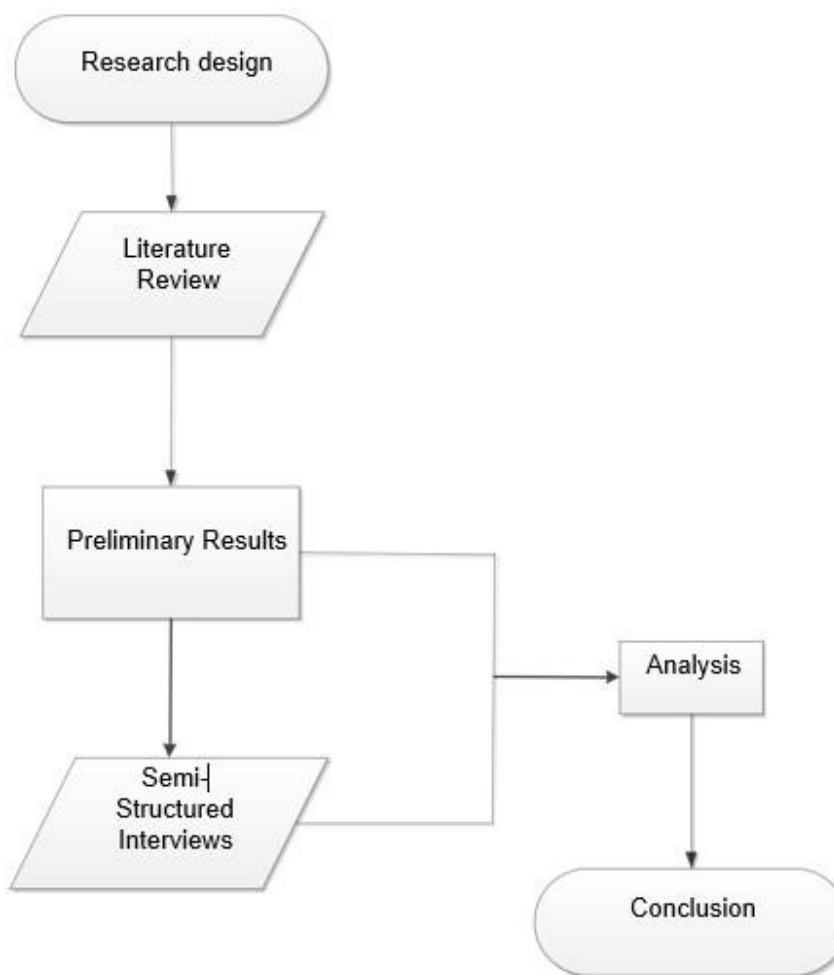


Figure 3.1 Research Framework

### 3.2 RESEARCH METHOD

A research can be conducted in multiple ways. Similarly, three different types of research designs namely exploratory, descriptive and hypothesis-testing are widely used. This research has used exploratory design, since the emphasis in exploratory

studies is the discovery of ideas and insights (Kothari, 2004). Subsequently, this research aims to identify the benefits associated with cloud computing, the risks associated with cloud computing, and progresses towards overcoming the risks, in order to substantially identify the reasons for adopting cloud computing. Thus, this research aims to explore the underlying criticisms of cloud computing and provide necessary details to overcome the risks, and assert the future of cloud.

Consequently, exploratory design is considered to be apt for this study.

This research was done by the use of semi structured interviews which were conducted via phone call and email responses as well.

The choice of sample space was Top level IT executives as experts from textile industry 2 being Chief Information Officer and Chief Executive Officer Level and 4 being either IT heads or Senior IT managers.

The data was collected in Subjective manner for 3 questions for which the answers were than matched with the preliminary research and the keywords and relation was established

The questions were asked to clearly understand the :

- Risks of cloud computing
- Benefits of cloud computing
- Suggestions by the experts.

For the questions via email the questions were asked in likert 5 point scale for the benefits and risks associated with cloud computing.

The responses as were from a small data set mean was considered to be the best review of responses leading to tracing out the most prominent risks and benefits as well as satisfaction.

The following tools were used in the research:

- Google Forms : It is an online service by Google Inc. which helps in creating forms for survey and questionnaire online and can be filled by the respondent through the link shared with him.



- Microsoft Excel 2013 : This tool was used for creating charts of the responses and also for mean calculation and then visual comparison on charts for better understanding.

Qualitative research uses researcher's insights in subjective manner for assessing instead of statistical interpretation. For this research quantitative is also used to just support the qualitative research in the data analysis.

### **3.3 DATA COLLECTION**

The two principle methods of data collection are primary and secondary. Since, exploratory research design has been employed in this research; data is collected through the analysis of concerning literature and collecting the experience of people

The data was collected from heads or senior management which represent the whole set of the company as they are the decision makers in the organizations for the cloud computing.

## CHAPTER 4

### RESEARCH ANALYSIS

#### 4.1 Preliminary research analysis

This is the research done on the basis of understanding using the literature review and subjective analysis method and by the use of this understanding the researcher can point out certain parameters which he assessed during the research. This research points towards certain parameters which are then compared to the Interview responses.

In this specific research parameters were benefits of cloud and risks and challenges related to cloud.

High centralization in organizations also results in non-implementation of cloud as more decentralized is the decision making more is the use of cloud.

The written electronic questionnaire measured all these factors and rated them on likert 5 point scale to understand their significance with what the experts have answered in the interview.

The interview and the rating were both then analyzed qualitatively and quantitatively resulting to the recommendation for cloud computing firms in order to improve their service and reduce the risks associated with it and motivate the textile company's' to implement it.

##### 4.1.1 Benefits of cloud computing according to the preliminary research:-

- Scalability: It is Upscaling or downscaling of data
- Efficient Data Recovery: It is easier as data is stored at more than one location
- Automation and Rectification
- Agility: It is the faster and cost effective adapting
- Flexibility
- Ease of Data Access: This contains remote access and multiple platform access.

The responses of the questionnaire of the above stated benefits have the following indication:

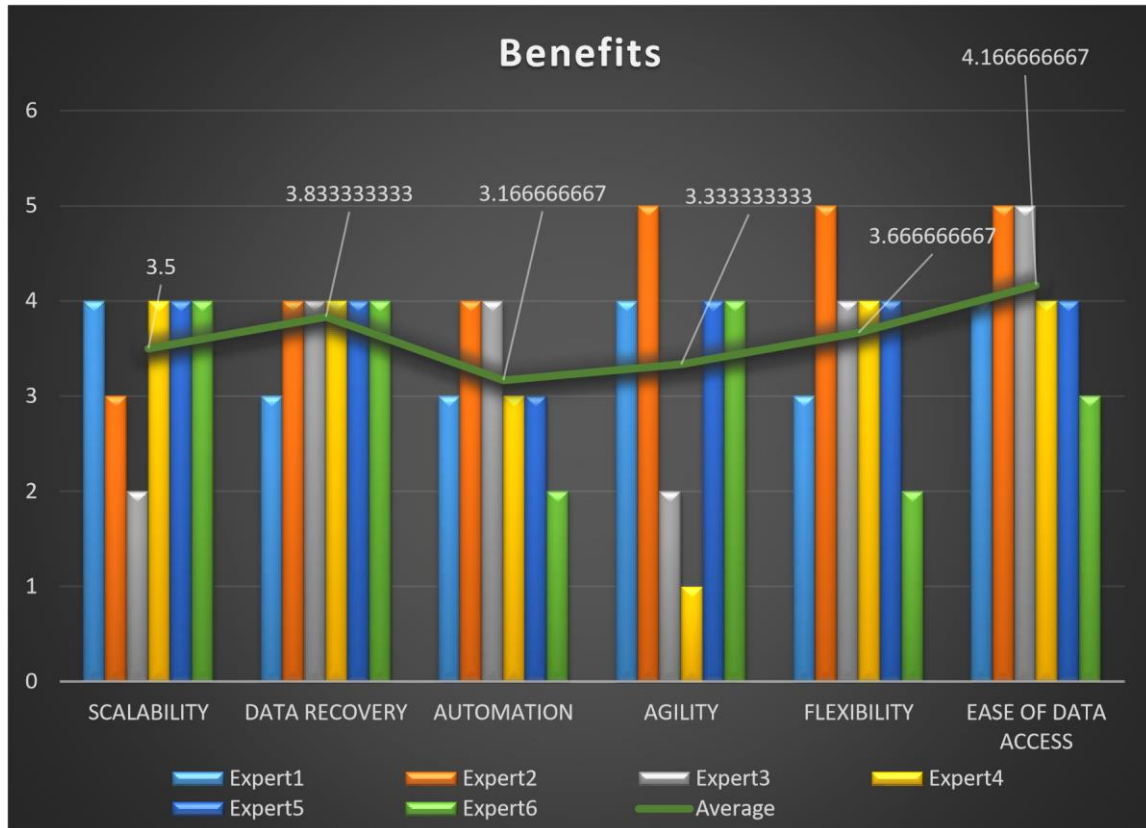


Figure 4.1 Benefits of cloud computing responses

By looking at the mean average of the benefits we can understand that the rating is above 3 which on 5 point likert scale where (1= Least significant benefit and 5 = Highly significant benefit ) would point towards a high significance and would mean they are likely to affect the decision making and would be favorable factors in implementation of cloud computing.

The highest Significance still would be towards:

- 1)Ease of data access
- 2)Data recovery
- 3)Flexibility

#### 4.1.2 Risks and challenges in Cloud Computing

- Downtime: It is the phenomenon of inaccessibility due to server down.
- Security and privacy of data may be compromised due to remote access and storing of data in a location which is accessible to the third party and at times is in the public domain.
- Internet stability and reliability: The instability of internet in India at times might hinder the tasks which require data access
- Limited control to the organization due to control of a third party at times and the vendors policies
- Vendor dependency and Locking of vendor: This happens due to the vendor not letting you switch as the implementation of cloud on their servers might have resulted into vendor specific customization.
- Complexity: The complexity after the implementation of cloud computing may increase or decrease depending upon organization.

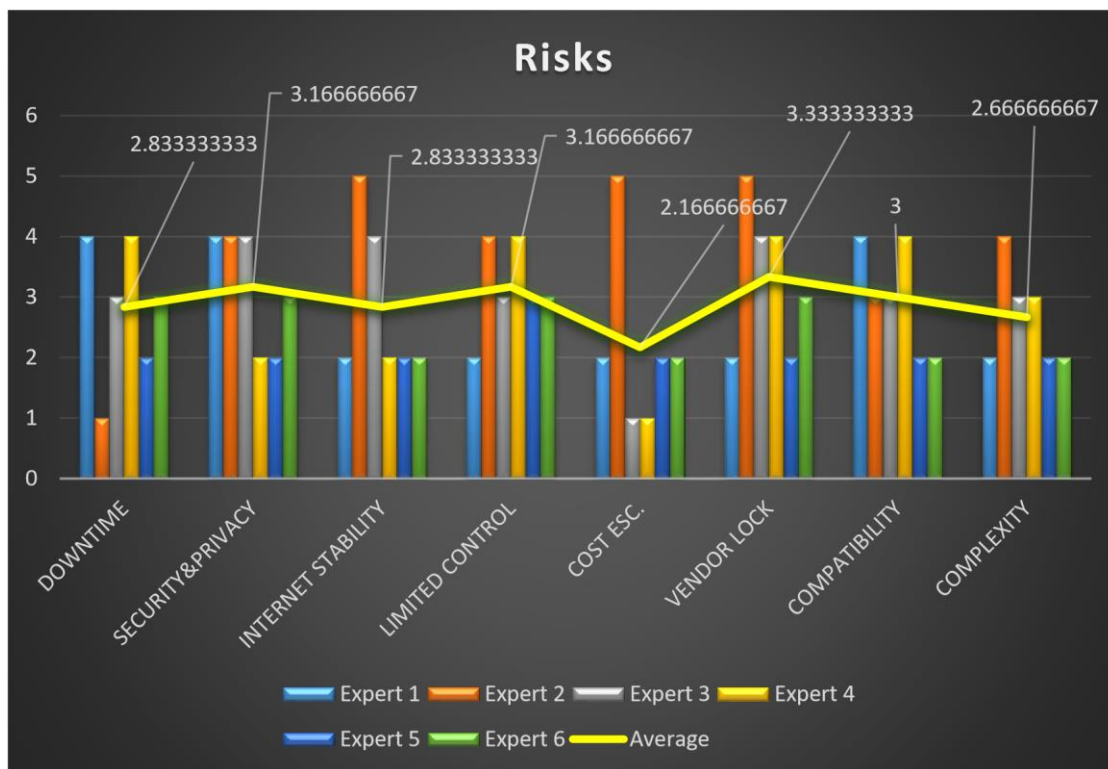


Figure 4.2 Risks of cloud computing

According to the responses in the questionnaire the above chart is plotted for risks in cloud computing. Taking into account the average mean which is

donated by the line above it is clear that only 3 risks have significance greater than 3. They are as following in the order of their level of risk topmost being the highest: 1)Vendor Locking

2)Security and Privacy

3)Limited control

This preliminary research which is for 6 respondents then points out towards 3 and 3 highly significant benefits which are then compared with the key observations from the interview by use of qualitative analysis.

## 4.2 INTERVIEW ANALYSIS

All the respondents were also interviewed via telephonic or written communication and were then analyzed to find out the key words used in each conversation and has been tabulated. The experts have an average work experience of ~22 Years meaning that they are highly skilled and have immense experience and turn out to be the correct respondents for this research.

### 4.2.1 - INTERVIEW RESPONSES OF QUESTIONS

Q1) What do you think are the USP or Benefits of Cloud Computing?

RESPONDANT	RESPONSE
EXPERT 1	- Remote Access(Ease of data access) -Platform Independent Access(Ease of data access)
EXPERT 2	- Remote Access(Ease of data access)
EXPERT 3	-Faster implementation(Flexible) -Easy to experiment(Flexible) -Scalability
EXPERT 4	- It help reduce the infrastructure cost.(Agile)

EXPERT 5	-Access-Anywhere, anytime, across device(Ease of access) -lower cost of operations and maintenance
	-Scalability
EXPERT 6	-Lower capex -Access on demand(Ease of access)

Table 4.1 Benefits According To Experts

This table of benefits depicts that the Ease of access is the most important and discussed benefit in the complete interview and flexibility being the second most significant.

Lower Capital investment and Lower cost of maintenance i.e. Financial issues also turn out to be a factor which was not taken into account earlier.

Q2) What do you think are other challenges or risks of cloud computing?

RESPONDANT	RESPONSE
EXPERT 1	- Change Management
EXPERT 2	Data leakage and Security.
EXPERT 3	-Locking of vendor -vendor going out of business monopoly of vendor once the project is successful.
EXPERT 4	- Recurring downtime -Security Issue
EXPERT 5	- change management -dependency on network
EXPERT 6	-Network redesign

Table 4.2 Challenges and risks According to Experts

The above table clearly states vendor issues and security issues as the biggest risk from our pre-identified risks but there are new risks like Change management and network redesigning required.

Q3) What are your recommendations for improvement of cloud computing ?

RESPONDANT	RESPONSE
EXPERT 1	- - To improve efficiency and effectiveness, should go for cloud.
EXPERT 2	-Improve performance and reliability
EXPERT 3	-Option of to switch to on premises model offer by vendor at any point of time
EXPERT 4	-Reliability should be increased India has to Grow more in this for reliability, Our Mentality is One Time is ok but Recurring is issue
EXPERT 5	-Offline access of some part of services
EXPERT 6	-Better SLA terms

Table 4.3 Suggestions According to Experts



## CHAPTER 5

### CONCLUSION AND RECOMMENDATIONS

#### 5.1 Benefits

According to the analysis and interview recommendation. Cloud computing has 6 significant benefits which are responsible for adoption of cloud computing.

- 1) Scalability
- 2) Efficient Data Recovery
- 3) Automation and Rectification
- 4) Agility
- 5) Flexibility
- 6) Ease of Data Access Out of these all

- 1) Ease of Data Access
- 2) Flexibility are highly significant

Are the highest in significance for motivation in the decision for adoption of cloud computing.

#### 5.2 Risks

Only 3 risks are significant in demotivation of adoption of cloud computing according to the analysis of questionnaire and when it is analyzed in accordance to interview Vendor and Security issue are the biggest risk and Change management is a new risk which is identified from the interview.

#### 5.3 Suggestions for lowering risks and challenges and increasing adoption of cloud computing in textile industry

The suggestions for lowering risks and improving cloud computing according to the analysis of the risks and benefits also from the responses of the interviewees are as follow:-

- 1) Data Confidentiality Should be focused on in SLA and Private cloud with on premises model is another way it could be increased and guaranteed.
- 2) Vendors should not only focus on services like CRM and ERP's over public cloud as some company's do not feel safe and it also puts their data at risk thus there should be option to switch to private cloud on premises if it is required
- 3) Vendors shall provide option to switch easily to another vendors if required as this increases the trust of the organization of vendor and also reduces the risk of vendor locking.
- 4) Small firms should focus on using cloud computing first as they will save immensely if their organization grows as their hardware will not become obsolete and they can still upgrade using cloud service as and when required.
- 5) Efficient Change management by adopting change management best practices by the organization during adoption and implementation stage in order to take the organization with you and them not feeling left out.
- 6) Better and Clearer SLA's in order to minimize the issues.

## CHAPTER 6

### SCOPE FOR FUTURE STUDY

#### 6.1 Researches which could be done

Although this research has highlighted the benefits, risks, and suggestions to overcome the risks for implementation of cloud computing in IT organizations, scope exists for further research, since cloud computing is a novice field and still in its developmental stages. The following future studies can be employed to overcome the risks or maximize the development and implementation of cloud computing.

- This research has highlighted the top down and hybrid approach to transfer existing applications to cloud in a smooth manner. However, great scope exists in understanding the actual cost of transferring existing applications to cloud-whether it is actually beneficial to transfer existing applications to cloud can be further explored.
- This research has highlighted the choosing of appropriate vendors to overcome security risks of cloud computing. Detailed studies can be conducted on the security aspects such as server sustenance of vendors during data segregation and upon malware injection and flooding attacks.
- This research also highlights the factors which influence the decision of adoption of cloud computing and satisfaction with it. Which could be further tested using a large data set for research in the institutions.

## Bibliography

AcuteSys; (2009). Hosted VMware ESX\ESXi Infrastructure (Cloud Computing). Acute Systems Consulting. Available at: [http://www.acutesys.com/?page\\_id=63](http://www.acutesys.com/?page_id=63) (Acc. 2011-9-15)

AICPA; (2011) Glossary of Cloud Computing Terms Related to Client Accounting Service Delivery. CPA2Biz. Available at: <http://clientsolutions.cpa2biz.com/Practice/Documents/Glossary.pdf> (Acc. 2011-9-15)

Altmann, Jörn and Rana, Omer F. (Eds.); (2010). Economics of Grids, Clouds, Systems, and Services 7th International Workshop, GECON 2010, Ischia, Italy, August 31, 2010, Proceedings. Cardiff, UK: Springer.

Bashir , Muhammad, TanveerAfzal, Muhammad and Azeem, Muhammad;

(2008) "Reliability and Validity of Qualitative and Operational Research Paradigm." Pakistan Journal of Statistics and Operational Research, 4(1), 35-45 Available at: [www.pjsor.com/index.php/pjsor/article/download/59/38](http://www.pjsor.com/index.php/pjsor/article/download/59/38) (Acc. 2011-9-15)

Briscoe, Neil; (2000). "Understanding The OSI 7- Layer Model." ITP Journals, 120, 13-14. File: T04124.

Buyya, Rajkumar, Yeo, Chee Sin, Venugopal, Srikumar, Broberg, James and

Brandic, Ivona; (2009). "Cloud computing and emerging IT platforms: Vision, hype, and reality for delivering computing as the 5th utility."

Elsevier, 25, 599-616. doi:10.1016/j.future.2008.12.001.

Convery, Nicole; (2010). Storing Information in the Cloud. Report. Department of Information Studies, Aberystwyth University. Available at: [http://www.pedimenta.com/storage/articles/Cloud\\_computing\\_report\\_fi nal-1.pdf](http://www.pedimenta.com/storage/articles/Cloud_computing_report_fi nal-1.pdf) (Acc. 2011-9-15)