Adoption of Cloud Computing in the SMEs:

An exploration of the issues and challenges for adoption of Cloud Computing by SMEs in Bangladesh in the context of "Digital Bangladesh"

Anupam Mazumdar BSc, MSc

Supervised by: Dr Stephen Sommerville & Dr Alex Bell

DECLARATION

This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree and this thesis has not been presented to any other education establishments in the United Kingdom or oversees.

Signed: *Anupam Mazumdar*

Date: 30/01/2018

STATEMENT 1

The entire work in this thesis was carried out by myself in accordance with the regulations of the University of Wales Trinity Saint David and is unique except where indicated by precise references in the text. Other sources are acknowledged by giving explicit references. A reference is appended.

Signed: *Anupam Mazumdar*

Date: 30/01/2018

STATEMENT 2

I hereby give consent for my thesis, if accepted, to be available for photocopying and for inter-library loan, and for the title and summary to be made available to outside organisations.

Signed: *Anupam Mazumdar*

Date: 30/01/2018

STATEMENT 3

I hereby give consent for my thesis, if accepted, to be available for deposit in the University's digital repository.

Signed: *Anupam Mazumdar*

Date: 30/01/2018

ACKNOWLEDGEMENT

My sincere gratefulness goes to 'Lord Krishna' first for giving me the loveliness, the strength, the insight and the opportunity to commence and complete this research even when all optimisms were lost at some points

I would like to express my deepest gratefulness to my parents for their all unconditional and incredible inspiration and support. I am thankful to my brother; my sister in laws and my only one lovey niece whom I am endlessly obligated for their inspiration, support and love throughout my UK life.

For me, it is really hard to overemphasize my endless gratitude to my Director of Studies, Dr Stephen Sommerville. His visions and tutorage throughout the research was just 'invaluable' in forming my entire effort into the book that is in your hand right now. I have learned a great deal of dedication, ambition and commitment from him not only within the university but also in my personal life. He is an exemplar of hard working person that I have ever seen.

There is only way left for me to express my sincerest gratitude to my second supervisor, Dr Alex Bell, for his promise, continuous support, motivation and direction. His constant faith in me resulted in the successful accomplishment of this thesis. Without his support and inspiration I would not have completed this journey.

I am also grateful to Dr Jill Venus, Programme Leader of DBA, for giving me an opportunity to commence this programme and for her continuous guidance and communication throughout this journey.

My special thanks goes to all the participants' for giving me their precious time, sincerity and assistance. I am taking an opportunity to appreciate my fellow research colleagues for their support at different stages of the programme.

And finally, I have my heartiest appreciation to my lovely wife, Tamalika who has just not only sacrificed her own interests in all aspects of her life but also created such an environment at home that supported me to complete my journey.

ABSTRACT

Cloud Computing is one of the most recent sophisticated technologies which can play a pivotal role in small and medium sized enterprises primarily because it may offer ICT resources to small businesses without large up-front costs nor expensive investment in specialist staff. This technology, however, is not presently used extensively in SMEs in Bangladesh owing to numerous causes and issues, which provide barriers to its adoption. The importance of SMEs in Bangladeshi economic and social development is crucial. The aim of this research is:

- to investigate and to identify issues that explain the challenges of adoption of Cloud Computing by SMEs in Bangladesh;
- to place these issues in an academic context by developing and proposing a conceptual framework for understanding drivers and barriers to Cloud Computing adoption and
- to explore directions for Bangladeshi SMEs to adopt Cloud Computing within the framework of Bangladesh's government policies for "Digital Bangladesh".

The "Digital Bangladesh" policy is a set of proposals for making the country digital by bringing the nation's economy under the umbrella of ICT-related technologies. This policy does not simply mean the comprehensive use of computers in businesses but a modernisation of thinking about the use of advanced digital technologies in an effective way in business, education, and job creation by connecting citizens, businesses, government and ICT specialists. Targets for Digital Bangladesh is to achieve an increase in the country's annual Gross Domestic Product (GDP) of 10% by 2021 and to double the GDP contribution of SME sectors from 23% to 40%. Development of ICT use in Bangladeshi SMEs – in a variety of business sectors is, thus, fairly central to the Digital Bangladesh policy.

This research has used primarily qualitative research methods, whereby data has been collected by conducting interviews with a sample of purposefully selected people from various SME sectors in different metropolitan centres in Bangladesh. In order to investigate and understand the nature of the issues confronting SMEs, this study sought to identify some potential solutions that may lead to Cloud Computing adoption within Bangladeshi SMEs within the Digital Bangladesh policy. Nine different types of SMEs

were chosen to participate in this exploration. By using thematic analysis, the collected data are analysed and matched against the proposed framework for identifying drivers and barriers to Cloud Computing adoption. The observed issues were categorized into 'internal', 'external' and 'technological' contexts.

This research contributes to the body of knowledge concerning Cloud Computing and its potential use in business contexts by providing a wide-ranging review of the literature that is directed upon identifying issues that challenging the Cloud Computing adoption. This research further developed two other frameworks addressing the drivers (incentives) and barriers to adoption of Cloud Computing especially in smaller businesses. In addition, an integrated but novel conceptual framework was developed to enable Bangladeshi SMEs and Bangladeshi ICT specialists to understand better the issues that may explain the challenges, thus far, of Cloud Computing adoption by SMEs. A realistic roadmap was developed to assist Bangladeshi SMEs to adopt Cloud Computing solutions in order to minimise the current gaps between theory and practice.

Keywords: *Cloud Computing, Small & Medium Enterprises in Bangladesh, Digital Bangladesh.*

TABLE OF CONTENTS

Appendix   318

ACRONYMS

B2B	Business-to-Business
BaaS	Business as a Service
BAL	Bangladesh Awami League
BASIS	Bangladesh Association of Software and Information Services
BOP	Business Process Outsourcing
CAPEX	Capital Expenditure
CC	Cloud Computing
DaaS	Database as a Service
DB	Digital Bangladesh
DBA	Doctor of Business Administration
DOI	Diffusion of Innovation
ERP	Enterprise Resource Planning
FaaS	Framework as a Service
G2B	Government of Business
G2C	Government to Consumer
G2E	Government to Enterprise
G2G	Government to Government
G2N	Government of NGO's
GDP	Gross Domestic Product
HaaS	Hardware as a Service
HRD	Human Resource Development
IaaS	Information as a Service
ICT	Information & Communication Technology
ITO	Information Technology Outsourcing
NIST	The National Institute of Technology and Standards
OaaS	Organization as a Service
PaaS	Platform as a Service
QoS	Quality of Service
SaaS	Software as a Service
SCM	Supply Chain Management
SMEs	Small & Medium Enterprises
TOE	Technology-Organizational-Environmental
WM	Warehouse Management

LIST OF TABLES

LIST OF FIGURES

Chapter – 1.0

Introduction to the Research

1.1: Origin of the Research

The idea of this research developed from concerns I have about the success of SMEs in Bangladesh. This concern emerged as a result of my personal aim to develop a successful family business from a small-scale business. My aim during 2012 was to do something unique within the business with the support of technology. Since starting the business, I have realised that Bangladeshi SMEs are far behind in the implementation and use of new technologies. Research has identified that in Bangladesh, the SME sector is one of the more noticeable sectors and contributes to about 23% of the country's gross domestic product (GDP). It has also shown how the country has benefitted in many ways. However, owing to the absence of technology in the SME sector, the country is not benefitting as much as expected and some SMEs are not succeeding in the business market (Uddin, 2014). I have also realised that the Bangladesh government is trying to build Digital Bangladesh and under the slogan of Digital Bangladesh, the government is proposing to inspire business owners and managers to use Information and Communication Technology (ICT) in their businesses, which has also attracted my interest. I have, therefore, started to look at the concepts of Digital Bangladesh and the government's perception and proposed plans. At this point, I have realised that the government is trying to introduce sophisticated and advanced technology, such as Cloud Computing, into business. However, they are not using the terminology in a straightforward way. This approach attracted my interest, as I was a Computer Science and Networking-based student. Therefore, I have started to examine the possibilities of using Cloud Computing in Bangladeshi SMEs. In the meantime, I have also started a Doctor of Business Administration (DBA) programme and have completed Approach to Research and Academic Communication module where I have investigated data storage security of Cloud Computing and how Cloud Computing can be implemented in small-scale businesses. The outcomes of the Approach and Academic Communication module study were so interesting; therefore, I have decided to investigate Cloud Computing adoption in SMEs in Bangladesh further.

1.2: Background of the Research

Bangladesh is one of the most ambitious developing countries in the world, where Small and Medium Enterprises (SMEs) are playing a fundamental role in the country's economic development and nationwide progress (SME Foundation, 2014). SMEs have a significant number of employment production, technological novelty and expansion in a collective size and a potential immense growth of Gross Domestic Product (Uddin, 2014). In Bangladesh, SMEs interest about 70% to 80% of trade workers and constitute over 95% of businesses (SME Foundation, 2014). It is a reality that the lively SME sector is an assurance for additional social consistency and better prosperity spreading across the country (Uddin, 2014). Hossain, Deb and Amin (2010) have further added that almost 80% of all businesses in Bangladesh are SMEs, which produce about 23 - 25% of the GDP and employ about 31 million individuals, providing about 75% of domestic income. The same authors also claimed that there is no way that we can deny that SMEs act as drivers of the country's national budget or communal expansion. Prior to that, Islam, Keawchana and Yusuf (2011) further added that the performance of the small & medium enterprise subdivision is thoroughly in keeping with the performance of the country.

According to Rashid (2012), in Bangladesh, SMEs are the single but largest industrial contributor to the finance sector. SMEs are well known for their methods of financial development workforce creation, poverty improvement and improving the typical life of their employees (Rashid, 2012). Furthermore, Rashid (2012) added that from the perspective of Bangladesh, sustainable SMEs could also play a pivotal role in achieving vision 2021, to build Digital Bangladesh, the ultimate dream of the current government. Digital Bangladesh concept means a process of digitalizing Bangladesh by ensuring an Information and Communication Technology (ICT) based society where information will be available in online and where all possible activities of the government and non-government or semi-government organizations will be performed using digital technologies. The motto of Digital Bangladesh is to establish technology and knowledge based digital services such as e-business/e-commerce, e-services, e-health, e-education etc. In chapter two, I will briefly discuss different aspects of Digital Bangladesh.

According to the World Bank (2017), the population of Bangladesh at the end of 2015 was 161 million; GDP was $195.1 billion; GDP growth was 6.6% with the inflation rate standing at 6.2% in a country of 147,570 square kilometres, which indicates that

Bangladesh is among the most densely populated countries in the world. According to the slogan of the Bangladeshi government's vision 2021, Digital Bangladesh aspires to be a middle-income country by 2021 (World Bank, 2017). To become a middle-income country, Bangladesh needs a cumulative GDP expansion of 7.5% to 8% per year, grounded in enhanced export and payment development by increasing both private and public investment (World bank, 2015). GDP growth will also need the formation of fruitful employment openings in the national economy (World bank, 2015). So, along with other sectors, contributions of SMEs to the domestic GDP could be doubled by 2021 and in the hope that it will be, the Bangladesh government has taken into account the industrial policy of 2010 to raise the trade sector's share in GDP to 40% from 28% by 2021, with the percentage of staff working in the subdivision concomitantly rising to about 25% from 16% of the country's entire workforce (Rashid, 2012).

However, in this contemporary era, there is huge competition in the business sectors owing to the improvement of advanced technology and evolvement of business markets (Khan, 2015). Advancements of technology have meant that the existing skills and products are losing their charismatic appeal (Pauly, 2011). Because of these advancements, most of the SMEs all over the world are becoming less competitive and, in particular, SMEs in developing countries like Bangladesh, owing to the nature of typical businesses. This is because SMEs have limited resource availability and limited competitive advantages and they do not have full access to contemporary skills to perform IT operations (Khan, 2015). However, it is very important for SMEs to respond as quickly as possible to gain access to the competitive advantages (Dillon *et* al., 2010). Hence, SMEs should implement innovative approaches, which include hi-tech solutions that may contribute to invention, diminish price and improve implementation rapidity (Khan, 2015). In this information technology and globalisation era, computing control and business vision can bring competitive advantages to SMEs (Liu & Orban, 2010). According to Khan (2015), SMEs have a variety of difficulties in the business market globally but those difficulties could be eradicated with the support of advanced IT infrastructures. This is because of the degree of suppleness that is characterised by SMEs and permits them to become more advanced and well organized in the market (Khan, 2015).

Cloud Computing (CC) on the other hand, is a model for enabling service users ubiquitous, convenient and on-demand network access to a shared pool of configurable computing resources such as networks, servers, storage, applications and services that can

be rapidly provisioned and released with minimal management effort or service provider interaction (Lee, 2012; Mell and Grance, 2010). Cloud Computing provides suitable resolutions of those IT related issues by offering scalable competences and substructures to SMEs (Sharma *et* al., 2010). In addition, Cloud Computing could provide quick access to contemporary resolutions of IT related issues and by having that access, SMEs could expand their services to interact with customers and reach business markets. Moreover, Cloud Computing could maximize the SMEs' return on their savings and support them to function successfully in constantly challenging business atmospheres (Velte, Velte & Elsenpeter, 2009; Vouk, 2008). It has been identified that the financial and human resources of SMEs are relatively low compared with large business firms, and, as a result, SMEs do not have the capability to effectively modernise their IT infrastructures (Khan, 2015). Sharma *et* al. (2010) also added that owing to the incompetence of applying advanced technologies in business, SMEs are losing the opportunity to contribute in an extremely progressive business setting and to compete with dominant opponents. However, Khan (2015) also mentioned that the adoption of Cloud Computing by SMEs could provide diverse facilities for them, such as storage facility necessities, association, IT substructure and specifically setting up of private Cloud. SMEs running with small IT sections could rent IT facilities rather than purchasing them.

Cloud Computing (CC) can be a way of addressing any inefficiency by gaining involvement in the development of a business organization specifically in SMEs (Khan, 2015). Moreover, Cloud Computing is an example of providing possible suppleness, competence and nimbleness when encountering a high number of requests (Iyer & Henderson, 2010). Khan (2015) mentioned that business competitiveness could be enhanced with the use of advanced technologies. Small and medium businesses can be developed with the utilisation of advanced technologies as they enable SMEs to compete with large business firms in a competitive market (Ahson & Ilyas, 2010). Khan (2015) has further identified that most SMEs have a complexity of management issues, which are related to network, software and hardware and old-fashioned IT backgrounds. But in order to compete in the market, SMEs need to hire IT professionals to implement and maintain IT services, which is very expensive for most of them (Khan, 2015). Furthermore, in an investigation of the adoption of Cloud Computing by SMEs, Alshamaila *et* al. (2013) indicated that in order to improve business competence, small and medium enterprises are highly recommended to use Cloud Computing facilities. Therefore, a comprehensive understanding and investigation is needed to support Bangladeshi SMEs in realising the

issues discouraging them from adopting Cloud Computing, as well as a roadmap to better explain the adoption plans in a more effective way. In chapter two, I will discuss different aspects of Cloud Computing such as definitions, characteristics, incentives, barriers, services, deployment models and technology trends of Cloud Computing in detail.

1.3: Statement of the Research Problem

It is repeatedly claimed that the successful implementation or improved use of technology supports the approaches of numerous business organizations (Henderson and Venkatraman, 1999). Kyobe (2004) argued that the efficient use of Cloud Computing refers to the use of Cloud Computing resources to offer a competitive advantage to a business organization. Hyvönen *et* al. (2003) acknowledged that efficient use of Cloud Computing is one of the vital components that modern business organizations develop in order to accomplish deliberate gains. Alam *et* al. (2007) claimed that the adoption of Cloud Computing certainly improves the performance of SMEs but yet, notwithstanding the high transmission development percentage of digital technologies internationally in current years, the use of Cloud Computing within Bangladeshi SMEs remains really limited. The authors Alam *et* al. (2007) have further advocated that Bangladeshi SMEs still fall well below owing to the numerous issues that hinder their progress. Abdin (2014) argued that the adoption of technology by Bangladeshi SMEs is fairly slow compared with other developing countries. Uddin (2014) mentioned that there are enormous contributions to come from the SME subdivisions, which can potentially support financial improvements but however, the issues experienced by Bangladeshi SMEs tend to have negative consequences for users and their ability to adopt sophisticated and advanced technologies such as Cloud Computing.

In spite of the increasing amount of research on the adoption of Cloud Computing by SMEs, researchers Harindranath *et* al. (2014) suggested the requirement for more exploration of the significant issues that impact upon the efficient implementation in dissimilar global contexts. The authors, Harindranath *et* al. (2014), have further added that exploration in the area of Cloud Computing adoption by SMEs is still under-researched in emerging countries and, of course, Bangladesh is no exception. Uddin (2014) and the SME Foundation (2014) strongly emphasised that the SME sector is one of the 'thirst' sectors of Bangladeshi economic growth but owing to the absence of technology use, this sector cannot contribute significantly to the country's financial development, which clearly demonstrates that there is a prerequisite of technology use within the Bangladeshi SMEs. It

is imperative, therefore, to explore the current condition of Bangladeshi SMEs in order to understand the real situation of adoption of an advanced technology such as Cloud Computing and their willingness of moving towards it.

1.4: Aims of the Research

- To investigate and to identify issues that explain the challenges of adoption of Cloud Computing by SMEs in Bangladesh;
- To place these issues in an academic context by developing and proposing a conceptual framework for understanding drivers and barriers to Cloud Computing adoption, and
- To explore directions for Bangladeshi SMEs to adopt Cloud Computing within the framework of Bangladesh's government policies for "Digital Bangladesh".

1.5: Objectives of the Research

The objectives of this research is an exploration of the issues and challenges for adoption of Cloud Computing by SMEs in Bangladesh and an evaluation of how those challenges will be overcome by the SMEs in the context of Digital Bangladesh.

1.6: Research Questions

"How do SMEs overcome challenges to the adoption of Cloud Computing in the context of Digital Bangladesh?"

1.7: Significance of the Research

In the adoption of Cloud Computing, complications may arise because of issues of trustworthiness, performance, vendor lock-in, management skills and knowledge, and absence of approved standards, which are also considered barriers to Cloud Computing adoption (Leavitt, 2009). In addition, Cloud Computing users could face further indecision in the use of technologies, uncertainty of demand, types of necessary software functionalities, lack of institutional inspiration, lack of planned significance of IT applications and incorporation (Xin and Levina, 2008). Moreover, there are issues of availability of service, cost, organizational change and the selection of appropriate service providers and legal issues, which users need to have resolved prior to the adoption of Cloud Computing (Heinle and Strebel, 2010). Furthermore, when considering Cloud

Computing adoption, specific 'socio-technological' matters concerning privacy, control, effect on work practices and, of course, boundaries of using business models pose challenges and these need to be resolved (Hosseini, *et* al., 2010).

It is observable that internally and externally SMEs face numerous difficulties. For instance, the requirements of technology-based services are progressively mounting but finance to assist SMEs is gradually reducing. The improvements made in the area of technology have empowered business owners and managers to use it but owing to the high expense of implementation and maintenance and of not having easy access to money, it is difficult for them. However, the cost of using technology can be minimised and IT-based services could improve significantly if technology is implemented and used collectively by SMEs.

Besides, many users do not have a full understanding of Cloud Computing, which is also another reason for not yet adopting Cloud Computing. Realistic information about new technologies is required in order to raise the users' consciousness so that they, and especially SME owners and managers, entirely understand the benefits. Most of the previous research in this area has been focussed on developed countries and/or European countries, and very little attention has been given to developing countries or those in South Asia. Further exploration is, therefore, recommended to investigate in detail and identify barriers to Cloud Computing adoption in developing countries such as Bangladesh by keeping in mind issues of adoption processes in every country. Moreover, the information and technology and infrastructures of SMEs needs to be adapted by the effective support of virtualizing and incorporating functioning procedures which can be achieved by following the Cloud business model.

Cloud Computing adoption is dominated by specific significant issues. Firstly, the issue is to build up a comprehensive understanding of the difficulties and challenges associated with the adoption of Cloud Computing. Secondly, a framework is required for better understanding of the issues and challenges that Bangladeshi SMEs face in adopting Cloud Computing throughout the country. The probable internal, external and technological issues challenging its implementation would be clarified and developed through this framework. Further investigation relating to Cloud Computing adoption and its innovative practices could be developed from the results of this exploration.

Finally, this research is meaningful for numerous purposes. It will support SMEs in their efforts to recognise the issues that hinder Cloud Computing adoption. This study will also help fill the gaps present in existing literature in the Bangladeshi SME and Cloud Computing sectors. In addition, this exploration will offer a realistic roadmap, which will assist Bangladeshi SMEs, in a step-by-step process of Cloud Computing adoption. Moreover, this investigation is noteworthy because it will add a new contribution to the existing body of knowledge in the area of Cloud Computing, SMEs and of course Digital Bangladesh. And finally, this study will provide enough information for future researchers in terms of Cloud Computing adoption, especially in developing countries such as Bangladesh, where individuals have high distinctive beliefs about their businesses.

1.8: Outline of the Research

Chapter 1.0: Introduction to the Research

In chapter one, the problems of the research will be outlined and the significance of this study will be clarified. Moreover, the research aims, objectives and questions will also be clearly specified. At the end of the chapter, an outline of the overall structure of the research will be presented.

Chapter 2.0: Review of the Literatures and Theoretical background

Chapter two will outline and explain the existing literature and theories. Related literature, which explains the issues challenging Cloud Computing adoption will be identified In addition, knowledge gaps that exist in the literature will be identified. The theoretical backgrounds of the issues highlighted in previous relevant studies will be investigated. Moreover, chapter two will present a review of the literature in order to create an appropriate framework, which integrates TOE and the Cloud Lifecycle model. This framework will lead to the proposal of a conceptual framework of Cloud Computing adoption and support the Bangladeshi government in building Digital Bangladesh.

Chapter 3.0: Presentation of the Research Methodologies and Methods

Chapter three will discuss the research methodologies and methods that were chosen for this study and also will explain how the research aims and objectives will be accomplished with the support of the chosen research methods, philosophies, approach and strategies. It also explains how the data collection and analysis will be achieved. In addition, a detailed description of the research design will be presented along with a detailed justification of all the methods, paradigms, approaches, techniques and tools that will be used.

Chapter 4.0: Presentation of the Participants' Context

Chapter four is based on the participants' individual insights and a summary of the interview transcripts for every single participant will be presented. This chapter will provide a clear picture of every participant and their understanding of Cloud Computing and Digital Bangladesh. This chapter will further provide the overall research ideas before moving onto the analysis.

Chapter 5.0: Discussion of Themes, Sub-Themes and Interpretation of Data

Chapter five will present the analysis of the themes of qualitative data that were collected from the interviews. This chapter demonstrates the participants' overall understanding, barriers and incentives of Cloud Computing, as well as their willingness to move towards Cloud Computing in the near future. There is also an explanation of Digital Bangladesh's concepts and how Bangladeshi SMEs can adopt Cloud Computing in the Digital Bangladesh context.

Chapter 6.0: Presentation of Data Discussion

Chapter six will present the discussion of the data revealed in the analysis, where all of the data will be classified under three headings: Internal, External and Technological Barriers and Incentives. This chapter will also demonstrate two different frameworks based on the barriers and incentives of Cloud Computing adoption, which will provide an overall summary of all the findings and discussion.

Chapter 7.0: Presentation and Discussion of Proposed Conceptual Framework

Chapter seven will discuss the developed integrated framework and provide a clear roadmap for SME owners and managers, and the Bangladeshi government regarding Cloud Computing adoption and building Digital Bangladesh. This chapter will also explain how Bangladeshi SMEs could adopt Cloud Computing and what they would need to do if an error were to occur during implementation. This chapter will further explain the step-by-step process of Cloud Computing adoption in the context of Digital Bangladesh.

Chapter 8.0: Presentation of the Research Justification

Chapter eight will present the overall justification of the research, both internally and externally. This chapter will also explain the trustworthiness of the developed integrated framework.

Chapter 9.0: Conclusions, Original Contribution, Reflections, Limitations and Implications for Future Research

Chapter nine will present a synopsis of conclusion along with the original contribution of the research, suggestions for further research, limitations of the research and implication for future research.

1.9: Summary of the Chapter

Chapter one has outlined the origin and background of the research and presented its aims and objectives associated with the investigation topic. This chapter has put forward the research question and studied literature that has offered the research background. The studied literature indicates that there is a mounting requirement for study of the issues that explain the challenges of Cloud Computing adoption and its exploitation. In addition, this chapter presented the problems and significance of the study, which focused on the scope of the research contribution. In conclusion, an outline of the overall research was presented in order to provide an indication of the entire exploration and explanation of the material covered in the following chapters.

Chapter – 2.0

Review of the theoretical background and literature

2.1: Introduction

Research into information technology adoption and innovation is a constantly expanding area; meanwhile new technologies are evolving on a daily basis (Wang *et* al., 2011). Information technology maintains its insistent march into nearly every aspect of the businesses world (Alam and Noor, 2009). Innovation in information technology makes organization tasks initially hard because of the issues of installation, adoption and implementation of new technologies. This chapter will review Cloud Computing (CC) in general by discussing various aspects such as barriers and incentives to adoption in order to provide a general idea of Cloud Computing opportunities in business. This chapter will further discuss how Cloud Computing can be used in SMEs and what would be the benefits of using it. Moreover, this chapter will further discuss the concept of Digital Bangladesh and how this initiative is associated with Cloud Computing. Finally, this chapter will present the appropriate theories on which the conceptual framework of this research was based -- including a detail review of prior Cloud Computing adoption studies alongside studies of the adoption and use of new technologies.

2.2: Cloud Computing – An Insight

According to Buyya *et al.* (2011), *"Cloud Computing cannot be a new and innovative technology since CC systems use relatively old computing and network technologies (hardware and software)"*. Cloud Computing is not an entirely new concept but develops from a long history – perhaps beginning in 'time-sharing' mainframe computer systems and (with the rapid development of local-area computer networks) developing through the 1970's into the technology that came to be known as 'distributed computing'. The first textbooks and college courses on 'distributed computing' appear in the mid-1970's (See Symposium on Principles of Distributed Computing (PODC), 1982) and, with the arrival of network technologies (like Ethernet, from the late 1970's) and more reliable data communications, solving computationally hard problems by sharing programs, data and communications across multiple platforms involving many 'computing nodes' located across a wide-area network became prevalent. ARPANET – the precursor to the Internet – was invented in the 1960's and one of its earliest applications was E-Mail – itself an example of large-scale, multi-platform distributed computing across wide area

networks. One needs, therefore, to consider more closely what more recent 'Cloud Computing services' offer that sets them apart from their historical predecessors; what makes CC distinctively different from distributed systems? In the following, I suggest that one part of that difference lies in the business model which CC presents for access to and use of distributed (remote) computing services.

Cloud Computing (CC) represents an on-demand distribution trade model of computing services, which includes "pay-per-use" services. By using this service, service users (clients) pay only for their exploited services, which is similar to the older communal utility amenities/timesharing (Buyya *et al.,* 2011). Cloud Computing also guarantees to distribute perceptible business reimbursements at lower cost because CC decreases the upfront expenses of computing that most of the time discourages small and medium sized businesses from exploiting fully Information and Communication Technologies (ICT) in their businesses (Staten, 2009). The services of Cloud Computing offer a reasonable return on the investment of small and medium sized businesses, it is claimed, owing to significantly lower upfront cost, reduced requirements for maintenance and less need for specialist (and expensive) IT support staff. As a result, small and medium sized businesses can focus more on what really distributes worth to their customers and results in financial returns. These, at least, have been the optimistic prophecies about Cloud Computing for the future. For example, Gartner CIO Agenda Report (2016) predicts that overall global spending on communal information technology and Cloud Computing could be approximately $250 billion by 2016.

2.2.1: Cloud Computing – What are the Definitions?

Alshamaila (2011) claimed defining Cloud Computing is not easy. Kim *et al.* (2012)*,* claimed that Cloud Computing definitions have been reformed several times in the past and will certainly reform in the near future. Raj (2013) mentioned that defining Cloud Computing is the key challenge for discussion due to the numerous background concepts and types of Cloud Computing service. Many scholars have defined Cloud Computing from the perspectives of various stakeholders such as scientists, providers, consumers, developers, engineers and service managers and from various applications aspects, but there is no clear consensus. The following table shows several different definitions of Cloud Computing based on both technical and service characteristics.

References	Definition of CC/ Quote
The National Institute of Technology and Standards (NIST), (Mell and Grance, 2010)	*"Cloud Computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., network, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction"*.
Gartner (Plummer *et al.*, 2008)	*"Cloud Computing is a style of computing where scalable and elastic IT capabilities are provided as a service to multiple external customers using Internet technologies"*.
Sathishkumar, Gurunathaprasad and Govinda (2012)	*"Cloud Computing is the way of providing computing resources in the form of a service rather than a product, utilities are provided to the users over the internet"*
Mukhopadhyay *et al.* (2013)	*"Cloud Computing is a complex infrastructure of software, hardware, processing, and storage, all of which are available as a service"*.
Centre for the Protection of National Infrastructure (2010)	*"Cloud Computing is a term used to describe a set of IT services that are provided to a customer over a network on a leased basis and with the ability to scale up or down their service requirements"*.
Buyya *et al.*, (2008)	*"Cloud Computing is a type of parallel and distributed system consisting of a collection of interconnected and virtualised computers that are dynamically provisioned and present as one or more unified computing resource based on service-level agreements established through negotiation between service provider and customers"*.
P. McFedries (McFedries, 2008)	*"Cloud Computing, in which not just our data but even our software resides within the cloud, and we access everything not only through our PCs but also cloud-friendly devices, such as smart phones, PDAs...the mega computer enabled by virtualisation and software as a service... this is utility computing powered by massive utility data centres"*.

Table 1: List of Cloud Computing definitions (Compiled by the author)

2.2.2: Cloud Computing – What are the Main Characteristics?

Cloud Computing, which is a resource provisioning model, integrates a number of existing technologies that have been applied in grid computing, distributed systems, utility computing, service oriented architectures, the 'internet of things', IT outsourcing and so on (Magoulès, Pan and Teng, 2013). This section will explain the key characteristics of Cloud Computing and the differences between the features of technical, qualitative and economic business-related aspects of Cloud Computing.

2.2.2.1: Cloud Computing – Key Characteristics

- **On-demand self-service through a secure portal**: The cloud service user does on-demand self-service provisioning for server, network, and storage capabilities, without interacting with the service providers (Josyula, Orr and Page, 2012).

- **Scalability and Elasticity:** Rapidly scale the computing capabilities up or down, always elastically to maintain cost efficiencies (Josyula, Orr and Page, 2012).

- **Pay per use:** Capabilities are charged using a metered, fee-for-service or advertising-based billing model to promote optimization of resource use (Josyula, Orr and Page, 2012).

- **Ubiquitous access:** Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thick, thin, or mobile client platforms. Thick client provides users with more features, graphics and choices making the platform more customizable. Thick client does not rely on a central processing server because normally processing is done locally on the user system and the server is accessed primarily for storage purposes (Beal, 2006). But in contrast, a thin client communicates with a central processing server, where very little hardware and software is installed on the user's machine (Beal, 2006). And, mobile or smart clients support work offline. Smart clients can work with data even when they are not connected to the Internet. These applications have the capability to be deployed and updated in real time over the network from a centralized server. Smart clients support multiple platforms and languages because they are built on web services and can run on almost any device that has Internet connectivity including desktops (Beal, 2006). Services must be secure everywhere in the cloud, and access to the cloud through Internet devices must be secured to ensure data

integrity, robust backups, authentication and cyber attack protection. (Josyula, Orr and Page, 2012).

- **Location-independent resource pooling:** Computing resources of the provider(s) are pooled to serve all users using a multitenancy model, with different physical and virtual resources dynamically assigned and reassigned according to user demand. No control or knowledge over the exact location of the provided resources is needed (Josyula, Orr and Page, 2012)

2.2.3: Cloud Computing – Distinctions between technical, qualitative and economic aspects

This section will describe and differentiate the technical, qualitative and economic characteristics of Cloud Computing.

2.2.3.1: Technical Characteristics

Technical characteristics are the base that supports other practical and financial requirements. Below I will summarise the technical aspects and their explanations

- **Virtualisation:** "Virtualisation is an important characteristic of Cloud Computing. It refers to a multi-layer hardware platform, operating system, storage device, network resources and so on" (Magoulès, Pan and Teng, 2013). For example (so-called) 'desktop virtualisation' provides a simulation of a user's experience of using applications, accessing online resources, communicating with other users as if they were operating their own desktop machine when, in reality, they may be interacting with multiple different platforms many of which are remotely located (Cafaro and Aloisio, 2010)

- **Multi-tenancy:** Multi-tenancy is a highly important issue for CC providers. It allows sharing of resources and costs across multiple users across a variety of platforms (Magoulès, Pan and Teng, 2013).

- **Security:** Security is the biggest concern for adoption of Cloud Computing. In order to attract potential clients, CC providers must ensure sufficient security to protect clients' private data, communications and application use. CC providers must segregate data for different clients and they need to ensure efficient

replication and recovery mechanisms to provide robust recovery from failures. (Magoulès, Pan and Teng, 2013).

- **Programming Environment:** The programming environment is important for CC providers to be able to replicate many storage and application features across different computing platforms in order to exploit Cloud features. Much of this capability was developed during the earlier emergence of distributed computing in heterogeneous environments (see above, pp. 11). For example, the programming language 'Java™' (released by Sun Microsystems in 1995, Gosling et al., 1996) was designed explicitly to allow application developers to "write once, run anywhere" (WORA, Gosling, ibid.) on any platform capable of compiling Java code. The programming environment had to be capable of addressing issues such as cross-platform execution (differing operating systems), multiple administrative domains, resource heterogeneity (differing file formats), performance stability and robust exception handling in highly dynamic environments (Magoulès, Pan and Teng, 2013).

2.2.3.2: Qualitative Characteristics

This refers to qualities or properties of Cloud Computing, rather than specific technological characteristics. One qualitative characteristic can be realised in multiple ways depending on different providers. In the following, I am going to present the qualitative characteristics of Cloud Computing which in part define CC's scope and purpose.

- **Elasticity:** Elasticity means the provision of services in elastic and adaptable ways, sufficient to allow users to request the service in near real-time without having to engineer new capabilities and resources at times of peak loads. The services required are measured in "fine-grain" detail, therefore, beforehand – with "Service Level Agreements" (SLAs) specifying the capacities and capabilities of the CC providers' services in advance. The terms of the CC provider's offering are then matched to a client's usage and set out in the SLA. (Magoulès, Pan and Teng, 2013). In terms of a CC provider's business model, thus, different levels of service can be offered at different prices – in relation to 'uptime' (uninterrupted service provision), storage requirements, access to applications, bandwidth (speed of

communications) and numbers of users and devices to be supported (Magoulès, Pan and Teng, 2013).

- **Availability:** This refers to a relevant capability that satisfies specific requirements of the outsourced services (Magoulès, Pan and Teng, 2013). SLAs do not simply set out for client users the terms of a CC provider's offer. They have also to specify the conditions under which business clients may extend or add to their requirements over time – for example to accommodate new business partners or business expansion – together with the costs associated with such developments. From the business CC user's point of view, service availability conditions may require some internal re-engineering of business functions (together with negotiation of changed conditions, for example with suppliers), to adjust operations to the new services (Magoulès, Pan and Teng, 2013).

- **Reliability:** Reliability signifies the ability to ensure constant system operation without disruption. Reliability is a particular Quality of Service (QoS) requirement, focusing on prevention of loss and robust recovery from errors and system failures. (Magoulès, Pan and Teng, 2013).

- **Agility:** Agility is a fundamental requirement for Cloud Computing. CC providers must be capable of on-line responses to changes in resource demand and environmental conditions. At the same time, efforts have to be made by clients to re-provision existing applications from an in-house infrastructure to Software as a Service (SaaS) vendors. Agility entails that both sides collaborate to provide self-management capabilities (Magoulès, Pan and Teng, 2013). Agility is a possible problem for many small and medium sized businesses in Bangladesh. Lacking (as many do) sufficient IT skills and awareness, some fail to anticipate the internal readjustments needed to adopt CC solutions. This is discussed further, below, in Chapter 6, pp. 221.

2.2.3.4: Economic Characteristics

Part of my argument, above, has been to support a view that the distinctive characteristics of Cloud Computing do not arise only from the technologies themselves which had been developed many years previously, but also from the characteristics of the business model which the technologies (in IT and in Network Communications) enabled.

Economic characteristics make Cloud Computing distinct, compared to other paradigms for ICT use in businesses. In a commercial environment, service offerings are not limited exclusively to the technological perspective, but extend to a broader understanding of business needs. In the following, I am going to provide a summary of the different economic aspects of Cloud Computing.

- **Pay-as-you-go:** Pay-as-you-go is a basic technique for the Cloud Computing business model, which means users need to pay according to the actual consumption of resources and services. Cloud Computing reduces the cost of infrastructure maintenance and acquisition, so it can help enterprises, especially small to medium sized. It may also reduce time to market and yield speedier return on investment (Magoulès, Pan and Teng, 2013). For the CC Computing business user, cost effectiveness of CC adoption has to be factored into evaluation of potential benefits – in terms of business expansion, increased capacity, speedier 'turnaround' times, potential to enter new markets. These are all considerations that will be addressed in my evaluation of benefits and barriers to CC adoption amongst SME businesses in Bangladesh, below, in Chapter 6.

- **Operational Expenditure:** The infrastructure of CC operations is typically provided by a third party and does not need to be purchased for infrequent intensive computing tasks nor does not require extensive knowledge of IT. Therefore, it is easy for the users to enter the computing world (Magoulès, Pan and Teng, 2013). In my own investigation, however, I will question whether (for SMEs in Bangladesh) initial operational expenditure is a critical factor in CC adoption. Adaptation of existing operational processes to accommodate CC has to be offset against the cost of adopting Cloud Computing solutions.

- **Energy Efficiency:** Energy-efficiency is due to the ability of Cloud Computing services to reduce the consumption of under-used resources. Computers are administrated centrally, so additional costs of energy consumption as well as carbon emission can be better controlled than in other cases. Moreover, green IT issues are subject to both software stack and hardware level, where software stack is a group of programs that work in tandem to produce a result or achieve a common goal. It also refers to any set of applications that works in a specific and

defined order toward a common goal, or any group of utilities or routine applications that work as a set (Magoulès, Pan and Teng, 2013).

2.2.4: Cloud Computing – What are the Deployment Models?

Cloud Computing has been developed based on the presence of public computer competences; additional deployment models dependent upon corporate location and volume of circulation have been espoused (Mell and Grance, 2010). Cloud computing may be deployed in different fashions, depending on the intended scope of usage and the type of exclusive or non-exclusive approach to providing CC services to the service acceptors. I am classifying these different deployment models as follows based on a classification by Kuyuro *et* al. (2011).

- Public/External Cloud,
- Private/Internal Cloud,
- Hybrid Cloud and
- Communal Cloud

2.2.4.1: Public/External Cloud Model

According to Magoulès, Pan and Teng (2013), the public cloud is the typical cloud-computing example, in which a service provider makes resources, such as applications and storage, available to the general public over the Internet. Public cloud or external cloud describes Cloud Computing in the typical mainstream sense and it is open to the public or to industry and owned and managed by a Cloud service provider (Josyula, Orr and Page, 2012). Public Cloud has been defined by Armbrust *et al.* (2010) as a *"cloud made available in a pay-as-you-go manner to the general public"*. Examples of Public / External Cloud services would be Apple's iCloud service, Microsoft's Office 365 service and a variety of specialist services, like "DropBox" (file sharing), Instagram (photos, video sharing), and other 'social media' sites. The common characteristic of such services is that they are accessible via any web browser or smartphone App from anywhere – but can charge fees for storage of data and / or access to premium services. The business model is, thus, individual subscription-based together with revenue generated from advertising.

2.2.4.2: Private/Internal Cloud Model

The private / internal cloud defines an exclusive computing service that distributes access to a controlled number of people usually via interior networks or extranets that require authentication by remote users. Business organisations tend to prefer a private cloud service because of the need to retain accurate control over their data in order to obtain all the scalability, metering and nimbleness benefits of a public cloud without yielding control, security and usage costs to a service provider (Magoulès, Pan and Teng, 2013). Dillon *et* al. (2010), identified that there are many reasons why an organisation may adopt a private cloud deployment model such as (a) there is a greater need to increase and enhance the exploitation of existing in-house resources, (b) service users are concerned about security, trust and privacy of their data, and (c) organisations look for total control over 'mission-control' activities, which are hosted behind their network firewalls and accessible only by authenticated devices and users.

The Private / Internal Cloud model may be attractive to large corporate enterprises – depending upon the business sector, but – as I will argue later (Chapter 6) -- the advantages of a "Private Cloud" may not be so significant for SMEs.

2.2.4.3: Hybrid Cloud Model

According to Keith and Burkhard (2010), *"A hybrid cloud uses a combination of public cloud, private cloud and even local infrastructures, which is typical for most IT enterprises".* This deployment model enables data and application portability (Josyula, Orr and Page, 2012). The objective of adopting a hybrid cloud is so that users can quickly switch from private cloud to public cloud in terms of shortage of capacity in the private cloud for extra resources to carry out their business operations (Josyula, Orr and Page, 2012). In addition, a hybrid cloud may facilitate remote working ("working from home") for staff whose access needs to be limited (owing to security concerns). On the other hand, organisations may adopt a hybrid deployment model to optimise their resources in order to increase their core competencies by outsourcing peripheral business functions to the CC provider while controlling core activities in-house through their private network (Dillion *et al.,* 2010). Hybrid models are a composite solution to distributing workload to staff depending upon cost and upon operational compliance factors.

Users can deploy an application hosted on a hybrid infrastructure where some nodes are running on real physical hardware and others on cloud server instances (Magoulès, Pan and Teng, 2013).

Although a hybrid deployment model may be appropriate for businesses, which are already committed to legacy systems, which have to remain "in-house", the advantages of a fully CC-based solution are reduced (Dillion *et al.,* 2010).

2.2.4.4: Community Cloud Model

The community cloud model involves sharing by two or more organizations with shared concerns (Jamsa, 2013). This model overlaps with 'computing grids' to some extent, in respect of different firms in a private community sharing a cloud-based substructure. Within the community model, firms may have apprehensions about mission, security necessities, strategy, and acquiescence in all parties conforming to the 'community' requirements (Magoulès, Pan and Teng, 2013). The community deployment model may be managed by an organisation or by a third party. This model may exist on premises or off premises (Josyula, Orr and Page, 2012). This model can additionally be aggregated with a public cloud-based model (see above) to configure a 'cross-boundary' structure (Magoulès, Pan and Teng, 2013). An example of a community model would be Terremark's Enterprise Cloud platform built by the United States Federal Government (Magoulès, Pan and Teng, 2013).

To the extent that Bangladesh SMEs may already be partners in collaborative arrangements (especially, for example, in export contracts) then there may be (based on my analysis in Chapter 5) scope for adoption of a 'Community Cloud Model' amongst business collaborators. Inevitably, however, issues of cost and division of responsibility may inhibit this being an appropriate model for Bangladesh SMEs' adoption of cloud-based solutions.

2.2.5: Cloud Computing – What are the Service Models?

Cloud Computing is characteristically a distribution of modified computing services over the Internet, which can be accessed in a simple and ubiquitous way (Alshamaila, 2011). Cloud Computing can co-operate with clients (users or applications) in multiple ways via server-client or peer-to-peer network services (Jamsa, 2013). According

to Wang *et al.,* (2012), the service models can be classified in many ways through web-based or customised interfaces such as:

- Software as a Service (SaaS),

- Platform as a Service (PaaS),

- Hardware as a Service (HaaS),

- Development/Database/Desktop as a Service (DaaS),

- Infrastructure as a Service (IaaS),

- Business as a Service (BaaS),

- Framework as a Service (FaaS) and

- Organization as a Service (OaaS)

In essence, however, Cloud Computing services can be categorised into three key services based on the computing necessities of the clients and various levels of Cloud Computing substructure namely, Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS) (Wang *et al.,* 2012). According to Marston *et al.* (2011), these categories of Cloud service models are known from end-user's viewpoint – though a CC provider's viewpoint may incorporate various combinations of these services customised to different clients' needs.

In my evaluation of the benefits and barriers to CC adoption amongst Bangladeshi SMEs, my focus will be upon these three key service provisions (SaaS, PaaS, IaaS) and the level of awareness SME owners and managers have about the potential benefits and limitations of their adoption (see Chapter 6), where other types of service, different from these three, may be appropriate, I will indicate the special circumstances within the SME context that may recommend these kinds of provision.

2.2.5.1: Software as a Service (SaaS)

The Software as a Service model offers an on-demand cloud-based foundation for software, which is usually web-delivered content that clients access through a web browser. Software can be accessed in any of the Cloud deployment models (Jamsa, 2013). Thus, clients do not necessarily need to install and run those applications on their own computers. These applications (e.g. document editing embedded in a web browser) can be used at any time from any location on the globe (Marston *et al.,* 2011; Dillon *et al.,* 2010). This service allows users to access reduced forms of desktop applications via the web. SaaS delivers applications as

fully or partially isolated services, similar to desktop, standalone applications, with which users are already familiar. These applications can be in the form of web-based applications combined with non-remote applications - with Internet based storage or connectivity to other system communications' resources (Wang *et al.,* 2012). SaaS is a multi-tenant platform, which allows users to access software applications hosted by Cloud providers on a pay-as-you-go or subscription basis (Wang *et al.,* 2012). The advantages of SaaS services are straightforwardness of incorporation into business operations, familiarity, low-cost and scalability. In addition, the overheads associated with maintenance and upgrading are (in the main) borne by the CC provider, rather than the client. The disadvantages of SaaS are perceived to be the security issues (new users may not perceive it to be secure to store their firms' data on Cloud-based servers (Jamsa, 2013). A second disadvantage may be a lack of compatibility of Cloud-based applications with legacy software, which may be costly to upgrade or replace. In my evaluation of SME adoption of CC solutions (Chapter 6), these perceptions of advantage and disadvantage will be analysed further.

2.2.5.2: Platform as a Service (PaaS)

Platform as a Service (PaaS) offers underlying hardware and operating system technologies, including virtual servers, file systems, database management systems, developer tools and network support for the CC users to install their own customised applications (Jamsa, 2012). The platform providers within PaaS services reduce the need for clients to invest in and maintain their own servers, data-storage devices, software development environments and specialist network management utilities. In PaaS, instead of planning and costing regular upgrades to systems, developers focus on their own business-specific applications (Jamsa, 2012). PaaS that is running via a CC provider's platform distributes resources such as Linux, Apache, MySQL and PHP to clients. This simplifies the distribution; maintenance and version management of applications with less cost and fewer complications than may be involved in purchasing and maintaining in-house hardware or software resources (Josyula, Orr and Page, 2012). PaaS typically supports concurrent operators how to use applications by offering concurrency administration, scalability and safety therefore operators do not need to manage or control core Cloud substructures for deployment and hosting environment configurations (Josyula, Orr and Page, 2012). Examples of PaaS inclues Cisco

(WebEx connect), Amazon Web Services, Google, Windows Azure and Apple SDK toolkits available online (Josyula, Orr and Page, 2012).

In relation to SME use of PaaS, based on my evidence from Bangladeshi SMEs, adoption of PaaS solutions would be restricted to a small number of SME clients – primarily those operating in the ICT sector itself: software developers, web designers, IT solution providers (see Chapter 6).

2.2.5.3: Infrastructure as a Service (IaaS)

Infrastructure as a Service (IaaS) is an on demand service of virtualisation for clients subscribing to CC services. The idea of Infrastructure as a Service is a transformation of Hardware as a Service (HaaS) to promote an all-inclusive approach to run IT substructures as services to end-users (Jamsa, 2013; Sotomayor, 2009). The fundamental scheme of IaaS is to create a flexible environment for clients to perform multiple tasks (Buyya *et al.,* 2011). In IaaS, designers have to set up and install their own operating systems, database management systems and all necessary specialist software to operate and manage hardware and software within their own operational environment (Jamsa, 2013). IaaS service models delivered to the clients including networking, computational, and storage resources to run different types of software specific to the CC client's needs. Using IaaS, clients do not necessarily need to have control nor to build essential IT substructures but they can have control of operating systems and their deployed applications (Josyula, Orr and Page, 2012). Usages of the most current versions of technologies on a pay-per-use or subscription basis are the key advantage of IaaS (Josyula, Orr and Page, 2012). Some of the key providers of Cloud IaaS providing fundamental IT hardware and software resources are Cisco, HP, IBM, Dell, VMware, Red Hat and Microsoft (Josyula, Orr and Page, 2012).

Again, in relation to SME use of IaaS, adoption of IaaS solutions would be restricted to a smaller number of SME clients – primarily those operating in the ICT sector itself: software developers, IT solution providers or similar (see Chapter 6, pp. 202) or SMEs wishing to access B2B or B2C online portals. In this latter case use of IaaS may be extended to included tools and utilities provided to enable CC clients to interact via established, web-based portals (like e-Bay, TaoBao and others) without having to incur the costs of specialist in-house expertise in making

their existing online facilities available to buyers or sellers (for example, payment systems, ordering and returns systems, advertising and data analytics).

2.2.6: Cloud Computing – What are the Key Drivers?

The world is undergoing a digital and mobile revolution with large amounts of data, with rapid access via more media than ever before. Technology users have moved onto social media and mobile applications with the expectation that these will not only enhance their personal lives, but also enable them to work in different, more convenient ways and many trust their technologies to be their main connotation arrangement (Berman *et al.,* 2012). Cloud Computing offers a new path for businesses to use the competences acquired from users' familiarity with digital technologies to meet clients' requirements and drive future development. About three-fourths of the firms globally had piloted, adopted or implemented Cloud Computing in their firms and 90% of them expected to adopt Cloud Computing services by 2015 (Berman *et al.,* 2012). In addition, firms who have already adopted Cloud Computing services are expected to have grown from 13% to 41% by 2015 (Berman *et al.,* 2012). Moreover, Berman *et al.* (2012) also identified that a higher percentage of large firms (those with revenues above US$20 billion) are testing Cloud-based services while small and medium sized firms are also experimenting with adoption. Furthermore, 67% of firms with less than US$1 billion turnover and 76% of the firms with revenues from US$1 billion to US$ 20 billion have been already adopted Cloud Computing services for some purposes, which indicates how the world Cloud Computing market is forecast to grow 22% yearly to US$241 billion revenue by 2020 (Berman *et al.,* 2012). The data above suggests that the demand for Cloud Computing services is growing rapidly throughout the world's business communities. The concern of my investigation is to evaluate how "uneven" this demand may be – depending upon regional, geographical and other economic factors, relative to the types and locations of the businesses concerned (especially SMEs).

The major benefits or drivers for the adoption of Cloud Computing are listed and discussed below.

- **Flexibility of Cost:** Flexibility of cost is a key reason for many firms to consider Cloud Computing adoption in the first place (Berman *et al.,* 2012. Cloud Computing offers an ability to reduce fixed IT costs and to move to a 'pay-as-you-use' cost structure (Berman *et al.,* 2012). By enabling movement of capital expenditure to operational expenditure or from fixed to variable expenditure Cloud

Computing may support a company in reducing fixed IT cost. Moreover, with computing applications, there is no longer a need to invest in specialist hardware or software or to pay frequent software update fees. {Can you supply any indicative examples of the amount of cost reduction these may provide?} Firms only need to pay what they use and when they may need to increase usage. This facility offers flexibility and eradicates the need for initial capital expenditure (Berman *et al.,* 2012).

- **Scalability of Business:** Scalability of business operations or IT scalability is recognized by many firms as one of the major drivers for adoption of Cloud Computing. Moreover, Cloud Computing services, it is claimed (Berman et al., 2012), allow companies both to scale up and, in less favourable economic circumstances, to scale down their costs in relation to IT provision – unlike in-house IT provision which requires on going expenditures even when under-used. This advantage of scalability, however, as my investigation will discuss later (Chapter 6, pp. 225) has to be offset against the relatively high initial costs of transforming business processes to make effective use of Cloud Computing solutions.

- **Market Adaptation:** Market adaptation in today's economic environment is vital because ability to respond to rapidly changing purchaser needs is one of the key differentiators. Therefore, firms are continuously looking for a path to develop their speed of response to market demands (Berman *et al.,* 2012). By empowering businesses to adapt procedures, services and products to meet the changing needs of the market, Cloud Computing has the ability to enable prototyping and innovation, so may support more rapid times to market (Berman *et al.,* 2012). Of course, rapid adaptation to changing market conditions applies primarily to market sectors, which are more turbulent. Berman's claim (2012) that Cloud Computing services provide easier ways in which companies can react to rapid market changes has been little tested. Cloud Computing providers have also to accommodate fairly rapid change in technologies, pricing structures, service provision and in their own hardware and software infrastructures in order to adapt to changing market conditions. Such changes may threaten the adoption of Cloud-based services if providers lack the capacity to react to changes in technologies, usage, connectivity and costs.

- **Masked Complexity:** Cloud computing not only offers business scalability and market adaptability but also offers the benefits of masking complexity. Cloud Computing has a way to hide parts of the technical intricacy of its operations from clients. This re-distributes the skills needed for end-users to be productive in their use of business-specific IT. It also offers the promise of reducing training costs for new employees. Rather, IT specific skills (configuring user accounts, maintaining robust and reliable data storage, ensuring optimal network 'uptime', and others) are transferred (on the whole) to CC providers (Berman *et al.,* 2012). Complexity is 'masked' from the clients (and from their customers) enabling, a business to increase the sophistication of its services and products without incurring as much overhead in respect of end-users' knowledge or technical facility to manage, maintain and control the technical infrastructure needed. For example, software updates and maintenance can be completed in the 'background' without the involvement of the consumers' (Berman *et al.,* 2012). However, it should be noted that – especially in CC adopting businesses whose core activities require extensive interaction (B2B or B2C) with customers – 'masking complexity', in this sense, requires a separation of the businesses' product or service-specific support (for example, product specifications or pricing / payment options) from IT service support (since this will usually be located elsewhere – in the CC service provider's support activities. When customers' requirements involve a combination of product / service specific support with IT service support, this separation may degrade the quality of support provided. A concern for quality of service, which for many SMEs may be an important differentiator in the market, I will suggest later (Chapter 6, pp. 216), in the context of SMEs in Bangladesh, may be a barrier to CC adoption.

- **Context-driven Variability:** Context-driven variability is one of the drivers of Cloud Computing due to expanded computing power and capacity varied for each business user's requirements. Users want to keep their business-specific data based on their own operational requirements. Cloud Computing services offer storage facilities for clients for their operational requirements, which permits product or service customization (Berman *et al.,* 2012). Context-driven variability is a significant Cloud attribute. In principle, CC services ought to be able to tailor services to the specific requirements of business subscribers. In reality, this (for

SMEs in particular) may be an illusion. Larger scale CC service providers (Microsoft, Apple, Google) in general do not offer customised services. The onus is upon the business user to tailor their business processes to make most effective use of generic offerings like iCloud, MS Office 365, Google Plus. In theory, customisable CC services should allow for more user-centric involvement and address-fragmented consumers' preferences for the companies subscribing (Berman *et al.,* 2012). In reality, "context-driven variability" is rare for businesses signing up for generic CC services. In my investigation, I will evaluate whether this advantage constitutes a genuine driver for CC adoption amongst SMEs.

- **Connectivity:** Connectivity is claimed to be one of the business enablers and key benefits of Cloud Computing offerings (Berman *et al.,* 2012). Cloud computing simplifies the exterior relationship with associates and customers, which can lead to enhancements in efficiency and amplified novelty. Berman *et al.,* (2012), point, here, appears to single out the potential for Cloud-based services to unify modes of interaction with both 'upstream' (supplier networks) and 'downstream' (customer relationship management) functions within a business. I will discuss below (in Chapter 6) that, in practical terms, there is little evidence to this claim. The underlying assumption appears to be that if sufficient numbers of businesses and customers subscribe to the same CC service, then connectivity and interaction will be simplified and enhanced. The assumption is questionable: integrating suppliers, businesses and customers into a 'single' CC ecosystem (as I will argue) requires considerably more than these services (at present) can provide. What, for example, is the incentive for suppliers (or customers) to change their modes of interaction with a business to accommodate the services that a CC provider may enable?

- **Facilities Consolidation:** Cloud computing services offer consolidation facilities. These may appear to be attractive to many companies for the saving implied for their data resources. It is claimed that resources such as storage, computational access, and memory and network bandwidth can be pooled under Cloud facilities in a way that is cheaper than localised provision. Consolidation of data storage, ease of access from anywhere to shared data, reliability of recovery from data loss: all of these may constitute drivers in favour of CC service adoption. For my investigation, there remains the question whether such an advantage of CC service

adoption is of much significance for SME businesses? I will allude to this potential benefit in my discussion, below in chapter 6.

- **Labour Optimization:** According to Macias and Thomas (2011), *"Cloud Computing deployment does not require as much provisioning, software development, or maintenance as a conventional infrastructure, organizations can make better use of valuable ICT expertise by redirecting the workforce from routine operational and maintenance duties to mission-critical tasks"*. Every firm expect to be able to save labour cost. By adopting Cloud Computing services and using its facilities businesses may save large amounts of labour cost by using their IT specialists to meet specific requirements instead of using them for generic IT-related tasks within the business (Macias and Thomas, 2011). The evidence for this claim within SMEs is not clear, as I will argue in (Chapter 6).

- **Swift Deployment:** In Cloud environment, there is no longer need a software installation or configure the system, which gives huge benefits of the consumers as most of the consumers are not efficient of setting up hardware and installing software for their system. Cloud Computing offers a very swift deployment facilities for the consumers (Macias and Thomas, 2011).

- **Increased Flexibility:** Cloud Computing has various deployment models and services, which gives a firms to chose their specific model and service or combination of many. This service is one of the key drivers for Cloud Computing because it guarantees the implementations can be associated thoroughly with industry requires and ICT policies (Macias and Thomas, 2011).

- **Assured Service Level:** Cloud computing can assure and offer a better level of services than other ICT groups provides limited resources. With the proper combination of Cloud models a firm can ensure the existing service-level agreements (SLA) are sustained (Macias and Thomas, 2011).

- **Robust Resilience:** Cloud Computing offer automated recovery or disaster recovery facilities, which is easy to access by the consumers due to its consolidated resources. This is another top Cloud driver as some point firms use their internal Cloud model as a failover for public Cloud to increase the flexibility. Due to the

dynamic flexibility of Cloud Computing, firms are able to responds to service outage very quickly comparing internal ICT specialist (Macias and Thomas, 2011).

In the above I have reviewed (primarily) Berman's claims in favour of CC services providing a beneficial solution to business IT requirements. I have questioned whether these purported benefits have significance for SMEs in Bangladeshi business context. Next, I intend to evaluate the key challenges facing businesses in Bangladesh to adoption of Cloud Computing services.

2.2.7: Cloud Computing – What are the Key Barriers/Challenges

Although there are significant drivers for adoption of Cloud Computing, there are still some noteworthy challenges. Ghaffari, Delgosha and Abdolvand (2014) found in their research that security is a major concern of Cloud Computing adoption because of fears about online data security. Security is not the only barrier to adoption. There are some significant hurdles such as temporary loss of service (outage), ability to change suppliers (interoperability) and reliability, which are also key barriers to Cloud Computing adoption (Voorsluys, Broberg and Buyya, 2011; Zissis and Lekkas, 2012). The following will describe in more detail the inhibitors to adoption of Cloud Computing.

- **Reliability:** At present, enterprise-wide applications in larger businesses are so extensive that they have to be reliable and available to all requiring their provision (Ghaffari *et al.,* 2014). In terms of systems failure, a recovery plan must begin with minimal disruption and additional cost. However, larger businesses may be able to invest in recovery systems mitigating the effect of systems failure but small businesses typically do not have such resources. So it is essential to monitor a track record of reliability to inform adopters of the need to monitor systems reliability in order to encourage the wide-ranging adoption of Cloud Computing (Ghaffari *et al.,* 2014).

- **Security and Privacy:** A Cloud Computing approach presents a novel delivery model for IT solutions, which seems not to offer sufficiently high a level of security (of data) for enterprises (Ghaffari *et al.,* 2014). Zissis and Lekkas (2012) claimed that there is a lack of sufficient certainty and security accompanied by the advent of every new technology or innovation. They (Zissis and Lekkas, 2012) suggest it is unavoidable. The capability of Cloud Computing to address sufficiently privacy

regulations has been called into question. Thus, firms have to address a multitudinous set of pre-requisites to safeguarding the privacy of individual's information (Ghaffari *et al.,* 2014).

- **Open Access and Connectivity:** The realisation of Cloud Computing is dependent upon the availability of high-speed access to all and open access to computing resources similar to water and electricity power accessibility. However, in real life, connectivity and open access of Cloud Computing is not present globally (Ghaffari *et al.,* 2014). Lack of open access and connectivity ought, therefore, to be a consideration for SMEs within their own business contexts: is there sufficient connectivity and access for their current and proposed supplier- and customer-base?

- **Interoperability:** In the process of Cloud Computing adoption, it is pivotal to secure an appropriate level of interoperability between private and public clouds (Ghaffari *et al.,* 2014). A large number of companies have made remarkable progress toward standardising their processes, data, and systems by means of implementation of ERPs. Standardisation requires an extensible infrastructure, which results in a fully integrated interoperability amongst instances (Ghaffari *et al.,* 2014). SaaS applications delivered via the cloud provide a low-capital, fast-deployment option. Multi-platform interoperability may be important considerations for larger enterprises supporting a variety of IT platforms and a variety of means of access to online resources. It is not clear, however, that such considerations are relevant to SMEs. Depending upon the application, it is important to integrate with traditional applications resident on a separate cloud or upon local technologies. Standards can be an enabler or an impediment to interoperability in that existing ('legacy') systems may or may not inhibit the transfer to Cloud-based applications. The key resides in data integration and cross-platform compatibility. (AlZain *et al.,* 2011).

- **Economic Value:** It sounds obvious that by sharing resources to smooth out peaks, paying only for what is used, and cutting up-front capital investment in employing IT solutions the economic value of CC adoption will be there (Ghaffari *et al.,* 2014). There is a necessity for SMEs to balance accurately all costs and benefits arising from Cloud Computing adoption —in both the short and medium term.

Hidden costs could encompass support, disaster recovery, application modification, and data loss insurance. Since usage expands and interoperability requirements for business processes become more complex, a novel approach is required (Ghaffari *et al.,* 2014). Although accurate costings are difficult to compile, in my research I will focus upon the 'fears about cost', which SMEs in Bangladesh may have.

- **Political Issues and Global Boundaries:** In the Cloud Computing world, there is variation in terms of where the physical data resides, where processing takes places as well as from where the data is accessed (Ghaffari *et al.,* 2014). Given this variability, privacy rules and regulation may become problematic. Owing to the variable nature of rules and regulations in different political contexts, the direct involvement of government become more salient in standardizing and regulating the adoption process for Cloud Computing – both for providers and for purchasers. (Ghaffari *et al.,* 2014). An example, here, would be useful: e.g. (hypothetically) if an American owned private healthcare company operating in the UK transfers patient data to New York, predominantly for the (legal) use of that data in evaluating treatment costs / epidemiological trends, then it may become an issue whether Data Protection principles from UK Law (the Data Protection Act (as amended, 1998)) should apply to that data or whether State Law in New York (notably 'weaker' than UK legislation about how data may be used or communicated to third parties) should apply.

After discussing different barriers or challenges of Cloud Computing, it is now required to discuss technology trends for Cloud Computing in general. This is because, around the world, different peoples are using Cloud Computing for different reasons. So, it is important to know where this technology can be used. Therefore, next, I intend to discuss various technology trends of Cloud Computing services.

2.2.8: Cloud Computing – Technology trends

If you ask people what Cloud Computing is, and you are highly likely to get a dozen different explanations. The truth is, Cloud Computing has so many different applications therefore; it is even difficult to define on the spot. On top of the definitions, if you ask people about the trends of Cloud Computing then the possibility is that you will receive very complex answers. This is because, around the world, there are different analyses happening about the technology trends of CC. However, in this study, I will

mainly focus on Smart City Movement and internet of things (IoT).

2.2.8.1: Smart City Movement

Smart City represents one of the most promising and prominent Internet of Things (IoT) applications. In the last few years, smart city concept has played an important role in academic and industry fields, with the development and deployment of various middleware platforms (Petrolo, Loscri & Mitton, 2014).

The use of IoT solutions for Smart Cities is a broad topic, covering a variety of research ranging from sensor networks through to open-data portals (Lea & Blackstock, 2014). Some specific examples include work that has sought to use IoT technologies to address specific city infrastructure issues, for example, the use of traffic sensing technologies such as magnetic sensors and wifi scanners to assist traffic operators (Kostakos, Ojala & Juntunen, 2013). Experiments with large-scale sensor networks enable real-time monitoring of critical infrastructure such as the urban water supply (Difallah, Cudre-Mauroux & McKenna, 2013); defining key interfaces to buildings allows smart-grid managers to interactively manage energy use for the city (Lee, Chu & Gadh, 2013). Augmenting this traditional infrastructure sensing has been work on crowd sensing, via social networks (Blackstock, Lea and Friday, 2011) and mobile phones (Benouaret, Valliyur-Ramalingam and Charoy, 2013).

It is expected that both the variety and quality of data streams generated by city infrastructure and citizens will continue to increase as additional solutions come online to address efficiency in urban sub-systems (Lea & Blackstock, 2014. Understanding that it is not enough to create different sub-systems that don't 'talk' to each other, researchers have begun to address interoperability with unified urban-scale sensor networks and large-scale architectures toward unifying Smart City systems to create open innovation platforms (Schaffers et al., 2011) and explore cloud technologies as the basis for open platforms (Zanella et al., 2014). The main focus here is on how to build an scale a cloud-based IoT middleware that can be used across a broad range of Smart City research and in particular, the use of Smart City data hubs as a central approach to building urban-scale IoT systems.

1) IoT Hubs for Smart Cities: Cloud-based hubs offer a promising approach to developing an IoT centric framework for smart cities and address two of the key issues identified above (Lea & Blackstock, 2014). Firstly, they offer a consistent and easy-to-use

interface for emerging IoT infrastructure within the city that systems integrators and application developers can use (Lea & Blackstock, 2014). Secondly, they support the system-of-systems approach to smart cities whereby a cloud-based hub can integrate a number of sub-systems that collectively make up the complete smart city software infrastructures (Boyle, Yates and Yeatman, 2013). In addition to infrastructure management, cloud based hubs also offer a framework to integrate both static and real time urban data sets from government, community groups and participatory sensing systems. To manage and deliver these diverse data sets, hubs can act as a curated portal for end users and an easy-to-use service access point for developers. Applications accessing these hubs can use this data to adapt themselves to current or expected conditions, addressing needs in areas such as multi-modal transportation, environment waste management, and load management, driven by the needs of urban authorities, or by local entrepreneurs and citizen groups.
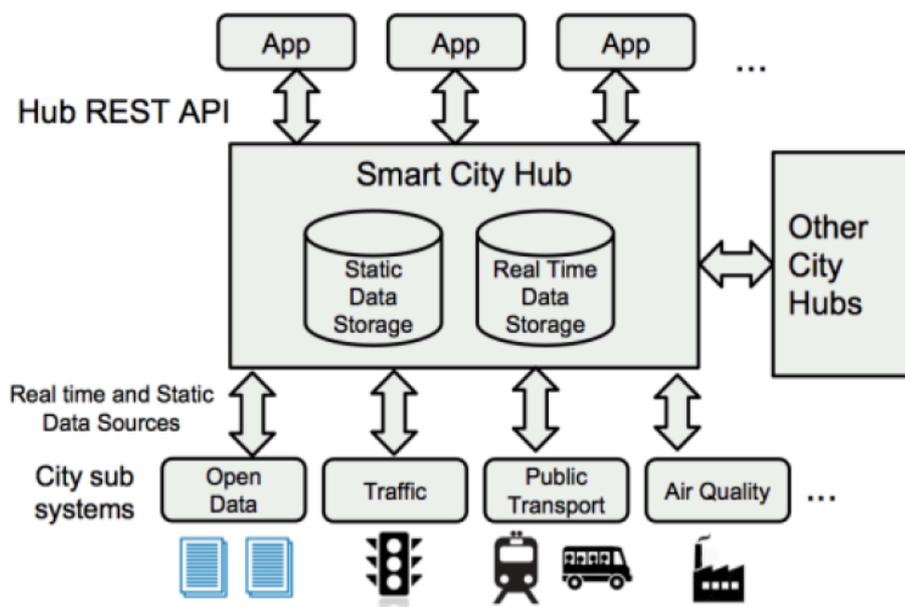
Figure 1: An IoT hub acts as a portal for Smart City Infrastructure as well as other hubs (Adapted from: Lea & Blackstock, 2014).

2) Cloud Considerations: According to Lea & Blackstock (2014), while Smart City hubs will offer the promise of a centralized and easy-to-use access point for Smart City data, there are a number of complexities driven by the realities of Smart City infrastructure and services such as:

a) **Hybrid-Cloud requirements**. It is unrealistic to expect that future Smart City

Hubs will be built as single stand-alone cloud-based hubs. Rather, they will need to address the reality of existing private infrastructure (Lea & Blackstock, 2014). Today, most cities run their own infrastructure software managing a variety of areas such as traffic management, licensing, water and sewerage, citizen engagement etc. This infrastructure is unlikely to completely migrate to public cloud infrastructure and so any eventual Smart City hub will have to address hybrid public-private cloud (Lea & Blackstock, 2014).

b) **Cloud-Cloud or Integrated Cloud.** As Smart City infrastructure evolves, it will need to address the issue of federated cloud services, or integrated clouds (Lea & Blackstock, 2014). City infrastructure is generally a system-of-systems approach with a number of self contained services supporting different aspects of a smart city, e.g. water, transport etc. While it is possible that in some cases, such sub-systems can be supported by a single cloud framework - as multiple services in a multi-tenant environment, it is also likely that a number of PaaS platforms will exist catering to different aspects of the smart city (Lea & Blackstock, 2014). There is a need therefore, to support integrated clouds to ensure new services can leverage across city infrastructure (Lea & Blackstock, 2014).

c) **Hub-to-Hub interoperability**. Given that multiple (often cloud based) Smart City services will co-exist, there is a need for some degree of standardization. This is likely to be based on common approaches and models to certain implementation issues such as concrete representations, URLs and schema for describing and querying data from Smart City hubs (Lea & Blackstock, 2014). This will include support for security mechanisms, so that hubs can control access to hubs and offer some guarantees over who is providing 'things' and their data.

2.2.8.2: Internet of Things (IoT) Platforms

The Internet of Things (IoT) has the potential to change the world, just as the Internet did. In 1998, Kevin Ashton introduced for the first time the term "Internet of Things". Some years later, in 2005, the International Telecommunication Union (ITU) formally introduced IoT, according to which: "from anytime, anyplace connectivity for anyone, we will now have connectivity for anything" (Petrolo, Loscri & Mitton, 2014). Since then, IoT starts to be a hot topic in academic and industry fields. Several EU projects have been launched with the goal to provide solutions for the realization of the IoT and its

integration in different application domains. The main reasons behind are the capabilities offered by IoT to create a world where all the objects around us are connected together and to the Internet with minimum human intervention (Perera, 2014) making possible the development of a huge number of applications in different domains (Petrolo, Loscri & Mitton, 2014) as shown in figure below.
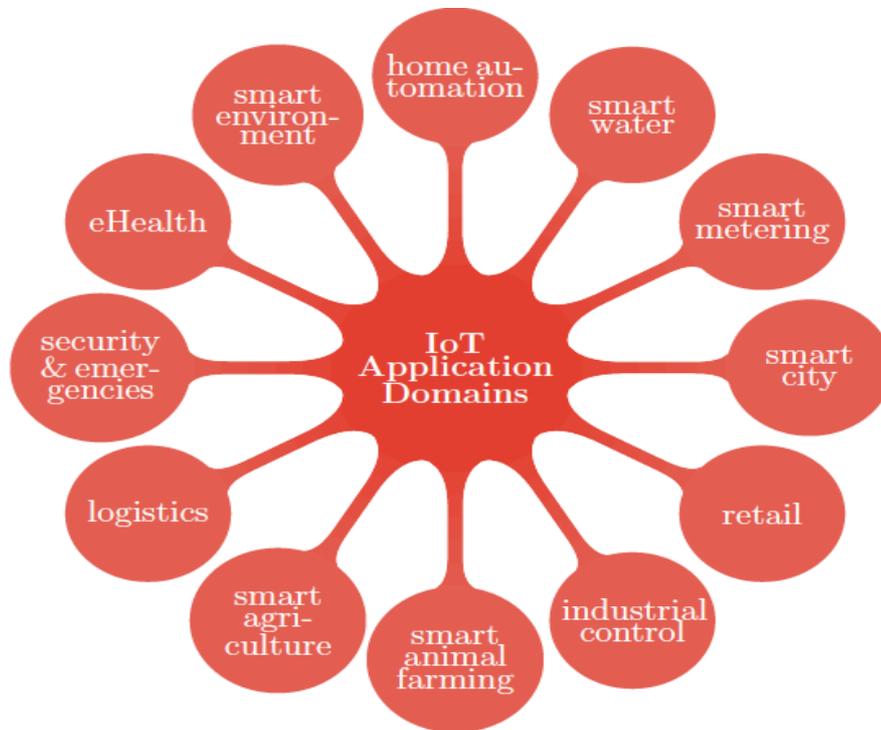
Figure 2: IoT application domain (adapted from: Petrolo, Loscri & Mitton, 2014).

Although, I have discussed couple of technology trends, which mainly focused on infrastructures of the Cloud Computing but however, aim of my study is not to pay my full attention to identify all the trends of Cloud Computing rather adoption of Cloud Computing. Therefore, I have not discussed further about it but however, I wanted to see some previous studies done by different scholars about adoption of Cloud Computing in order to understand the importance of adopting and using Cloud Computing. Next I will present some of the previous studies related to the Cloud Computing adoption.

2.2.9: Cloud Computing –Previous Studies on Cloud Computing

The aim of this section is to provide an overview of previously published papers about Cloud Computing and adoption of Cloud Computing. Many studies tried to define what Cloud Computing is and they mainly tried to improve the readers' understanding and knowledge about Cloud Computing (Grossman, 2009; Youseff, Butrico & Silva, 2008).

Some other scholars aim to investigate the concept of Cloud Computing by studying only one type of Cloud Computing such as Infrastructure-as-a-Service (Kim, 2011 & Repschlaeger *et* al., 2012).

Some of the studies have been carried out on specific system such as Enterprise Resource Planning (ERP), which offered by Cloud providers (Saeed, Juell-Skielse & Uppström, 2011). Some other studies focuses on the application of Cloud Computing in different fields of study such as construction (Liu, 2011), digital forensic investigations (Biggs & Vidalis, 2009), service industry (Borangiu, Curaj & Dogar, 2010) and biology (Talukder *et* al., 2010). Other studies aim to explain how consumers can get benefit from using Cloud Computing. Depending on the study, consumers have been defined as individuals, companies or educational establishments.

Many other scholars conducted research about the risks of using Cloud Computing. They have tried to identify the challenges that are related to using Cloud Computing (Khorshed, Ali & Wasimi, 2012). Some researchers proposed different models, strategies and ways such as change in policies, regulations and laws that can be used to face the issues related to Cloud (Merchant & Falvey, 2011). Diffusion of technologies in one of the interesting areas of research but however, diffusion of Cloud Computing has not yet received much attention from the researchers. Peiris *et* al. (2011) conducted a research about this topic, in which they tried to develop a model that not only considers the financial aspects of Cloud Computing but also other business initiatives such as IT governance structures, IT operational control structures and technical architecture requirements. This model can be used by organizations to define whether adopting Cloud Computing is beneficial for them or not.

Another study which investigates the adoption of Cloud Computing conducted by Low *et* al. (2011). They have investigated the influence of eight factors in adoption of Cloud Computing in high tech industry in Taiwan. Another study regarding Cloud Computing adoption, authors suggested that the usages of Cloud Computing can be viewed from two different perspectives in the Nigerian SMEs perspective such as IT outsourcing and technology adoption. They suggested that using Cloud Computing may have negative consequences such as losing money for SMEs, if they adopt this technology without a through analysis of all positive and negative aspects of it (Nuseibeh, 2011).

In addition, many previous studies in the field of Cloud Computing have addressed the

areas of new technologies, security requirements and the future expectations in these emerging environments. From the financial point of view, Misra and Mondal (2010) built two types of business models that can be drawn for companies (Cloud users) willing to adopt Cloud Computing services. There are business models for companies with an existing IT infrastructures and business models for startup companies. A contemporary survey found that the current charging pattern and other factors of the Cloud make it highly suitable for SMEs (Misra and Mondal, 2010). Pyke (2016) has stated that firm applications typically would be in charge of their localized sets of processes, with the connections of applications to these processes.

Prior studies have proposed a trade-off equation that indicates which technology can lead to higher profits. Misra and Mondal (2010) tried to broaden this outlook with a model that not only helps identify the suitability of a company of Cloud Computing but clearly tracing all the factors but also tries to give a certain profitability valuation of the benefits associated with Cloud Computing. Benerjee (2017) provides an overview of technological research studies that were performed in HP labs and that adopted Cloud-scale smart environments, such as utility computing and the smart data center. Buyya *et* al. (2016) have also dealt with market-oriented resource allocation of Cloud Computing by leveraging third-generation Aneka enterprise grid technology. Grossman *et* al. (2013) developed a Cloud-based infrastructure that had been optimized for performance networks and supported necessary data mining applications.

Many countries including such as Australia, Japan, Malaysia, Taiwan, Nigeria, Iran, United Kingdom and etc. significantly invested on Cloud-related projects therefore, Cloud Computing adoption is becoming so compelling (Lin & Yen, 2017). However, similar kind of research is very limited or none within the South Asian countries like Bangladesh, India, and Nepal etc. Despite its importance, several researchers studied the adoption process of Cloud Computing and this number is even less for studies whose main focus is on Small and Medium-sized Enterprises. Therefore, there is no doubt that my research would be appropriate and persisting.

It is now necessary to present the perspective of Bangladeshi SMEs and their associated issues relating to adopting Cloud Computing solutions in their businesses. Thus, below, I am going to present those features that provide a clearer picture of the overall understanding of Bangladeshi SMEs in their perception of issues related to Cloud

Computing adoption – in relation to existing literature reviewing the types and characteristics of SMEs who are my primary focus in this thesis.

2.3: Small & Medium Enterprises (SMEs) – Definitions in Different Contexts

In the context of Bangladesh, the expansion of SMEs is a dynamic instrument for poverty mitigation and rapid domestic development. But, unlike so many other countries, in Bangladesh there is no specific nor unique way of defining SMEs. The definition of SMEs depends on the different standards and principles used to measure the size of the business to define its classification (Hashim and Abdullah, 2000). There are different definitions in developed and developing countries and many of the definitions are not consistent with each other. Inaccurate measures are used to describe satisfactorily the size of the business in different industries (Hashim and Abdullah, 2000). I set out below some of the different definitions that have been proposed.

Definition of SMEs in the EU

The EU definition (Recommendation 2003/361/EC adopted on 1st January 2005), which is similar to the UK definition, includes a category called "micro enterprise".

Category	Headcount	Turnover **	Balance Sheet Total **
Micro	<10	£1.7 million	£1.7 million
Small	<50	£8.2 million	£8.2 million
Medium	<250	£41 million	£35.2 million

Table 2: Definition of EU SMEs (Adapted from Berisha & Pula, 2015)

[** The definitions are given above with the Euro values converted into Sterling at the rate applicable in June 2010].

Definition of SMEs in the UK

"In the UK, sections 382 and 465 of the Companies Act 2006 define a SME for the purpose of accounting requirements. According to this a small company is one that has a turnover of not more than £6.5 million, a balance sheet total of not more than £3.26 million and not more than 50 employees. A medium-sized company has a turnover of not more than £25.9 million, a balance sheet total of not more than £12.9 million and not more than 250 employees" (Berisha & Pula, 2015).

From the definition above it can be said that the UK Companies Act definition appears to be solely in terms of annual turnover (rather than number of employees). Both 'number of employees' and 'annual turnover' varies greatly from country to country and business sector to business sector, so standardisation of what defines an SME is not straightforward. In the following I will review alternative definitions before fixing upon a standard for Bangladeshi SMEs.

Definition of SMEs in Sri Lanka

According to Cooray & De Silva (2007) & Sumanasena (2005), *"the definition of SMEs in Sri Lanka is that small-scaled enterprises are those consisting of 5 to 49 regular employees whilst medium-scaled enterprise have 50 to 149 regular employees"*. Thus, in contrast to SME definitions in the UK and EU, Asian governments (such as Sri Lanka) classify business types (SMEs) primarily in relation to employee numbers.

Definition of SMEs in Nepal

According to Nepal Industrial Enterprise Act 1992, originally cited in Agarwal (2006), *"the definition of SMEs in Nepal indicates that enterprises whose fixed assets are worth less than Nepal Rs 30 million are small firms and those with fixed assets worth between NRs 30 million and 100 million are medium enterprises"*. Again a different method of classification – not in terms of annual turnover, nor number of employees – but in terms of value of fixed assets. This inconsistency in classification of business types complicates the selection of data sources classified as 'SMEs' and makes cross-comparison of different countries' policies and practices in relation to SME development more difficult to analyse. I am proposing to use the definition (below) proposed by the SME Foundation in Bangladesh (2015), but will reflect later on whether the lack of a standardised definition is a confounding factor in comparing my findings to developing countries elsewhere.

Definition of SMEs in Bangladesh

According to the SME Foundation (2015) and National Industry Policy Bangladesh (2010) the definitions of Bangladeshi SMEs of various types are below. From the definitions below, it is clear that none of the SME definitions are identical to each other country mentioned, making country-to-country comparison more difficult. Therefore, it is difficult to select the appropriate definition. In my research, I am going to use the definition of SMEs defined by National Industry Policy (2010) because of its criteria, which are more suitable for defining the overall SME sector in Bangladesh.

SI	Type of Industry		The amount of investment (Replacement cost and value of fixed assets, excluding land and factory buildings)	Number of employed workers
1.	Cottage Industry		Below 5 lakh	number of workers not exceed 10
2.	Micro Industry		5 lakh to 50 lakh	10 to 24
3.	Small Industry	Manufacturing	50 lakh to 10 crore	25 to 99
		Service	5 lakh to 1 crore	10 to 25
4.	Medium Industry	Manufacturing	10 crore to 30 crore	100 to 250
		Service	1 crore to 15 crore	50 to 100
5.	Large Industry	Manufacturing	More than 30 crore	More than 250
		Service	More than 15 crore	More than 100

Table 3: Definitions of Bangladeshi SMEs (Adapted from: National Industry Policy (2010)).

After knowing different definitions of SMEs, it is now required to know what are the possible characteristics of Bangladesh SMEs? In my opinion, knowing only the definitions makes it not possible to describe one overall characteristic of an SME. Therefore, it is better to define the sample in terms of a variety of characteristics of SMEs. In the following section I will explain in detail the variety of characteristics of SMEs in Bangladesh.

2.3.1: Small & Medium Enterprises (SMEs) – What are the Characteristics?

For a decade many researchers have been showing their interest in SMEs. They have discovered that two thirds of the firms are SMEs globally and those firms are playing a pivotal role in countries' economies (Islam *et* al*.,* 2011). Moreover, the performance of a nation is closely connected to the performance of SMEs (Islam *et* al., 2011). According to Smallbone and Wyer (2000), SMEs are essential mechanisms in business and it is commonly documented by Islam *et* al. (2011) that SMEs are making a significant contribution to national and global economic progress because SMEs are the fundamental sources of employment in many nations. SMEs not only play a pivotal role in creation of employment but also they are a significant component in that SMEs provide communal and financial welfare with new products and technological sources of innovation (Alshamaila, 2013). Traditional views of SMEs are that they are equal to the bigger firms with only differences in size (Akbari, 2012). According to Akbari (2012), *"it is currently a well-known fact that the very size constraints of the SMEs make them distinct from their larger counterparts".* The characteristics of SMEs are important when SMEs are considering technology adoption strategies (Akbari, 2012). According to Welsh, White & Dowell (1982), the main differentiator between a large and SME is a level of accessible assets to the SMEs, which is known as "the SME's resources poverty

According to Simpson and Docherty (2004), a significant amount of literature has been investigated to identify the defining characteristics of SMEs and their approach to technology adoption. Byrd (2009) identified that in relation to many SMEs, they differ from the larger business in many ways such as a product or service, smaller market choices, on some occasions SMEs have a single product and a single customer service and they like to take initiatives to reduce production cost (Storey, 1994; Storey and Sykes, 1996). Byrd (2009) also identified that most of the SMEs manage to support initiatives by starting business with one person or number of entrepreneurs to survive. In relation to SMEs management practices Akbari (2012) and Alshamaila (2013) claimed that most of the SMEs have an owner-manager management model and unified management practices. In most of the cases, the owner of an SME is the manager thus, they have a significant influence on decision making within the business, which indicates that the esteem of owners'/ management is needed for adopting new technologies within the business (Murphy *et al.,* 1996). Alshamaila (2013) mentioned in her study that there are a number of SME characteristics available. The table below shows the main characteristics of SMEs.

Characteristics of SMEs	Meaning	Source
Origin of enterprise	*"Origin of enterprise in small firms, where ownership and management were typically combined in one or more individuals and future goals for the business might be determined as much by personal lifestyle and family factors as by commercial considerations".*	(Smallbone, Leig and North, 1995)
Duration in operation	*"Duration in operation may be associated with learning curve and significantly linked to business success, broader business experience and more prior start up experience, and to believe that they had less control of their success in business, than unsuccessful entrepreneurs".*	(Krisiansen, Furuholt, & Wahid, 2003; Duchesneau and Gartner, 1990)
Size of firms	*"Size of firms reflects how large an enterprise in employment terms, which is significantly linked to better business performance".*	(McMahon, 2001)
Capital Source	*"Greater dependence upon external finance associated with better business growth and financial flexibility is*	(McMahon, 2001; Krisiansen,

	significantly correlated to business success".	Furuholt, & Wahid, 2003)
Initiatives	*"Small business are usually begun by a single person or a group of entrepreneurs, and therefore this type of business tends to support initiatives"*.	(Megginson *et at.,* 1994)
Specialisation	*"SMEs are usually specialised in a single product and sometimes they may have only a single buyer comparing with larger firms, they tend to have smaller market scope, and always attempt to reduce production cost"*.	(Storey, 1994; Simpson and Docherty, 2004)
Survival and growth	*"Small businesses usually focus on survival and independence rather than growth. Therefore, growth in SMEs is relatively slow; however, it does usually tend to be incremental and steady"*.	(Curran *et al.,* 1996; Bridge *et. al.,* 2003)
Availability of resources	*"SMEs have a modest resource base, a lack of economic clout and suffer from weak asset bases. They are likely to have a limited availability of resources in terms of time, money and expertise"*.	(Wymer and Regan, 2005; Bharati and Chaudhury, 2006)
Planning	*"SMEs usually have limited formal planning and control procedure mechanisms in the business"*.	(Chell *et al.,* 1991; Bharati and Chaudhury, 2006)
Control mechanism	*"Usually the manager is the owner of the business. Control mechanisms in small businesses tend to be centralised and have a low level of formalisation. The decision-making authority within a small firm is held personally by the owners"*.	(Chell *et al.,* 1991; Murphy *et al.,* 1996)

Table 4: Characteristics of SMEs (Adapted from: Alshamaila, 2013; Islam *et al.,* 2011)

From the discussion above, it is clear that SMEs have a huge importance for a developing country like Bangladesh. For Bangladesh, SMEs play a decisive role for economic development and business success and contribute a lot to the national economy in Bangladesh (Hossain, Deb & Amin, 2009; Islam *et* al., 2011; Ahmed, 2003; South Asia Enterprise Development Facility, 2013; Asian Development Bank (ADB), 2002). (Please refer contributions of SMEs in the national economy in Bangladesh in Appendix – E). SMEs in Bangladesh, however, are struggling and cannot perform well owing to many

barriers (Abdin, 2010). At this point of my investigation, it becomes important to know those barriers that Bangladeshi SMEs are facing. Thus, in the section below I will focus on those challenges with which Bangladeshi SMEs are struggling.

2.3.2: Small & Medium Enterprises (SMEs) – What are the Challenges/Barriers in Bangladesh?

In Bangladesh, SMEs play a dominant role in the national economy as well as contributing to gross domestic product (Abdin, 2010). Apart from some nourishment industries, medicine companies, adhesive factories and telecoms businesses, the remainder of the business entities are SMEs in Bangladesh and they are almost 6.0 million (Abdin, 2010). These SMEs are producing about 50% of the country's business output every year by generating the largest amount of employment and by contributing import substitution in many ways, creating low price class products, creating import subsidiary products and by saving oversees currencies (Abdin, 2010). But the question is what are the initiatives government has taken to boost SMEs to get their support to make the country a middle-income country?

According to Abdin (2010), the government has already taken some initiatives to support SMEs such as establishing SME foundation, dealing with SME sectors' problems and facilitating and promoting SME development. Abdin (2010) claimed in his article "Bangladesh's SMEs are facing so many challenges" that the government's key achievement is building a SME Foundation for encouraging SMEs and to direct financial providers to simplify SME loans for very poor SMEs. But still there are many things that SME Foundation are unable to perform due to inadequate resources and policies (Abdin, 2010). I will now address the various barriers and challenges that SME subdivisions are facing at the moment in Bangladesh.

- **Insufficiency of Resource and Information:** There is huge insufficiency of raw materials in Bangladesh, which obstructs the ability of SME subdivisions to be export friendly and restricts SMEs' capability of reaching further stages in global business expansion (Ahmed & Chowdhury, 2009). In Bangladesh, SMEs have much less capacity to use information technology (Miah, 2006). Only 1% - 2% of SMEs are using accounting software packages and about 15% of SMEs are using computers in their business. In addition, in terms of SME use of the Internet, this proportion is just below 10% (Ahmed & Chowdhury, 2009). The figures above

indicate that the lack of experience and inadequate information sources, SMEs are suffering from operational underperformance (Abdin, 2010).

- **High Employee Turnover and Low Productivity:** It seems that because of inadequate development in SMEs (especially in IT-related adoption), a large number of skilled employees are leaving SMEs because they believe that SMEs are very good as knowledge originators but not good enough for knowledge retention (Ahmed & Chowdhury, 2009; Levy, Loebbecke & Powell, 2003). In Bangladesh, SME subdivisions are employing nearly 82% of workforce but, unfortunately, producing only 50% of business output, which shows that the workforce in SME subdivisions are really less productive (Abdin, 2010).

- **Poor Physical Infrastructure and Utility Support:** There is a tendency in Bangladeshi peoples' minds that industrialization should be urbanized and capital based and this is owing to an inadequate supply of infrastructure amenities (Abdin, 2010). At present a basic utility like electricity supply has improved but it is still not easy to get continuous supply in rural areas (Abdin, 2010). Other utilities such as gas, water, roads and highways are obstructing the development of SMEs in respect of making supply chains efficient or transport of goods downstream – especially from rural areas. Hostile topographical circumstances increase transport costs (Ahmed & Chowdhury, 2009). At the moment, poor infrastructure and disrupted utility supply is one of the main challenges for Bangladeshi SMEs (Abdin, 2010).

- **High Bank Interest Rates and Absence of Security Free Bank Loans:** At present for a Bangladeshi SMEs, bank loan interest is 13% set by the central bank of Bangladesh, which is relatively too high according to Abdin (2010). For SME owners to retain a profit margin with 13% high interest on loans, hiring employees, paying wages, rents and utilities, they need to sell their products at more than 50% more than their production cost, which is just impossible. To get competitive advantage SMEs need to produce high quality products but double-digit bank interest rates makes achieving those advantages unthinkable (Abdin, 2010). They (SME owner/manager) need finance to bring their entrepreneurial dreams into reality but they do not have a guarantor to get a bank loan (Abdin, 2010). Bangladesh Bank, the central bank of Bangladesh, takes the view that SMEs are at

the extreme risk of borrowers since they do not have capabilities to meet the bank's guarantee requirements (Abdin, 2010). According to Ahmed & Chowdhury (2009), only 15% - 20% of SME proprietors have fixed assets and banks are issuing loans based on those assets. Therefore, about 80% of the SMEs are not getting bank loans, as they do not have fixed assets to produce as guarantor. Lack of access to bank loans is a serious inhibitor to SME development – certainly to investment in ICT technologies – as my investigation will make clear in Chapter 6, pp. 206 – 207.

- **Availability of Advanced Technology:** One of the key barriers to the expansion of Bangladeshi SMEs is inadequate technology being used. Many SMEs cannot develop because the difficulty in adopting technology (Ahmed & Chowdhury, 2009). Abdin (2010) found out that majority of the SMEs in Bangladesh are using local machinery and in house technology (for limited use only) to produce products but the reality is that those products are not sufficiently productive to meet market requirements. Moreover, there are a lot of Indian and Chinese low cost products available in the Bangladeshi local markets. Therefore, Bangladeshi SME owners or entrepreneurs are losing income owing to not having sufficient technical knowledge (Abdin, 2010). I will further discuss and provide a clear understanding in Chapter 6, pp. 214.

- **Lack of Sector Specific Skilled Manpower and Absence of an SME Entrepreneurship Program:** The expansion of Information and Communication Technology is improving but, in Bangladesh, there are too few high standard ICT academies available with the full equipment of advanced technologies for our fast developing industrial subdivisions. These would be needed to provide training to people to hire in that area (Abdin, 2010; Ahmed & Chowdhury, 2009). Quite surprisingly in Bangladesh there is not a neither single training agency nor academic institute available for SME entrepreneurs to undertake learning and training required, which shows that SMEs are not getting skilled manpower to perform tasks to deliver and execute their business plan (Abdin, 2010).

- **Lack of Government Support:** To start a business whether it would be small or medium size, business owners need a series of clearances, registrations and licences from different authorities and even from a different ministry of the Bangladeshi government. Completing those formalities is difficult for a normal person (Abdin,

2010). Moreover, they need to pass bribes to almost every desk with their file, which is highly demotivating for them (Abdin, 2010). According to Abdin (2010), Bangladesh government should have taken different approach for the SME owner/manager to make procedures easier to get all the clearance done from the same authorities under the same roof to save times and unnecessary hassle in order to make process faster to start a business and to make SME owner/manager satisfied.

- **External Shocks:** Compared to large businesses, SMEs are relatively weak in terms of decision-making, structure of management and business planning, which exacerbates the problem of SMEs being able to cope with many business jeopardies and uncertainties (Fatai, 2010). In addition, SME subdivisions are vulnerable to the financial and economic circumstances (Suh, 2010). The impact of external shocks is that a majority of SMEs are facing a wider variety of uncertainties and jeopardies, which are rooted in the combination of internal and external environment of the businesses. Similarly, when it comes to technology adoption, owner/manager or SME subdivisions necessarily do not want put their business in that situation where risks and uncertainties are associated.

The barriers above mentioned are in general for Bangladeshi SMEs but however, there are a lot of opportunities for Cloud Computing solutions that Bangladeshi SMEs may use to overcome such barriers - in order to expand their business functionalities and to reduce their vulnerability to changes in the external environment. At the same they need to face some other challenges if they want to adopt Cloud Computing in their business. Those opportunities and challenges for Cloud Computing adoption are given in Appendix – E. However, after implementing Cloud Computing, SMEs need to deal with possible adoption risks, which are unavoidable but could be manageable. In the section below, I am going to present those adoption risks.

2.3.3: SMEs and Cloud Computing – What are the Possible Adoption Risks of Cloud Computing for SMEs?

Many scholars have been mentioned many associated risks of adoption of Cloud Computing but Bannerman (2010) has categorised the main risks emerged of adopting Cloud Computing in his study. The categories related to the risks are follows:

- **Security:** Security is the top ranked Cloud Computing adoption risk (Bannerman, 2010). Key adoption risks are nefarious usage, insecure interfaces, issues of collective technology, data loss or leakage, account hijacking and uncertainty due to "security by obscurity" (Cloud Security Alliance, 2010). Security is the biggest risk because of the high level of abstraction. Customers cannot see what their systems are doing in the public Cloud and it becomes difficult to determine whether their systems are secure. Security is the concern because customers always want to see visibility and transparency of operation but under Cloud Computing they cannot see many kinds of operation (Bannerman, 2010). This perception of risk was evident in my own primary data, which have been discussed in Chapter 6, pp. 215.

- **Lock-in:** Owing to the rapid development of different Cloud Computing offerings many are highly proprietary in nature, generating a risk that subscription to a CC provider whose platform is not ultimately successful will incur extensive costs in migrating to different providers (Bannerman, 2010). According to Bannerman (2010), rapid emergence creates challenges in migrating data and applications to the Cloud or switching Cloud providers and puts customers at significant risk if the need arises for systems to interoperate across Cloud and in-house environments or to retrieve data and/or applications if a Cloud provider withdraws from the market. For SMEs in Bangladesh with little experience of using CC solutions (DaaS, SaaS), the demands of interoperability and of planning for contingencies when alternative providers may be required can be prohibitive.

- **Control:** This group of risks results from the reality that control over an organisation's data and systems execution ultimately passes to a third party service provider in Cloud Computing (Bannerman, 2010). Bannerman (2010) also claimed in his study that this could raise important concerns and barriers to Cloud adoption because a change in control means a change in risk because, in cloud, users' do not have any control over any changes but providers do. Thus if providers make any change, users' may not be able to control. These concerns represent part of the down side to the benefits of Cloud Computing, resulting from not owning the infrastructure (Bannerman, 2010). For Bangladeshi SMEs with the little knowledge of using CC, change in control could be one of the top adoption risks.

- **Legal and Services:** Legal risks include compliance with jurisdictional laws and regulations, legal liability, contracts and audits (Bannerman, 2010). Depending on the nature of the data and the jurisdiction, regulations may apply to where data is stored, how it is handled and the procedures under which it may be accessed or seized by the courts or government. Cloud virtualization could cause data to be moved around Cloud environments, placing it under different state and national laws and even result, unknowingly, in the owner becoming liable for breaching regulations (Bannerman, 2010). On the other hand, service category relates to service features and levels, service availability and reliability and support. But due to the utility nature of Cloud Computing, services and service levels are 'commonly-like' in nature with 'iron-clad' guarantees on services, availability, reliability and support rarely provided (Bannerman, 2010). However, in the context of Bangladesh, there are very limited legal risks presents therefore, there is no guaranty that customers' data will be monitored or regulated by the authority, which is definitely a potential risk.

- **Performance & Cost:** According to Bannerman (2010), the system performance of Cloud Computing is slower and more variable compared to on-premises systems. Moreover, performance is constrained by Internet speeds, network quality and the distance between the user and the various Cloud service providers. So if performance were critical in service level agreements then the Cloud would be a risky option (Bannerman, 2010). Bannerman (2010) raised a question in his study whether it is that simple in practice that a Cloud user only needs to pay for what they use and when they use the service? Accurate predicting and measuring of spending for Cloud use is more difficult under an "on-demand" costing model. Moreover, the uncertainty about whether the required instances were over-subscribed or under-used makes costing unreliable (Bannerman, 2010). So this is a real risk for business firms/customers to lose control of IT budgets and spend more money than they need to under this model (Bannerman, 2010). Such risks are, of course, critical in the context of SMEs in Bangladesh operating with very tight margins and frequent cash flow problems.

- **Competencies:** Cloud computing draws on legacy client-server and service-oriented architectures; it represents a new bundling of pre-existing technologies. Most of the Cloud adopters do not have relevant knowledge and skills to build and

deploy Cloud applications as quickly and efficiently as the hype suggests is possible and there is a steep learning curve with this computing model (Bannerman, 2010). Moreover, Cloud service models and platforms differ in their technical makeup and usage requirements so experiential-based learning can be a barrier to realizing benefits through Cloud adoption (Bannerman, 2010). This condition is more likely to be true of majority of the Bangladeshi SMEs owning to not having required knowledge and skills to adopt CC.

Based on the risks above, in aggregate, my opinion is that Cloud use cases are limited to when demand is unknown, uncertain or highly variable. In addition, when data and applications are not tightly coupled with other data/apps or the points of integration are well-defined, Cloud adoption and use will be limited. Moreover, it is always risky for the CC adoption, when tight security and control are not present; availability and performance are issues and when specific data regulations do not apply. After outlining the many possible advantages, drawbacks and risks, it is not obvious whether SMEs should adopt Cloud Computing or not? In the following section I will discuss in more detail the specific reasons why SMEs should or should not adopt Cloud Computing based on some evidence from previous research conducted.

2.3.4: SMEs and Cloud Computing – Why SMEs Should or should not Adopt Cloud Computing?

Cloud Computing is an evolving example of information technology, which is an evolution out of the existing technologies like Internet, grid computing and virtualization (Khan, 2015). Cloud Computing offers modern computing (usually web-based) services to consumers globally. But, there are some limitations that have been identified, for example by Sultan (2011) in his study of some of the issues business organizations face during migration to Cloud Computing alternatives. Khan (2015) clearly mentioned in his study that, although there are some limitations to adopting Cloud Computing, Cloud Computing still has some exceptional aspects like flexibility, feasibility and on-demand provision, which make CC attractive to SMEs. Moreover, the pay-per-use aspect limits the financial impact needed to accomplish the requirements of IT, which play a vital role to manage price overhead for SMEs. By managing the price structure, SMEs could increase their affordability to enable them to function in the changed financial circumstances (Khan, 2015). One has to raise the question, however, whether 'affordability' is a major barrier to CC adoption for Bangladeshi SMEs – which my own research will address in Chapter 6.

According to Khan (2015) IT experts keep trying to find out more reasons to implement Cloud Computing services into the business environment. To establish the uniqueness of Cloud Computing services Abdollahzadehgan *et* al (2013) identified a list of advantages of Cloud computing (CC), which may encourage a business organization to adopt CC. They have also mentioned some of the drawbacks of CC in their study but mainly they focused upon why SMEs should adopt CC. According to their study (Abdollahzadehgan *et* al., 2013) SMEs should adopt CC because SMEs cannot acquire the effective IT necessities because of not having adequate human capital and financial resources to deal with a challenging market. They (Abdollahzadehgan *et* al., 2013) have found some critical success factors for Cloud Computing adoption by businesses in their critical review of their study. And the outcome indicated that "technological issues" like compatibility and complexity really stimulate Cloud Computing adoption in SMEs.

In today's digital era, some businesses are positive about Cloud Computing since its inception because CC increases the profitable value of business by proposing technological explanations (Khan, 2015). The notion of CC becomes famous owing to progress in distribution and access to the Internet, enhanced broadband and bandwidth and increasing end-users' mobility requirements (Khan, 2015). Various studies (such as Khan, 2015) suggest that SMEs' IT requirements are more diverse than in large enterprises. Thus, many aspects of CC may also prejudice usage of CC in SMEs. Gupta *et* al (2013) claimed details in their study concerning in the favourable of CC and their professed benefits. In their study (Gupta *et* al., 2013) they have acknowledged five major influencing factors of CC, which could motivate SMEs to adopt CC. Out of those five aspects the most favourite is "opportuneness of ease of use". The second favourite is privacy and security. The third reason for adoption of CC is lower cost. The fourth and fifth aspects however are less favourable to CC adoption as argued by Khan (2015). Those two aspects are reliability and data sharing respectively. According to Khan (2015), Cloud Computing services are not sufficiently reliable for SMEs, as SMEs most likely do not trust Cloud Computing for sharing individual data records.

In the recent past, Rath *et* al (2012) have undertaken research in India to assess the advantages and disadvantages of Cloud Computing adoption in Indian SMEs. They have identified that most of the businesses can focus more on their main business processes when entire IT necessities are subcontracted with the support of Cloud Computing. They

have also discovered that many small and medium sized businesses have already adopted Cloud Computing in order to reduce their functioning cost. They have also found however that most Indian SMEs have a lower tendency to subcontract and adopt Cloud Computing services. The outcome of their study specifies that Cloud Computing could be more advantageous for Indian SMEs if CC is used for calculation-concentrated tasks like simulation, modelling and data mining. They have further identified some of the unique advantages of CC such as faster software upgrades, minimum amount of infrastructure investment and effective use of computing systems, which provides an incentive for Indian SMEs to adopt Cloud Computing into their business.

Although many scholars have been trying to identify the main reasons for adopting Cloud Computing in SMEs, there is still a lack of studies of Cloud Computing adoption in SMEs. In the recent past many researchers all over the world undertaken some research on Cloud Computing adoption on SMEs: for instances Conway *et* al (2014), El-Gazzar (2014), Alshamaila, Papagiannidis and Li (2013) and Adam & Musah (2015). They have all identified some of the advantages and disadvantages of adoption of Cloud Computing. However, they all have most likely agreed that SMEs should adopt Cloud Computing to maximises their business opportunities to take the competitive advantages compared large business organizations. Similarly, for SME in Bangladesh, Cloud Computing could bring significant change in business growth. Thus SMEs might get all competitive advantages from the competitive business market.

From the discussion above I have tried to clarify some barriers that SMEs could face while adopting or even after adopting Cloud Computing into their businesses. Comparing barriers, Cloud Computing offers many opportunities for SMEs -- for instance on-demand service, convenient pay-as-you-go billing, flexibility and scalability in resource utilization (up and down), facilitating rapid start-up, minimizing start-up costs/cost effectiveness (minimum infrastructure setup cost), reducing operating costs (use only what you need), 'anytime-anywhere' availability, facilitating user mobility, collaboration through shared data and applications stored in the cloud, reducing IT capital expenditure requirements, freeing-up IT resources for other priorities, lower technology risks, data security, effective IT support, technical skills which could motivate SMEs to adopt Cloud Computing in order to enhance their business growth. So, evidence above from the different existing literature suggests that Cloud Computing could be an appropriate solution and answer for the SMEs. Can we say Cloud Computing would be the answer for

the SMEs to get the best means of meeting their IT requirements? The section below will provide some answers to the question whether Cloud Computing could provide solutions for SMEs or not?

2.3.5: SMEs and Cloud Computing – Is Cloud Computing the Answer for the SMEs

Currently, Cloud Computing became one of the daily discussion topics globally and it is a new and innovative brand of the well-worn notion of 'utility computing' (Hartman, 2009). Cloud computing is an influential set of technologies, which can deliver real business returns (Hartman, 2009). Therefore, every business especially SMEs need to think if Cloud Computing will fulfil its precise needs. SMEs therefore need to assess the possible business values Cloud Computing could offer and the associated risks involved. As a result, SMEs need to ask themselves what would be the most important for them from Cloud Computing like cost, control or scale? The following sub sections will discuss some details of these questions.

- **Control versus Scale:** The range of Cloud Computing can be evaluated by running from "control" at one end to "scale" on the other end. But positioning your business in one end or other end through the Cloud ranges is not the option. Therefore, SMEs need to think where they are most comfortable within the Cloud Computing range (Hartman, 2009). In order to position themselves, SMEs need to consider the following:
    - An application that runs on-premise requires that you buy your own hardware, and manage your own data centre, which means plenty of control but low economies of scale and higher costs.
    - An application that runs at a hosting provider allows you to share the cost of infrastructure and management service, which gives you a mix of control and economy of scale and
    - An application that runs as a cloud service offers a lower level of direct control but vastly higher economies of scale.

In order to understand more about control versus scale, SMEs need to understand where to host and manage different types of applications and which approach would be the best for their business? Control versus scale is nothing more than a "build versus buy" decision (Hartman, 2009). As an example how would you decide whether you would love

to buy a pre-built ERP system or would like to build your own? The Cloud solutions works exactly like this.

From the discussion above it is now clearer that Cloud Computing provides more control, accessing power of using technologies and satisfying influences but however, the question is how Cloud Computing is different from the traditional computing? It is now time that I clarify the key differences of Cloud Computing and traditional computing environments for SME owners in relation to the scenarios envisaged. In the following table I will show some of the general differences of Cloud Computing compared to traditional computing environment/traditional ICT.

Cloud Computing	Traditional IT
• Hardware and/or software is hosted off-premise (public or hybrid) or on-premise as a private Cloud service • Services are provisioned and used based on actual demand, providing this elasticity as a managed service • Services are typically focused on short-term "burst" demand to gain cost savings over provisioning and owning the assets • Statistical automated scaling is used to optimize the shared virtual assets • Risk is transferred from the buyer to the seller/provider of the Cloud service • Cloud sellers and providers seek to grow amortized economies of scale through increasing the numbers of users of the shared resources • The IT infrastructure and operation is masked from the service user and Cloud is more than just SaaS.	• Hardware is hosted on the premises of the organization and/or manage hosted • Hardware and software is provisioned for peak demand • Service management monitoring is used to generate forecasts of demand usage and current SLA performance • Chargebacks and compensations are used to adjust usage and payments • Under-provisioning and over-provisioning of capacity can result from unforeseen demand changes • Business invests in ownership of assets that can be enhanced and extended through IT programs and development • Changes to IT involve migration and divestment/investment issues and programs.

Table 5: Basic comparisons of Cloud Computing and Traditional IT (Adapted from: The Open Group Guide, 2010).

From the table above I have tried to show some of the basic differences between Cloud Computing and traditional computing in terms of their hardware, software, service, and risks. However, those differences do not show key characteristic differences between Cloud Computing and traditional computing which are important to SMEs in order to understand the best way of adopting Cloud Computing into their businesses. Therefore, in the table below I am going to differentiate key practical differences on a scenario basis between Cloud Computing and traditional computing environments.

Scenarios	Traditional Computing (Before Cloud)	Cloud Computing (During/After Cloud)	Comparisons/Key differences
Duration to gain access	Days or weeks	Minutes or Hours	Upon completion of initial set up of Cloud Computing user can gain faster access compared to traditional IT systems because in traditional systems lead-time is needed for installation, set up and configuration.
Technical management/ Scalability	Manual	Automatic and Flexible	Many of the resources of Cloud computing can frequently be scaled up or down automatically but in a traditional system human involvement is regularly required to enhance software or hardware.
Scale of parsimonies/Cost Reduction	Applicable only for large establishments	Applicable for all establishments	Cloud computing not only offers cost returns in procurement of software and hardware but also offers cost returns from enhanced efficiency. Moreover, Cloud Computing offers benefits to all customers as soon as the

			greatest performs are functional but on the other hand, experience studied from one situation and essentially be replicated in other situations in traditional systems.
Virtualized	Occasionally	Regularly	Cloud computing environments are normally virtualised but traditional systems comprise a combination of physical and virtualised setup.
Financial cost/ Capital Expenditure	Fixed upfront cost	Variable pay-as-you-go cost	In Cloud computing, the pay-as-you-go model diminishes or sometimes even removes the up front costs experienced in acquiring software and hardware but in traditional system upfront costs are fixed and there is no way to diminish or remove upfront costs.
Project management	Step by step process	Comprised of Project initiation, planning, execution, monitoring and controlling and closing	In Cloud computing, managing a project is a temporary endeavour undertaken to create a unique system either in hardware or software or both that will run on a cloud computing architecture by following a particular project initiation, planning, execution, monitoring and

			controlling and completing. On the other hand, in a traditional systems management project it is more difficult because the project needs to start from the beginning and needs to follow through step by step. If any error occurs in the middle of one phase then project manager/teams needs to recheck everything from the beginning.
Communication	Generally no, but can be found in application hosting	Multi-tenant	In Cloud computing, multi users can communicate at the same time to share or exchange their data or information but in a traditional system, only one user can share data or information to other users and vice versa.
Supply Chain Management (SCM) (includes planning and forecasting, sourcing and procurement, logistics and service and spare parts management)	Non-innovative	Innovative	In Cloud computing, the applications to the supply chain are innovative and generate a new field of research. Two or more parties linked by cloud services supply chain provide cloud services to deliver related information and payments. Moreover, in a Cloud environment, managing SCM is less risky

			and has less cost associated with hardware, software and access to physical facilities (Srivastava, 2012). But in traditional system, SCM in non-innovative and cannot generate new field of research. Moreover, in a traditional system, managing SCM operations are risky and cost associated with hardware, software and physical facility.

Table 6: Scenario based characteristics differences of Cloud computing and the traditional computing (Adapted from: Pocatilu, 2010, Tiwari and Jain, 2013, Srivastava, 2012, The Open Group Guide, 2010 and compiled by author).

From the scenario-based differences above it has become clear that before adopting Cloud Computing there are lot of advantages that traditional IT users are missing. Moreover, managing different scenarios (mentioned above in the table) will become easier by using Cloud Computing. Therefore, I am proposing a position that affirms that Cloud Computing adoption could be the best answer for SMEs to get the best access to IT resources for their businesses. But what would be Cloud Computing structures, which best fit in SMEs? It is vital to know the structure of these proposed solutions in order to adopt Cloud Computing. I have set out some possible structures for Cloud Computing use for SMEs in Appendix – E. Such structures may also support SMEs in their efforts to support government initiatives to build the 'Digital Bangladesh' concept. In chapter one, I have highlighted definition of Digital Bangladesh and now in the following I will discuss details of the concept of Digital Bangladesh and the reasons for using Digital Bangladesh as a context for this study.

2.4: Digital Bangladesh – Vision 2021: What is the Digital Bangladesh Concept?

"Change we can believe in" – US President, Barak Obama's presidential election campaign slogan in 2008 inspired Bangladesh Awami League (BAL), a political party in

Bangladesh. They introduced "A Charter for Change" for their ninth parliamentary election manifesto, which worked well for them to win a convincing success (Islam & Grönlund, 2011). One major vision of the "Charter for Change" is to reach a "Digital Bangladesh" by 2021 (Bangladesh Awami League Election Manifesto, 2008).

Since the parliamentary election in 2009 in Bangladesh, the word "Digital Bangladesh" (DB) has become a very popular and day-to-day saying amongst the citizens (Islam & Grönlund, 2011). "Digital Bangladesh": this buzzword has become governmental and organizational terminology, which has been used by the present governing party for expansion of any innovative decisions in relation to Information and Communication Technologies (ICTs) (Islam & Grönlund, 2011). ICT has been playing pivotal roles in the 21st century in terms of economic development. The ruling government in Bangladesh has focussed on adopting advanced technology for the future and upon developing ICT sectors to adopt the globalization changes (Islam, 2010). The term "Vision 2021", declared by the present ruling party in Bangladesh, Bangladesh Awami League (BAL), aimed to establish a resourceful and modern country by 2021 (the country's 50 independence year) through effective use of Information and Communication Technology, which is a dream of present Bangladeshi Prime minster, Sheikh Hasina to build "Digital Bangladesh" (Islam, 2010).

The terminology "Digital Bangladesh" does not carry the meaning of more comprehensive use of computers; it means that contemporary thinking of using and implementing advanced technologies in an effective way in poverty, education, health, business, job placement is a means by which business development, economic growth and social improvement may enhance opportunities and income for Bangladeshi citizens. As a result, the ruling government of Bangladesh show positive attitudes in their thinking and seek to implement innovative ideas for the success of their "Digital Bangladesh" policy (Islam, 2010). The viewpoint of "Digital Bangladesh" includes rights and democracy for the peoples of Bangladesh: transparency, accountability, establishing justice and guaranteeing distribution of government facilities to every door by use of technology and with the goal to facilitate routine tasks of citizens (Islam, 2010).

"Digital Bangladesh", the dream of Bangladeshi Prime Minister Sheikh Hasina, is becoming a very important daily discussion topic among Bangladeshi IT specialists, journalists, politicians, students as well as policy makers (Islam, 2010). But what the catchphrase precisely means is still unclear (Genilo, Islam & Akther, 2009).

Although the government did not fully specify the definition of "Digital Bangladesh", government officials, business leaders, media personalities, academicians, non-government (NGO) heads and Information Technology (IT) specialists have developed their own individual meanings for "Digital Bangladesh" (Islam, 2010; Genilo, Islam & Akther, 2009). Some definitions of "Digital Bangladesh" provided are given below.

Sector(s)	Description
Government	Digital Bangladesh is a vision where the citizens of the country can get information through electronic channels. Government services can be provided over electronic channels and the need for human interaction will be minimal. It is to apply the latest advancements of science and technology in the country.
Business	A Bangladesh that is globally competitive with the adoption of digital technology that enables a real knowledge economy.
Academe	Digital Bangladesh, as people believe, is something that will solve most of the country's problems such as corruption, unemployment, illiteracy, poverty and inflation. It is a gift of the newly elected government that will come true by 2021.
IT Specialists	The integration of ICTs into social and economic activities. It calls for a happy, rich, educated, poverty-free and hunger free Bangladesh where people have equal rights. But, this will be driven by digital technology.
Media	It means that all possible tasks of the government, semi-government and private sector will be processed using technology. It is unclear what the government means by it. However, it seems to be about technology, introducing IT and modernization. It is about being based on digital technology by 2021.
Civil Society	A vision to bridge the gap between the rich and people, between the urban and the rural. It is a poverty-free Bangladesh where people can exercise their rights, apply knowledge and fulfil desires.

Table 7: Definitions of Digital Bangladesh (Adapted from: Islam, 2010 and Genilo, Islam & Akther, 2009).

From the characterisations above, this study attempts to arrive at a position to define "Digital Bangladesh". It is a policy for the creation of an ICT grounded modern nation, where use of the Internet, e-commerce, e-banking, e-governance, use of open-source software, well-networked software and acceptable power sources will be available constantly. From this characterisation of the concept of Digital Bangladesh, it is now important to know why am I introducing the concept of Digital Bangladesh into my study. The following section will explore the reasons why the Digital Bangladesh policy may be significant for my investigation into Cloud Computing adoption amongst Bangladeshi SMEs.

2.4.1: Digital Bangladesh – When the Vision was put in Place

The concept of Digital Bangladesh entirely based on national ICT policy of Bangladesh 2008. Below is given details of ICT policy 2008, its structure and vision.

National ICT policy 2008:

In October 2002, the Government of the People's Republic of Bangladesh approved a National ICT Policy, which later became known as the 'National ICT Policy 2002'. This was the first declared national policy on ICT. While this ICT policy touched upon almost all facets of national life that could benefit from the use of ICTs, most of the time-bound goals and objectives are either past the time frame mentioned in the policy document, or have already been achieved, or are no longer relevant due to other policy decisions of the Government. For example the ICT Policy 2002 envisioned a 'knowledge-based society' in the country by 2006 as a terminal goal (Choudhury, 2008). In a knowledge-based society 'knowledge' or 'information' is regarded as the most productive resource. Needless to say, there is some distance to go before that level of development in ICTs is achieved. In view of this, the ICT stakeholders felt the need to revise the current ICT Policy in line with the national goals, objectives and capabilities. The subject was raised in the Better Business Forum headed by the Chief Adviser where a decision was taken to review the current ICT Policy and recommend revisions as necessary. Accordingly, the 'National ICT Policy Review Committee' was formed by the Ministry of Science and ICT (video Circular No. MOSICT/Section-13/IT-7/1999/Part-2/108, Dated: 4-5-2008, published in Bangladesh Gazette in Vol.29: July 17, 2008). The 'National ICT Policy 2008 (Proposed)' is the outcome of the work of this committee (Choudhury, 2008).

The proposed National ICT Policy 2008 has incorporated all the ingredients of the National ICT Policy 2002 in a structured manner with requisite updates necessitated by developments since 2002. The revised policy has also incorporated new policy directions in line with the everchanging technological advancements in this area. The most remarkable changes that have been made in the revised National ICT Policy are (1) a methodical framework of the policy document and (2) inclusion of planned action items in conformity with policies and strategies. In April 2009, the Bangladesh government has adopted this revised ICT Policy 2008, which is actually the foundation of Digital Bangladesh concept (Choudhury, 2008).

In order to ensure the success of the revised national ICT Policy the review committee took into cognizance the government's declared intentions in the PRSP and other national policy documents to align the revised ICT policy with the national goals as envisioned in those documents. The vision was framed and other parameters for achieving that vision were decided accordingly. At that point the committee felt the need for a coherent framework. A pyramidal framework is followed where the vision remains at the top as the ultimate goal and the other linked parameters are placed in the subsequent layers. The layers of the pyramid are defined as follows:
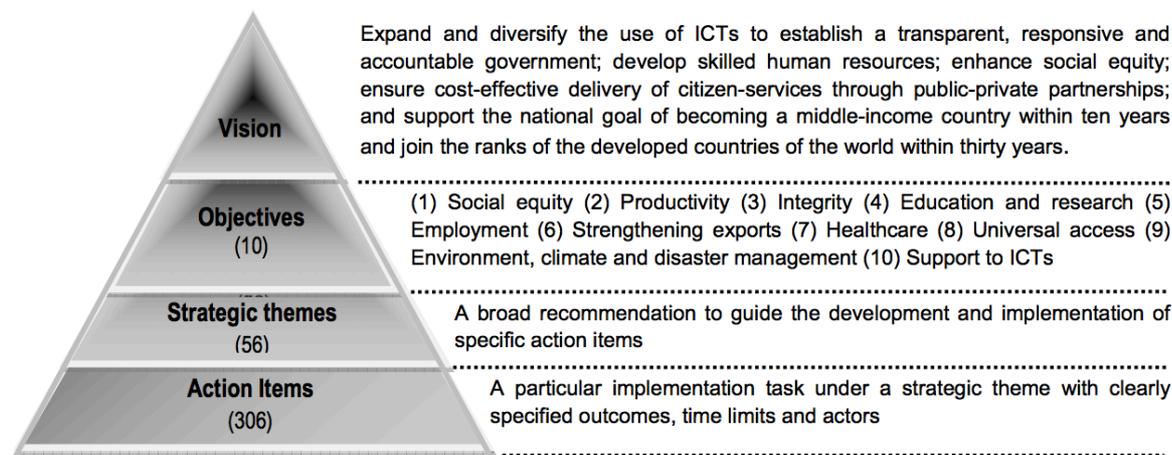
Figure 3: Layers of ICT policy 2008 (adapted from: Ahmed, 2014)

Structure and Conventions of ICT Policy 2009:

The policy document is structured as a hierarchical pyramid with a single vision, 10 broad objectives, 56 strategic themes and 306 action items. The vision and objectives are aligned with the general national goals while the strategic themes are areas within the broad objectives that can readily benefit from the use of ICTs. The action items are generally meant to be implemented either in the

• short term (18 months or less),

• medium term (5 years or less) or

• long term (10 years or less).

However, some action items have been recommended for continuation throughout multiple terms where the scope of the activity gradually expands in the longer terms. Conventional notions of vision, objective, strategic theme, etc. tend to differ greatly from person to person and from discipline to discipline. Thus, for the purpose of this policy proposal, the following definitions have been adopted for a) Vision, b) Objective c) Strategic Theme, d) Action Item, and e) ICTs (Choudhury, 2008).

Definition of Vision: The national aspirations with respect to maximising the use of ICTs for national development.

Definition of Objective: A set of related goals to be achieved to realize the Vision

Definition of Strategic Theme: A broad recommendation to guide the development and implementation of specific action items

Definition of Action Item: A particular implementation task under a strategic theme with clearly specified outcomes, time limits and actors

Definition of ICTs: All e-technologies used in creating, storing, processing, communicating and disseminating information of all kinds.

Vision of ICT Policy 2009:

- Expand and diversify the use of ICTs to establish a transparent, responsive and accountable government
- Develop skilled human resources
- Enhance social equity
- Ensure cost-effective delivery of citizen-services through public-private partnerships
- Support the national goal of becoming a middle-income country within ten years (within 2021) and join the ranks of the developed countries of the world within thirty years.

2.4.2: Digital Bangladesh – Why the Digital Bangladesh Context is important

Bangladesh is a low-to-middle income country somewhat ICT connected within the country, but also with adequate connections to the outside world. This is a consequence of globalization and the expansion of export trade (Sarbin, 2012). But in the arena of ICT, the country's only impressive achievement lies in the development of mobile telecommunications infrastructure, which has dramatically changed the overall telecommunication status of the country (Sarbin, 2012). In addition, Sarbin (2012) mentioned that in other areas of ICT, the country's achievement is not favourable and people are really far behind from transforming themselves to build a modern and technology-based society. However, Chowdhury (2009) argued that Bangladesh has many demanding challenges including basic resources in almost every sphere of communal and commercial lives and use of technologies. Chowdhury (2009) believed that technology is not a "silver bullet" but it could be beneficial in some arenas, could be obligatory for use in some areas but could be possibly overkill in others.

Owing to global transitions/transformations it is now mandatory for less developed countries to adopt advanced technologies (Chowdhury, 2009). Countries, which are capable of driving the movement towards expected transformations, have become successful but those not capable have dropped behind. Therefore, it is a crucial time for the Bangladeshi government to take a decision on its urgencies during this on-going comprehensive transformation, which will decide whether country will be in the type of "developing economies" or "straggler economies". Although Digital Bangladesh has some ideal objectives but there are possible risks, which could impact the objectives of Digital Bangladesh. The following table therefore present the goals and objectives of Digital Bangladesh.

Sector(s)	Goals and Objectives
Government	*"The goals are to ensure human rights, legal services, social equality, productivity, integrity, law and order etc. for the people through the automation and deployment of ICTs".*
Business	*"The goal is to have a knowledge economy that enables industries to create higher value added wealth, which will increase the national income".*
Academe	*"The goal is digitization as a pathway to economic success, quality education, public health and government transparency. But, it is both a blessing and a curse.*

Media	*"Its goal is transparency in the government using modern and digital technologies. All citizens will have access to Internet and enjoy modern facilities. With this, they will have all the information available to them*
IT Specialist	*"Economic empowerment of the citizen. Bangladesh, as a developed country, will use digital technology; increase equal distribution of opportunity and poverty free.*
Civil Society	*"The goal is a poverty-free Bangladesh through the strategic use of ICT, good governance and zero corruption. The goal is to give people the right information at the right time without distortion so that they can make the right decision.*

Table 8: Goals and Objectives of Digital Bangladesh (Adapted from: Genilo, Islam & Akther, 2009)

From the discussion above, this study is now in a position to say that the context of Digital Bangladesh fully lies in using ICT. Therefore, to build Digital Bangladesh a robust ICT setup is most needed and a pre-requisite. In order to build a robust ICT setup, uninterrupted power supply, nationwide network setup, increasing access to the Internet, increasing access to open source software, increasing the English literacy rate and increases in e-learning, e-commerce and e-government are areas needed to focus upon. By focusing on the areas mentioned, ICT infrastructure could be developed and now is the time for Bangladesh to develop ICT to build Digital Bangladesh. The concept of Digital Bangladesh means using ICT in every sector throughout the country by as many citizens as possible. But it is worth raising a question about what an ICT revolution could bring to Digital Bangladesh? Could an ICT revolution bring improvement in all the areas or only in technology sectors? The following section will explore the key elements that ICT could bring for Digital Bangladesh.

2.4.3: Digital Bangladesh – What are the Key Elements of Digital Bangladesh

Under the concept of Digital Bangladesh, ICT is one of the foremost enabler to the country's fight to attain the financial, communal and cultural freedom (Access to Information (A2I) Programme, Prime Minister's Office, 2009). Digital Bangladesh, in various ways is a re-creation of the dream "Sonar Bangla", which is called "Golden Bengal". One of the key motivations for "Digital Bangladesh" is the distinctive unfairness concerning the underprivileged comprising the majority of people (Access to Information (A2I) Programme, Prime Minister's Office, 2009). Based on this view, it can be said that

ICT and advanced technologies requirement to be leveraged in all the phases of national advancement of a Digital Bangladesh dream (Access to Information (A2I) Programme, Prime Minister's Office, 2009). According to Access to Information (A2I) Programme, Prime Minister's Office (2009), some of the key broad outcome areas in which ICT can be influenced is summarised below in the diagram. The diagram clearly shows that the "Digital Bangladesh" concept is entirely relying on four pillars namely Human Resource Development, Connecting Citizen, Digital Government and ICT in business.
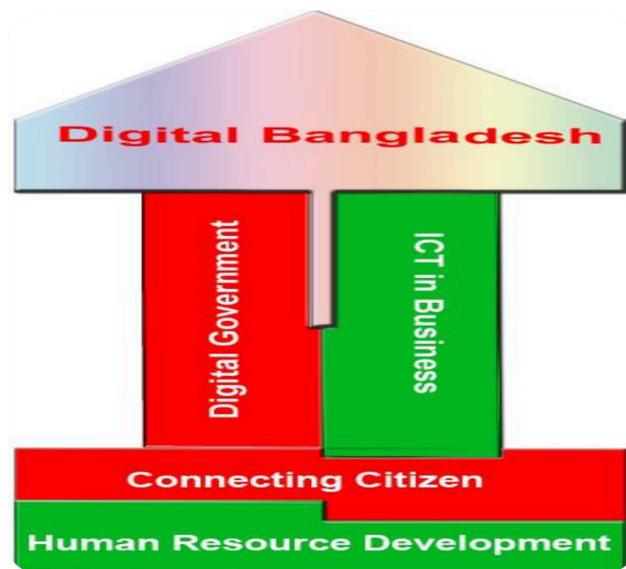
Figure 4: Digital Bangladesh outcome areas (Adapted from: Access to Information (A2I) Programme, Prime Minister's Office, 2009).

2.4.3.1: Human Resource Development (HRD)

Human Resource Development is one of the vital components of Digital Bangladesh (Access to Information (A2I) Programme, Prime Minister's Office, 2009). One point of the Digital Bangladesh concept is to bring more people into the ICT industry to raise skill levels who can move forward and enhance skill levels throughout the country (Access to Information (A2I) Programme, Prime Minister's Office, 2009). According to Access to Information (A2I) Programme, Prime Minister's Office (2009), *"the key objective of Digital Bangladesh is to make the best use of new technologies to build world-class skills in all areas of study"*. The aim of Digital Bangladesh is to build the proficiencies that are needed to compete in the globalized 21st era by using less expensive delivery tools and digital learning environments (Access to Information (A2I) Programme, Prime Minister's Office, 2009).

2.4.3.2: Connecting Citizens

Connecting citizens is another fundamental cornerstone of Digital Bangladesh policy, which entails guaranteeing access to Digital Bangladesh for every citizen. Finding right channels is the key objective of this component, so citizens can benefit from all that a Digital Bangladesh could offer (Access to Information (A2I) Programme, Prime Minister's Office, 2009). The key aims of this component are (a) making people conscious and capable to access public-services leveraging ICTs, (b) concern related to native languages gratified and making local content available and (c) ground-breaking access to channels and platforms for common purposes. (Access to Information (A2I) Programme, Prime Minister's Office, 2009.

2.4.3.3: Digital Government for Pro-Poor Services

In Digital Bangladesh policy, one of the key sub-components is provisioning ICT enabling services, such as e-Citizen services, by public agencies. Priority should be given for those services that are critical for many citizens in various sectors (Access to Information (A2I) Programme, Prime Minister's Office, 2009). The main deliverables of an e-Citizen service initiative are innovative service design and delivery channels that suit citizens' lifestyles, which means (1) reducing the number of interactions between service providers and recipients, (2) delivering in a speedy and cost effective way and (3) extending service availability to twenty four hours per day (Access to Information (A2I) Programme, Prime Minister's Office, 2009).

2.4.3.4: ICT in Business

The final pillar of Digital Bangladesh deals with three broad issues namely (i) access to markets, (ii) promotion of ICT business to support Digital Bangladesh (business productivity), and (iii) ICT as an export oriented sector or industry for local and export markets (Access to Information (A2I) Programme Prime Minister's Office, 2011). ICT-based market access mechanisms will not only benefit disadvantaged producers and businesses by ensuring equitable access to domestic and international markets but also will enable the government to establish transparent and efficient market monitoring by implementing ICT policies (Access to Information (A2I) Programme Prime Minister's Office, 2011). The key objective of this section is to influence ICTs to promote admittance to various marketplaces by less developed businesses. In addition, this component further includes leveraging ICTs to preserve communally accountable and an unbiased marketplace for all. Introducing ICT portals, which is called e-Tender is just an example of

how ICTs could influence in different areas of the world to open new chances for the business (Access to Information (A2I) Programme, Prime Minister's Office, 2009). As it has mentioned earlier that Cloud Computing is the next step of ICT therefore, Cloud Computing could be used/influenced in favour of business.

The basic objective of this final pillar of Digital Bangladesh is to support the business industry especially SMEs to ensure that it may provide services and technology needed to sustain the other three components of Digital Bangladesh (Access to Information (A2I) Programme, Prime Minister's Office, 2009). In addition, the third sub-section also includes the right foundation for the local businesses to access the international marketplace (Access to Information (A2I) Programme, Prime Minister's Office, 2009).

In the discussion above, I have tried to provide an overall idea of how ICT may bring changes in major outcome areas of the concept of Digital Bangladesh including the SME sectors as well. I can say that the whole concept of Digital Bangladesh means using ICT in every sector throughout the country by citizens. Therefore, the key focus of my research is entirely relying on ICT in Business, Digital Government and connecting citizen but not relying on human resource development. In my research, I will discuss in the later chapter (chapter 7) how ICT and Cloud Computing can be used to connect citizens to support SMEs to use technology into their business. In addition, I will also discuss how ICT and Cloud Computing can support Bangladesh government to build Digital Bangladesh. Now the question is can I say Digital Bangladesh context is the revolution of ICT? The following section will explore whether Digital Bangladesh is a revolution for ICT use in Bangladesh or not.

2.4.4: The Digital Bangladesh Policy – Is 'Digital Bangladesh' a concept only for ICT Revolution?

Digital Bangladesh, the dream of Bangladeshi government does not only transmute the country into a advanced and knowledge-based country by 2021 but also create the South Asian state as one of the next ICT destinations in the world (Bryon, 2015). In today's technology based society, ICT has developed as an influential tool in socio-economic growth (Bryon, 2015). Undeniably, in terms of enlarged employment, greater public services and better information access, ICT is bringing welfare enhancements across the world, which may also have inspired Bangladeshi government. Therefore, Bangladeshi

government has taken ICT development and implementation as one of their highest priorities (Bryon, 2015).

Digital Bangladesh, the core plan of the government's Charter for Change 2021 is an initiative to build Bangladesh as a truly world-class technology based country with the support of ICT and Internet connectivity (Bryon, 2015). Therefore, Zunaid Ahmed Palak, Bangladesh's Minister of ICT put their plan into consideration through different pillars. According to Zunaid Ahmed Palak, *"the main pillar of Digital Bangladesh is to connect all the rural areas by broadband connectivity by developing the infrastructure and human resources and connecting youth population in the industry through liberating ICT"*. Mr. Palak added that within next four to five years they would be creating about 1 million new and different categories of jobs in ICT sector. The ICT ministry of Bangladesh set the clear objectives that within the next couple of years they will develop about 32,000 young IT graduates to provide support to reach a target of $1 billion in ICT exports by 2018, which will be an extra 1% GDP contribution to the country's economy (Bryon, 2015). This plan clearly shows that there is a possibility of rising new ICT based SMEs in Bangladesh where those SME owners/managers will use ICT into their business to expand their business growth. This is almost similar approach compared with one of my research objectives.

Indeed, Bangladeshi government's goals and objectives for ICT are clear and ambitious but the ICT subdivision remains comparatively insignificant in Bangladesh (Bryon, 2015). When the Digital Bangladesh plan was first set forward in 2009 the ICT industry has possessed a high development rate of 40% and this trend is expected to continue as government has taken into their consideration improving ICT infrastructure and making the young population ready by educating them (Bryon, 2015). In addition, under Digital Bangladesh, the government is going to invest about $1 billion for ICT development over the next five years to roll out broadband everywhere in the country and develop Bangladesh's high-tech businesses and Business Process Outsourcing (BPO), which will support Bangladesh to be one of the world's future ICT destinations (Bryon, 2015).

Since 2009, Bangladesh has developed a lot in terms of ICT strategy. Thus, A. T. Kearney, the global consulting firm has selected Bangladesh is one of the top 50 IT destinations in the world by (Bryon, 2015). In addition, along with many domestic IT

companies, many international companies such as Google, Dell, Microsoft and Samsung are creating business centres in Bangladesh and from them significant inward investment is taking place. With their support domestic sectors are taking the lead (Bryon, 2015). According to the Bangladesh Association of Software and Information Services (BASIS), *"with Bangladesh now establishing itself as a BPO hub, which the country hopes can soon rival neighbouring countries' hugely successful BOP sector and the next aim will be to truly unleash the country's entrepreneurial spirit, enabling innovation to an extent where Bangladesh start-ups will grow to one day have the capacity to become global players"* (Bryon, 2015).

According to the Bryon (2015), Digital Bangladesh is the Bangladeshi government and entrepreneurs' big dream for ICT development. And the highest priority of Digital Bangladesh is uplifting the lives of everyday business and citizens' transactions to provide better access to knowledge and information. Bryon (2015) further added that the ICT revolution in Bangladesh might prove to be one of the important weapons in reducing poverty and allowing Bangladesh to accomplish its aims to be one of the fastest rising economies in Asia.

From the discussion above, this may imply that Digital Bangladesh is a concept for an ICT revolution within a developing country. But it is worth questioning whether the Digital Bangladesh concept is limited only to an ICT revolution in use of digital systems or may incorporate more advanced technology developments like Cloud Computing use with sufficient uptake to generate a "step-change" in individual and commercial ICT activity? In the section below therefore, I am going to present whether Digital Bangladesh concept is only an ICT revolution in terms of use of computer technologies or may also be combined with Cloud Computing solutions that may result in a "step-change" in business operations (especially amongst SMEs in Bangladesh).

2.4.5: Digital Bangladesh – Is the Digital Bangladesh Initiative Combined effectively with Cloud Computing initiatives?

What do we really expect from the Digital Bangladesh initiative? Do we really want the country to remain exclusively on the apparently predictable cheap labour route? Do we really want that Bangladesh will only grow a modest, prosperous and well-educated middle-class powering small businesses and sustaining employment for low-wage employees that involves? If we really want such an improvement, then Bangladesh should

significantly accelerate the financial growth of the country as a whole (Prokopp, 2012). But how would that be possible? How may the implementation of 'Digital Bangladesh' contribute to improving the working conditions, pay, and prospects for the least advantaged sectors of the Bangladesh workforce?

Prokopp (2012) said the answer we are looking for lies with Cloud Computing, which is a technological change developing from the Internet's rapid evolution over the last two decades. Cloud Computing is consistent with Digital Bangladesh initiatives, connectivity and availability of computer skills. It links the digital gap sufficiently to empower Bangladeshi small businesses to benefit from the adoption of technologies, without (it would seem) high costs in initial and on going ICT investment. The rapid evolution of Internet use in business is a third revolution in information management similar to the advent of the printing press and the emergence of speedier forms of electronic communication and electronic funds transfer (telegraphy, fax, e-Commerce). These improvements dramatically introduced changes in how we acquire, process and analyse business-related information (Prokopp, 2012). Cloud Computing is one key development that enables this. It represents the commodification and globalisation of computing resources as a service to businesses.

Until very recently, it was very difficult for a business or administration (government body) to acquire, store and process huge amounts of data. To do so, they had to buy computers to process data for themselves and had to buy space or build a data centre (warehouse) to acquire and store their data, which was really expensive and complex owing to high Tax of computer accessories and other materials (Prokopp, 2012). Cloud Computing has changed this issue because Cloud Computing allows anybody to subscribe (for a fee) cheap, virtual computing possessions of different sizes and forms depending upon their needs at anyplace in the world for short or long term use (Prokopp, 2012). One does not need to buy storage facilities nor physical hardware (other than standard desktop machines). A business only needs a computer, Internet connection and a subscription to access storage, data or information processing services.

Prokopp (2012), therefore, suggested that within the Digital Bangladesh concept, Cloud Computing could be a viable option for small businesses. According to Prokopp (2012), *"to build a Digital Bangladesh, government does not necessarily invest money on building data centres or buying physical machines but instead they can fully rely on Cloud*

Computing". Prokopp (2012) added that Digital Bangladesh is a mega-project for the Bangladeshi government. Therefore, there may be lot of money invested in it but this may be too complex a project for them. In that case, Prokopp (2012) suggested that the Bangladeshi government could migrate their Digital Bangladesh project into the Cloud perhaps through outsourcing or through invitations to large MNCs (like Microsoft and Amazon) to provide Cloud Computing infrastructure. Bangladesh government then do not need to invest money on building data centres, train public sector employees to manage those centres and do not need to buy extensive computing hardware and software. Cloud Computing resources are typically based upon a virtual machine, which aims to be be indistinguishable from physical localised computers to simulate the same computing capacity. Prokopp (2012) further added that the Bangladeshi government could offer their services primarily online, which is called "e-government". Under e-government, most activities will be undertaken in the Cloud – including business registration, taxation services, information services, business planning, financial and legal compliance services and related governmental services. As per requirements, government administrators could access relevant data whenever and wherever needed. From the discussion of Prokopp (2012), above), it seems to be clear that Cloud Computing could bring sustainable change and could support the building of Digital Bangladesh. Can we say that Cloud Computing is an answer for the future of Digital Bangladesh? The following section will explore this question.

2.4.6: Digital Bangladesh – Is Cloud Computing an answer for the future of Digital Bangladesh?

Before investigating whether Cloud Computing is an answer for the future of the Digital Bangladesh initiative, we need to know firstly how may Cloud Computing influence Bangladesh's opportunities for an improved economic future – especially for SMEs? According to Prokopp (2012), the message for Bangladesh is that the digital gap has now diminished and the obstacle of large capital expenditure for businesses delivering services by exploiting computing resources has been reduced. Therefore, start up businesses throughout the world is taking advantage of this fact and have come to rely on Cloud Computing solutions. Similarly, Bangladeshi start up businesses could rely on Cloud Computing provided that the reliability, staff skills, quality of service, costs are appropriate. All the necessary resources would be available for everyone with an Internet connection with minimal funds (Prokopp, 2012). There are fewer differences between a digital businessperson sitting anywhere in Bangladesh from one sitting in 'Silicon Valley'

in California today than there were yesterday. Does the availability of Cloud Computing solutions play a sufficient role to make the playing field level to provide a chance for SMEs to benefit from a Digital Bangladesh (Prokopp, 2012)?

Despite the Digital Bangladesh initiatives, knowledge gaps still persist, which need to be overcome in order to shape Digital Bangladesh in a better way (Prokopp, 2012). According to Prokopp (2012), Internet business people have all the facilities of a better education and thus, they will have been submersed in a life full of technology in developed countries in the world. In Bangladesh, however, despite the success of the Digital Bangladesh policy these knowledge gaps are still a concern (Prokopp, 2012). However, the Digital Bangladesh initiative aiming to provide adequate tools to minimize the gaps to build new technology skills to Bangladeshi individuals and businesses (Prokopp, 2012).

In Bangladesh, younger generations have a positive thirst to challenge the status quo and they have trust in their own capability to enhance tomorrow's Digital Bangladesh (Prokopp, 2012). Prokopp (2012) strongly believes that to build a Digital Bangladesh, the Bangladeshi young generation needs to educate themselves with support from the use of advanced technology. And by doing so they can minimize the knowledge gaps within the country and leverage prospects like Cloud Computing adoption. Thus, Prokopp (2012) strongly hopes that, with the support of Cloud Computing, Digital Bangladesh will be built successfully and Cloud Computing could be the best prospect for Digital Bangladesh and its future. It is worth raising a question whether Cloud Computing is a better future for the Digital Bangladesh initiative? Is the Bangladeshi government ready to move to Cloud-based solutions for their e-government proposals? This question is likely to be critical because government is the main body to make the Digital Bangladesh initiatives successful. In the following section, I will discuss the Bangladeshi government's readiness to move to Cloud Computing solutions.

2.4.7: Digital Bangladesh – Is the Bangladesh Government ready to move to CC for its e-government development?

Before discussing the readiness of Bangladeshi government's to move to Cloud Computing based e-government provision, it is important to know what the current functions of technology in government are and the benefits the government can get from the Cloud Computing adoption. Conventionally, government facilities have been distributed in a brick and mortar environment, which is restricted for many people. Few

sectors of society in Bangladesh, where socio-economic inequalities predominate, the efficacy of government facilities for that segment of the population is, at best, based on an old-fashioned model (Parakala and Udhas, 2010). In Bangladesh, traditional government services are based on form-based records and personal attendance at government offices, with work scheduled along old-style queues, which (for businesses) takes away time and (sometimes) accuracy of records and notifications (Parakala and Udhas, 2010). The aim of the Bangladeshi government is to provide effective, transparent and on-demand facilities to individuals and businesses that could be available whenever and wherever citizens want (Parakala and Udhas, 2010). But now the question is what are the current e-government services available in Bangladesh? Rahman (2016) has mentioned a list of available e-government services in Bangladesh such as e-tax, e-transportation, e-health, online interactions between citizens and government (C2G), between government and agencies (G2G), between government and employees (G2E) and of course, government and business (G2B) services.

Regardless of the Cloud service or delivery model, they offer many important key benefits in different parts of government agencies or e-government that Bangladeshi government can easily use (Hashemi, Monfaredi and Masdari, 2013 and Brownhill et al., 2014). Some of these benefits are given below in order to evaluate whether the Bangladeshi government can use these benefits to move their key functionalities to the Cloud.

- **Speed, Agility and Scalability:** Cloud Computing allows faster distribution of services and could support an increase in the agility and nimbleness of government services (Brownhill *et* al., 2014). Scalability enables government organizations to reply to peaks in requests for facilities. According to Brownhill *et* al. (2014), government services with Cloud Computing could swiftly position core applications and measure up or down speedily to meet unstable or even volatile demands (Brownhill *et* al., 2014).

- **Security:** Public and private organizations want their data and processes to be secure. Government especially faces stringent security and privacy requirements (Brownhill et al. (2014)). As a result, security is a key issue for government to adopt Cloud Computing (Brownhill et al. 2014; Hashemi, Monfaredi and Masdari, 2013).

- **Efficiency and Cost:** Government could manage IT resources more effectively with the support of Cloud Computing and with the technology expertise, which make possible minimal requirements for human intervention (Brownhill et al., 2014). The main focuses of Cloud Computing's service models are to offer cost-effective facilities to businesses and to government activities (Hashemi, Monfaredi and Masdari, 2013).

- **Disaster Recovery:** In Cloud Computing environments, disaster recovery provides sophisticated options to restore data swiftly (Buyya, Broberg & Goscinski, 2011). Thus, government will have an opportunity to access a remote server using the Cloud as a backup for disaster recovery on a daily basis. In addition, government will have the option to save data off-site using a third party (Hashemi, Monfaredi and Masdari, 2013). This benefit, however, has to be offset against the concern government users may have about the security of third-party systems in relation to access to data and the robustness of data recovery systems.

- **Protection, Care and Technical Support:** According to Hashemi, Monfaredi and Masdari (2013) Cloud Computing providers are fully accountable for apprising software and offering technical support. The beauty of Cloud Computing appears here to resolve e-government's problems especially related to services outside the metropolitan areas because professionals prefer not to work in remote areas (Cellary and Strykowski, 2009). In addition, in Cloud Computing, it is not necessary to modernize software applications for every individual computer, which will certainly save cost and time and the needed trained personnel (Furht and Escalante, 2010). Hashemi, Monfaredi and Masdari (2013) believe that by adopting Cloud Computing by the government in developing countries like Bangladesh will increase system competencies and efficacy.

From the discussion above so far it has become understandable that the Bangladesh government is ready to move to Cloud Computing (Hasan, 2013). Moreover, Bangladesh government could use CC applications for many of their administrative services for example file sharing amongst ministries to minimise their time and service cost. One problem is however concerns how the Bangladesh government will move to Cloud Computing? Is it possible for the Bangladesh government to adopt Cloud Computing by itself or should they replicate adoption ideas of using Cloud Computing services in a manner similar to other Asian countries? And how should the Bangladesh government evaluate the Cloud Computing solutions for e-government? In the section below, I will

discuss this issue and try to provide some evidence whether the Bangladesh government should adopt Cloud Computing solutions specific to their own needs or should try to replicate other countries' ideas?

2.4.8: Digital Bangladesh – Can the Bangladesh Government replicate the ideas of the use of Cloud Computing services from other Asian Countries?

The suppleness offered by the adoption of Cloud Computing services can be a significant factor in the Bangladesh government's decision to distribute facilities through the e-governance model (KPMG, 2011). Undeniably, at the moment the pace of adoption of Cloud Computing as a model for Bangladesh government's information services is really slow. The Bangladesh government is however planning to move entirely to Cloud-based services to play a pivotal role in implementing 'Digital Bangladesh' (Kamal, 2014; KPMG, 2011).

According to Kamal (2014), the Bangladesh government realised that the advantages of having information systems hosted in the Cloud and the availability of supple service models need to be taken into account. Therefore, Kamal (2014) suggested that the Bangladesh government now needs to adopt Cloud Computing but it would be worthwhile to take some adoption ideas of CC and evaluation processes from some of the nearby developing countries because the Bangladesh government is at its infancy stage in terms of adoption of Cloud Computing systems as a whole. It is illuminating to examine some government examples from elsewhere, below, which may give an idea to the Bangladesh government how they may need to adapt and for what purposes they may need to adopt Cloud Computing services in specific governmental sectors.

- **Japan:** In Japan, the national government of Japan has undertaken a Cloud Computing initiative namely "Kasumigaseki Cloud" to develop a private Cloud environment that would eventually host all of the Japanese government's computing requirements (Wyld, 2010). According to Wyld (2010), Kasumigaseki Cloud will allow for better evidence and resource distribution and encourage better calibration and consolidation for the government's IT service requirements.

  Kasumigaseki Cloud is a part of a "Digital Japan Creating Project" aimed to bring all governmental IT under the umbrella of a single Cloud infrastructure to

minimise the prices and with more "green", ecological IT processes (Rosenberg, 2009).
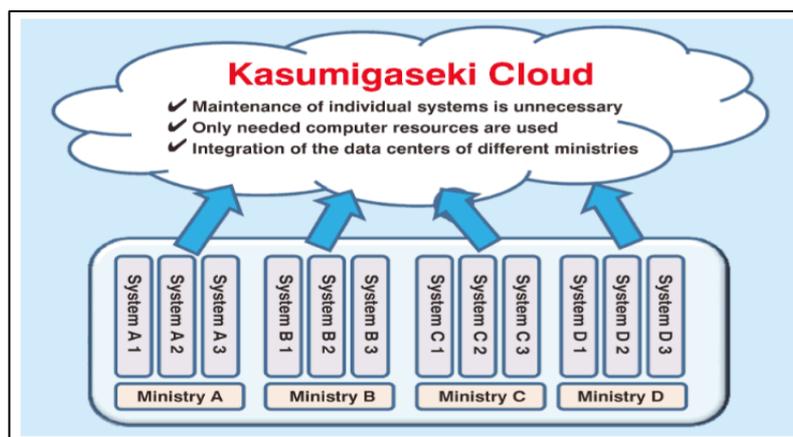
Figure 5: Japanese Government's Kasumigaseki Cloud (Adapted from: Wyld, 2010)

According to Hoover (2009), *"Kasumigaseki Cloud represents a governmental effort aimed at using IT investments (valued at just under 100 trillion yen) to help spur economic recovery by creating several hundred thousands new IT jobs in the next few years and doubling the size of Japan's IT market by 2020"*.

- **India:** In the context of Indian government policy, Cloud Computing could reduce the overhead of changing data to numerous languages and calibration needed to speed up delivery of e-governance services to the people (KPMG, 2011). According to KPMG (2011), *"instead of making massive IT investments in procuring IT hardware and software by different branches of the government, India could directly leapfrog into the Cloud"*. Because Cloud Computing has the capability to scale up to assist in online concurrent dealings, countries can look forward to minimising bottlenecks (KPMG, 2011). Thus, Indian government's leader believed that the Cloud Computing could be used to hasten the delivery of e-governance (KPMG, 2011).

From the above examples of Cloud Computing applied to e-government activities, this study will suggest that the Bangladesh government should replicate the Japanese "Kasumigaseki Cloud" model in order to build Digital Bangladesh. The aim of "Kasumigaseki Cloud" is similar to the aim of Digital Bangladesh although there are some significant differences in financial investment and business activities. Question is how might replicating the Japanese government's "Kasumigaseki Cloud" model apply to the Bangladesh government "Digital Bangladesh" policy? More importantly, how will the

Bangladesh government evaluate Cloud Computing solutions that relate to e-government services? The following table summarises those evaluation criteria.

Evaluation Criteria	Results
Performance	Improve the quality of service and availability of services and resources on-demand and increase access for individual and business users.
Efficiency	Reduce implementation costs and reduce the time needed to access applications and data.
Key Benefits	Improve integration of data and reliability of interactions between organisations. Create newer and better services at lower cost. Enhance transparency and on going evaluation of services and processes over time through data analytics. Overcome geographical, hardware and software limitations and skills shortages in order to increase participation for citizens.

Table 9: Evaluation of Cloud Computing related to e-governance (Adapted from: Hashemi, Monfaredi and Masdari, 2013).

Now the obvious question for me to clarify in this investigation, if the Bangladesh government is to replicate a Cloud Computing model in order to support their Digital Bangladesh policy, is to ask how and why are they going to use Cloud Computing for interactive relations between organizations? Is there sufficient awareness and enthusiasm for the potential benefits outlined above to generate social and political momentum for these large-scale (and perhaps expensive) changes? In response to this question I am now going to explore in the section below how to gain a better understanding of how and why Bangladesh government may use Cloud Computing solutions between organizations to support interactions and transactions amongst stakeholders.

2.4.9: Digital Bangladesh – How and why should the Bangladesh Government use Cloud Computing solutions to support interactions and transactions amongst organizations in the Digital Bangladesh context?

We are in a provisional period in computing history and Cloud Computing appears to be undergoing a swift evolution in the personal, business and governmental sectors (Wyld, 2010). Therefore, IT experts need to recognize that there are certain fundamental vital elements that enable the Cloud Computing concept to evolve. The following figure shows those elements. From the figure below, it can be said that Cloud Computing evolution has at least 8 components and each component carries different functions. Thus, it is likely that with technological evolution many issues will prove to be people-based but not technology-based (Erlichman, 2009).

Cloud Computing will unquestionably generate employment in the near future (Wyld, 2010), but it may also either reduce or change the prospects for employment in ICT provision and support for ICT specialists within individual businesses. In the area of Cloud Computing, there will be new businesses and new jobs developing with the displacement of "nuts and bolts" technology jobs moving towards Cloud Computing providers, away from in-house IT departments. Moreover, technical skills needed for IT jobs will be likely to decrease with the support of Cloud Computing (Wyld, 2010). Thus, the Bangladesh government needs to consider the movement of their administrative services to Cloud based alternatives in order to assess the potential savings, increased collaborative capabilities and operational advantages against the security, reliability and privacy concerns that have been expressed against adoption of Cloud-based systems (Wyld, 2010).
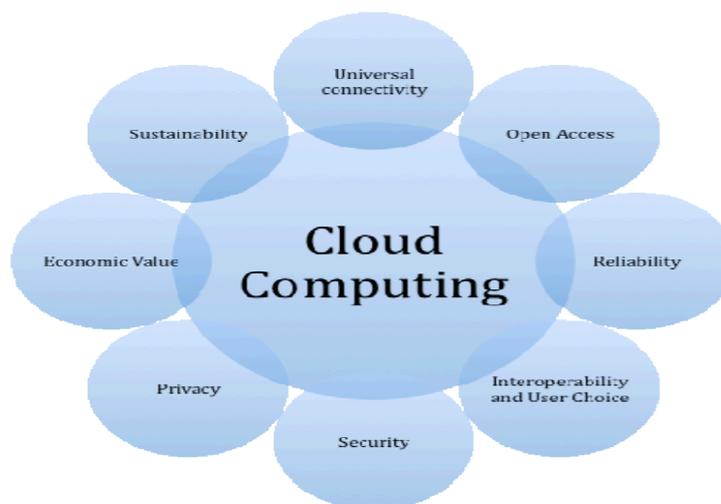
Figure 6: Fundamental elements of Cloud Computing (Adapted from: Wyld, 2010)

According to Aveek and Rahman (2011), *"e-governance is a process of reform of the way government delivers services to external and internal clients for the benefits of both government and the clients that they serve"*. The Bangladesh government could have many applications that could be wholly or partially automated. Government expenditure on IT will need to focus upon the efficiency of the administration and evaluate the support for decision-making and strategy implementation (Aveek and Rahman, 2011). Bangladesh government's e-governance services should focus on the categories below.
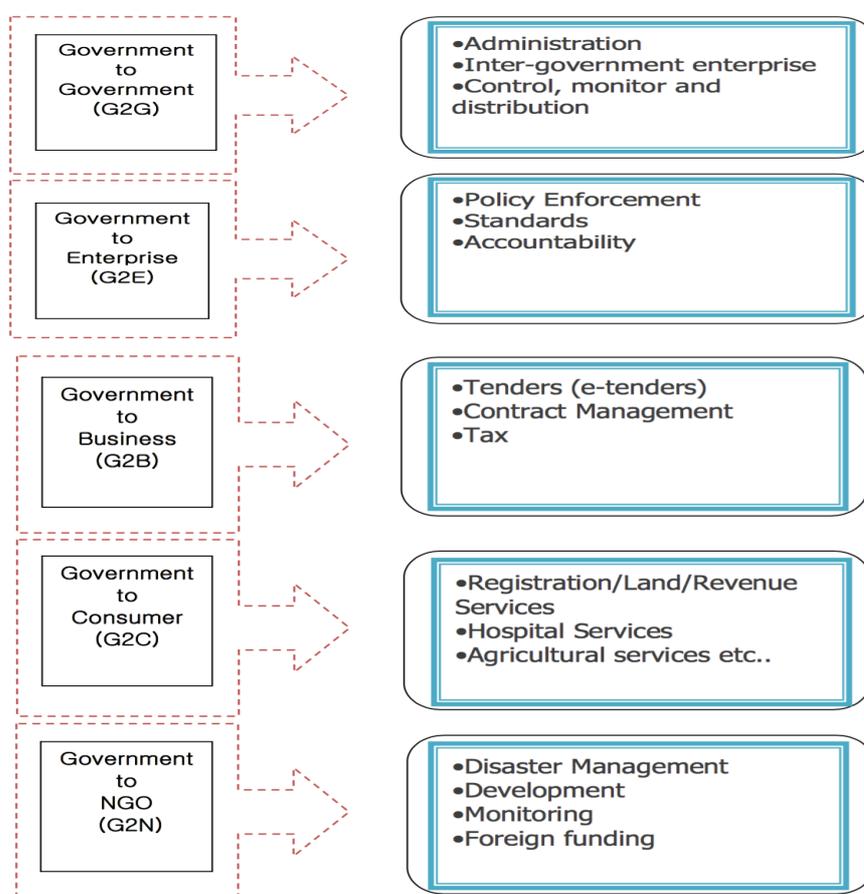
Figure 7: Interactive relations between organizations in e-governance (Adapted from: Aveek and Rahman, 2011)

- **Government to Government (G2G):** Government to government facilities are transactions between many departments and organizations associated with central and local government (KPMG, 2011). G2G service applications are vertical and horizontal where vertical applications target a precise application of central government policy and horizontal interactions concern inter-departmental

interactions (Aveek and Rahman, 2011). Enabling G2G interaction will be critical to implementation of Cloud Computing initiatives in support of the Digital Bangladesh policy.

- **Government to Enterprise (G2E):** By using Cloud Computing systems, the Bangladesh government can control infrastructure enterprises like the Water Board and Electricity Utility and can respond swiftly to failures. Under G2E, policy enforcements, auditing and security are the highest challenges (Aveek and Rahman, 2011). G2E interactions, of course, require the collaboration of utility companies who will need to invest in the development and implementation of appropriate CC systems.

- **Government to Business (G2B):** According to KPMG (2011), *"G2B services include the provisioning of facilities related to licence renewals and individual income taxes"*. Government interrelates with different businesses in relation to policy implementation, agreement management and so on and the prime responsibility that falls on government is Contract Management (Aveek and Rahman, 2011).

- **Government to Consumer (G2C):** Government could offer various services to its citizens. And several departments of the government could offer various facilities that could measure from a modest appeal determination to a preliminary workflow linked situations (Aveek and Rahman, 2011).

- **Government to NGO's (G2N):** According to Aveek and Rahman (2011), *"government provides numerous services to the NGOs who have been working for the rural development and the services are monitoring, security services and so on"*. In addition, NGOs offer international fund, loan and disaster recovery policies (Aveek and Rahman, 2011). In this context there are problems of adoption for NGOs – who may not have access to the systems and skills required to make best use of information services provided by Cloud Computing. The problem may not simply be a matter of financial resource; rural development projects typically lack reliable means to access online information resources and may also lack expertise in making effective use of those resources. NGOs are not a major focus of this investigation, but may be problematic for the implementation of Cloud-based solutions for the Digital Bangladesh policy.

In the <mark>section</mark> below, I will present, evidence of different achievements under the Digital Bangladesh context in the last 10 years.

2.4.10: Digital Bangladesh – Evidence of Achievements

ICT Policy 2009 has specific direction and guidelines reflecting most of the priorities of the Digital Bangladesh agenda of current government of Bangladesh. In the below, I will present summary of the achievements of building Digital Bangladesh since 2009 to at present.

Ten years since the Awami League government (current Bangladesh government) came into power with a promise to technologically transform the nation with an agenda aptly titled "Digital Bangladesh". Since then the country has seen radical transformation in the arena of information and communication technology. Under the leadership of Sheikh Hasina, during her two consecutive terms as the prime minister, Bangladesh has become an emerging country in the technology world (Rahad, 2018; Islam, 2018).

The government has also put a special emphasis on utilizing information an communication technology (ICT) as a tool for development and sustainability. Despite many bottlenecks and limitations, work is in progress for the realization of Digital Bangladesh. Over the past nine years, the government has implemented a large number of projects relating to digital technologies. In a bid to fulfil the aim to transform Bangladesh into a technologically advanced nation by 2021, the country has come along way. The country has seen exponential growth in internet connectivity, mobile phone usages, IT export earnings and use of ICT in education and accessibility of public services, driven by widespread digitization in the public and private sectors and policy support. Below is a list of achievements about in the past 10 years when the concept of Digital Bangladesh was first put in place (Rahad, 2018; Islam, 2018).

Creating Jobs:

ICT training by the government has opened a new horizon in youth employment through outsourcing. According to a study conducted by Oxford University, Bangladesh is now home to around 16.8% of all outsourced online workers in the world, a rate that is second only to India, at 24.6%. Under the professional Outsourcing Training Program, the government has set a target for training 13,000 unemployed people in three key ICT areas

such as graphic design, web design and development and digital marketing. Of the target, a total of 11,920 people have already completed their training. The business process outsourcing (BPO) industry in Bangladesh is growing at breakneck speed. The export revenue of the BOP industry has been growing rapidly. At present, the industry employs more than 40,000 educated Bangladeshi workers (Halim, 2017; Islam, 2018).

Towards Universal Access:

Ten years ago, only 20 million Bangladeshis had access to mobile phones. As of April 2018, that number has grown to more than 150 million. The number of Internet subscribers in Bangladesh as of April 2018 stood at 86 million, while the rates of tele-density and internet-density were 91% and 50% respectively. According to the GSMA intelligence (2018), Bangladesh has the potential to be the 10th largest Internet using country in the world by 2020 (Halim, 2017).

Almost all services including those related to education, health-nutrition, agriculture, birth-registration, allowances under social protection programs are now easily and comfortably delivered to the doorsteps of intended beneficiaries through union information centres at union level, e-service centres in Deputy Commissioners (DC) offices, e-centres in 147 upazillas (police stations) and village post offices and 254 agricultural information centres. As many as 18,434 government offices including 58 ministries or divisions, 240 government departments and 64 Deputy Commission offices of the country are now connected with an integrated network. A total of 883 video conferencing systems have been installed for live communication, sending messages and information, and conducting meetings. As part of the agenda of Digital Bangladesh, the government is trying to ensure greater transparency in its work through measures such as the introduction of e-filing in government offices (Halim, 2017).

Massive IT Infrastructures:

The government has already planned to set up 12 IT parks at the district headquarters of different locations throughout the country. Around 8000 km of optical fibre cable has been installed across the country. A second submarine cable has been installed in Kuakata (Name of the place) through, which Bangladesh will get 1500 GB/s bandwidth. Twelve high-tech parks, which are under constructions will create thousands of jobs and allow various local and foreign companies to work there. The government says, through IT park to export software and ICT services worth $10 billion by 2030 and aims to earn $5 billion from them by 2021 (Halim, 2017).

According to the state minister for ICT, the park authorities had come up with a plan that has three phases – two years, five years and 10 years. There is also a specific road map in the plan. Different stakeholders said it would be possible to reach the goal if the short, mid and long terms plans are followed properly. According to Halim (2017), Digital Bangladesh is one of the key commitments of the government therefore; Bangladesh government has built an extensive essential IT infrastructures for delivering quick and easy services to the doorsteps of the common in particular those who are marginalized. With sincere endeavour, mobile network services could be introduced in all upazilas of three inaccessible hill districts, which is major leap forward towards socio-economic development in this region (Islam, 2018).

Halim (2018) further said that government will bring all the union parishads across the country under the digital connectivity within one year. In addition, digital laboratory will be established in each of the educational institutions across the country. The government has facilitated the growth of mobile banking, which launched in 2010. At the end of May 2018, the average daily transactions through mobile banking amounted for more than Bangladeshi currency (BDT) 1058 crore. The latest achievements of Bangladesh under Digital Bangladesh concept is to enter the space age though successful launching of the first satellite into space on 11th May 2018, which gave Bangladesh a newer height in using information technology. Below is the figure of achievements unlocked of Digital Bangladesh.
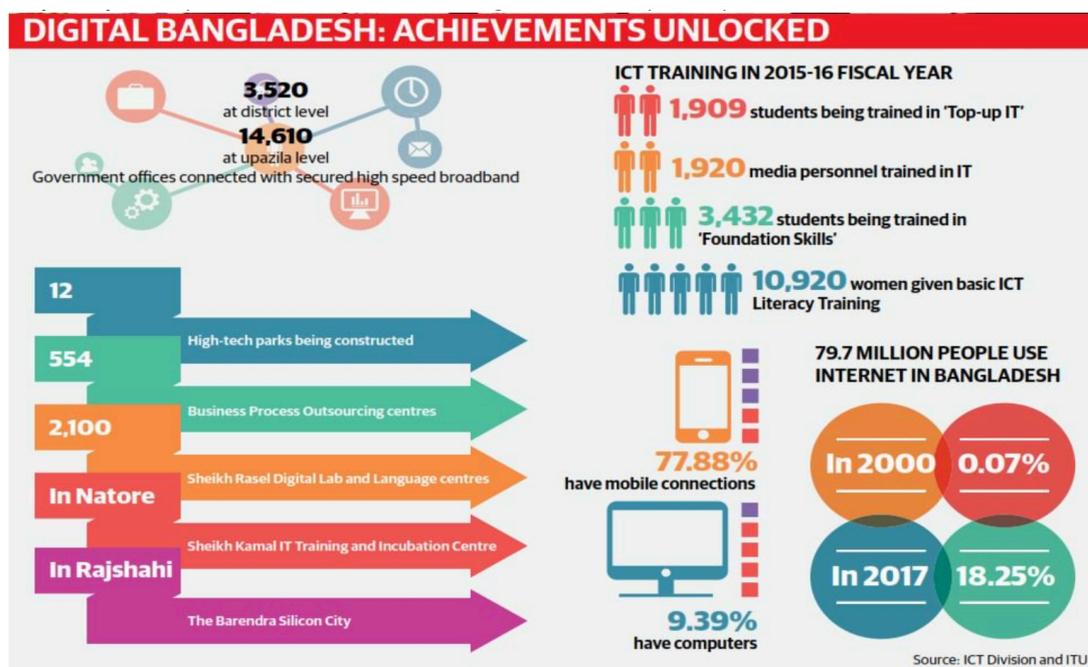
Figure 8: Achievements unlocked of Digital Bangladesh (Adapted from: Halim, 2017).

ICT Division Road Map

The ICT Division has come up with a roadmap for the development of the sector. Various programmes have been running past few years under the short (two-year), mid (five-year) and long (10-year) term roadmap. According to Posts, Telecommunications and Information Technology Minister Mustafa Jabbar, we were ahead in agricultural revolution but lagged behind in industrial revolution. Mr. Jabbar also mentioned that Bangladesh has risen from the rubble after independence. Given the situation we were in, we would not have been able to utter the word 'robot'. But now we can (and) in the Digital World, at least 20 robots built by us are being exhibited and this is our achievement in ICT, according to the Posts, Telecommunications and Information Technology Minister Mustafa Jabbar (Halim, 2018).

Youths Getting Opportunities

Various start-up projects have been launched with government and private initiatives for new entrepreneurs in the ICT sector over the past few years. These projects have helped train young entrepreneurs, implement initiatives, and arranged funds. Among them is the Innovation Design and Entrepreneurship Academy (iDEA), which was launched in July 2016 to promote innovation and design, and develop entrepreneurs. According to Halim (2017), different stakeholders have mentioned Tk229.74 crore project will play an important role in nurturing talents, which will certainly support to build Digital Bangladesh (Halime, 2018).

SME and Farmers Bank:

Under the Digital Bangladesh policy, the government's promise to support small and medium businesses, therefore, they have opened two different banks, namely SME bank and Farmers Bank. The aim of opening these banks are to provide enough financial support to the SMEs so that SMEs can enhance their businesses. SME owners or managers can take loan from these two banks with very minimum interests and no capitals are required to show before applying for loan. IT shows the positive approach of the Bangladesh government to help and support SMEs to promote their business to get competitive advantages from the market (Halim, 2018; Islam, 2018).

Other Achievements in the ICT sectors

Work is underway to build Sylhet Electronic City on a 163-acre plot for the development of the ICT sector. Sheikh Kamal IT Training and Incubation Centre is being built in Natore.. In addition, a software technology park has been built at Karwan Bazar's Janata Tower at Dhaka city. The fourth floor of the building has been allocated for various companies to help create new entrepreneurs. In Rajshahi's Nabinagar, the Barendra Silicon City has been constructed and another IT park is being built on a 31-acre plot. State Minister Palak said fibre optic connection had been successfully extended to the upazila level with a goal to provide the service to all unions in the country by 2018. According to the state minister for ICT, Palak, *"work was underway on the construction of 554 Business Process Outsourcing centres, and that 2,100 Sheikh Rasel Digital Lab and Language centres out of 2,972 have already been built and work on the remaining 971 is in the final phase"* (Halim, 2018; Islam, 2018).

From the above exploration, it has become clearer why the Bangladesh government should make use of Cloud Computing a component of their Digital Bangladesh strategy and how they may develop interactive relations with different organizations in the Digital Bangladesh context. Like SMEs, however, the Bangladesh government will have to face many implementation challenges as they are also at an immature stage of adopting Cloud Computing systems. Thus, this study should address the major challenges in implementing Cloud Computing that a Bangladeshi government could face under the Digital Bangladesh context. This is developed further in Appendix F. After exploring all the possibilities/opportunities and challenges of Cloud Computing adoption, the readiness of the Bangladesh government for Cloud Computing adoption, it becomes significant to ask if Cloud Computing is implemented in Digital Bangladesh policy, which area, types of SMEs, size of SMEs and business activities of SMEs will be benefitted? In the section below, I am going to summarise the answers by reviewing overall findings within the literatures and boundaries of this research.

2.5: Research Boundaries and Review of Findings

From the discussion above, this study could say that by using the key benefits of Cloud Computing a business can be more agile and adaptive, they can improve their business growth. Moreover, with the support of the benefits of Cloud Computing a small

and mid sized business can get operational resilience and Cloud will support to move your capital expenditure to operational expenditure, which is really needed for the SMEs. In addition, Cloud Computing is only computing at the moment that can support users' to use green computing by reducing the carbon footprint, which will absolutely support SMEs to enhance their profile in the business market. Therefore, this study suggest that if SMEs can use the benefits of Cloud Computing properly then they will get positive business outcomes, which will be ultimately innovative for them to continue their business in a long term.

However, now the questions are how could we evaluate the above judgements that Cloud Computing would be the best solutions and answer for SMEs and what categories/types/sectors and percentages of SMEs in Bangladesh would be beneficial from Cloud Computing? Moreover, SMEs in rural areas or in metropolitan areas in Bangladesh would be beneficial from Cloud Computing? In addition, which areas of SME business or activities is Cloud Computing relevant in Bangladesh? And what size of SMEs would be benefitted from using Cloud Computing? This is highly important because as a researcher, I must coherent what categories, size, percentage, SMEs location and business activities of SMEs in Bangladesh will be relevant for my research. Therefore, now I am going to provide short summary to provide the answers to describe above questions.

In Bangladesh, no one knows exactly how many categories of SMEs available. According to Mintoo (2006), in 1979 Bangladesh Small and Cottage Industries Corporation (BSCIC) under the Ministry of Industries of Bangladeshi Government conducted a survey to identify the total number of SMEs. In spite of reliability and legitimacy of the survey questions this initiative provided a suitable benchmark of SMEs by the effort of the Bangladesh Bureau of Statistics (BBS) but unfortunately, this report was never updated hereafter. However, the survey results represented with the conclusion that SMEs are the engine of economic growth of Bangladesh. The result also drew up that there were roughly 6.0 millions micro, small and medium enterprises (MSMEs) available in Bangladesh. The amount of SMEs were identified included business with up to 100 workers employing a total of 31 million people, which is equivalent to 40% of the total population of the country ages 15 years and above (Mintoo, 2006). The survey also revealed that more than three quarters of domestic earnings in both rural and metropolitan areas are provided by the SMEs. Deb & Hossain (2009) mentioned in their study that approximately 90% of all industrial units in Bangladesh are SMEs generating almost 25%

of the GDP. They have also identified that with the contribution of the numerous types of SMEs contribute from 80% to 85% of industrial employment and about 23% of total civilian employment in Bangladesh (Bangladesh Bureau of Statistics, 2007).

After careful consideration, I have chosen several categories of SMEs out of 6 million SMEs that relevant to my research. Those categories/sectors are IT – based activities, Computer software and ICT goods, stationary goods industry, telecommunication, mobile set and accessories, electronic business, clothing business, retail food industry, readymade garments, importer of medical equipment and furniture. The reason I have chosen these sectors of SMEs for my research because they are the most promising SME sectors in Bangladesh. Moreover, these sectors of SMEs are making national and international transactions, earning and saving foreign currencies by manufacturing export-oriented products or import supernumerary products. For instance, readymade garments are the highest foreign currency earnings sector (about 79% of total export earnings and 12% of GDP) of Bangladeshi economy. In addition, the reason behind choosing these sectors of SMEs for my research because these sectors need more support from advanced technologies and they have opportunities to adopt advanced technologies such as Cloud Computing. In the current circumstances and perspective of Bangladeshi SMEs my research is not relevant for Nakhshi kanta and handloom, fishing boat building, hatchery, horticulture, floriculture, construction business, tailoring, saloon, printing and packaging etc. categories/sectors of SMEs. This is because, these sectors of SMEs in Bangladesh are very small in size, very limited investment and most of them are one-man company. Therefore, adopting Cloud Computing would not be the best solutions for them because they do not need any IT solutions or infrastructures for their business. As a result, my research is not relevant for them.

In terms of the percentage of total number of SMEs running their business, Abdin (2010) discovered in his study that in Bangladesh approximately 60% to 65% of SMEs are located outside of the metropolitan and port city such as Dhaka and Chittagong. Therefore, my research would be relevant for those SMEs running their business within the metropolitan cities, which is about 25% to 30% of SMEs in Bangladesh but not for the SMEs in rural areas. The reason my research is not relevant for the SMEs in rural areas because at present in Bangladesh, the IT facilities and IT infrastructures in rural areas are not so adequate. Moreover, SME owners or managers have really less IT skills or even no skills at all. In addition, some of them have very less amount of money to invest and most

of the sectors of SMEs in rural areas are one-man company. On top of that, in rural areas, there is no continuous supply of electricity and not everyone and every place are covered by the Internet services. Therefore, using Cloud Computing would be very difficult for them at present. As a result, I am going to focus on only those 25% to 30% of SMEs located in the metropolitan cities in my research because Internet covers most of the Bangladeshi metropolitan cities. They do have 24/7 continuous electricity supplies. Most of the SME owners or managers are IT skilled and they do have full access of online resources. Moreover, most of the SME owners have adequate amount of money to invest. As a result, my research would be the best suitable and relevant for them at the moment. And they would be surely benefitted from moving to Cloud Computing in order to develop their business growth. However, within next four to five years this scenario will be changed and SME owners or managers in rural areas will come to know more about IT and ICT. Therefore, this study would be relevant for some sectors of SMEs in rural areas after 4 – 5 years whenever rural businessmen will be more IT skilled with the support of ICT division and IT infrastructure will be built as well.

Now lets talk about the areas of small medium enterprise business activities are relevant of Cloud Computing in Bangladesh. From the discussion of drivers of Cloud Computing above it has been clear that every aspects of business being performed in the Cloud can be benefitted from using Cloud based services with all types of business. Enterprise businesses have huge benefit from Cloud Computing with "storage", "email", "web applications", "document management" and so on. For small businesses the importance of productivity, organization, and most of all, cost savings are so essential and there is no need break the bank when it comes to Cloud based solutions. Therefore, I am going to discuss the areas of business activities of Bangladeshi SMEs will be benefitted from the moving journey on to Cloud Computing below.

- **Email and Collaboration:** With the Cloud based email; Bangladeshi SMEs especially selected SMEs for this study do not have the expense of constantly patching the server's operating system on a monthly basis or worried about the hard drive on the server crashing and who will perform maintenance on the email server. The benefits of having an email in the Cloud are great for any size of business especially for the SMEs because the vendors patch all services. The service providers themselves are the ones patching, updating and constantly upgrading the

software and hardware for the users. Moreover, Cloud based email can be accessed from anywhere on any device with an Internet connection (Lopez, 2014).

- **Application Delivery (Cloud Applications) – Software as a Service:** Most of the SMEs have the need to deliver applications to their employees. The types of applications needed are dependent on the nature of the business but most businesses share a common set of base level requirements. These include applications such as word processing, spread sheets, presentation software, accounting packages, CRM and many more. Cloud Computing provides an online alternative to the traditional "buy, install and manage" method of application delivery. This is commonly known as "Software as a Service", where applications are delivered via an Internet browser. Moreover, with SaaS, software is update automatically by the service providers so that the latest versions are always available and there is no need to manually patch and update the software. Cloud based applications also benefit from being increasingly integrated with mobile devices allowing access to business data and applications from mobile smart phones (Lopez, 2014).

- **File and Data Storage – Cloud Storage:** Conventionally most of the small and medium businesses, business data are stored on computer equipment based at the office. This data could be stored on PC's or on a network server or device allowing the data to be shared between multiple users. Storing data in this way has meant that small businesses have always been fully reliant on their own equipment and their ability to manage this equipment, internally or via a partner, to ensure their data is safe, backed up and always available. However, Cloud storage provides small businesses with online storage capacity. These services are typically paid for according to the volume of data stored with the provider. Cloud storage can replace the need for businesses to buy and manage file servers, network attached storage devices or removable hard drives. Cloud based online backup services can provide a simple and low cost means of automatically backing up this locally stored data to an off-site location and replace the need for manual and labour intensive tape or disked based backup regimes (Lopez, 2014).

- **Hosted Desktop Computing:** Hosted desktop computing remove the need for traditional desktop PC's in the office environment and offer numerous advantages

in terms of cost savings, security, resilience, flexibility and reduced management overhead. A hosted desktop looks and behaves like just like a normal desktop PC but the applications and data are stored and delivered online from secure data centres. Hosted desktops can be fully configured with the relevant line of business applications and user environment required on an individual or company wide basis (Lopez, 2014).

- **Hosted Servers:** Hosted servers replace the need for on-premise servers and can provide the same roles and functionality provided by on-site servers such as centralised data storage, a means of enforcing permissions based access to company IT resources, or delivering an application or database. They do this without the need for upfront capital expense, energy costs; management and support overhead of on-premise severs. Hosted servers are typically backed up daily, so SMEs do not have to worry or manage this in-house, and are fully managed with updates, patches, and antivirus protection (Lopez, 2014).

- **Business Continuity and Disaster Recovery:** According to Lopez (2014), Cloud Computing solutions are accessible via the Internet from anywhere and are therefore not reliant on equipment physically located at a business premises. They provide an inbuilt low cost remote access, disaster recovery and business continuity solution to businesses giving peace of mind that applications and data are always available from any location. Cloud Computing providers also make considerable investment in data centre infrastructures includes technologies such as real time replication of data to multiple data centre so as to ensure constant availability of their services (Lopez, 2014).

- **Project Management:** The term 'Cloud Computing' is one of the highest rapidly mounting IT field and is expended in various extents of business activities (Jolanta, 2015). Contemporary businesses and organizations are carrying out various activities in the arrangement of projects. And the opportunity of the projects are dissimilar therefore using of Cloud Computing are dissimilar as well (Jolanta, 2015). In order to ensure project gets successful and investment will bring the expected return of investment (ROI), project managers need to highly focus on developing the strategic value and long-term succession plan. Cloud Computing is a novel approach in the IT with the significant trend in the expansion of the

discipline. This is because of virtualization, expansion of high-speed Internet and collective standards of software growth (Jolanta, 2015). Therefore, the use of Cloud Computing becoming rapid mounting part in the IT marketplace and use of CC is unavoidably affect different businesses upsurge incomes and reducing the prices of public management (Jolanta, 2015

- **Supply Chain Management (SCM):** Undeniably, due to the competitive business and the exclusive financial globalization throughout the world the degree of supply chain management is becoming very critical for any business (Srivastava, 2012). In order to ensure faster, cheaper and better way of serving customer, SCM can combine with technology as an unavoidable option. Because consumers' needs and essential instability is keep changing in a faster way to force businesses to adopt more lively technology based supply chain system (Srivastava, 2012).

    Current improvement in technologies such as Cloud Computing can enable the businesses to benefit information easily in their premises by coordinating the activities to manage the supply chain (Tiwari and Jain, 2013). According to Tiwari and Jain (2013), *"Cloud computing emerges as a useful technology that contributes to this optimization by providing infrastructure, platform and software solutions for the whole supply chain via Internet"*. The use of Cloud Computing in SCM can lead to economical and operational benefits such as lowering cost in disparity to on-premises substructure cost, supply chain (SC) discernibility, podium scalability and flexibility via SC partners' (Tiwari and Jain, 2013).

- **Warehouse Management (WM):** Warehouse management system offers necessary information to competently accomplish the products flow for the time of receipt to time of shipping within the warehouse (Faber *et* al., 2002; Aravind, Sampath and Venkatesh, 2013). Therefore, a revolution of the technology now needed within the warehouse. According to Aravind, Sampath and Venkatesh (2013), the revolution is only possible with the support of the new technology called 'Cloud Computing' and Cloud-based arrangements. In Cloud-based arrangements, warehouse management system offers host the software applications and hardware infrastructure for the consumers. Moreover, Cloud-based deployments permit users to access the precise resource or application over the Internet without really installing the prerequisite hardware application on-premise

(Aravind, Sampath and Venkatesh, 2013). According to Aravind, Sampath and Venkatesh (2013), *"owing the high cost of on-premise Information Technology (IT) Systems, companies are in the process of transition towards Cloud based models such as SaaS, which paints the advantages of cost reduction and less IT talent resources needed from the customer side"*. Under the Digital Bangladesh context, Cloud-based SaaS model for warehouse management (WM) system will have countless prospective for growth in the Bangladeshi market and there would be an overall development of supply chain efficiency to enable a business organization to compete globally (Aravind, Sampath and Venkatesh, 2013).

After considering the aspects of Cloud Computing, SMEs, Digital Bangladesh and the boundaries of my research, it is now important for me to discuss theories that relate to the technology adoption. Thus, in the sections below, I am going to present in more detail some of the existing technology adoption theories available in the research literature.

2.6: Technology Adoption Theories – An Insight

Cloud Computing is in its initial stage of diffusion so research into Cloud Computing adoption process is needed. Because this adoption process will support Cloud providers to distinguish the issues that influence to adopt Cloud Computing. Scholars have been agreed that adoption of innovation in the business depends on various issues. In the last few decades various researchers have been attempted to define influencing and affecting issues of transmission process of numerous technologies. There are many theories and frameworks such as Technology-Organisation-Environment (TOE), Diffusion of Innovation (DOI), Institutional Theory; Iacovou *et* al. Model, Cloud lifecycle Model (Lindner *et* al., 2011) have been proposed in order to study the adoption process of new technologies. Diffusion of Innovation is the most frequently used theory among all the theories, which support to explain the acceptance of modernization. DOI mainly explains the acceptance decision based on the issues that are associated to the technology itself such as features of the technology or consumers' insight about the technology. But DOI does not take into consideration of other issues, which are not technology associated constructs such as organizational and environmental issues and specifically environmental issues.

On the other hand, Technology-Organization-Environment (TOE) theory not only practices technological aspects of the adoption process but also organizational and environmental aspects as well, which will resolve the drawbacks of DOI theory. But

problem with TOE framework is this framework does not provide a solution if there is a breakdown or error in the adoption process instead TOE supports to identify the influencing or affecting issues of adopting technology. And unfortunately, neither DOI nor TOE framework does provide opportunities of iterative process during adoption of technologies, which Cloud Lifecycle model does provide.

In the perspective of Bangladeshi SMEs, understanding and using Cloud Computing is at the beginning therefore it is unquestionable that they must need to have iterative process in place. So that they can go back not only beginning of the adoption process but also wherever they need to go upon making mistakes during transformation. Therefore, in my research, I am going to integrate TOE and Cloud Lifecycle model in order to identify the issues explains failure of adoption of Cloud Computing through TOE and providing opportunities to the iterative process of adoption of Cloud Computing through lifecycle model.

This section therefore will build up on the relevant studies and theoretical literatures, which will lead towards developing a conceptual framework (in chapter 6) of the Cloud Computing adoption by the Bangladeshi SMEs. This framework will further explore the affecting issues that affect Bangladeshi SMEs' to adopt Cloud Computing. In addition, in this chapter I will discuss some of the frequently used technology adoption theories to understand the nature of Cloud Computing adoption in the SME sectors. My proposed conceptual framework (in chapter 7) will then be used as the basis of understanding of the Cloud Computing adoption in the Bangladeshi SMEs' context.

2.6.1: Theory of Technology-Organization-Environment (TOE)

Technology-Organization-Environment (TOE) is formerly a structure of organizational psychology theory. This theory is an organization level multi-standpoint structure, which has been developed by Tornatzky & Fleischer (1990). TOE identifies various components of a business, which incline to influence the decision of innovation process of technology adoption and implementation in the business (Baker, 2011). This framework has been categorised into three aspects namely, technological, organizational and environmental (figure 9), which explores the theories and structure that has been functional in earlier studies. The first aspect represents technological issues, which are internally and externally technology related onto the organization (Baker, 2011). Under technological context, both existing technology already in the business such as software,

hardware, technical issue and IT infrastructure or any other technological practices and those technologies available in the market but not presently using in the firm is taken into consideration (Baker, 2011).
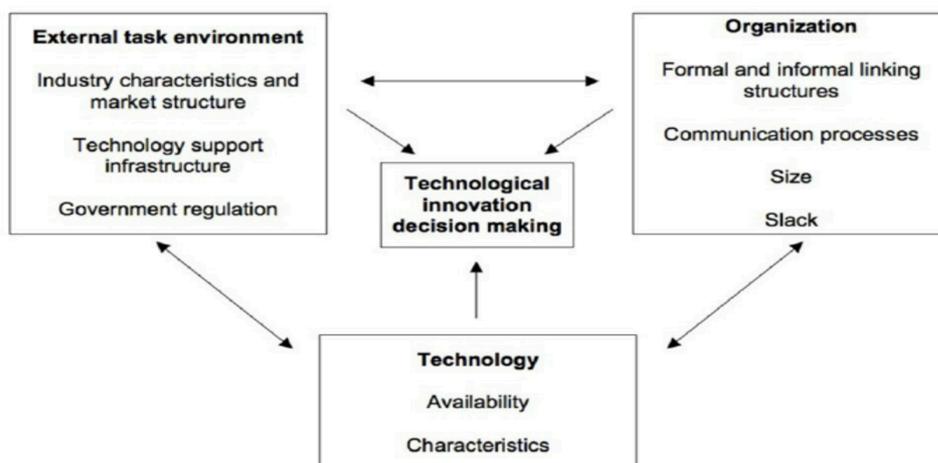
Figure 9: Technology-Organization-Environment (TOE) Framework (Adapted from: Tornatzky & Fleischer 1990)

The second aspect of the framework represents the organizational background, which is mostly related to the features and the properties to the business firm such as firm size and administrative structure (Alshamaila *et* al., 2013). Moreover, this second aspect of TOE denotes to the interior and exterior pressures associated with the firm such as procedures, principles and of course market rivalries. And finally, the third aspect of TOE represents the environmental background, which denotes to the ground where firm performs its trade. It could be associated to the adjacent features such as technology, competitors, business itself and the existence of technology service suppliers (Alshamaila *et* al., 2013). According to Tornatzky & Fleischer (1990), all three aspects of TOE framework represent both opportunities and limits for technology adoption.

From the figure above (figure 9) it has been clearly showed that technological aspect of TOE structure signifies both characteristics and availability of the technology. Any types of interior or exterior firm associated technologies are part of technological aspect. According to Tornatzky & Fleischer (1990), existing technology in the firm and exterior technologies, which are not part of the firm currently, can still influence the decision of technology adoption. This is because; existing technology can define the possibility and boundary of the possible technological transformation that firm can adopt whereas exterior technologies can specify how firm can change by implementing new technologies. Tornatzky & Fleischer (1990) further added that exterior technologies that

are not using in the firm currently could generate incremental, synthetic or intermittent variations. Because technologies are proposing incremental alterations can enhance new structures to the existing technologies, which has got very bottommost volumes of jeopardies.

Organizational aspect of TOE framework defines the features and properties such as size, structure and communication process of the firm. There are various ways organizational features affect the technology adoption and implementation decision whereas organizational structure inspire the adoption procedure. Baker (2012), added that for modernization phase, decentralized firms are the best suited while centralized firms are finest suited for execution phase of transformation process. And communication process is another influential organizational factors of the adoption process within the firm. In addition, managerial behaviour from the top management is again play a role of influencing or obstructing factors of technology adoption. According to Baker (2012), *"the role of size in adopting innovations is not yet understood; and there is no defined relationship between size and adoption rate"*. However, on the other hand, various thoughts are present in the firm about the functions of slack resources. Baker (2012) strongly believed that presence of slack resources are desirable for the firms but however, it does not essentially support the transformation process.

Environmental aspect of TOE framework denotes the structure of the firm, supporting technological substructures and different regulations of the government. Scholars like Baker (2012) believed that technology adoption process is much higher in swiftly growing firms compared with moderately slower progressing firms because technology adoption process is not clear within immature or declining firms. Under the environmental aspect, skilled labour availability is another influential factors of adopting technology. However, the impression of government's regulations on adoption process is unclear because those regulations possibly can either support or obstruct the acceptance of revolutions (Baker, 2012).

2.6.2: Theory of Diffusion of Innovation (DOI)

Diffusion of Innovation (DOI) theory is mainly a theory of technology adoption developed by Rogers (1983). DOI is beneficial for the analysis of the issues that simplify and obstruct adoption of technology. Depending on various attributes (compatibility, observability, relative advantage, complexity and trialability) DOI theory defines the

degree of acceptance and easiness of execution of an invention (Rogers, 1983). From this theory it can be understood that how and why new ideas and technologies are transforming from one culture to another and they could be used independently and cumulatively.

The prime objective of this theory is to express why one transformation fruitfully diffuses and why another one does not. According to Rogers (1995), *"DOI theory sees innovations as being communicated through certain channels over time and within a particular social system where individuals are seen as possessing different degrees of willingness to adopt innovations, and thus it is generally observed that the portion of the population adopting and innovation is approximately normally distributed over time"*. But however, ending this distribution into divisions possibly leads towards five types of individual transformation such as innovators, early adopters, early majority, late majority and laggards (Roger, 1995). This is because, transformation process in firms is very complex and it involves not only many peoples but also supporters and opponents of the technology, who play a pivotal role of adoption decision (Oliveira and Martins, 2011).
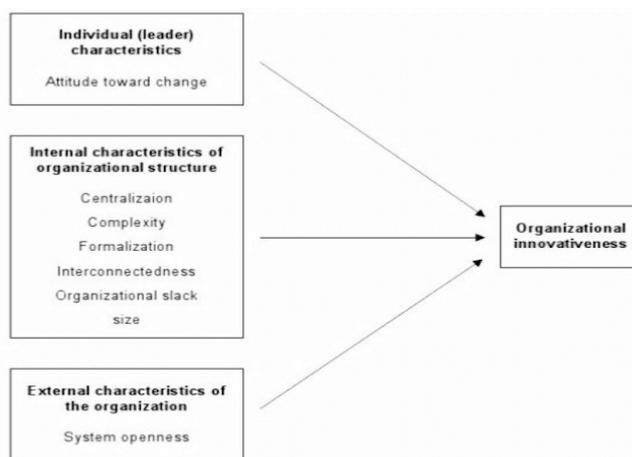
Figure 10: Diffusion of Innovation (DOI) framework (Adapted from: Rogers, 1995).

Based on Rogers (1995) DOI theory, in a firm's innovativeness is highly related to different variables such as leader/individual characteristics, interior organizational structural characteristics along with exterior characteristics as depicted in the above figure 6. Under individual characteristics, leaders' attitudes towards change have been described whereas interior organizational characteristics structure comprises observations of various instances, which includes level of skills, knowledge and ability to perform their tasks (Oliveira and Martins, 2011). Formalization known as to what extent firm is emphasizing its employees to follow the rules and procedures of the firm. Hence, interconnectedness defines the degree of link between interpersonal networks and social system. Consequently, organizational slack known as how much amount of uncommitted resources

is available within the organization. And size defines the amount of employees of the firm. Finally, exterior characteristics of the organization refers system openness, which means how much system of a firm is open can be acknowledged through exterior characteristics (Roger, 1995).

2.6.3: Theory of Cloud Lifecycle

Lindner *et* al proposed Cloud lifecycle model in 2011 based on the strategies of Outsourcing lifecycle model, which was successfully tested in different Information Technology Outsourcing (ITO) and Business Process Outsourcing (BOP) organizations (Cullen *et* al., 2005). The prime objective of outsourcing lifecycle model is to provide a swift way to the firms' to accomplish their outsourcing procedures to get the best results from outsourcing (Cullen *et* al., 2005). Lindner *et* al. (2011) and Conway & Curry (2012) further identified that outsourcing lifecycle model allows firms' to break down the whole process into separate and controllable phases in order to firms' get right information to make right decision before moving onto next phase, diminishing the possible jeopardies and for committing resources to only single step at a time. Having identified objectives of Outsourcing lifecycle model Lindner *et* al (2011) come up with similar types of model to lessen the migration and management concerns of the Cloud, which is Cloud lifecycle model (figure 7). This model strongly focuses on the transformation of IT services onto Cloud. The term 'lifecycle' itself permits actions to be separated into discrete practicable steps by enabling firms' and lessening related risks to swiftly transform services into Cloud (Lindner *et* al., 2011).
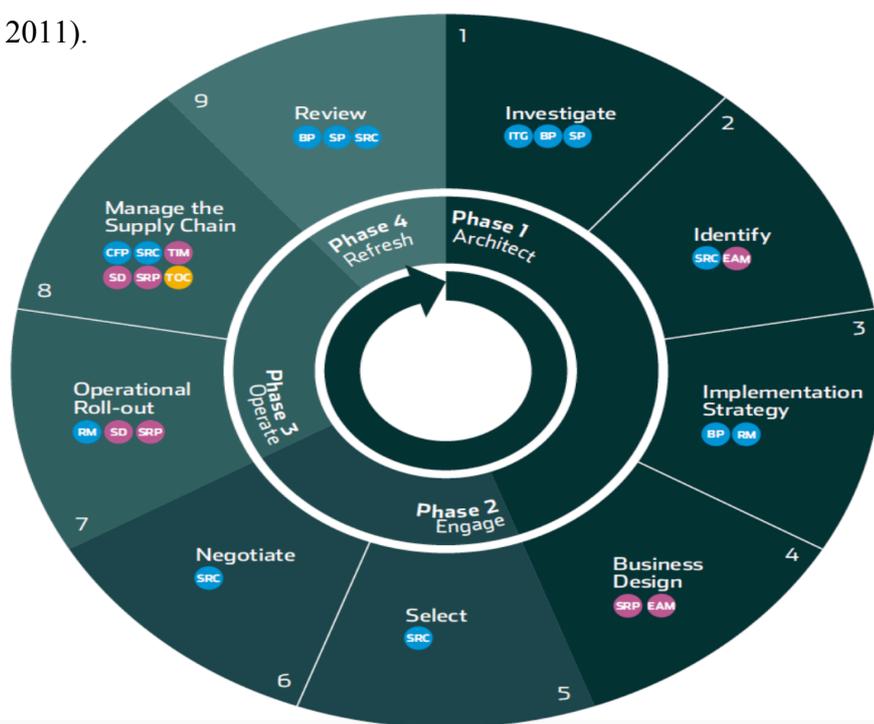
Figure 11: The Cloud Lifecycle (Adapted from: Lindner *et* al., 2011)

The Cloud lifecycle model is divided into four different phases namely Architect, Engage, Operate and Refresh and those phases again alienated into nine different steps. Every step makes the path for the next step; as the order is very significant and therefore those orders need to be followed for fruitful consequence (Conway & Curry, 2012). This is because those orders will permit a firm to break down firm's preparation and workload to ensemble its necessities. The key idea of this order is to form an incremental approach where a firm will only pledge its resources step by step therefore, after completing one step firm can go to next step or option would be given to the firm to stop their process without even missing their preliminary investment (Conway & Curry, 2012; Lindner *et* al., 2011). This approach always supports firm to reduce potential jeopardies related with Cloud projects (Lindner *et* al., 2011). The following sub-section will describe all the phases and steps associated with Cloud lifecycle in order to understand the overall structure, implementation and usage process of Cloud services.

2.6.3.1: Different Phases of Cloud lifecycle

- **Architect:** Architect is the first phase of Cloud lifecycle, where architect phase comes up with investigation, identification, implementation and business design planning of the Cloud project. Characteristically, a firm will pledge only an insignificant number of high-level possessions before they go ahead with full-scale project (Lindner *et* al., 2011; Conway & Curry, 2012).

- **Engage:** Engage is the second phase of the model, which support to select service providers who can provide prerequisite Cloud services. There is a possibility that many firm will decide to give up at engage phase due to unavailability of the Cloud services or firms' cannot potentially keep their confidence on Cloud service providers (Lindner *et* al., 2011; Conway & Curry, 2012).

- **Operate:** The third phase of the model called operate, which includes negotiation and operational rollout. In this phase, a firm can implement and manage Cloud services in day-to-day basis (Lindner *et* al., 2011; Conway & Curry, 2012).

- **Refresh:** The last phase of the model is called refresh, which is the forth phase of the model. In this phase, a firm can review the whole process using Cloud services into the firm (Lindner *et* al., 2011; Conway & Curry, 2012).

2.6.3.2: Different steps of Cloud lifecycle

- **Investigate:** This step delivers a vision into an understanding of what a firm would like to achieve after moving to the Cloud and what objectives and opportunities would be met (Conway & Curry, 2012).

- **Identify:** This step will quantitatively measure the areas of the business will be suitable to move to the Cloud and what implication will may happen on the existing system in the business (Conway & Curry, 2012).

- **Implementation Strategy:** This step will define how Cloud services will be outsourced and rolled out at strategic level. In addition, this step will document how significant choice will be made on employment, administrative rules, podium roll-out, statement and of course business associated risk evaluation (Conway & Curry, 2012).

- **Business Design:** This step will ensure what needs to be outsourced and how businesses future would be looks like. Under this step a firm will come to know how this service will be, how this service will be well managed, how this new service will be interfaced with the current systems and finally, how new services will be supervised and testified (Conway & Curry, 2012).

- **Select:** During the architect phase whatever necessities and criteria has been outlined based on that, this step selects the greatest suppliers based on value, sustainability and characteristic (Conway & Curry, 2012).

- **Negotiate:** This is one of the important steps of the model because in this step a firm needs to come up with the ending compromise, select the desired supplier and finally need to get the internal approval within the firm and need to sign the contracts (Conway & Curry, 2012).

- **Operational Roll-out:** This step will place together a complete project team who will be responsible for managing the changeover of the settled services to the new Cloud service (Conway & Curry, 2012).

- **Manage the Supply Chain:** Effectively and efficiently managing Cloud services are essential, as firm needs to adapt to the new setup especially at management level. This is because instead of managing inner resources, requirement will be to accomplish the Cloud supplier and in precisely the supplier relationship (Conway & Curry, 2012).

- **Review:** Review is the last step of the model. In this step, a firm needs to review the requirements of the Cloud services, additional alterations within the firm, alterations within the suppliers and the requirement to alter the supplier (Conway & Curry, 2012).

2.6.3.3: Justification and Appropriateness of Cloud Lifecycle Model to the SMEs

Cloud Computing is a paradigm shift in IT services delivery. This shift promises large gains in agility, efficiency and flexibility at a time when demands on data centres are growing exponentially. Despite the importance of Cloud Computing, there is a dearth of research of Cloud Computing adoption in Small and Medium Enterprises. As this study is based on the SMEs who are in the process of adopting CC or developing or never adopted but want to adopt in the near future. Therefore, a systematic model, Cloud Lifecycle Model (CLM) was used along with TOE framework. This CLM model will enable a measurement capability that will be an invaluable tool for the organizations as it will ensure that risks will be mitigating and the opportunities will be created by Cloud Computing are maximized in a planned and controlled way. As CLM is very new model therefore, in order to use this model in this study, it is required to discuss the appropriateness of using this model. Below, I will discuss different reasons of why this model will be appropriate for the adoption of Cloud Computing (Conway, Curry & Donnellan, 2014).

The idea of Cloud Lifecycle Model was developed in the context of the IT-Capability Maturity Framework, which is a high-level process capability maturity framework for managing the IT functions within an organization (Curley, 2004). This model identifies different critical IT processes and describes an planned and controlled approach to designing each process. This model addresses a continuing structural problem in the IT profession and IT industry around managing the returns from IT investments. The applicability of this model is to solve real-world problems, which has been reported by

many scholars such as (Carcary, 2011; Curry *et* al., 2012; Doherty *et* al., 2012 and Donnellan *et* al., 2011).

According to Becker *et* al. (2009), there is always a lack of validity testing of newly developed models; however to ensure their relevance or practitioners the models need to be piloted and "applicability checks" needs to be conducted with practitioners. Closing the gap between current and desired maturity is also problematic, as many models do not describe how to carry out improvements actions (Mettler, 2009). As CLM is a newly developed model, therefore, this model needs to addresses the above mentioned concerns through following a rigorous development process based on the innovative principles, testing and validating of the model. In order to do that, it is required to implement this CLM model and practice as many times as possible in the different SMEs in different countries. If this can be done then the objectives of this CLM model will be practically observed and the contribution of this model to the SME field will also be checked (Conway, Curry & Donnellan, 2014).

In order to extend the boundaries of this model, it is required to create new and innovative artefacts, methods and instantiations (Hevner *et* al., 2014). This model is design-oriented and in the form of descriptions and guidelines (Mettler and Rohner, 2015). In order to adopt Cloud Computing within SMEs and to transform traditional ICT based business to Cloud based businesses, usually this model describes all the methods and guidelines for the SMEs by categorising the entire process into four phases namely, architect phase, engage phase, operate phase and review phase. The Cloud Lifecycle model represents both model elements in the form of assessments as well as method components in the form of improvement guidelines, which would be highly required by the SME owners and managers.

Finally, the Cloud Lifecycle model provides a mechanism for organizations, especially for SMEs to assess and control the migration and on-going management of Cloud-based services. In addition, CLM uses a systematic approach to measure organizations (SMEs) capability to migrate and manage Cloud services and enables the generation of a practical capability improvement roadmap. Moreover, the CLM approach provides organizations such as SMEs with a management structure to rapidly understand and assesses their capability maturity to position, evaluate, introduce and manage Cloud based services.

From the above discussion, it has now been clear that Cloud Lifecycle Model has an enormous amount of facilities, which SME owners/managers can easily use in their business. Therefore, it can be said that using Cloud Lifecycle model for the Bangladeshi SMEs to adopt Cloud Computing would be accurate and appropriate. However, there are many IT alignment maturity models are also available. In order to understand whether those models such as The Business – IT Maturity Model for an example could be appropriate or not for Bangladeshi SMEs to adopt CC and transform their traditional ICT based business to Cloud based business, in the below I will discuss The Business – IT Maturity Model and explain possibilities of acceptance by the Bangladeshi SMEs.

2.6.4: The Business – IT Maturity Model

Pearlson & Saunders' (2007) business-IT maturity model is well suited for investigating my research aim and objectives. It draws attention to the need for collaboration and alignment between an organization's IT department and its other parts to maximize IT's value—whether for supporting, incrementally improving, or radically innovating the business (Henderson & Venkatraman, 1993). As the model does not focus narrowly on technology but on the relationship between IT and business in using the technology—in a broad sense—to increase efficiency, effectiveness, or transform the business, the business-IT maturity model is an ideal lens through which to view cloud computing's potential.

The model includes three stages viewed from two different perspectives: business demand and IT supply. Like other maturity models, it shows an evolutionary path for companies wanting to increase the value from IT and suggests that lower level requirements be satisfied first. Business demand is basically the business' needs for IT, while IT supply is the ability to meet those needs. More specifically, IT supply plays a dual role in this model: an IT organization's ability to satisfy the business demand for IT by providing solutions on the one hand and the stimulation of business demand for further IT capabilities to maximize benefits on the other hand (Pearlson & Saunders, 2007). Below is the figure of Business-IT maturity model.
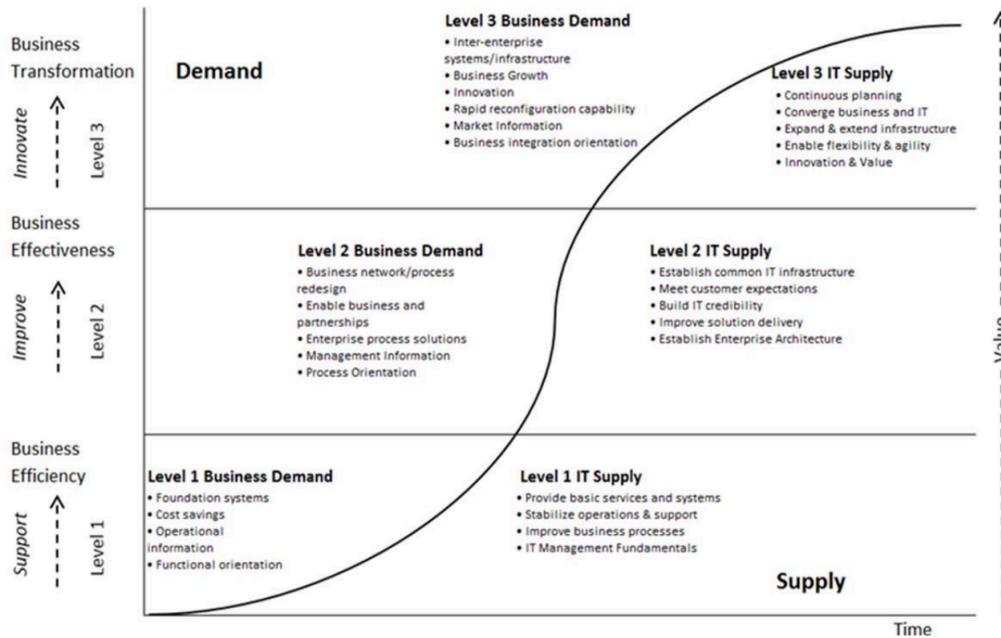
Figure 12: The Business-IT Maturity Model (Adapted from: Pearlson & Saunders, 2007).

The model above depicts an S-shaped learning curve, which reflects the learning process associated with increasing levels of maturity. The three levels, therefore, entail very different processes and practices and require radically different organizational thinking, which is why higher levels of maturity build on preceding levels (Pearlson & Saunders, 2007). The three levels of business-IT maturity are: business efficiency, business effectiveness, and business transformation. Figure below shows the model. To fully harvest IT's potential, one may use the model as an analytical framework to understand the as-is state, but one can also use it for constructing a road map of how to reach a future to-be situation. The model draws on some of the same characteristics as the framework by Applegate, Austin, and Soule (2008) who mention similar IT-enabled capabilities; namely: 1) cost savings, 2) asset efficiency, 3) revenue growth, and 4) sustainable competitive advantages (Applegate et al., 2008). These capabilities are represented in the three maturity levels of the business-IT maturity model.

Level 1: Business Efficiency

We can characterize IT at maturity level 1 as an expense that must be minimized and where IT is something that the IT organization is expected to maintain with minimal disruption to the business (Pearlson & Saunders, 2007). The IT demand is focused on efficiency and often originates in independent business units with the purpose of automating transactions and minimizing costs. It is equivalent to enterprise architecture's

"business silos" stage described by Ross, Weill, and Robertson (2006). These silos are built around business or organizational units and usually prevent interdepartmental issues from being resolved (Pearlson & Saunders, 2007). Each silo is typically preoccupied with its own goals rather than those of the enterprise and integration between business silos is at a minimum (Rummler & Brache, 2012). As a consequence, the IT department's goal is often to "keep the lights on" and provide a reliable and stable IT infrastructure in support of each silo (Pearlson & Saunders, 2007).

Level 2: Business Effectiveness

At level 2, organizations shift their focus from cost to enterprise process awareness. Initiatives at level 2 aim at increasing business integration for the company to become more effective as an enterprise and to break down the silo mentality at level 1 (Pearlson & Saunders, 2007), which is typically accomplished via implementing enterprise-wide systems, pursuing business process improvement (BPI) and reengineering (BPR) initiatives, and establishing a common IT infrastructure. This focus also implies a shift from a technical orientation at level 1 to a more business-oriented view, which lowers total IT costs, reduces redundancy, and supports business integration through IT customization. IT sourcing shifts to a more flexible and integrated approach with a limited set of strategic partners, and basic IT services are often outsourced (Pearlson & Saunders, 2007).

Level 3: Business Transformation

IT-enabled business growth, innovation, and collaboration are topics typically addressed at level 3. In continuation of level 2, the focus extends beyond the organization itself and emphasizes business partner collaboration and rapid experimentation—both with other business units and with customers and suppliers (Pearlson & Saunders, 2007). Rather than delivering service, the IT organization generally focuses on co-creating value in collaboration with the business. The role of IT shifts from being a service provider to becoming a business partner by, for instance, enabling business agility (Pearlson & Saunders, 2007). Critical IT assets are structured and managed as a portfolio of capabilities to innovate quickly and seize new opportunities. IT is a tool to be used as part of the organization's value proposition and the enterprise architecture is used as a flexible platform with standard interfaces to business partners, which emphasizes business agility. The goal of IT is to maximize value realization of information, technology, and technology-based initiatives for the business (Pearlson & Saunders, 2007).

It is important to know about the adoption theories but how those theories can be integrated and which integrated framework would be appropriate for this research. In this research, I have integrated TOE and Cloud Lifecycle model to build up a unique framework, which would be the best suited for Bangladeshi SMEs and government. However, there was an opportunity to integrate Business – IT Maturity model with TOE framework but due to the fact that Bangladeshi SMEs need more fundamental adoption process such as experimentation, migration, transformation and review. Although Pearlson & Saunders (2007) Busienss – IT Maturity model does provide support to make business efficiency and effective and provide transformation but unfortunately, transformation is in the higher level that most of the Bangladeshi SMEs would be able to use due to lack of skills and knowledge as those SMEs are at initial stage of adopting technology. Nevertheless, Busienss – IT Maturity model does provide level one and level two support but unfortunately, those support would not be adequate for the Bangladeshi SMEs. In addition, level three of this model does support by Berman *et* al. (2012), who strongly emphasized that only big businesses can implement Cloud Computing and therefore; level three of the Busienss – IT Maturity model can be used only in the big businesses but not by the SMEs (more explanations have been given earlier and limitations of Berman *et* al. (2007) claim has been explained in the limitation section in this study). So, integrating TOE and Business – IT Maturity model would conflict with my research intention. Therefore, below, I will discuss why have I applied TOE and Cloud Lifecycle model in my study for the Bangladeshi SMEs and government.

2.6.5: Integrating TOE and Cloud Lifecycle to Study the Issues of Cloud Computing Adoption?

According to Alatawi *et* al. (2012), for better information technology (IT) or technology adoption it is always a best practice to combine TOE theory with other theories such as Cloud Lifecycle theory. Therefore, in this research I am going to put forward TOE as main theory for the various reasons along with Cloud Lifecycle model. The first reason is TOE framework offers environment background, which can explain in a better way the intra-companies changeover acceptance (Oliveira and Martins, 2011). The prime advantage of TOE theory is the consistent pragmatic provision and compact theoretical foundation, which DOI theory does not include (Oliveira and Martins, 2011). In 2007, Rui noted that compared with Rogers (1995) innovation diffusion model, *"the TOE framework overcomes the domination of the technical perspective and provides a useful analytical*

tool to distinguish between the inherent qualities of an innovation and the motivations, capabilities, and broader environmental context of the adopting firm".

The second reason is, I have identified from the earlier findings that technology adoption at the organization level mainly resulting from TOE and Cloud lifecycle innovation models (Chong *et* al., 2009; Oliveira and Martins, 2011). Rui (2007) further suggested that, *"other multiple perspective frameworks proposed in IT adoption research are similar to the TOE framework, and can be considered as variants of the TOE framework in which some dimensions of the TOE are further divided".* And third reason is, TOE theory is very trusted theory as TOE framework has effectively been applied in various studies.

Finally, according to Alshamaila *et* al., (2013), IT adopting firms need to not only comprehend the technical traits and price of the technology, but also need to identify business functionalities will be benefitted from the adapted technology. But however, Cameron and Quinn (2005) claimed that structural area are essential because plans for any alterations accepted without comprising structural factors will generally have unexpected and customarily undesirable significances. In addition, environmental elements are especially significant in forecasting technological modernization acceptance (Damanpour and Gopalakrishnan, 1998).

On the other hand, Cloud lifecycle is planned to establish the significant competences a firm must consider in order to successfully migrate and manage a Cloud environment (Conway and Curry, 2012). In addition, there are many qualitative studies have been conducted by using Cloud lifecycle model, which have been very successful (Lindner *et* al., 2011). Moreover, Cloud lifecycle model offers a high level of maturity therefore, a firm can rapidly understand their ability to migrate and manage. Furthermore, Cloud lifecycle model provides a continuous cycle of adopting facilities, which will surely support those firms wishing to adopt Cloud computing into their business for the first time. Furthermore, Cloud lifecycle model has an extensive amount of step-by-step process where an early adopter can have opportunities to investigate more and get the best out of the model in order to use the model in a best suited way into their business.

Finally, I would like to mention that this research is based on the Bangladeshi SMEs and at the moment, most of them are not in a position to transform their in house

technology to Cloud straightaway. This is because of not having enough technical skills, educated workforce and of course infrastructure. Therefore, they will be looking for something easy understandable model that they can use. As a result, in my research, I am going to integrate both TOE model and Cloud lifecycle model because, to me, by integrating these two models, Bangladeshi SMEs will be easily able to find out the affecting issues that explain the failure of adoption of Cloud Computing. And of course, they will find an easy and systematic way of adopting Cloud Computing.

In the section below, therefore, I will describe the reasons of integrating TOE and Cloud lifecycle model in a detail.

2.6.5.1: Why Applying TOE and Cloud Lifecycle to Cloud Computing Adoption?

Unquestionably, Cloud Computing facilities are the innovations of information technology, which can support operations of business. Besides operational process, in order to comprehend contextual issues that influence and affect adoption of Cloud Computing and consequences, TOE framework and Cloud lifecycle model are best-suited theories (Alshamaila *et* al., 2013). TOE structure permits scholars to study a comprehensive set of background issues. Many scholars individually and collectively agreed that TOE framework deliver an outstanding theoretical underpinning for studying IT acceptance behaviour in many sectors, in particular within SMEs (Ismail & Ali, 2013). For instance, Mehrtens *et* al. (2001) adopted TOE structure exploring the Internet adoption in seven different SMEs. In addition, in the year 2003, Lertwongsatien Wongpinunwatana showed the suitability of the TOE structure for examining e-commerce implementation in SMEs in Thailand. Moreover, Ramdani *et* al. (2009) adopted TOE framework for forecasting possible enterprise system adopters in SMEs in England.

TOE framework itself is aim to support scholars to identify the issues explains challenges of adoption of Cloud Computing. In order to get the best outcomes from the TOE framework, it has been advised by many scholars that TOE framework should be integrated with other framework or model (Awa *et* al., 2011). According to Awa *et* al. (2011), *"integrating TOE with other models offering larger number of constructs than the original and provides richer theoretical lenses to the understanding of adoption behaviour"*. Alatawi *et* al. (2012) further added that combination of TOE with other

theories explain better IT adoption. The table below will show examples of some of the studies that TOE theory has been jointly used with other theories by many researchers.

Theoretical Model	IT Adoption	Analysed variables	Methods	Data, and Context	Author(s)
TOE and DOI	Uses at least one major software application: accounting; inventory control; sales; purchasing; personnel and payroll; CAD/CAM; EDI; MRP.	CEO characteristics → CEO's innovativeness; CEO's IS knowledge. IS characteristics → relative advantage of IS; compatibility of IS; complexity of IS. Organizational characteristics → business size; Employees' IS knowledge; information intensity.	T-tests, FA, discriminatory analysis, and partial least squares (PLS)	Letter with questionnaires sent during 2005, 166 small firms; Singapore	(Thong 1999)
Theoretical Model	IT Adoption	Analysed variables	Methods	Data, and Context	Author(s)
TOE and DOI	Number of personal computers and software applications Collaborative commerce (c-commerce)	Environmental characteristic → competition. Innovation attributes → relative advantage; compatibility; complexity. Environmental → expectations of market trends; competitive pressure. Information sharing culture → trust; information distribution; information interpretation. Organizational readiness → top management support; feasibility; project champion characteristics	FA, and OLS	e-mail survey; 109 firms Malaysian	(Chong et al. 2009)
TOE and DOI	E-Business usage E-business impact	Relative advantage Compatibility Costs Security concern Technological context → technology competence. Organizational context →organization size. Environmental context → competitive pressure; partner readiness.	CFA, second-order factor modelling, and SEM	Telephone interview during 2002; 1415 firms across 6 EU countries European (Finland, France, Germany, Italy, Spain, and U.K.)	(Zhu et al. 2006a)

Table 10: Examples of the combination study of TOE theory and other theories (Adapted from: Oliveira and Martins, 2011).

TOE framework is one of the well-known frameworks for IT innovations within the frim level in different aspects. TOE framework mainly used by the researchers to identify the influential as well as affecting issues of adopting Cloud Computing into the firm. But however, TOE does not aim to provide a concrete model describing how framework will be used if there is an error happens during implementation. Moreover, TOE does not provide a model, which will explain how this framework will be used in order to overcome the failure issues of technology. In addition, TOE does not aim to provide a real model that could describe the influencing and affecting issues of the adoption process; TOE is rather taxonomy for classifying issues in their respective context (Ven & Verelst, 2011). Furthermore, TOE does not provide a systematic way to

implementing Cloud services within the firm. However, TOE encourages scholars in a boarder way to take into consideration in which adoption takes places (Ven & Verelst, 2011).

From the review of literature in chapter 2, this study revealed that TOE framework would be the main theory for this exploration that would be combining with the Cloud lifecycle model. This is because; in my research I am intending to explore the issues and challenges of adoption of Cloud Computing in Bangladeshi SMEs. And the characteristics of TOE as a result will support me to identify those issues that are responsible for delaying of Cloud Computing adoption. But however, using TOE I would not be able to explain how systematic way adoption issues will be overcome, as TOE is not a systematic and iterative approach therefore, in this research I am going to use Cloud lifecycle model together with TOE. This is because; Cloud lifecycle model will support me to adopt Cloud Computing in a systematic way by lessening the adoption risks. In the section below, I am going to describe why Cloud lifecycle model will be used in my research and how this model will be beneficial.

According to Conway and Curry (2012), *"the move to a cloud computing environment has started in earnest with the complete spectrum of businesses, from large multinationals to smaller organizations, moving their IT services to cloud computing platform"*. There are many drivers for this transformation along with some challenges (Harms and Yamartino, 2010). All the claims have been made on behalf of Cloud computing, it is not a solution for all the problems are facing by the firms and their IT departments.

Brooks (2010) pointed out that unpleasant experiences had been exposed if an IT division struggles to provide facilities then transformation to Cloud computing will either leave them with the equal jumble or possibly transformation could go extreme worse. So, in order to ensure a smooth changeover, Conway and Curry (2012) strongly advised into their research that a systematic adoption approach is needed. They have further added that firms' definitely need a systematic approach, which will support firms' to review their commercial requirements and considering up the probable improvements and chances in contradiction of the acceptance threats. If a firm can use the systematic approach then changeover to Cloud computing will be strategically planned and understood (Conway and Curry, 2012).

In order to ensure delivering maximum advantages and overcoming or lessening risks facing by the firms want to move to Cloud, now is the time for them to define proper and systematic management structure, which is Cloud lifecycle. And this lifecycle will explain how a Cloud computing transformation could be successfully maintain and managed. In addition, Cloud lifecycle can be functional in both the changeover and the on going management of Cloud services (Conway and Curry, 2012).

Cloud lifecycle not only concerns proven and documented project management philosophies but also make the whole project into different disconnected controllable phases that permits a firm to collect the right information in order to make the right decision before moving to the Cloud. As this lifecycle works as cyclic way therefore, this cycle confirm not only suitable pre-planning but also support to understand the impacts on the business are accurately understood, managed and controlled (Conway and Curry, 2012). For instance, lifecycle allows a firm to recognize the right services to move to the Cloud and to make plans for the impact on employees directly and indirectly impacted. Moreover, Cloud lifecycle further offers a mechanism of building up a source of knowledge and greatest practices to fill the present void fashioned by this innovative usage of technology, with its absence of values and best practices (Conway and Curry, 2012).

From the discussion above it has been clear that both TOE framework and Cloud lifecycle has extensive amount of features, which can really support a firm to adopt Cloud Computing. But as a researcher it is my responsibility to ensure the reason why have I chosen TOE and Cloud lifecycle model for my research. There are few reasons in order to provide the answer of the question. Firstly, my research is intend to investigate and explore the issues explains failure of adoption of Cloud Computing. Based on this aim, I have chosen TOE framework because TOE framework will support me to identify those affecting issues from different perspective such as technological issues, organizational issues and environmental issues. Secondly, my research is based on the firm level, which means how a business organizations face the issues that affecting them to adopt Cloud computing. Based on this situation, TOE was the first preferences because TOE does work smoothly in the firm level to identify influencing as well as affecting issues. Therefore, TOE framework has been chosen. And finally, in Bangladeshi SMEs, understanding and adopting Cloud Computing is at beginning or at immature stage. Therefore, it would be worth having a systematic approach for them to adopt new technology into their business. As a result, to provide them extensive amount of implementation support Cloud lifecycle

model has been taken into account. Because Cloud lifecycle model will allow them to stop at any time during the implementation process and they can start the process whenever they want without losing their previous tasks. As Cloud lifecycle model provides an iterative approach that Bangladeshi SMEs need because as a beginner Cloud adopter there is vast possibility that Bangladeshi SMEs will make error while they will be adopting Cloud Computing. Therefore, they need to go backward and forward time to time to ensure whole implementation process is going well. These are the reasons, in my research; I have chosen TOE framework and Cloud lifecycle model.

2.7: Summary of the Chapter

This chapter provides a detailed review of the literatures related to the Cloud Computing, SMEs and Digital Bangladesh concepts. From the review, this chapter has identified the key aspects related to my research. Moreover, it has concentrated upon different technology adoption theories and how they may be used in the research. Finally, the chapter provided a critical review of findings from relevant literature and the types, boundaries and business functionalities within SMEs, which may benefit from CC adoption. In the next chapter I present the methodology adopted for my research investigation.

Chapter – 3.0

Presentation of the Research Methodology and Methods

3.1: Introduction

'Research methodology' the term itself describes the logic of the research developed by a researcher in a precise study. The term 'methodology' includes a rudimentary awareness associated with the research areas and methods in enquiries and a framework within a precise context (Sarantakos, 2005). Having commenced a logical literature analysis and developed a conceptual framework, the following phase of this exploration is to provide a detailed description of the methodology used in conducting this research. Therefore, the determination of this phase of the research is to offer the reader an understanding of the implemented methodology and to explore how the conceptual framework is used to explore the issues affecting the adoption of Cloud Computing by SMEs in Bangladesh. An appropriate research methodology, models and procedures must be well defined in order to represent the issues explaining the challenges of Cloud Computing adoption by SMEs in Bangladesh. Therefore, the current phase of this research provides a coherent structure of activities that will exemplify the research approach to address the research questions that enlightens the selections of research methodology, and explains how to accumulate and analyse the data.

This chapter is a justification of the epistemology that I have chosen for my research. This viewpoint is supported by the elaboration of a methodology applied in the selected background that is rich in fact. The methodology established is suggested as "interpretive and constructive rather than positivist or reductionist" (Fisher, 2004). The conception and investigation of a practical, informally constructed field is dominant in this research. Moreover, this research is completely consistent with daily life in a precise background to comprehend the diversity of significance in such a background (Elliot, 1996). The data collection method used for this research is a semi-structured interview and the data analysis method is thematic analysis. Therefore, this phase of the research complies with a description of the subjective research strategy that is used in an interpretivist style to attain a rich, thick explanation (Denzin and Lincoln, 2005). The form of thematic analysis used in this research supports the construction of a thematic framework – developed from the primary data (interview transcript). It begins with discussion of the collection of data, exploration of recorded responses and interpretation of

how the extraction of themes fits in with the uncertainties, confounding factors, individual moral and practical limitations of this kind of research approach.

The subdivisions of this chapter primarily discuss the research philosophy, paradigms and approaches employed, as well as the motives for their selection. In the second phase, this subdivision sets out the suggested research design method that has been trailed in this study including the research purpose or strategies, research phases and processes, along with discussion of data gathering instruments, sampling and analysis. Finally, this subdivision concludes with a discussion of the ethical considerations that are associated with data collection.

3.2: Philosophical Stance of the Research

The first and foremost question that researchers must take into account before conducting a piece of research is what the philosophical stance of the research might be. Philosophy is itself the practice of using abstract concepts and philosophies that inform our research and philosophical stances are classically the principal ideas emerging in research. How they describe the complete procedure of research, however, remains unidentified (Creswell, 2013). A research philosophy states the methodical practices grounded in expectations about the world and the kind of knowledge (Collis & Hussey, 2003). The philosophical stance of every piece of research is based on a precise worldview and truthfully related to the nature of the research inquiry, as well as the philosophical favouritism of the researchers (Corbin and Strauss, 2008).

The selected philosophical stance of this research directed this study and was based on the significance of each viewpoint to the research inquiries and purposes set out in chapter one. Therefore, the selection of the research philosophy in this exploration was determined by my assumptions about the truth of the background to the study and is hence subjective (Crotty, 1998). As a result, I have chosen an epistemological research philosophy for this study's methodology because epistemology encompasses "knowledge" that expresses a convinced understanding of "how we know what we know" (Crotty, 1998). Moreover, epistemology 'complies' with the type of knowledge, its opportunity, choice and all-purpose basis (Hamlyn, 1995). Maynard (1994) explains, *"Epistemology is concerned with providing a philosophical grounding for deciding what kinds of knowledge are possible and how we can ensure that they are both adequate and legitimate"*. However, this philosophy does not anticipate only one truth but many truths grounded in

individual involvement and the presence of numerous truths (Denzin and Lincoln, 2000). From the above discussion, my own understanding led me to choose a precise philosophical position with regard to the background of this research and it is my own personal and subjective view. This research is seeking to emphasize the collective significance of persons in socially assembled arenas (Burrell and Morgan, 1979).

The way I first perceived the philosophical stance was in very simple terms – i.e. by viewing many people inside a restaurant. I could see them through the restaurant's windows and see who they were but what I could not see was how they really saw the world from inside the restaurant. There is only one way for me to get their views on this and that is to enter inside the restaurant and build up some sort of social interaction with them. Qualitative research supports emphasis on definite exercises in situations and in this sense, this study outlined the philosophical viewpoint, where social contact takes place (Silverman, 2000). Under an epistemological, philosophical stance, research data is normally taken from interview transcripts, which eventually provide themes and sub-themes for a study. Right or wrong statements are not looked for but instead the mission is to discover a number of significant categories and apply those categories to the selected context. These are called social facts that are entirely socially structured within narratives that can become daily narratives, an autobiography or profile (Atkinson and Coffey, 1997) and in that they become what are considered research texts. These texts are analysed by using a thematic analysis.

Hunter (2004) added that the key argument for using a subjective means of investigation is the individual belief that the separation between a researcher and the individual being investigated is a fiction that carries a meaning, which is attributed to social knowledge. My own experience harmonises with that of Yates (2004) who, because of the apparent link between quantitative research and positivism, warns of the danger of providing a simplistic view of the world. In terms of Cloud Computing adoption, therefore, I thought that the epistemological stance would be appropriate because it would perfectly deliver what I wanted to identify. The epistemological approach that I have, therefore, I sought an epistemological stance, which investigated meanings behind the immediately observable, in order to address 'Why' and 'How' questions, rather than simply 'What' questions. This stance follows Knox (2004) who pointed out that an epistemological approach leads to a precise understanding and expresses why the research method is being used in the specific settings. Therefore, I have considered the value preferences and

assurances for both the researcher and respondents. As a researcher, I have empathy with data regarding sources, people and theories.

In addition, the reason I have selected this epistemological stance is because this stance is grounded in the relevance of a philosophy to the research questions. This stance can reflect the a priori preferences of the investigator, which also informs the choice of research questions. By keeping this in mind, I deemed an epistemological stance (which is also called post-positivist) to be the best stance to answer the research questions and to achieve the objectives of this exploration. The main reason for selecting a post-positivist stance as the correct choice is that this study aims to investigate the issues that explain the challenges of Cloud Computing adoption by SMEs in Bangladesh. Therefore, the identification of those issues is placed within this context. In addition, a post-positivist approach is appropriate because it suggests that reality does not occur within a vacuum. The background influences its structure where many constructions of reality are possible (Hughes, 1994).

3.3: Paradigm Stance of the Research

The research question involves an assumption that, with time, Cloud Computing adoption will be taken up by Bangladeshi SMEs and will offer an appropriate framework to provide a roadmap to demonstrate how SME owners or managers can overcome barriers to a large extent. My choice of research question was guided by my own experiences, as well as by my ideas developed from the existing literature. In order to 'see' myself as a subjective individual, an interpretive approach was determined. Based on this sense, meaning was co-constructed and re-constructed, assembled and repeatedly adjusted over time (Crotty, 1998). This is why I thought that a social constructive or interpretivist approach (the why) was appropriate for this research. Interpretivism is defined as a research paradigm that views the socially constructed world (Orange, 2010). According to Bryman (2001), *"interpretivists seek to understand human behaviour and the social world whereas a positivist would seek to explain the situation"*. Easterby-Smith *et* al. (2008) further stated that interpretivism mainly emphasises the way people view the world by sharing their own experiences with others. However, Bryman and Bell (2007) argued with this statement from Easterby-Smith *et* al. (2008). They mentioned that the key aim of interpretivism should be to explain the reason why people have dissimilar experiences when engaging in social interaction (Bryman and Bell, 2007).

Williamson *et* al. (2002) on the other hand, further debated that the interpretive stance is frequently, but not exclusively, connected with qualitative research methods whereas the positivist stance is typically, but not entirely, united with quantitative research methods. In addition, Bryman (2008) stated that the interpretivist stance is based on the individual belief of a strategy to distinguish between object and people in the usual sense. Therefore, the interpretivist paradigm needs the researcher to comprehend the subjective sense of the social act. Saunders *et* al. (2009) described interpretivism as essential for the researcher to realize the dissimilarities between individuals in our part as social performers. Besides the above, Taylor and Bogdan (1998) strongly emphasised that it is necessary for interpretivists to capture human interpretation in order to carry out qualitative research. Moreover, Collis and Hussey (2003) suggested that interpretivism definitely needs qualitative methods to signify the 'how' and 'what' types of research questions.

From the discussion above, therefore, I have chosen the interpretivist stance for this study. This is because, for this study, I did not have a critical outline but was rather looking for the respondents' creation of meaning with myself as part of the process as subjective researcher embracing my subjectivity (Thomas and Davies, 2005). Moreover, I wanted to place emphasis upon sense making that interpretivism would offer, rather than social constructionism's emancipatory agenda. I was determined on constructing, classifying and understanding that which establishes knowledge (Crotty, 1998). In addition, an interpretivist stance takes particular reports of actions, as mentioned by the respondents grounded on their lived understandings that converted complex constructions, interpretable on numerous levels. In addition, the interpretivist paradigm stance has been adopted for this study because more explanation was needed in order to make a number of recommendations, which will support dealing with the main challenges that hinder the adoption of Cloud Computing by Bangladeshi SMEs. Moreover, this exploration was not conducted based on theory and therefore; that needs to be confirmed objectively, rather it was aimed at identifying and comprehending the issues that confront Bangladeshi SMEs in the adoption of Cloud Computing and recommending potential solutions to resolve those issues based on the interpretation. Furthermore, amongst Bangladeshi SMEs, the practice of technology utilisation is regarded as a social problem and this problem relates to a specific aspect of society. Therefore, it was really difficult for me, as a researcher to investigate this problem properly by using a positivistic, realist and pragmatist stance.

Another reason for adopting an interpretivist stance for this research is because interpretivists normally accomplish a detailed review of the existing literature in order to develop a complete understanding of the subject that is under exploration. Based on the literature, interpretivists produce exploratory questions and create a plan to carry out the study (Williamson *et* al., 2002). Moreover, it has been identified that a research problem is connected to a positivist stance if the problem develops from literature where variables and theories exist and need to be verified and tested. But on the other hand, for an interpretivist stance only very little evidence exists and a relatively high amount of exploration is required since the variables are unknown (Creswell, 1994). This is another reason that I chose an interpretivist stance for this study and the reason why I did not use a critical stance (Myers, 2009). It is, however, relatively less common and aims at altering social reality and encouraging emancipation (Niehaves and Stahl, 2006).

3.4: Stance of the Research Approach

According to Creswell (2003), *"the selection of the research approach is a critically important decision because the research approach does not simply inform the research design but it gives the researchers the opportunity to consider critically how each of the various approaches may contribute to, or limit, his study, allow him/her to satisfy the articulated objectives and design an approach, which best satisfies the research's requirements"*. There are two types of research approaches that are in line with the research methodology in the context of theory development and building knowledge i.e. the **deductive** and **inductive** research approach (Crowther and Lancaster, 2008; Saunders *et* al., 2009). Both approaches are normally acknowledged of as stating to polar opposites (Hair *et* al., 2003). Below, I describe these approaches and reference the adopted research approach for this study and the reason behind the selection.

3.4.1: Deductive Approach

A deductive research approach is a study in which a theoretical structure or conceptual structure exists, which is then tested by empirical observation where precise occurrences are removed from general (Hussey & Hussey, 1997). Crowther and Lancaster (2008) mentioned that a deductive approach builds up theories or hypotheses to justify them through experiential annotations. They also stated that a deductive approach is a group of techniques for applying theories in the physical world in order to verify and measure their rationality. According to Saunders *et* al., (2009), a deductive approach generally begins with the expansion of the research hypothesis, and examines theories and

the design of the research strategy in order to verify that hypothesis. They have further added that a deductive approach can be quicker to carry out, although that time must be keen to setting up the study prior to data gathering and analysis. It is possible to plan accurate time schedules when using a deductive approach. This approach can be considered as the failure to match social subjects' actions and beliefs (Apulu, 2012).

3.4.2: Inductive Approach

In contrast to a deductive approach, an inductive research approach is a study in which theory can develop from explanations of experiential reality where, overall extrapolations are encouraged from specific occurrences (Hussey & Hussey, 1997). An inductive approach develops theories from observations and is flexible, so takes account of the background in which events are taking place (Sauders *et* al., 2009). According to Crowther and Lancaster (2008), under an inductive approach, researchers build up theories to discuss the experiential reflection of the real world, where experiential reflection depends on numerous factors such as personal experiences. Additionally, Crowther and Lancaster (2008), further added that theories can be established to describe experiential data and information, and all types and forms of information and data can be cast aside in order to add theories.

In addition, the flexibility of the inductive approach has identified as one of the utmost strength by Crowther and Lancaster (2008). This flexibility enables research designers to include features like sample size and data types but it does not necessitate formation of a priori philosophies or hypotheses. However, Apulu (2012) strongly argued that a scholar could develop their theory depending on what they have seen, so permitting an issue to be studied in many different ways with different clarifications of what is going on. Besides, an inductive approach is appropriate for examining human behaviour in organizations (Crowther and Lancaster, 2008). However, Saunders *et* al., (2009) stressed that an inductive approach is prolonged and, therefore, takes more than the usual period of time for data collection, interpretation and analysis. Additionally, they have mentioned that under an inductive approach, there is a vast possibility that no meaningful or useful information will be developed from collected data. According to Ghauri and Grønhaug (2005), *"the processes of induction and deduction are not totally exclusive of each other and induction includes elements of deduction and vice versa"*. The major alterations between induction and deduction are described in the table below:

Induction emphasizes	Deduction emphasizes
- Gaining an understanding of the meanings humans attach to events - A close understanding of the research context - The collection of qualitative data - A more flexible structure to permit changes of research emphasis as the research progresses - A realization that the researcher is part of the research process - Less concern with the need to generalize	- Scientific principles - Moving from theory to data - The need to explain causal relationships between variables - The collection of quantitative data - Researcher independence of what is being researched - The application of controls to ensure validity of data. - The operationalization of concepts to ensure clarity of definition - A highly structured approach - The necessity to select samples of sufficient size in order to generalize conclusions.

Table 11: Differences between inductive and deductive approaches (adapted from: Saunders *et* al., 2007)

From the discussion above, I have therefore decided to adopt an inductive approach for this study. This is because I intended to develop a new theory from the observations and implemented an inductive approach based on the qualitative, collected data. I was concerned about the background in which proceedings took place and the social communications with the environment. Moreover, I was deeply concerned with the experiences of Bangladeshi SMEs, who have gone through a practice and I understand the nature of the difficulties they face and would overcome in adopting Cloud Computing. Furthermore, I was attempting to make sense of the data in order to clarify the benefits of Cloud Computing adoption and to express a theory related to the background of SMEs in Bangladesh. Additionally, the selected induction approach informs the techniques by which data is collected and analysed and how that data is interpreted, in order to understand why certain issues are hindering the adoption of Cloud Computing.

3.5: Methodological Stance of the Research

The methodological stance of research can be divided into two, namely the qualitative method and the quantitative method. According to Blaxter *et* al. (1996), *"the data required can be classified as qualitative if it comes in word form, while they are regarded as quantitative if they come in the form of numbers.* In order for research to be successful, it is pivotal to select the appropriate research method along with its applications. Boodhoo and Purmessur (2009) mentioned that selecting the best suited methodology for research is a major problem because investigators either like to use a mono method or multi-method (discussed under heading 3.8 of this chapter) depending on the circumstances. Below I discuss both the qualitative and quantitative methods along with the adopted method for this study.

3.5.1: Qualitative Research Method

Miles and Huberman (1994) described the qualitative method as "word of mouth" rather than numbers. Minichiello *et* al. (1995) added that qualitative methods are those that are connected with the interpretative paradigm from the participants rather than calculating distinct and noticeable behaviour. Qualitative methods mainly answer the nature of phenomena with the aim of unfolding and considering those phenomena from the participants' points-of-view (Leedy, 1997). But Cornford and Smithson (1996) criticised from the research effort hence it is perhaps incorrect to distinguish between the methods just based on the use of numbers. Sykes (1990) discovered the strength of the qualitative method, and mentioned the flexibility and the receptive communication between participants and investigators. In addition, Yin (2009) further noted that a qualitative method supports clarification of complex subjects in the natural backgrounds of the research phenomenon. Strauss and Corbin (1990) also noted that qualitative research typically means, *"any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification"*.

From different viewpoints, meaning and topics can be explored and covered easily in qualitative research. Questions can be prepared in an easy and clear way for the participants and, therefore, this type of research can be an improvement for exploring perceptions such as construct or theoretical validity and the associations between them (Myers, 2001). Likewise, Hakim (1987) stated that the utmost power of qualitative research is its validity of data. According to Hakim (ibid.), this is because participants are interviewed in enough detail for the outcomes to be taken as factual, precise and realistic reports of their own views and experiences. Therefore, Lincoln and Guba (1985) referred to qualitative research methods as 'constructivist', 'naturalistic', 'interpretative', and 'post-positivist' or a 'post-modern perspective' research paradigm.

According to Yin (2009), a qualitative research method is usually to offer an in-depth understanding of the phenomena being explored where a specific subject has been minimally written about or studied. Myers (2009) further added that qualitative research not only explored a briefly written about subject but also supported researchers in comprehending people, what they say and how they perform. Additionally, qualitative research supports investigators in comprehending the social and communal situation within which individuals live. Patton (2001) also included that, *"qualitative research uses a naturalistic approach that seeks to understand phenomena in context-specific settings,*

such as a 'real world setting where the researchers do not attempt to manipulate the phenomena of interest. Moreover, qualitative researchers contend that it is virtually impossible to understand why someone did something or why something happened in an organization without talking to people about it". In addition, Myers (2009) further acknowledged that, if an investigator wishes to comprehend peoples' motivation, reasons and actions, and the background of their ideologies in an in-depth way, then a qualitative research method is best suited to this task.

Furthermore, Morse (2003) stated that qualitative research is not contingent on the investigators knowing the entire characteristics and types of a topic but rather it permits perceptions to be established and developed with the progress of the research. According to Galliers and Land (1987), *"before deciding on an appropriate research method in the field of information systems, a researcher should first consider the nature of information systems themselves and then look at what is expected to be gained from undertaking research in the chosen area"*. Galliers and Land (1987) added that information systems is a meta topic that extends various disciplines in business, social sciences and occasionally in natural sciences and, therefore, choosing the best research method is not an easy task. Unlike psychology, sociology or other related fields, information systems have very few research approaches and, therefore, it is vital to have a proper plan to select the best method to use (Crotty, 1998). This is important because it not only explains the methodology but also provides an explanation for the justification that it offers for the selection of the methods and the specific forms of methods that are employed (Crotty, 1998).

3.5.2: Quantitative Research Method

In contrast to qualitative methods, quantitative research methods depend on numbers or metrics, which can explain the phenomena of the study. This research method includes a numerical approach to the subject under investigation, as well as data analysis, and that data can then be examined by using statistical analysis techniques (Cornford and Smithson, 1996). This method is appropriate for calculating manners and expressive aspects by permitting evaluation and duplication. Jayarante (1993) claimed that quantitative research methods permit data gathering on a huge scale, examination at a sensible price and determination with numerical proof. According to Amaratunga *et al.*, (2002), *"quantitative research method is characterised by the assumption that human behaviour can be explained by what may be termed 'social facts', which can be*

investigated by methodologies that utilise 'the deductive approach' of the natural sciences".

In addition, Creswell (2003) identified some of the characteristics of quantitative research methods such as: a quantitative method shows that there is honesty in the world and honesty can be accurately and quantitatively measured in terms of the connections between researchers and what is being investigated. Moreover, quantitative methods recommend that researchers must stay detached and autonomous regarding what is being investigated to ensure an objective valuation of the condition. Creswell (2003) further noted that in quantitative research, ideas, variables and theories can be selected based on a previous investigation and stay fixed throughout the study. The intention of quantitative research is to build up simplifications that add to the theory and allow an investigator to enhanced prediction and explanation of some phenomena (Creswell, 2003).

A quantitative research method does provide some strengths, like permitting contrast and duplication, consistency and rationality, framing hypotheses for confirmation, assisting the researcher in looking for fundamental clarifications in order to simplify analysis (Amaratunga *et* al., 2002). Myers (2009), however, added some of the disadvantages of a quantitative research method by adding that, *"as a general rule, many of the social and cultural aspects of the organizations are lost or are treated in a superficial manner".* In addition, Saunders *et* al. (2009) mentioned that quantitative data carry only very little meaning for most people before those data fully managed and examined. Furthermore, Bryman (2008) stated that in contrast to qualitative methods, a quantitative method does not look at ways of increasing the fruitfulness of the data regarding the social processes involved in a research problem.

3.5.3: The Adopted Methodological Stance of this Research

According to Crotty (1998), describing a research method as accurately and specifically as possible is really vital. For this study, I selected a qualitative research method, which I have found to be reliable, with the intention of establishing a multifaceted phenomenon by reflecting the background of its settings (Yin, 2009). In addition, the motives for the selection of a qualitative method for my research were grounded in the research problem defined in chapter one, and I have taken into consideration my epistemological position and the level of ambiguity adjoining the phenomenon. Moreover, "how", "what" and "why" types of questions were more appropriate for me to investigate

in my study, which suggested to me to that a qualitative research method was appropriate for my research.

Additionally, a qualitative research method is likely to acknowledge sophistication and subjectivity, which enabled me to use my observation of the phenomenon, interpret the results and gain an understanding of the meaning of a precise experience, situation, and cultural and political event. Moreover, I stated that a quantitative research method was not appropriate for exploring the complexities of a particular issue, as this method only permits the investigator to become familiar with the issue or perception to be examined, and possibly generate hypotheses for testing. This was not my intention, as I wanted to understand the individual insights regarding Cloud Computing adoption, where the participants' own experiences and thoughts were required.

Another reason for selecting a qualitative research method for my study was based on my epistemological stance described earlier. In order to make my research really meaningful, it was necessary for me to investigate and identify the connection between my philosophical position and the methods used. Therefore, I have adopted an interpretivist epistemological position for the identification of issues that explain the challenges of Cloud Computing adoption by SMEs in Bangladesh, as well as issues that influence Bangladeshi SMEs to adopt Cloud Computing to improve their e-business performances and functions, and to support the Bangladeshi government in building Digital Bangladesh. Furthermore, I have chosen an inductive research approach with the aim of comprehending the phenomena's deep significances and building a theory from the collected data, which is associated with the literature in the literature review.

3.6: Stance of the Research Strategy

The process of collecting, analysing and interpreting data is defined by the research strategy. According to Yin (2009), based on the interview questions, a research strategy is determined and the researcher creates an appropriate plan to answer the research question in order to meet the aim and objectives of the research. Pathirage *et al.* (2008) stated that the research strategy determines the main course of the research and establishes one of the significant decisions made by the researcher. According to Marshall and Rossman (1999), *"a research strategy consists of the overall rationale; site selection, population selection or both; the researcher's role; data collection methods; data management; data analysis strategy; trustworthiness features; and, a management plan"*. The authors have further added that an appropriate selection of the research approach not only echoes the nature of

the research but also the research objectives. There are many research approaches available for conducting research, such as a case study, survey, descriptive, action research, grounded theory, exploratory and explanatory. Saunders *et* al. (2007), however, suggested that the three identified research strategies, for example, exploratory, explanatory and descriptive, are repeatedly used strategies in research. In this research, I have adopted an exploratory research strategy.

3.6.1: Exploratory Research

An exploratory research strategy may include a literature exploration or interviews (Manerikar and Manerikar, 2014). The exploratory strategy provides a new phenomenon for the researchers to support them in gaining a better understanding of their research, analysing the practicability of an extensive piece of research or defining the best-suited approach to be used (Manerikar and Manerikar, 2014). Therefore; an exploratory strategy is very broad in focus and infrequently delivers certain answers to a precise research question. The objective of an exploratory strategy is to identify key issues and key variables (Manerikar and Manerikar, 2014).

In addition, for most purposes, an exploratory strategy produces qualitative data and usually simply involves conversations between an investigator and the people being investigated (Polit and Hungler, 1999). Although, a researcher leads the conversation when covering issues during an interview, they keep the discussion open for the participants by asking open-ended, semi-structuredd interview questions (Polit and Hungler, 1999). Additionally, an exploratory strategy always produces textual data, which is not numerical and does not lend itself to statistical analysis, but rather to textual analysis (Pathirage *et* al., 2008).

According to Brink and Wood (1998), *"an exploratory research strategy studies what has not previously been studied and attempts to identify new knowledge, new insights, new understandings, and new meanings and to explore factors related to the topic"*. The authors state that an exploratory research strategy does not concern itself with determining cause-and-effect associations.

3.6.2: Why an Exploratory Strategy for this Research?

The reason I have selected an exploratory research strategy for my study is because my research is attempting to provide an answer to the research question and to meet the objectives of the research. By considering many differing points of view, my research

question was associated with the research objective, which was an exploration of the issues explaining the challenges of Cloud Computing adoption by Bangladeshi SMEs in the context of Digital Bangladesh. Another reason that I have chosen an exploratory research strategy for my research is because I wanted to provide an exploration of the insights into Cloud Computing adoption, the barriers and incentives of Cloud Computing adoption by Bangladeshi SMEs, as well as attempting to understand how a Bangladeshi SME sees the influencing issues (incentives) of Cloud Computing for their business success in relation to their perceived experience. Finally, I was fully aware that not much research has been conducted about Cloud Computing adoption in the Bangladeshi SME sectors and, therefore, it was an enormous opportunity for me to answer the research question in an exploratory way and add new knowledge about the issues challenging the adoption of Cloud Computing. Furthermore, an exploratory strategy has given me an opportunity to explore and make an original contribution to the new meanings of Cloud Computing incentives that could support SMEs in creating and implementing e-business functions, as well as a new way of exploring Digital Bangladesh concepts.

3.7: Design of the Research

The design of the research defined by Babbie (2010), is a concept of how researchers intend to carry out their research. The purpose of the research design is to make sure that the evidence allows researchers to respond to the preliminary question as unambiguously as possible (de Vaus, 2001). This suggests that the quality of the research will be improved by a very good understanding of the research design. The intention of the research design is to support researchers in minimising uncertainty or vagueness as far as possible (Apulu, 2012). Apulu (2012) further suggested that the design of the research explains a flexible set of procedures that link theoretical paradigms to strategies of investigation and methods for collecting data. The design of this research comprises three phases i.e.: 1) A development phase 2) An implementation phase and 3) An analysis/validation phase. To understand all of the phases of the research design, I present a flow chart of the developed research design below.

3.7.1: Development Phase

The development phase is the initial phase of the research design. This phase leads to the operationalization and conceptualization of the research construct and then the development of the instruments to design the research. Researchers begin with the

systematic literature review in order to have an in-depth understanding of the literature and gain the knowledge to design the research. This phase is sub-divided into two parts, i.e.: 1) Conceptualization and Operationalization and 2) Instrument Development. Below I explain both parts.
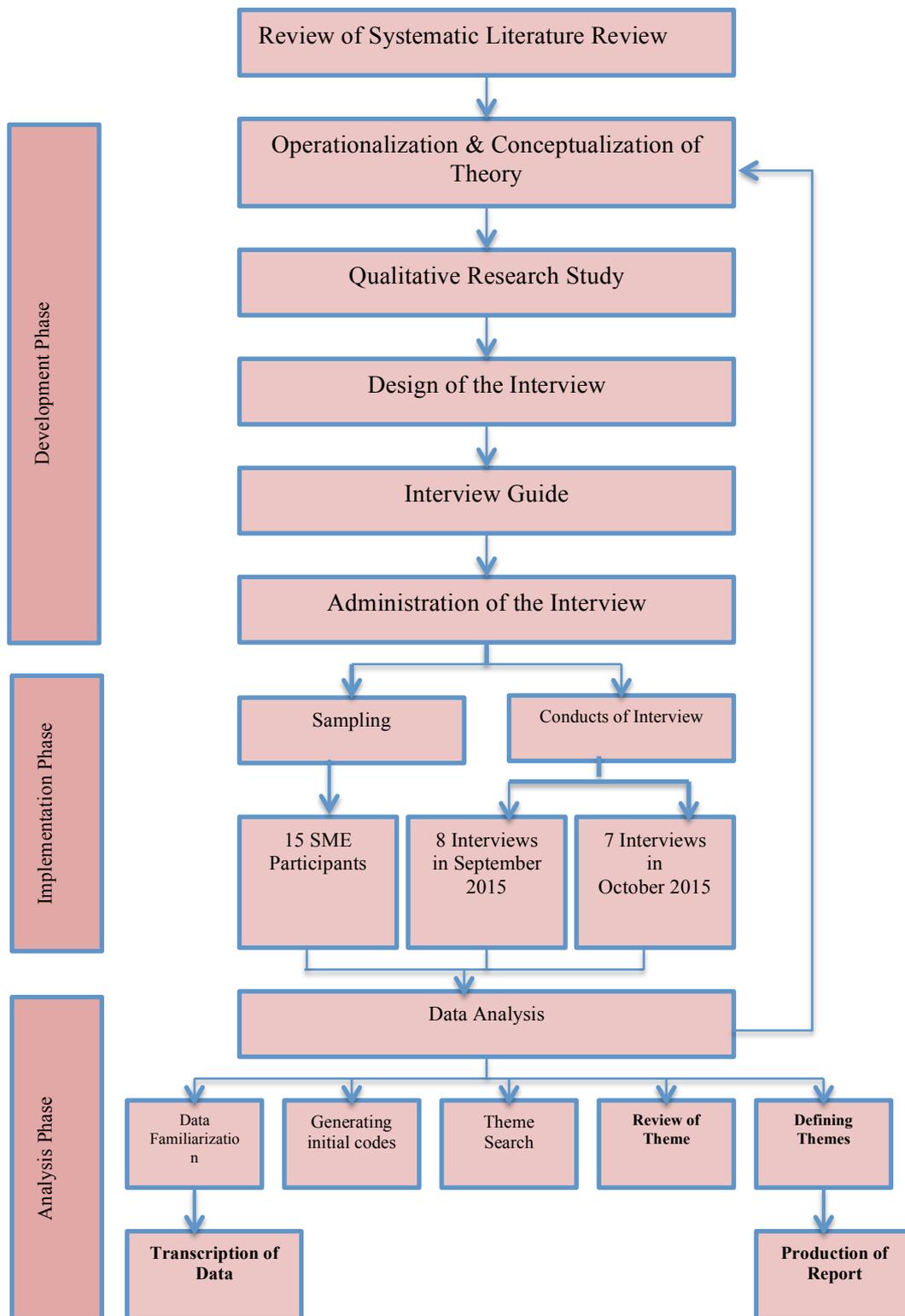
Figure 13: Research Design Flowchart (Source: Author)

3.7.1.1: Conceptualization and Operationalization of the Theory

The operationalization and conceptualization of the research theory is the first part of the development phase of the research design. According to Cohen *et* al. (2007), *"theory conceptualization refers to the definition of the theory and what it represents; the operationalization of the theory refers to the translation of the identified theory to specific concrete measurable items and finally the theory source refers to published literature, from where the theory was taken"*. In the table below, I present in detail some of the research theory in terms of its conceptualization, operationalization and source.

Constructs	Construct conceptualization	Construct operationalization	Construct source
Size of the enterprise (SIZE)	It reflects the understanding of how the size of the enterprise could influence the success of SMEs.	The construct was treated as a classificatory and was measured by two questions representing size of sales and number of employees.	Harabi (2003)
Age of the enterprise (AGE)	It reveals the understanding of the influence of the age of the enterprise on the success of SMEs.	Considered as a classificatory construct, age of the enterprise (AGE) was measured with one question.	Harabi (2003)
Location of the enterprise (LOCT)	It indicates the understanding of how location of the enterprise could influence the success of SMEs.	Classificatory construct which was measured with one question.	Harabi (2003)
Gender of the entrepreneur (GENDER)	It reflects the understanding of the impact of gender on the success of SMEs.	Classificatory construct which was measured with one question.	Rachdi (2006)
Age of the entrepreneur (AGE 1)	It shows the understanding of the impact of age of the entrepreneur on business performance.	Classificatory construct which was measured with one question.	El Hamzaoui (2006)
Education of the entrepreneur (EDUC)	It reflects the understanding of how education influences business performance of SMEs.	Classificatory construct which was measured with one question.	El Hamzaoui (2006), Gray (2006)
Previous experience (PEXP)	It reveals the understanding of how previous experience influences the success of SMEs.	Classificatory construct , which was measured with 3 questions.	Dahlqvist et al. (2000)
Family background (FBAC)	It indicates the understanding of the influence of family background on the success of SMEs.	Classificatory construct which was measured with 2 questions.	Gray (2006), McCline et al. (2000)
Need for achievement (NACH)	The construct reflects the understanding of how the need for achievement quality could impact the success of SMEs.	The measurement of scale was made up of 3 items designed in a 5 likert style format.	Gray et al. (2006)

Table 12: Description of the Research Theory (Adapted from: Sefiani, 2013)

3.7.1.2: Instrument Development

Instrument development is the second part of the development phase of the research design. This segment starts with the interview question design and finishes with the interview design. Below I discuss all of the steps that I took to develop the instrument design for this research.

3.7.1.2.1: Interview Design

According to Bryman (2008), interview questions are defined *"as a paper and pencil exploration in which information is obtained by asking participants to respond individually to series of pre-determined interview question".* Akintoye *et* al. (2000) emphasised that the success of the interview and the accuracy of the data is broadly contingent to the proper and careful design of the contents of the interview questions, and the overall structure and form of reply. In this study, therefore a set of semi-structuredd interview questions was developed. In terms of developing the interview questions, the main reflection was to capture, as far as possible, all of the relevant information that was needed to answer them (Dunn & Huss, 2004). As a result, self-designed, semi-structuredd interview questions were created based on the review of the existing literature and analysis. In addition, the interview questions were structured by concentrating on the theories that were acknowledged in the literature review. Some of the interview questions were designed by following Benzing *et* al. (2009), who designed a set of questions focusing on the success of the ICT adoption of SMEs in Turkey. Most of the interview questions, however, were designed by considering the perspective of Bangladeshi SMEs, and their knowledge of Cloud Computing and Digital Bangladesh. Several of the interview questions were specifically designed to gain access to the exact information from the participants about the insight of incentives and barriers to Cloud Computing adoption.

The interview questions were initially designed in English but since this study was based on a Bangladeshi context, translation of the interview questions, therefore, became a vital requirement. Considering that Bengali is the official business language of most companies in Bangladesh, apart from some multi-nationals, the interview questions were translated into Bengali to ensure participants could respond freely to them in the language that they are most comfortable with. Consequently, I translated all of the interview questions from English to Bengali and then confirmed them with a university professor, who was a specialist in Bengali literature. Finally, I cross checked both versions and found that they matched. In appendix C, I have added a sample of the interview questions. However, the designed interview questions needed appropriate wording and below I explain the content and categorization of the questions, and the structure of the response.

3.7.1.2.2: Question Phrasing and Content

The interview questions were designed to be simple, specific and understandable and I avoided imprecise, ambiguous, oversimplified, disrespectful and less meaningful

questions. In addition, before the questions were asked, I clearly mentioned the reasons for asking particular questions. Moreover, some of the interview questions were asked positively and some negatively in order to encourage the participants not to answer routinely but to think first before answering.

3.7.1.2.3: Structure of the Response

In order to gain an in-depth understanding of the participants' knowledge, skills, thoughts, experiences and understanding of Cloud Computing adoption and the Digital Bangladesh concept, I used only open-ended questions. I asked one question at a time and, based on the answer, I asked 'how' and 'why' questions again. In addition, I asked supporting questions at the end of the answers in order to gain as much information as possible from the participants and make the data richer.

3.7.1.2.4: Categorization of the Interview Questions

The interview questions began with three blocks: block – 1 was about business and the respondents. Block – 2 covered IT services and Cloud Computing, as well as follow up questions covering the reasons for adoption of Cloud Computing and reasons for not adopting Cloud Computing. The final block was block – 3, which is concerned with ICT, Digital Bangladesh and SMEs. In block – 1, I asked some basic questions about business, such as the goals and objectives of the business, duration of the business, types of services they provide, applications they use, types of customers they have and about their suppliers. Finally, I asked questions about the respondents' position, roles and responsibilities and their ICT dependencies in the performance of their daily tasks. Within this block I tried to access all of the business related information to get an idea of how Bangladeshi SMEs are really carrying out their businesses.

In block – 2, I asked questions about IT services and Cloud Computing. My intention was to access as many details as possible from the respondents about Cloud Computing. Therefore, I started with questions about their understanding of Cloud Computing and its special meaning to them. In addition, I asked questions about whether they use Cloud Computing or not. Based on their answers, some follow up questions were asked in order to know why they are using Cloud Computing and how they think that it has changed their businesses. I asked some other follow up questions to ascertain the reasons why some of the participants are not using Cloud Computing and what the barriers were that prohibited them from adopting it. In addition, I asked those participants who have

adopted Cloud Computing about their implementation experiences. Finally, I asked them about their different points of view in order to gain insights into Cloud Computing adoption.

Finally, in block – 3, which was the most complex section of the entire interview process. I wanted to know from the participants whether Bangladeshi SMEs need to use more ICT-based technologies or instead adopt Cloud Computing rapidly. I therefore designed some relevant questions, as well as some follow up questions in order to understand the reasons for their answers, and their thoughts on whether it is possible for SMEs to adopt Cloud Computing or not in the Digital Bangladesh context. Following on from this, I asked the most important questions in this block, as I needed to know about the barriers to and incentives of Cloud Computing and the possibilities of making businesses agile and adaptive so that Bangladeshi SMEs become successful. In addition, I asked about whether Cloud Computing could give an overall competitive advantage or not when compared to bigger Bangladeshi and overseas companies, as well as the reasons why. Finally, I designed questions to gain a detailed understanding of Digital Bangladesh concepts, initiatives and the government's support.

3.7.1.2.5: Testing the Interview Questions

According to Sarantakos (2005), *"researchers seldom begin a study unless they are fully confident that the chosen research method is suitable, valid, reliable and effective and free from problems or errors or at least that they have taken all precautions to avoid any problems in the preparatory stages of the research".* As a result, the pre-designed interview questions were needed to test for clarity, understanding, vagueness and response exertion. In order to test the interview questions, I used two types of question testing styles namely, **pre-testing** and **field-testing**.

Pre–testing

According to Polit & Hungler (1999), when interview questions are used as a data-collecting tool, it is obligatory to determine whether the interview questions are clear enough to research the subject and that the participants are clear about the researcher's expectation of them. Therefore, after designing the initial interview questions for this research, I carried out a pre-test in order to ascertain whether or not there was clarity and that the possible meaning of the questions was understandable. The initial interview questions were discussed over the telephone, Skype and e-mail with about 6 Bangladeshi

SME owners whom I know personally (they were not part of the sample for this study). Upon discussion, the key anomaly identified was that some of the questions were vague. They found that the meaning of those questions was not clear enough for them to answer. So, in order to make them more easily understood, I re-phrased those questions. In addition, some of the questions were repeated, which I also re-structured.

Field–testing

In order to accomplish the field test, I conducted a pilot study, based on the initial designed questions, with those 6 SMEs, which I selected to determine whether all of the questions were meaningful, clearly understandable and jargon free. During the pilot study, a problem was identified in that there was neither enough focus nor enough questions related to the research context, Digital Bangladesh. Therefore, I re-designed block – 3 of the interview questions and more emphasis was given to the Digital Bangladesh context.

3.7.1.2.6: Design of the Interview

In 2007, Saunders *et* al. contended that quality of the data entirely rely on the interview structure and design of the questions. This is very important because to keep participants focussed on the topic, the researcher needs to have a proper interview structure, as well as control during the interview. In addition, by keeping in mind that not all of the participants have same level of understanding of the meaning of the questions I created an interview guide where there were explanations available for some of the more complex questions. Additionally, an interview guide was created with key questions, follow-up questions and, of course, some clarifying questions. Moreover, my intention was to cover the research subject and get as much information as possible during the interview. I did not, therefore, ask the same questions to all of the participants.

3.7.2: Implementation Phase

The implementation phase is the second phase of the research design for this study. In this phase, the selection of the sample and the data collection were the main focus. During the implementation phase, the interview questions were developed in order for primary data collection. Below, I describe the selection of the sample and the data collection procedures.

3.7.2.1: Population and Selection of Participants

According to Saunders *et* al. (2009), there is a consistent association between the aim and objectives of the research and sample collection. In order to understand sampling techniques, the authors summarised them in the form of figure below. I selected the Inductive research approach for this study and, therefore, I was very much concerned with the context in which Cloud Computing adoption could take place.
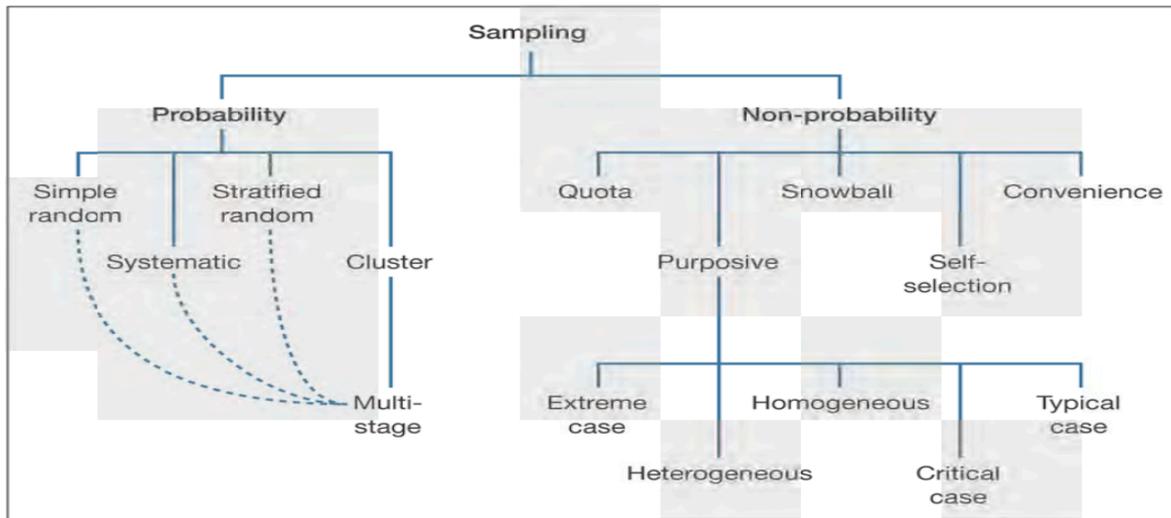
Figure 14: Summary of Sampling Selection (Adapted from: Saunders *et* al., 2009).

The sample selection is determined by the likelihood of a comparatively small sized sample, to choose informative instances and information. In this study, I was interested in the person and wanted to know their individual experiences of and insights into Cloud Computing, away from their businesses. Therefore, using convenience, snowball, self-selection or a quota sampling method would not have been best suited to my research focus for this study because above mentioned sampling methods are unselective type of their sample selection technique. Stake (1995) has suggested that researchers select purposeful sampling techniques, if possible, in order to create the greatest diversity in replies and permit participants the opportunity to offer a variety of insights regarding the subject that is being explored (Maylor and Blackmon, 2005). Merriam (1998) described purposeful sampling as the most commonly used sampling selection technique in qualitative research. Denscombe (2007) further added, *"purposeful or purposive sampling is the 'hand-picked' sampling for the research where researcher previously knows something about the precise people or events and deliberately selects them because they are seen as instances that are likely to produce the most valuable data"*. The author also added that in purposeful sampling, participants are selected for a precise purpose to ensure that it reproduces certain qualities of the people or events selected and their significance to the subject of the exploration. In addition, Maxwell (2005) stated that, *"purposeful*

sampling is a strategy in which particular settings, persons, or activities are selected deliberately in order to provide information that cannot be gotten as well from other choices. Therefore, I believed that a purposeful sampling selection technique would be the most suitable because this selection would provide insights into the issues explaining the challenges by SMEs in Bangladesh to adopt Cloud Computing.

I have noted that from the perspective of Bangladesh, knowing all of the types and the number of SMEs is not conceivable because such information does not exist. In addition, it is not possible to construct a sampling setting to outline the interested population of SMEs who have already implemented or are in the process of adopting Cloud Computing, or have failed to adopt Cloud Computing because the information is not available. It is hard to find an SME population within Bangladeshi that has successfully adopted Cloud Computing by screening the overall population of SMEs. In this case, I have found similarity with the suggestions of Saunders *et* al. (2009). They suggested that if the population is unknown for a particular piece of research then a non-probability sampling section technique is more appropriate because researchers need to make simplifications by relying on theory not populations. Therefore, in selecting a non-probability sampling method, I have made an assumption that there is no even circulation of individualities present within the population of Bangladeshi SMEs. According to Boyce and Neale (2006), *".... simplifications about the results are usually not able to be made because small samples are chosen and random sampling techniques are not used".* Therefore, in this study, a non-probability purposive sampling selection technique has been selected because of the objectives of this exploration.

Patton (1990) suggested that size of the sample depends on the research objectives and questions, which can be chosen amongst existing resources. Therefore, it was not possible to determine statistically the selection required for this study to provide a satisfactory number of samples. Additionally, the question of choosing the sample size was not straightforward because the validity of the research breaks the competence of the sample to achieve the aim and objectives of the exploration because Bloor and Wood (2006) contended in their study to figure out the meaningful conclusion with the reflection of the diversity of the population with the small sample size. However, Saunders *et* al. (2009) suggested that the sample size could be selected by commencing a continuous collection of data till data saturation is reached. Mason (2010) recommended that if the same stories, issues, topics, contexts and themes develop from the discussion then the

researcher must accept that a satisfactory sample size has been reached. This technique is described as 'theoretical sampling' by Bryman and Bell (2011). These authors also warned that this technique infrequently echoes the practice. Depending on the above suggestions, in this exploration, therefore, I have acknowledged that an adequate sample size will be reached when I see that new insights are emerging from the collected data within the possibility of the time available to deliver the collection and analysis.

The selection of the participants required that I identified as the potential participants via special recommendations from another participant, business sources and personal contacts. Those persons who met the sample principles such as understanding of Cloud Computing and Digital Bangladesh concepts were contacted to clarify the context and objectives of this research and were then invited to participate. Individuals who responded confidently were selected as potential participants for this study. The final selection of participants, however, was acknowledged after a phone dialogue to confirm that they were completely clear about the objectives of the study and that they thought their participation would make a significant contribution. Nevertheless, this was the middle stage of the sample selection. The final selection of the sample size was determined by the collected data. In order to simplify this, every interview was transcribed and I completed a preliminary analysis of every transcript. I have then assessed the themes as they emerged from each interview and determined them to be similar enough to conclude a consensus. This process therefore, supported me in identifying the coding or indexing in order to build up common themes in the data (all the developed themes will be described in chapter 5). The choice to take the next participant into the sample was made after this analysis. This process was recurrent until the collected data showed the themes in the data were recurring and saturation of data was accomplished.

In this thesis, I did not intend to provide a new theory of Cloud Computing adoption but wanted to explore my own ideas with an insignificant but extremely relevant sample of participants and make an innovative contribution to the theory. Therefore, the selected participants are relevant because they are all involved in the context and have had the experience of using Cloud Computing or working for a smaller firm in Bangladesh. As confidentiality needs to be guaranteed, I have therefore used aliases and only a flavour of the types of people and their businesses is given. All respondents are presented anonymously throughout the thesis. It is worth noting that the findings in chapter 6 are obviously not generalizable to all Bangladeshi SMEs. All ten participants for this study,

however, were purposefully selected from various SME sectors in the main metropolitan cities of Bangladesh, such as Dhaka, Chittagong and Jessore. This is because they were identified as potential participants in terms of their insights into Cloud Computing and Digital Bangladesh.

3.7.2.2: Data Collection

When performing research, it is vital for a researcher to answer the research enquiries and, therefore, it is fundamental to acquire adequate and significant data through a suitable research process (Apulu, 2012). According to Bell (2005), an effective research approach is needed in order to resolve the research problem. Tellis (1997) mentioned that although exploratory research is selective by concentrating on one issue, which is basic to understand the process being studied, it could be considered as a triangulated exploration strategy. To support the needs of triangulation, Yin (2009) emphasized on exploration strategy, which results from the ethical requirement to confirm the legitimacy of the methods.

In my qualitative research, the primary investigation was undertaken and required a data collection method to allow me to place special focus on the phenomena being considered within the limitations of a small sample and cross-sectional time horizon. The data collection was performed by employing a wide range of techniques including observation, documentation and open-ended, semi-structuredd interviews. These techniques were applied in order to identify a comprehensive understanding of the research subject. Maxwell (2005) argued, *"structured data collection approaches can ensure compatibility across data sources whilst unstructured approaches are particularly useful revealing the process that led to specific outcomes"*. The inductive research approach of my research was used in order to deliver an in-depth understanding of the facts of Cloud Computing. Scholars believe that dialogue normally provides 'greater' thoughtfulness of social facts that might be obtained from methods such as interview questions (Gill *et* al., 2008).

My research was intensive and was concerned with the historical modernization of events and issues that were resistant to observation and documents, and therefore, open-ended, semi-structuredd interviews were the suggested research instrument for my data collection. Open-ended, semi-structuredd interviews are supported by Maxwell (2005) who mentioned their use as a research instrument because this is the only way to obtain access to actions that took place previously or those to which you cannot obtain access. Gill

(2008) further added, *"the use of open-ended semi-structuredd interviews when access to areas not amenable to quantitative research methods and/or where depth, insights and understanding of particular phenomena are required"*.

According to Gillham (2005), there are various interview methods that are commonly used in qualitative research such as unstructured, semi-structuredd and structured. An appropriate choice of interview method in research is vital to produce good quality data. Mack *et* al. (2005) further advised that the choice of interview method must *"give an opportunity to gain an insight into how the research recipients order their world and provide explanations for what they have experienced and believe"*. This directed me, as a researcher, to look for stability between the flexibility of unstructured interviews and highly structured interviews with a similar set of questions asked to individual participants. Gillham (2005) also emphasized that semi-structuredd, open-ended interview questions use a sequence of questions for structure whilst remaining flexible to facilitate discovery and focus. This format ensures that similar questions will be asked to the participants and almost the same interview time will be permitted. Gill *et* al. (2008) pointed out that an open-ended, semi-structuredd interview questions *"allows for the discovery of information that is important to the participants but also allows the interviewer or interviewee to diverge in order to pursue an idea or response in more detail"*. Marshall and Rossman (1999) suggested that when research has an exploratory emphasis, as it is in my research, suitable research strategies are field studies comprising in-depth interviews.

With reference to the context above, therefore, in my research I have chosen semi-structuredd, open-ended interview questions in combination with self-administrated questions to support a better explanation of the outcomes. The interviews supported me in obtaining an in-depth understanding of ICT, Cloud Computing and its benefits and barriers, and Digital Bangladesh initiatives outlined in the self-administrated questionnaire. Petticrew and Roberts (2006) acknowledged, *"Interviews are a key feature of successful cases as they provide the best access to interpretations and views of participants regarding actions and events, which have taken place"*. In order to collect data, I conducted semi-structuredd interview questions with ten different selected SMEs in Bangladesh between August and October 2015, where an interview procedure was used as an interview guide. The reason an interview guide was used is because it supported me to choose sensibly how best to use the time available in an interview, as agreed by Wu (2007).

I started the interview by introducing myself along with a detailed description of the research aim and objectives. In the first set of questions, I asked some questions related to the participants' background, as well as questions related to the types of software applications and ICT applications that were used by SMEs. A section of the procedure concentrated on questions about Cloud Computing adoption and its effective use, as well as issues challenging the adoption and effective use of Cloud Computing by SMEs. This was done in order to get participants' views on the extent to which a number of issues inhibit the adoption and effective use of Cloud Computing and also determine the extent to which these SMEs use sophisticated Cloud Computing solutions. In addition, a section of the procedure determined whether or not the SMEs were willing to adopt Cloud Computing into their businesses in future. Similarly, questions were asked based on business competition and competitive advantages to determine the extent to which participants understood their business environments in a bigger picture and the nature of the competition.

In addition, by asking open-ended interview questions, participants were given the opportunity to offer their views in their own terms. Wu (2007) added that semi-structuredd interviews with open-ended questions support gathering field data regarding structural issues in information technology. Respondents' were continuously encouraged to profligate on their answers and to cite examples where possible. Yin (2009) mentioned, *"the use of semi-structuredd interviews not only assisted in presenting the participants' perceptions of the issues under investigation but also, provided an opportunity for the interviewer to ask for further clarification and elaboration of answers"*. Likewise, Bell (1993) affirmed that the use of semi-structuredd interviews allows the gathering of rich data, as they are observed as a beneficial method of inspiring the conversation of issues that may have otherwise not have been recognized in the surveys/questionnaires.

The length of the interviews was on average an hour with the shortest interview being 35 minutes and the longest being 1 hour and 45 minutes. All of the interviews were conducted in Bengali, which was afterwards interpreted into English. All of the respondents were given enough time to respond to the questions and I, as the researcher, did not try to interrupt at any point. At the end of every interview, I encouraged participants to have an open discussion by allowing them to ask many questions and add any comments that they wanted to include. Interviews were conducted with different SME owners, managers, software engineers, IT managers, managing partners and operation

managers, and at certain points allowed some of the interested colleagues to gain a broader perspective in achieving triangulation (Brun *et* al., 2006). This approach was found to be very supportive and was supported by Prasad (2009), who suggested that, *"it is important to include employees and managers from different hierarchies in the organizations and at a site where the groups must have had fundamental ICT investments"*.

All of the interviews were tape-recorded and a transcript of the recording was produced to form the raw interview data. Recording the interviews ensures that all of the participants' answers to the questions are captured and allows the researcher to focus on the interview questions and subsequent probing questions. This guarantees that the engagement between the participant and the researcher is maximised. In addition, this is designed to ensure a consistent experience in the interview process and increase the accuracy of the data collected. Miles and Huberman (1994) strongly acknowledged, *"tape-recording of interviews is regularly suggested as a means of providing a complete description of interviews, responses and comments.* Every single interview was transcribed just after completing the interview and written up while the interview was still fresh in my mind. This transcript supported me in clarifying the information obtained and also to decide what information was needed in the script. Hence, the transcript was completed on the same day as the interview after which summaries of the individual transcripts were sent to each respondent for checking accuracy and giving them the option to correct any misinterpretations. This acted as a means of controlling bias and producing reliable and authentic data, as recommended by Saunders *et* al. (2009).

3.7.3: Data Analysis and Validation Phase

After completing the data collection in the implementation phase, I have analysed those data. The analysis of the data is the method of bringing order, structure and significance to the form of the gathered data (de Vos *et* al., 2002). According to Wikipedia (2012), data analysis is a procedure of inspecting, cleaning, transforming and modelling data with the goal of highlighting useful information, suggesting conclusions and supporting decision-making. Mosby's Medical Dictionary (2009) further stated, *"data analysis is the phase of a study that includes classifying, coding, and tabulating information needed to perform quantitative or qualitative analyses according to the research design and appropriate to the data"*. The analysis of data basically shadows the collection of information and leads its interpretation. Sarantakos (2005) emphasised that the analysis of gathered data offers scholars facts and figures, which allow researchers to

interpret outcomes regarding the background of the community and to write reports about the consequence of the outcomes for the individual and society. However, Malhotra (1999), on the other hand, strongly argued that elements of research, namely research problems, objectives and characteristics of data, and the fundamental properties of the numerical methods, should be considered while selecting a data analysis strategy. In my research, data collection includes only qualitative data and, therefore, only the thematic method of data analysis has been implemented.

3.7.3.1: Thematic Analysis and its Practicalities

The principles of thematic analysis or template analysis that are referred to by King (2004), and Waring and Wainwright (2008) have been used to analyse the data collected in this study. According to Crabtree and Miller (1999), thematic analysis offers an outline that captures the richness of the data and also supports organizing the gathered data into a framework. Braun and Clarke (2006) defined thematic analysis as a *"process that can be used in qualitative research to translate qualitative information into quantitative data if this is desired by the researcher"*. They have further added that thematic analysis is a process used in identifying, examining and reporting patterns and themes within data. In addition, Marks and Yardley (2010) mentioned that thematic analysis shares different ideologies and processes of content analysis. However, Boyatzis (1998) agreed with Marks and Yardley (2010) when mentioning that *"thematic analysis can be used as a way of seeing, a way of making sense out of seemingly unrelated material, a way of analysing qualitative information, a way of systematically observing a person, an interaction, a group, a situation, an organization or a culture and a way of converting qualitative information to quantitative data"*.

According to Boyatzis (1998), thematic analysis is the method of coding information that needs unambiguous codes, which may be a list of themes. A theme is an outline that originates in the information that at least defines and shapes the probable annotations and at most interprets aspects of the phenomenon. In addition, Braun and Clarke (2006), stated that a theme captures important data in relation to the exploration question and signifies a certain level of patterned replies or meaning within the data set. They have further stated that thematic analysis includes searching across a data set to find repeated patterns of meaning. Boyatzis (1998) considered thematic analysis not as a precise method but as a tool to use through various methods. In order to make outcomes more accessible to others, a researcher must employ various ways of systematizing and

showing data (Miles and Huberman, 1994). Denzin and Lincoln (2005) added that thematic analysis could be used as a useful link between investigators of fluctuating direction and grounds because thematic analysis allows researchers using qualitative methods to ease communication between a researcher's observations, outcomes and interpretation of meaning to others who are using different approaches. Furthermore, Wolcott (1994) noted that, *"descriptive or interpretive methodologies do not preclude scoring or scaling of themes and then using numeric representation to check consistency of judgements, neither do they preclude using the information to portray the themes and describe the unit of analysis"*. Thematic analysis improves the clarity of the outcomes and ease of communication (Wolcott, 1994).

According to Braun and Clarke (2006), *"thematic analysis offers numerous advantages including flexibility, a relatively easy and quick method to learn, easily accessible to researchers with little or no experience of qualitative research, results are generally accessible to educate the general public, it's a useful method for working within a participatory research paradigm, it can be used to summarise key features of a large body of data and offers a 'thick description' of the data set, can highlight similarities differences across the data set, can generate unanticipated insights, allows for social interpretations of data and can be useful for producing qualitative analyses suited to information policy development"*. Cassell and Symon (2004) further added that thematic analysis supports researchers in creating codes, which signify themes identified in their textual data.

This research is qualitatively based and qualitative data analysis tends to be mainly an inductive process of forming data into categories and recognizing associations amongst categories. The analysis of qualitative data was carried out using thematic coding practices that match the semi-structuredd interviews conducted in this exploration. Thematic analysis supported me in minimally organising and describing the data set in detail, and in interpreting many aspects of the research subject.

In this exploration, the whole data analysis process follows the six phases that are described by Braun and Clarke (2006), namely: familiarization with the data and transcribing it, generating initial codes, the theme search, the theme review, the theme definition and report production. In order to simplify the qualitative data analysis, and to make it more reliable and transparent, many researchers have used software like QSR

NVivo but in my research, unfortunately, I did not use any software. This is because I could not understand how to work with the software. Although I had help from others, I still found it difficult to handle the data and, therefore, I transcribed all of the recorded data manually and from there I identified all of the codes and themes. A sample of the interview transcript is provided in appendix D. Details of the six phases of the thematic analysis, as well viewpoints of those six phases are described in detail below.

3.7.3.1.1: Data Familiarization/Transcribing the Data

According to Braun and Clarke (2006), it is vital for the researchers to be familiar with all aspects of the collected data. Rhodes and Brown (2005) argued that whilst the practice of transcription may be seen as time consuming, frustrating and at times boring, it could be a good way to become familiar with the data. Saunders *et* al. (2009) further argued, *"there is a need to create a full record of the interview soon after its occurrence as one means to control bias and to produce reliable data analysis"*. This view is reinforced by Robson (2002) who had the same belief that a full record of the interview should be compiled soon after it has taken place. Therefore, to achieve familiarity with the collected data, the recorded interviews were fully transcribed as soon as possible after each interview had taken place. As soon as transcripts had been typed into a Microsoft Word file, they were then printed out and read many times so that I became familiar with the data. Then all of the actual scripts were transcribed into my own understanding to find out numerous codes. All of the codes were then combined in order to narrow them down and formulate the themes. To ensure accurate identification of data, all of the interviews were labelled with different names and those labels appear throughout this phase of the study.

3.7.3.1.2: Generating Initial Codes

Sekaran & Bougie (2010) emphasised that interviews must be coded. According to Miles & Huberman (1994), the coding process contributes to the quality of the qualitative data analysis where coding facilitates the later analysis of the data and ensures both the accuracy and relevancy of the analysis. Bazeley & Richards (2000) suggested that coding has an organizational and an analytical role. They have further added that, *"coding is one way that could be used to manage data and store knowledge gained from the documents, or interpretations made"*. Braun and Clarke (2006) mentioned that the coding phase contains the production of initial codes from the gathered data. Therefore, to identify the

initial codes within my research, I have identified the key meanings of the interviews in every single conversation and have written them up under the coding or indexing heading.

3.7.3.1.3: Theme Search

Braun and Clarke (2006) argued that this phase re-focuses the analysis at the broader level of themes rather than codes. They have further stated that this phase involves the combination of different codes into a unique code, which will provide a potential theme and organises all the relevant coded data extracts within the acknowledged themes. The association between codes, amongst themes and amongst different levels of themes, can be explored at this phase. Braun and Clarke (2006) further argued that at this phase some of the initial codes may go on to the formation of main themes, whereas other codes may form sub-themes and some codes may be discarded. During the theme search phase in my research, I read all of the transcripts with every section of the text to identify the relevance of the exploration question stored in the suitable nodes. As the investigative process continues, new thoughts become deceptive from examining the stories of the participants of the different SME sectors in different metropolitan cities in Bangladesh. These thoughts supported me in the creation of new themes and sub-themes.

3.7.3.1.4: Review of Themes

According to Braun and Clarke (2006), *"the review of themes should be carried out at two levels, firstly, the themes should be reviewed in relation to the coded extracts and secondly, they should be checked whether they work in relation to the entire data set"*. In this study, therefore, I have re-read all of the extracted data related to each theme to make sure that it fits into each theme in a comprehensible way. Moreover, I have checked every single theme in relation to the entire data set. I have also checked the relationships between themes in an initial map to confirm that they reproduce the right meaning of the data as a whole.

3.7.3.1.5: Themes Definition

According to Braun and Clarke (2006), *"this phase consists of reviewing the themes further in order to refine the specifics of each theme, and the overall story the analysis tells"*. At the end of this phase, a rich definition and names for each theme have emerged. This process was continued and after careful revision of all the themes in relation to the data, a final set of themes and sub-themes was developed from the analysis.

3.7.3.1.6: Report Production

Presenting a report is the last phase of the thematic analysis and involves the final analysis and writes up of the report. Braun and Clarke (2006) argued that at this stage, a concise, coherent, logical, non-repetitive and interesting account of the story the data tells – within and across themes – should be provided. In this research, rich extracts, which capture the essence of the study, were selected. Moreover, the analysis of the reported extracts was performed in relation to the research question and available literature.

3.7.4: Trustworthiness of the Qualitative Research Findings

According to Sefiani (2013), *"trustworthiness is the term used in qualitative research to measure the quality of the research"*. Marshall & Rossman (2010) argued that trustworthiness is very closely related to the terms 'reliability and validity' in quantitative research. Graneheim & Lundman (2004) further added that outcomes of the research should be as trustworthy as possible and every piece of research must be evaluated in relation to the procedures used to generate the findings. Many scholars (Polit & Hungler, 1999; Schwandt *et* al., 2007 and Marshall & Rossman, 2010) of qualitative research have suggested that the perceptions of credibility, transferability, dependability and confirmability can be used to establish the trustworthiness of qualitative research. In my study, I have used these to assess the trustworthiness of my research findings.

3.7.4.1: Credibility

Polit & Hungler (1999) argued that credibility deals with the emphasis of the exploration. Sefiani (2013) claimed that credibility is similar to interior legitimacy in qualitative research, which defines how research outcomes match with authenticity. However, Smith & Ragan (2005) mentioned that with regard to qualitative research, rationalists would suggest that there is not one truth to be revealed but rather that every individual concept has its own truth. Lincoln & Guba (1985) claimed that the greatest critical method for forming credibility is the inclusion of associates examining the results. Based on the above, in my research, the final results have been checked by two university professors and two other philosophers from the academic arena in order to gain more comments on the results.

3.7.4.2: Transferability

Polit & Hungler (1999) argued, *"transferability refers to the extent to which the findings can be transferred to others or groups and it is comparable to the concept of external validity used in quantitative research, which specifies the extent to which the findings can be generalized"*. Seale (1999) further added that transferability could be accomplished by offering a comprehensive and rich description of the settings investigated and to offer satisfactory information to the readers. Seale (1999) explained further that such satisfactory information should empower readers to make their own findings about the applicability of the results to other surroundings that they may know. In my research, a comprehensive description of the thematic analysis procedures, which helped with classifying the themes, was stated. In addition, a copious account of the outcomes was offered to encourage readers to evaluate the outcomes and critique their transferability. Furthermore, in my research I have provided a comprehensive picture of SMEs and Cloud Computing in the context of Digital Bangladesh in order to make the readers fully aware of such a context and help support them in making use of the research outcomes in other contexts. However, Lewis & Ritchie (2003) claimed, *"transferability is a matter of judgement of the context and phenomena found, which allows others to assess the transferability of the findings to another setting"*. Therefore, it can be easily said that the matter of transferability is complex in a qualitative study and has to be determined by the readers based on how close the current research and the readers' backgrounds are.

3.7.4.3: Dependability

Dependability denotes the degree to which outcomes can be duplicated (Merriam, 1998). According to Sefiani (2013), the term 'dependability' is mostly used in a qualitative study in preference to 'validity', used in a quantitative study, which shows that if the investigation is recurrent with the same context, methods and the same respondents, then there is a possibility of similar outcomes. In order to achieve dependability, Lincoln & Guba (1985) claimed, *"the process of auditing in which others can examine the inquirer's documentation of data, methods, decisions and end product"*. Schwandt (2007) further acknowledged that inquirers are entirely answerable for ensuring that the procedures of investigation are rational, observable and clearly recognized. In my research, dependability was achieved by offering profound exposure of the procedures. Moreover, in order to address the investigation issues of change over time, I conducted interviews in different time periods and similar outcomes were obtained from participants.

3.7.4.4: Conformability

According to Tobin & Begley (2004), *"conformability is concerned with establishing that interpretations of the outcomes are not figments of the inquirer's imagination, but are clearly derived from the data".* Sefiani (2013) argued that the concept of conformability could be similar to objectivity in quantitative research. Moreover, Lincoln & Guba (1985) claimed that like dependability, auditing could be used to confirm authenticity. In my research, the review commenced by offering a clear explanation of the investigation steps from the beginning of my study through to the development and reporting, and on to the outcomes. In addition, to establish conformability, I have used triangulation in this research. Moreover, apart from interview transcripts, supplementary information was added using field notes.

Having discussed the overall research design, it is now time to discuss the choice of research. Therefore, in the section below, I present the choice of the research and practicalities of using them in this study.

3.8: Choice of the Research

According to Saunders *et* al. (2009), there are many choices for selecting the appropriate research method in which researchers can combine procedures and techniques - this is called the 'Research Choice'. In the figure below, I present all of the available choices for the research that Saunders *et* al. (2009) have been suggested in order to understand a better way of breaking down all of the research choices.

From the figure below, it has been identified that the research choice is primarily divided into two types, namely the mono method and multiple methods. The mono method normally includes a single data collection technique with corresponding numerical or non-numerical data analysis (Saunders *et* al., 2009). On the other hand, the multi-method, listed under multiple research choice, includes more than one data collection technique with a corresponding quantitative and qualitative research method, a single analytical procedure and a numerical or non-numerical data analysis, leading to either multi-method quantitative research or multi-method qualitative research (Saunders *et* al., 2009). The mixed method research choice under multiple methods includes both quantitative and qualitative data collection methods with both mathematical and non- mathematical investigative processes (Saunders *et* al., 2009).
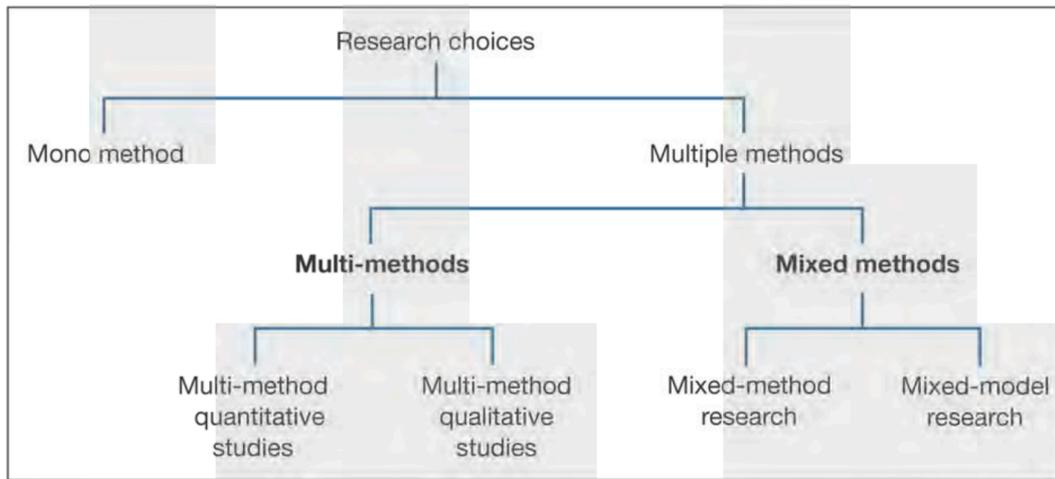
Figure 15: Research Choices (Adapted from: Saunders *et* al., 2009)

However, there is no perfect explanation for the choice of the research except for a detailed understanding of the background of the data but however, appropriate research choice is very important in a complex subject like adoption of Cloud Computing. Additionally, the research choice can sometimes be determined by the time available to create a relevant plan to continue with the research. This can lead the investigator to make negotiations by selecting a single data collection practice. This practice should not impact upon the investigation because of the clear and well-defined research consideration. Therefore, I selected the practice of using the mono method for this investigation with one time data collection practice because in order to provide answers to the complex issues, the hypothesis or simple yes/no answers would not be appropriate (Maxwell, 205). Moreover, owing to time limitations, it was not possible for me, as a researcher, to use multi-methods or mixed-methods, and therefore, I have discounted them in my research. I have selected the qualitative mono method practice for this research, as this is the most suitable choice for answering the research question and to ensure that the research objectives are met within the limitations of the study, and will influence the time prospects (Maxwell, 2005).

3.9: Time Prospects of the Research

Time prospects describe the time frame in which the research takes place. It can be both cross-sectional and longitudinal, where a cross-sectional time horizon studies a point in time of singularities and longitudinal time prospects study singularities over a time frame in order to observe variation and expansion (Saunders *et* al., 2009). In addition, a longitudinal investigation would only be applicable if researchers wished to investigate the changes over the lifecycle of the research or part of the lifespan, from beginning to end (Saunders *et* al., 2009). This exploration was time controlled and moreover, I was not

expected to look at the possible changes that had already taken place during the time frame. Therefore, for my purposes, I have chosen cross-sectional time prospects because this study has already investigated and identified that successful Cloud Computing adoption by SMEs has occurred in the past in different countries. The intention of this study was to identify the respondents' in-depth understanding, evaluation and reflection of moving towards Cloud Computing. A cross-sectional approach would provide opportunities for the participants to not only evaluate their own understanding of the Cloud Computing journey but also to re-evaluate their individual experience through their journey to the Cloud. Additionally, a cross-sectional time horizon would influence the sample selections and collection of data. To be precise, the selection of the cross-sectional time horizon guarantees that the sample and data collection practices are well-designed and produce the depth and high quality of data that are prerequisite for addressing the research objectives and question. Therefore, in my study, I have used cross-sectional time prospects.

3.10: Ethical Consideration of the Research

The first and foremost responsibility of the researcher when carrying out research is careful consideration of the ethical consequences. The ethics of the research signify the acceptability of investigators' manners in relation to the rights of those who become the subject of a study and are affected by the study (Saunders *et* al., 2007). According to Sekaran & Bougie (2010), this can probably occur at any time during the entire process of the investigation. Maxwell (2005) strongly recommended that ethical practices should be encompassed at each phase of the research design. Therefore, in this research, I have specifically taken this into account and have explored the following ethical consideration to reduce any potential risks.

3.10.1: Harmony/Consent

In order to carry out research, a researcher is required to consider how to treat participants and preserve their confidentiality. I have therefore taken the ideas of Bryman and Bell (2011), who mention a universal attitude about building trust by providing a full consent form before performing the data collection. I did so because I believed that the importance of a consent form and acting in an open manner would support me in achieving the participants' trust. It is fundamentally associated with the success of research and practised in order to avoid deception. Therefore, I gave all of the participants an informed consent form at the beginning of the interview.

3.10.2: Secrecy/Confidentiality

In order to get assurance from the participants as to the integrity of the investigation for ethical reasons, it was imperative to maintain the confidentiality while conducting the business exploration. Therefore, I considered the suggestion by Mack *et* al. (2005) regarding participant confidentiality and used it in this research by not using individual names or business names at any point. In addition, interview transcripts were allocated with different names. These were used during the presentation of the transcript quotations in the individual insights report and analysis. Moreover, I assured the participants that the collected information would only be used for the purpose of this study and, therefore, collected data for this research was treated in the strictest confidence. The laptop I used on which the data was saved was my own and was password protected. All of the recorded paper documents were kept in a locked drawer at my study table, where only I had access. Additionally, I assured the participants by providing an information sheet along with a consent form, stating that upon completion of my investigation, all of the recorded documents would be destroyed and all audiotapes of recorded interviews would be wiped clean.

3.10.3: Debriefing

I verbally debriefed all of the participants regarding the purposes of carrying out this investigation before conducting the interviews, in order to ensure that they would fully understand the aim and objectives of the research in order to avoid any confusion.

3.10.4: Protection of the Respondents

The primary responsibility I had as a researcher was to protect respondents from any kind of physical or psychological harm during the investigation. I was fully aware that harm could occur at any time during or beyond the data collection stage. Therefore, I took this risk into consideration and in order to overcome this issue, I informed all of the participants to contact me after completing the interviews, should they have encountered any problems or if they had any further questions to ask.

3.10.5: Participation Withdrawal

I made clear to all of the participants at the beginning of the interview process that withdrawal from participating in this study would always welcome at any time. I verbally recommended to all of the participants that they were not obliged to take part in the study and could, at the conclusion of the interview, make any recommendations for a diverse

approach at any point, even after they agreed to take part. The way that respondents might communicate their withdrawal from the research to me was considered and I provided my contact details (post, email and telephone) to all of them in order to make it stress-free for them to make contact with me.

3.11: Limitations of the Research

I made every effort to minimise the limitations of this research but there were, however, clearly some limitations were present. At first, the selected sample size was relatively small but this was a characteristic of the chosen research approach. If extra interviews were added, then an increased number of research texts would have been generated – possibly without adding significant meaning to the investigative outcomes. The second limitation of this research was the interpretation of the data, which was really problematic. I did not use any software and, therefore, it was very difficult for me to interpret the data and recall it during analysis. I did, however, try to remedy this situation by implementing a thematic analysis, as discussed earlier. Moreover, creations of research texts outside of the recorded interviews, such as note taking during the interview process, slightly improved the data availability for the research findings. However, it was very difficult for me to retrieve the data because most of the notes I took down in Bengali and, therefore, I could not add all of them in their actual form. Thirdly, there were the typical inherent limitations of the data collection method: the semi-structured interview. This study was not seeking to justify the use of either the principal data collection method or thematic analysis but rather to support the implementation of the semi-structured interview and thematic analysis.

There are a number of other observations, depending upon the context, functions and effects that could be drawn generally from the literature. The difficulties were normally linked to the main data collection technique and were possibly worsened in the thematic analysis context, which specified the emphasis put on words and sentences. Putting words into the informant's mouth, or leading the informant, takes on a deeper significance, especially in terms of the interpretive approach to analysis taken in this study. It was also tricky for me to identify themes and sub-themes and their satisfactoriness. If, for instance, criticisms of the government's initiatives regarding encouraging Bangladeshi SMEs to adopt technology in their businesses, or even the strategies of Digital Bangladesh, are seen as 'not the right thing to do', then I needed to consider this so as not to place the participants in a difficult position. In addition, I have discovered that some of the responses

go against the government's policy regarding Digital Bangladesh, which was very difficult for me to describe within the analysis and discussion. Finally, time was very limited for me to carry out this investigation by going back to Bangladesh, selecting samples and meeting with different SME owners, managers, CEO and managing partners. In addition, there were enormous difficulties for me when attempting to translate the recorded information because most of the participants were interviewed in Bengali. I had to spend a great deal of time; therefore, to complete one interview transcript and sometimes I lost my concentration. What I have found to be the greatest limitation, however, was not having access to the secondary sources regarding Cloud Computing, SMEs and Digital Bangladesh from the perspective of Bangladesh.

3.12: Summary of the Chapter

This chapter presented the adopted research methodology and research design that directed my research. The key focus of this chapter was to establish a robust research methodology along with the selection of subjective research. I chose a social interpretivism paradigm, which was supported and confirmed by the explanation and implementation of the interpretive repertoires. My epistemological stance was anchored in the subjective nature of this study that encompassed my own reflexivity. In order to provide in-depth exploration and for the purposes of this research, I used a qualitative research method with a greater authority. I also explained the reason for the chosen inductive research approach for this study and I further explained how I chose the sample and data collection. Finally, I further explained the research design method in detail and the ethical considerations with regard to the data collection, as well as the data analyses method. In chapter four I present the participants' individual insights taken from interview transcripts.

Chapter – 4.0

Participants Background Context and Individual Insights

4.1: Introduction

After discussing existing literatures, theories and research methodologies and design, it is now important to see what participants' talked/thought about Cloud Computing adoption in Bangladeshi SMEs individually. It is significant to describe here because not all the respondents' have the same ideas, knowledge, skills, and experiences. Every participant has his or her own views, ideas, knowledge, skills and experiences about Cloud Computing adoption. Therefore, in this chapter I am going to present the summary of all the individual respondent insights of Cloud Computing adoption, which I have been revealed during the interview. The reason I am going to present the summary because, this summary will provide overall information, ideas, experiences, expectations, criticism, suggestions about influencing and affecting issues of Cloud Computing adoption as well as Digital Bangladesh initiatives by the Bangladeshi government. But before presenting the summary of the individual insights, below I am going to present the participants details who were interviewed for this study where participants names are anonymised. In the analysis I have used participants' fictional name.

Participants Details				
Participant No	**Name of the Participants**	**Designation of the Participants**	**Types of SMEs**	**Included/Excluded in the research**
01	Badhan	Database Administrator	Telecom	Included
02	Chakraborti	Branch Manager	Furniture	Included
03	Plabon	Director	Software Firm	Included
04	Chaudhury	Director	Readymade Garment	Included
05	Rahman	Owner & Manager	One Stop Shopping Mall (Retail Shop)	Included
06	Joarder	Managing Partner	Electronic	Included
07	Amir	Chief Executive Officer	E-Commerce	Included

08	Rozario	Senior Operational Manager	Super Shop/Retail	Included
09	Ms Poddar	Software Engineer	IT Firm	Included
10	K Saha	Manager	Software Firm	Included
11	Anjan	Database Officer	Telecom	Excluded
12	Jahangir Opu	Supervisor	Import/Export	Excluded
13	K D Trina	Manager	Residential Hotel	Excluded
14	Rabiul	Manager	Pharmacy	Excluded
15	L K Saha	Manager	IT Firm	Excluded

Table 13: List of the participants' details (Created by the Author)

4.2: Presentation of the Insights of respondent "Badhan"

Badhan is working as a senior Database Administrator in a telecom company in Bangladesh. His main job roles and responsibilities are to keep all the business and customers' data secure and to confirm those safeguarded data working properly or not based on customers request. He also monitors daily IT operations (up and downs) of the business. Badhan's current job roles depends on ICT technologies as well as advanced technologies.

Badhan is fully aware of Cloud Computing and his own understanding of Cloud Computing is, *"centralised data without keeping those data into us and data must be stored into Cloud"*. Very specifically, CC means to him is *"keeping data secure and can having access whenever and wherever want basis"*. According to Badhan, the definition of CC is *"instead of keeping all the process separately for the customers we could keep everything together. Moreover, instead of keeping all the data pieces separately, the final outcome would be saved in particular location so that anyone can access"*. He is currently using Cloud Computing services into the business (HADOOP system) since January 2015 because, subscribers of this company is significantly increasing daily basis therefore, by using traditional technologies it is becoming difficult tasks for this company to store customers' data in a decent way. In addition, using traditional technology, it is very difficult for this company to retrieve customers' data and sometimes traditional technology (RDBMS) takes six to seven hours to generate customers quarterly or yearly usages report.

In order to avoid these issues, this company started moving to Cloud Computing because they discovered Cloud Computing could generate any format of data (structured or non-structured). He mentioned that users' could store any sort of data into Cloud without facing any trouble. Moreover, Cloud Computing system (HADOOP) does work not only as a database but also as a file system according to Badhan. Therefore, users' can extract various types of files (text, documents, excel, lock file etc.). According to him, data can be stored in Cloud Computing without creating any table and users' does not require using query to generate report. He believed that Cloud Computing can store unlimited amount of data and it can read any combinations of data and could generate report very faster, secure, reliable and accurate way and need not to worry about whole system fail. He further mentioned that they were highly concerned about implementation and operation process; however, apart form implementation time there was no disruption happened and all the employees' job has been kept.

According to Badhan, using Cloud Computing in the business is entirely backend and therefore, customers' do not know the process of using Cloud Computing because customers' only need their report in a faster and reliable way. Therefore, customers' are not that much willing to use CC and not even concerns about security or privacy of CC. In addition, he added that their suppliers' are giving them innovative ideas of using various features of CC. Furthermore, competitors of This company are very eager to know more about Cloud Computing system (HADOOP) and they are very willing to use it and trying to find out the major differences of traditional technologies and Cloud Computing. However, this company is ensuring their system is fully reliable and secure to store and use customers' data.

According to Badhan, the status of Bangladesh is changed from lower income to low-middle income country and government has taken many initiatives of using IT but his concern is these initiatives are not fully advertised by the government and therefore, peoples are not aware of using ICT and its benefits and drawbacks. His own view is first of all peoples need to understand the basic of ICT before moving to Cloud because; current infrastructure is not ready/up to the mark to move to Cloud Computing. He also concerned about the shortage of skilful and knowledgeable workforce in IT sector in Bangladesh to support Bangladesh to move towards CC. He personally believed Bangladeshi SMEs at first need to adopt ICT – based technologies to get used to with technologies before move onto CC. His own insight is that at present Bangladeshi SMEs are not ready to adopt CC but within five to seven years Bangladesh and in particularly SMEs will be ready to move

towards to CC. However, his suggestion is for SME owners or managers to learn the best uses of ICT based technologies to know the benefits of adopting new technologies in the mean time. He strongly believed that at present Bangladeshi SMEs will not move to CC as they do not have enough resources (such as money, skill, knowledge) to invest and they do not know that much about CC, as CC is relatively new topic in Bangladesh.

However, Badhan is fully concerned that without adopting CC in to the SMEs, will be very tough for SMEs to survive for the long term. His own views of the affecting issues of failure of adoption of CC for SMES in Bangladeshi are lack of IT-based education system; skilful IT-based engineers are migrating to overseas, less knowledge of IT/CC, indolent mentality of saying no to accept new technology, CC is expensive, lack of communication, no continuous electricity supply, high Internet price and poor speed and of course extra VAT on computer accessories. However, he strongly personally believed that within next 5/7 years Bangladesh would be fully ready to adopt CC and by that time surely SMEs will transform their business onto Cloud. Badhan suggested that if Bangladeshi SMEs move onto Cloud or shared Cloud then they will surely get competitive advantages over large organizations and he is very much optimistic that one day Bangladeshi SMEs will be more successful than bigger organizations with the support of CC. His personal insight of the future impact of CC in Bangladesh/Bangladeshi SMEs is very bright because he believed that CC could bring many changes within the shared environment therefore, SMEs should choose CC either individually or in a shared environment so save setup and maintain cost.

Finally, Badhan's personal insight of the concept of Digital Bangladesh is an important topic but still unclear therefore people are not showing their interest in it because they do not know the aim and objectives of the vision 2021 or Digital Bangladesh. His concern about Digital Bangladesh is that government needs a clear outline of DB and what could be possible outcome first to increase the awareness of the peoples. He also concerns that government is not taking positive initiatives to support SMEs in order to use more ICT technologies by advertising the benefits of ICT or CC. His further concern is the DB initiatives are not fully structured and due to not having public awareness, peoples are not getting the right information about DB. He further added that, in order to build DB, Bangladeshi government should consider various ideas from the nations and implement those ideas into expansion of IT into SMEs and at the same time, government needs to bring the all the qualified and skilful people from oversees to add more knowledge into DB

context, which will support SMEs to adopt ICT and particularly CC as well as government to fulfil their dream to build Digital Bangladesh.

4.3: Presentation of the Insights of respondent "Chakraborti"

Chakraborti is a branch manager of one of the established furniture companies in Bangladesh where his main job roles and responsibilities are managing accounts and ensuring and looking after sales within the branch. Production wise he is directly and indirectly responsible for 50 employees and within the branch he is responsible for only 5 employees. Recently this business started using ICT based activities therefore, he also using very basic IT related activities as per job roles.

Chakraborti personally do know about advanced technology such as Cloud Computing and its advantages and disadvantages. As per his own understanding of CC is *"not an individual server but it is a shared server where all the details would be stored and customers can have access whenever and wherever they want"*. In addition, *"CC is a special type of storage server where everything could be stored and could be used from anywhere in the world not only from Bangladesh"*, according to him. In order to understand the meaning of CC, Chakraborti's view is *"doing daily tasks smoothly, rapidly, easily and can be doing those tasks from any convenient location of the world"*. According to him, the definition of CC is a kind of using services like Google or Facebook.

This business started using CC since January 2014 but previously they were using in house technology or traditional technology. But traditional technology was difficult for this business to blowout their goodwill among many customers' and marketing were expensive and sometimes were impossible but however due to various benefits of CC for instance, Chakraborti stated that customers' can access their web to complete their business tasks even by sitting in their private room as well as customers can get relevant information about the products this business offers and for placing an online order by logging into their account. In addition, he added that CC could give more facilities to the customers so that they can save their time for getting the product information as well as services globally. Moreover, CC could give extra privileges to the company's employees to provide more support even outside the business hours, believed by Chakraborti. He believed that after implementing CC into their business, huge changes came into their business in terms of file sharing, communication, customer care, and HR and logistics departments. According to him, the main differences between traditional technology and

CC is *"traditional technologies were slow in response and taking long time to perform one task but CC is very faster, smoother, convenient, time saving, secure and trustworthy technology"*.

Implementation of CC was not so easy and adequate because of not having enough training, skills, knowledge and poor Internet speed and high price of Internet was the main disruption for the business according to Chakraborti. However, his personally do believe that within next two years most of the disruption will be over and CC adoption would be easy. In response to the different views of CC from different group of people he added that, most of the customers, suppliers, competitors and business partners' view were positive and they showed their interest of using CC but however, he mentioned that they are not fully aware of all the feature of CC such as security issue as an example therefore they are somehow in doubt about implementing CC.

According to Chakraborti, Bangladeshi SMEs should think about adoption of CC because it is the time for CC and the way Bangladeshi government supporting ICT sectors, which will surely bring huge change within couple of year time. Therefore, SMES need to adopt CC otherwise SMEs have to quit their business according to him. However, he is also concerned about skills and knowledge of using CC by the Bangladeshi SMEs as a result he strongly said, *"it is possible for Bangladeshi SMEs to adopt CC but before that they need to adopt ICT to understand properly how technology works and could bring lot of benefits for their business then they can move to CC"*. In the perspective of the current situation of Bangladesh, he strongly named various factors that explains failure of adoption of CC such as political unpredictability, poor Internet connection, Internet management, public awareness, electricity, education, government initiatives, less engagement of private IT sectors, communication and VAT on computer accessories. He deeply believed that by adopting CC, small and medium types of business will be more agile and adaptive and will get competitive advantages and his own view is *"if SMEs sectors want to develop then they must adopt CC now or very soon because development of SME sector cannot be possible without adopting CC"*. He further believed that the future impact of CC on Bangladeshi SMEs in the context of Digital Bangladesh is really bright because to build DB we need to cope up with all the new technologies otherwise, it would be really difficult to reach our destination by 2021. However, Chakraborti is really concern about government's initiatives because DB initiatives are not fully clear to the countrymen and not people

focus and government is not giving opportunity to the countrymen to work for the government to work hard to build DB.

4.4: Presentation of the Insights of respondent "Plabon"

Plabon is the Director of a private software development firm where he is working as a Head of the software development team. The main job roles and responsibilities of him is looking after company's compliance and communicate with the new clients as well ass looking after software development process and observe the teamwork. He is responsible and supervising in total 20 employees. As a lead of software development process team and software project, his various jobs entirely depend on ICT. According to Plabon, *"in a software firm, completing a particular task is nearly impossible without the support of ICT technologies"*.

Plabon's own understanding of Cloud Computing is *"the practice of using network from the remote server and it is kind of storage server where people can store, manage and process their data instead of keeping them in local or private server"*. In order to explain the special meaning of Cloud Computing, he mentioned *"meaning of CC is computing that some cloud providers set a bunch of server cloudy to store unlimited amount of data and providers offer access services 24/7 anywhere in the world by using pay as you go method.* According to him, the definition of CC is a *"virtual storage device where registered customers' can store their unlimited desire data from anywhere in the world and can access those data 24/7 with the support of Internet"*. Before November 2013, this business used to use local hosting services from different service providers but from November 2013, they moved to Cloud computing by considering various advantages of CC such as faster, reliable, authentic and more secure compared with traditional system. However, he mentioned that this transformation was not easy for them because of lack of skill, knowledge and of course suitable infrastructure. He added that after implementing CC into their business, certain areas of the business such as security/managing clients' data has been dramatically changed, which he liked to call a "dramatic change". In addition, there are some identified benefits that have been added into their business after adopting CC such as flexibility, quick recovery, auto software update, less cost, allowing more teamwork locally and globally that he mentioned. In terms of differences between traditional systems and Cloud Computing, he added that security is the biggest difference among them, which is the biggest advantage of Cloud Computing. Employees of this company did not face any problem during implementation process because they had

enough training, skill and knowledge and therefore, they have found the system is very easy to use however, they all are intend to take more training to get the best knowledge of using CC.

Plabon's own views of their customers' (mainly different ministries of the Bangladesh government) of understanding technology and importance of technology are really concerned. Plabon very strongly criticised about the government's staff's idea, thinking, skill and IT knowledge particularly by saying that *"it maybe harsh to say but most of our ministries authorities are still back dated (meaning 'out of date') and educated themselves with our traditional educational system so they are not really highly IT educated or up to date with the advancement of technology such as CC"*. He also criticised some of the local supplier's view of seeing and their awareness of CC, which deeply concerns him. However, on the other hand, he is happy with the involvement of their business partner's view and willingness of using CC but criticised the way competitors are working in Bangladesh.

Plabon personally believed at present Bangladeshi SMEs need to adopt more ICT based technologies because SMEs are already way behind adopting traditional technologies so it would not be wise idea for them to jump to CC without up skilling themselves with traditional technologies or ICT. He further added that Bangladeshi SMEs are not in a position to adopt CC because CC is the latest technology so without having skills and knowledge of basic ICT technologies it would be difficult for SMEs to adopt CC because they really do not have enough skills and knowledge. He strongly believed that today or tomorrow every SMEs needs to adopt CC due to its extensive amount of advantages otherwise it would be difficult for SMEs to survive in the competitive business market. He further added that next choice of Bangladeshi SMEs would be adopting CC because he believed CC adoption is not impossible for SMEs but however, they need proper support, ideas and guidelines from SME Foundation or Bangladeshi government or even from private IT firms' to make SME sector digital under the Digital Bangladesh context.

Plabon claimed that at the moment Bangladeshi SMEs are not ready to adopt CC but however with the support of ICT, SMEs would be ready near future and possibly within next three to four years. He mentioned that sooner is better for SMEs to adopt ICT and move to CC otherwise SMEs will be seriously impacted. According to him, there are many influencing factors of CC such as customisation of network functions with data

caching and compression, stable and immense data storage space, undeniable in accomplishing business adaptability and flexibility, multiple users access to save cost, environmentally friendly, reduce the down time to half, CC is accessible to utilize straightway, agility, mobility solutions and high security of course and so on. He fully aware of a list of affecting factors of CC adoption such as very low Internet bandwidth, very poor Internet speed but very high price, unnecessary VAT on computer accessorises, there is no guideline from government or any private IT organisations, there is no influential advertisement from the Government's side, there is not enough IT based education system (though currently Bangladeshi government started adding digital content into the academic syllabus), due to political unpredictability there is no continuation of process, less initiatives from SME Foundation and from the Government, Less awareness of private sectors and electricity of course is the biggest factors.

Plabon strongly thought that by adopting CC, Bangladeshi SMEs would be more agile, adaptive and successful and will get all the competitive advantages because it is business demand now days to stay in the business market and if SMEs want to survive and continue their business to bring changes into their business to make business profitable then they have only option and that is CC. His own view of the future of CC in Bangladeshi SMEs in the context of Digital Bangladesh is very brighter and influential because under the context of DB, everything in Bangladesh will be digitalised and whole Bangladesh will be cover up by Internet services with the minimum prices but government needs to take right decision/initiatives to support SMEs to adopt technologies to expand their business. Plabon strongly criticised Digital Bangladesh initiatives by the government because government focus is "somewhere else". He believed if government provides supportive hands with ideas and guidelines then within next 3 to 4 years SMEs would be ready to adopt CC and they would be able to support Bangladesh government to build up Digital Bangladesh.

4.5: Presentation of the Insights of respondent "Chaudhury"

Chaudhury is the Director of one of the small-scale type 'business to customer' enterprise in the readymade garments sector in Bangladesh. He is directly responsible for 5 employees but as a Director, indirectly look after all 30 employees. He added that as per the job roles ICT is playing vital role because ICT is one of the arches to garment business and he is running an e-commerce site therefore, different functionalities of ICT is part of his job role.

The understanding of Cloud Computing by Chaudhury is *"a kind of central database and those database we can use in every aspects and every angle and wherever and whenever we want but however, database will be the same but different users can access the database from different geographical locations at the same time"*. The especial meaning of CC to him is just like a central database. According to him, the definition of CC is *"kind of database that has much functionalities and features that many users can use at the same time from different purposes from various locations in the world"*. He is not using Cloud Computing directly in the business because CC is not needed for the business. In addition, he added that at the moment their infrastructure is not ready to move to CC therefore they are indirectly using a locally created database for their clients. He revealed that the differences between traditional technologies and CC is traditional technology is like contacting with someone one by one and listen to them one by one and in traditional system it is not possible to communicate with many peoples at the same time but on the other hand, CC offers those functionalities to connect many peoples at the same time and can communicate with them from different locations as per your need, which means, traditional technologies are not open for all but CC is fully open for all, open for the whole world. Chaudhury does not aware whether their customers, suppliers, business partners and competitors are using or willing to use Cloud Computing or not. He also does not know whether they are really aware about security of Cloud Computing and their data will be stored and maintain.

Chaudhury's own view is that in Bangladesh, ICT and CC both are equally important and at present, ICT is already in use properly therefore, he does not think Bangladeshi SMEs need any more use of ICT but ICT could be a helping hand of using CC, which means it is time for Bangladeshi SMEs to adopt CC. This is because; the term CC is relatively new technology and world is changing and considering all new innovations everyday and everyone wants to break the traditional system because by using traditional system, you can only do one thing or maybe couple of things but using advanced technology you can even do many things in an easier way.

Chaudhury personally does believe that Bangladesh is fully ready to adopt CC because here in Bangladesh, there are lot of opportunities and infrastructure is ready so this is the time for Bangladeshi SMEs to start using CC because Bangladesh is a better place for implementing something new and innovative term. He has assured that there is no way

Bangladeshi SMEs can ignore using CC in their business. If some SMEs want to ignore then surely they are not going to survive for long run but whoever is going to adopt CC will only be profited stay longer. Therefore, he believed that CC is necessary for Bangladeshi SMEs to stay in the very small and tight business market. And in the context of Digital Bangladesh, whole Bangladesh will be digitalised with the support of IT/advanced technology. Therefore, he thinks that Bangladesh is ready to adopt CC/advanced technology and especially Bangladeshi SMEs need to adopt CC. However, according to him, it is not too late for Bangladeshi SMEs to adopt CC but it is already late and it is not time for using ICT but time to move forward to adopt CC like some other countries in South Asia.

Influencing factors of Cloud Computing described by Chaudhury are marketing, time saving, easiness, and faster, multi-access and multi-shared database. On the other hand, issues explains failure of adoption of Cloud Computing is accessing information, lack/absence of proper information, communication, skills, knowledge, cost, excess VAT on computer related accessories, high cost on business plan, not enough manpower to work to overcome these issues, education factors, high Internet/bandwidth price, less support from Internet service providers and government's initiatives. He strongly believed that if all the functionalities of CC could be used on its own way and right way then of course Bangladeshi SMEs will be benefited and after adopting CC there would not be any basic differences between SMEs and large enterprises. Therefore, his thought is there is a huge possibility of success of SMEs if they adopt CC by getting competitive advantages.

Chaudhury was not so sure about the future impact of CC in Bangladesh but he is optimistic that CC could be good and by adopting CC, SMEs will have right information about the customers and based on the information SMEs can produce their products and deliver on time and can support Government to get more local and foreign revenue. However, Chaudhury strongly denied that Bangladeshi government has not got any initiatives to expand ICT in SMEs alongside criticism made by him that whatever ICT initiatives government has taken so far are only for multinational companies who are doing business in Bangladesh, but not for Bangladeshi SMEs. According to him, Bangladeshi SME development through ICT expansion is 'fake sound' from the government, 'nothing else'.

In terms of Digital Bangladesh, Chaudhury mentioned that most of the countrymen are not sure about the term Digital Bangladesh and its vision and what government is going

to do. However, for our own necessities, we have to be digital and it does not matter whether Government will build Digital Bangladesh by 2021 or not but we have to be digital to survive in the business market added by Chaudhury. He further added CC is needed for him to expand his business so, if government does not take any initiatives still he will do as much as possible to adopt advanced technologies such as CC to expand his business and stay in the business market for longer period of time. According to Chaudhury, *"I really do not have time to think about government's support or whether government will support me or not. I do not know government will build Digital Bangladesh or not but I know and I believe today or tomorrow I will be digital, because they are basic needs"*.

4.6: Presentation of the Insights of respondent "Rahman"

Rahman is an owner and manager of B2C (business to customer) type of one-stop shopping mall at Jessore city in Bangladesh. He is responsible for all 19 staff and managing inventory, monitoring services and looking after IT within the business. Various types of job role that he is responsible are ICT dependent such as salary system, sales, and purchase and inventory management. He does not have that much idea about Cloud Computing. According to him, Cloud Computing is a just an advanced technology that can be used in many ways in business but however, he could not define CC from his own understanding and cannot explain the special meaning of CC. But, by attending different seminars they have come to know about CC and its various advantages and showed their interest in using it into their business. Due to many advantages of CC such as performance management of sales, waste, inventory management, project management, online payment and financial management along with easy access and faster services, he started using CC into business. He does believe that CC is essential for the business and they have identified major changes in inventory management and can improve their daily profit and loss calculations using CC.

However, Rahman was unable to distinguish the differences between traditional technology and CC, as owing to his lack of knowledge about CC. In terms of implementation experiences they had very painful experiences due to not having proper skills and knowledge. But however, he was strongly concerned about VAT system. Because due to having accurate information they are paying high VAT/TAX compared with other businesses. Cloud providers given enough training to use the system and services for the whole team. His own view about customers is very positive and customers

are showing their positive interest of using CC and sometimes customers have been given suggestions to him and his team about the improvement they could make in order to using the system. His own suppliers are not using advanced technology therefore, he criticised them. However, he mentioned that some of their suppliers are positive about using CC and some of them already started using but could not continue for long time due to not having proper skills and knowledge. He believed that their business partners are pretty happy about CC although there were some misunderstandings at the beginning. On the other hand, his competitors have been highly welcomed CC due to its various benefits. However and surprisingly he could not clarify whether customers, competitors, suppliers or business partners' are concern about security and privacy of CC. According to him, Bangladeshi SMEs now need to adopt advanced technologies such as CC. This is because SMEs need to be digitalised with time in order to survive in the business market. He personally believed that, by 2021 almost 60% to 70% of Bangladeshi SMEs would adopt CC.

However, Rahman mentioned that SMEs needs to adopt ICT first to get the basic knowledge before moving to advanced stage because according to him, SME owners or managers need to know first how the system works and they need to perform. He believed that without implementing/ using CC, SMEs would face many difficulties in order to achieve their business goals and functionalities and SMEs cannot survive for the long run. He strongly believed that this is the time for Bangladeshi SMEs to adopt CC in the context of Digital Bangladesh. But he thinks that Bangladeshi government needs to play a pivotal role to encourage Bangladeshi SMEs to adopt CC. However, his personal view is that in order to adopt CC, Bangladeshi SMEs first need to adopt ICT to understand the basics of technology, which he believed is the backbone of CC.

According to Rahman, there are many influencing factors of CC such as easy access, high speed, secure service, reliable and time saving. And his own view of affecting factors explains failure to adoption of CC in Bangladeshi SMEs such as difficult VAT system, high price on computer related accessorise, BD government's slow development law and policy, education system, lack of communication, poor Internet speed and of course electricity. He strongly believed that very soon Bangladeshi SMEs would be able to adopt CC with the support of government, private IT organizations and other large business organizations. His view is that large enterprises do not necessarily think of SMEs as their competitors but however they can offer SMEs a helping hand to work collectively

for the country to make SMEs successful to develop the growth and get competitive advantages.

In terms of building Digital Bangladesh, Rahman wished if Bangladeshi SMEs could adopt CC then BD government will be successful in order to fulfil their dream to build DB by achieving double-digit GDP figures from the growth of SMEs and country will be successful. Because he believed, SMEs and Digital Bangladesh are correlated due to many factors. Therefore, development of SMEs must need to build DB. He personally believed that building Digital Bangladesh, government's current initiatives are highly appreciated because government is trying to encourage SMEs to use ICT into their business by offering low cost accessories and reducing Internet price and VAT on computer related accessories. He believed that within next few years (four to five) most of the Bangladeshi SMEs will adopt CC and with the growth of SMEs, government would be able to build Digital Bangladesh by 2021.

4.7: Presentation of the Insights of respondent "Joarder"

Joarder is a Managing Partner of one of the B2B and B2C types of electronic businesses in Dhaka city in Bangladesh. The name of the business translates as 'Real Needs of Life', where they sell different types of electronic goods nationwide and through their distribution centres they do distribute various electronic goods to other businesses all over Bangladesh. He is one of the key persons of the business, where he managing the business as a whole like finance, purchase, export, import, total supply change and customer change. In terms of IT operations, he said they maintain stocks, sales, salary, banking, attendance and HR system through IT. He is responsible for 37 staffs. He believed that almost 25% of his job roles are ICT dependent, which he uses for making communications via Internet for placing orders, collecting samples and processing deliveries and in terms of his office work, almost 100% are ICT dependable.

Joarder has a very good understanding of Cloud Computing, which he liked to call as Cloud Computing/ Cloud Server, which *"is a kind of web server or web protocol, which means whenever you are storing some of your data is not only storing into personal computer but also passing through the web so that other users can access at the same time, which is a faster Internet based services"*. The meaning of CC to him is to make business smarter and faster without any errors where CC is kind of web or network which makes communication easier for different people from different locations with less times and

effort. His own view of defining CC is doing things errorless and within the real time and the definition of CC from him is *"a time saving and smarter way to do a business to look after customers and everything"*. In addition, he further added that CC is a wireless computing, where data will be available on air that users can use from anywhere without feeling the necessary of personal computer. Joarder is using CC into their business from day one because of many benefits of CC. Moreover, because of using CC, he personally believed that his business, personal life become easier and smoother and he believed that CC is cost effective and have more storage space. In addition, he also added that CC made their business smarter, organized, accurate, faster and reliable. He differentiated traditional technology as an old fashion car whereas CC is advanced model of cars or trains because, old fashion car does work but work very slowly and take longer time than usual, which is similar to traditional technologies where as cars with advanced technologies are faster and taking less time to complete the same job like CC. Different point of views of using CC is positive and they all (customers, suppliers, competitors and business partners) showed their real interest of using CC. However, he further added that customers are not concerned about security or privacy but on the other hand, suppliers, business partners and competitors are highly concerned about security and privacy of CC.

According to the Joarder, SMEs need ICT or CC, is entirely depends on the types of business. He added that if the business is an ICT type or CC business, then of course they need CC but for other types of business, first need to adopt ICT and then move to CC because, IT-based SMEs need to adjust quickly to the advanced technology in order to stay up to date at all the times whereas, other types of SMEs are not ready yet to adopt CC therefore, they need to adopt ICT first. However, he believed that both ICT and CC are equally required for the business. He personally thought that without using CC, it would be difficult for the SMEs (especially IT businesses) to keep their data safe and near future, without using CC, business cannot survive for long run. He strongly believed that currently there is not a possibility of Bangladeshi SMEs to adopt CC because SMEs are not ready yet in terms of skills, knowledge and infrastructure, which means the foundation is not ready to adopt CC. In addition, he believed due to lack of moderate speed of Internet supply this is not the time for Bangladeshi SMEs to adopt CC because without Internet, it is not possible to use CC. However, his own view is that with the support of government's initiatives, ICT and involvement of young generations, it is possible for SMEs to adopt CC. His own understanding of the influencing factors of CC is flexibility, faster recovery, automatic software updates, free capital-expenditure, better teamwork, anywhere

accessibility, well document control, attractiveness/competitiveness, ecologically friendly and security. He personally believed that networking, skills & knowledge, motivator/motivating persons, not right people in the right place, inadequate training of rural business owners/managers, electricity, political instability, unavailability of high speed Internet, high price of Internet and traditional education system are the affecting issues of adopting CC in the perspective of Bangladeshi SMEs. He believed that doing your business in a smarter way to get more benefits, of course CC could be used into the business to make business more agile and adaptive, which will support SMEs to get competitive advantages too.

Joarder's own view of CC is very optimistic because he believed by using CC by the SMEs and government many business doors will be opened and Bangladesh will be the one of the richest countries in the world. He personally believed that Bangladesh will be Digital Bangladesh if government can take the right decision at the right time and implement those decisions by involving more people by educating them with the IT based education system and offer them something good like high speed Internet with low cost and continuous electricity supply. He further added that Bangladesh government will possibly face many difficulties but however they need to be proactive to deal with those difficulties and Bangladesh government need to invite private IT companies to work together to take collective initiatives to up skills countrymen to teach more about IT, ICT and of course CC to implement CC in every sectors of SMEs in next four to five years, which will improve SMEs growth, which will positively support to build Digital Bangladesh by 2021.

4.8: Presentation of the Insights of respondent "Amir"

Amir is one of the pioneers of online-based business (e-commerce) in Bangladesh, who is running the business for the last five years, where he is selling various electronic products such as TV, mobile phone, laptop and tablet PC. He is the CEO of the business and managing almost all business functionalities. This is because his investment is not too much therefore he cannot effort to have many employees, whom he has to pay. His main responsibilities are looking after customers, sales, inventories, banking, contacting with suppliers', managing his own employees and their payments. Almost 100% of his job roles depend on usages of ICT but he thinks doing everything by using ICT is difficult under the current circumstances in Bangladesh. One of his main objectives of the business is to create some innovative products such as 'N PC", which is a kind of PC that at least 30

users' can use one PC at the same time by using desktop, keyboard and mouse with full of data confidentiality, which will be performing like Cloud Computing but not exactly like Cloud Computing.

Amir is fully familiar with Cloud Computing and his own understanding of Cloud Computing is *"the last stage of scientists thinking, which is a kind of storage device that has been stored virtually and instead of storing data into personal computer, laptop or any other personal storage device users' can store their data virtually"*. He personally believed, overall circumstance of CC in Bangladesh is not too popular yet and currently status of CC in Bangladesh is at immature stage. Especial meaning of Cloud Computing to him is *"wherever you are does not matter but your data will be moving or circulating every sides of you therefore, if you go somewhere with empty hands but still you can access and use your data from anywhere and anytime even without carrying your personal laptop or computer"*. He has been using Cloud Computing since last five years whenever social media started becoming popular in Bangladesh because he realised in terms of infrastructure, security or even financial condition it would not be the best idea for him to keep all his data in many places and in many devices. Therefore, he started using Cloud Computing, which he now can say without Cloud Computing he really cannot think anything at the moment. The reason he moved to Cloud Computing because of its various benefits such as time saving, data security, faster access and all time availability. In terms of changes in the business, he has identified is saving spaces and doing things in a faster and smarter way and looking after sales, pending and dispatched orders even by sitting at a coffee shop. The differences between Cloud Computing and traditional technologies are Cloud is something that you can store your dream somewhere and you can play with your dream whenever and wherever you want but in traditional technology there was no such advantages according to him. According to Amir, views of customers', suppliers', business partners' and competitors of using CC is very positive and they all are highly concerned about security and privacy of CC.

Amir's own views of advanced technology is Bangladesh is moving forward very speedily under the Digital Bangladesh banner therefore, technology is most needed to ensure peoples are understanding the various benefits of using it and especially for SMEs, they need to understand how their business will be benefitted from technology. He personally strongly believed that Bangladeshi SMEs need to first use ICT to get used to with the basics of technology then they should move to CC. This is because he believed

that without having the basic knowledge of technology SMEs cannot go for advanced technology even if they manage to switch still they wouldn't survive. However, he believed that this is the best time for Bangladeshi SMEs to use more and more ICT based technology because government is encouraging SMEs in every sector to use ICT into their business and providing enough support on it. His personal insights of influencing issues of Cloud Computing adoption in Bangladesh are huge data storage facilities, highly secure, less possibility of data loss (sometimes no possibility of data loss), high accuracy and time saving. On the other hand, his own thought regarding affecting issues of Cloud Computing adoption for SMEs in Bangladesh are electricity, slow broadband service, poor Internet connectivity in rural areas, high price of Internet and slow speed, education system, skills, lack of understanding, lack of government's support, lack of private IT firms support, lack of advertising of the benefits of CC, Internet service providers looking for more profit, transport system, political unpredictability and not having enough training institutes. He personally would like to see and hopeful that within next 3-4 years more peoples will start using CC and especially SMEs will definitely move to CC in order to get competitive advantages by bringing complete new formation of the SME business. In addition, Amir strongly believed that by adopting CC, SMEs would get competitive advantages because there would not be any differences between large businesses and SMEs and potentially they all will use the same technology therefore; they all will be equally benefitted.

Amir's personal thought is due to globalization, world is very small now therefore, Bangladeshi young peoples will have more Internet access to get all the relevant information beforehand using something new. And by nature, Bangladeshi people will do anything to get something new into their hands. So, government and other private IT firms needs to show them the right path then only they will surely accept new technology such as CC. His own view of Digital Bangladesh is a huge topic to discuss but what he believed is if CC could be used by SMEs under DB slogan then it would be unquestionably benefitted for both of them. His concern is that DB initiatives by the BD government are not satisfactory because most of the times government does not or cannot implement their initiatives. Moreover, government's prime thinking is all about large organizations but not for the SMEs or new entrepreneurs. He believed, just because of biased decision, government is kind of destroying small medium enterprise. However, he is very pleased to see that government recently started supporting SMEs by taking many initiatives such as providing interest free loan or very minimum interest on loan and tax-free purchase on computer accessories. Moreover, government has taken highly influential initiatives for the

rural peoples especially for the rural SME owners or managers by opening Union Information Centre (where Union is a collection of few villages) in almost every union to provide free service and consultation on how to use technology, where to go for a service and so on. This initiative will surely support rural SME businesses to get used to with technology and they will feel interest to use technology into their business. However, he is fully anxious about the future of Digital Bangladesh concepts because he believed, if current government cannot come onto the power by next election then the new government will not continue this Digital Bangladesh initiatives because this is the reality in Bangladesh therefore, he is in doubt that DB initiatives would not be successful unless this government stays on the power and carry on.

4.9: Presentation of the Insights of respondent "Rozario"

Rozario is working in a super shop/chain in Dhaka city in Bangladesh as a senior operational manager, where they mainly sell groceries, fresh fruits, vegetables, cloths and cosmetics. The objective of this business is to simply just make profit by ensuring and fulfilling customers expectations by keeping desired products. This business has been in Bangladesh since 2010 and Rozario has been working in the business since March 2015. His main job roles are ensuring smooth trading since open to close but however, he has got very limited job roles, which are ICT dependant. Because, he is not authorised to do any sort of IT development or any changes rather he is only responsible for ensuring head offices decision goes through effectively and in terms of IT operations, in this business has got almost everything IT based for instance attendance system and payroll system. Within the business, he is responsible for 80 employees.

Rozario has a clear idea about Cloud Computing. His own understanding of CC or Cloud server like if you use iPhone everything is on Cloud, which means, *"Cloud Computing is a virtual hard drive"*. His own understanding of the meaning of Cloud Computing is *"it is same thing like server is provided by apple as an example and I am using for my phone. If my hard drive is full I just transfer anything (content) from my phone or computer to the Cloud. I can transfer all the contents to the Cloud and can make my phone empty"*. According to Rozario's own thinking of defining CC is *"going to be like is a hard drive, which is not in your phone or you do not have any hard copy, it is like a soft copy, which is on the air on the Internet and you put everything there and whenever you need anything just login and take it from anywhere you like"*. Though this is one of the larger retail chains in Bangladesh but however, they are not using Cloud Computing

because head office (company) has not decided yet move to Cloud stated by him. In terms of any identified barriers stopped them to move to Cloud or not or any future plan of adopting CC into the business, he has not got clear idea about it because he is not authorised person to make any decision. He strongly believed that using CC in the Bangladeshi business is not possible yet because customers or suppliers are not really ready yet. Moreover, there are not enough infrastructures to implement CC. He is fully concerned about peoples consciousness of using IT into business because they think using IT is more expensive than traditional system but however, he is very much hopeful because of young generations are really showing their interest of using IT. By accessing Internet young generations will get all the information about IT and advanced technology such as Cloud Computing and hopefully they will change their mind according to his insights.

In terms of ICT based technology or Cloud Computing will be the best suited for the Bangladeshi SMEs, Rozario strongly believed that *"SMEs need to use more Cloud based services and they need to adopt rapidly because Cloud Computing is safer, easier, cheaper, hassle free and you can access the services from anywhere in the world"*. His own insight is today or tomorrow Bangladeshi SMEs need to adopt Cloud Computing because now days we are in an age of globalization and as an example you cannot do manual banking as an example and whole world is moving with Cloud so you have to move to Cloud. He personally does not believe that it is possible for Bangladeshi SMEs to adopt CC now but however, he believed within next five years of course possible because Bangladesh is not ready yet to adopt CC as a whole. According to him, apart from economical factors, some other influential factors of CC is cheaper, easy accessible and safer. And on the other hand, time is the biggest affecting factors according to Rozario. In addition, he believed that bureaucracy is one of the main affecting factors of CC adoption. He thinks CC can be used near future to make business more agile and adaptive because CC is easy accessible, less cost and of course safer. He further believed that, if SMEs adopt CC then they will get overall competitive advantages because Cloud is everywhere so Cloud can make your life easy.

Finally, Rozario's individual insight of the future impact of CC on Bangladeshi SMEs and Digital Bangladesh initiatives are very much uncertain because he does not want to rely on something; as things keep changing. He further added that in our country, political situation has huge impact on everything therefore he is anxious about the future CC or DB initiatives or digitalization process. His own believe is future of DB might be a

game changer or might be nothing and he believed everything is depending upon the time and who is coming onto the power in the next parliament election. He is very much worried about the DB concepts because he thinks if another political party comes onto power then they might completely change the DB policy or they might stop the whole digitalization process. He strongly believed that initiatives so far taken by the ICT ministry to support expansion of ICT use in general is of course very positive move under the DB context and he believed if government can continue up to 2021 then it would be possible for SMEs to adopt Cloud Computing and to build DB. However, he does not want to believe it unless he could see the true outcomes of DB initiatives.

4.10: Presentation of the Insights of respondent "Ms Poddar"

Ms Poddar is working as a software engineer in one of the well renowned IT Company running the business almost last 14 - 15 years in Bangladesh. This company is mainly providing IT support to other businesses or organizations. The main customers of this company are different government organizations and different banking sectors customers. She is working in this company last 4 years and her job roles are looking after developing and modifying software as well as providing additional support by adding new features depending upon customers demand. According to her, not that much of her job roles directly depends on ICT but however she uses different sort of IT based skills and knowledge to carry out her job.

In terms of understanding of Cloud Computing Ms Poddar stated that *"Cloud Computing is one of my data that necessarily do not need to have in my local computer/personal computer or I personally would not have in my visual server but would be available on the Internet throughout the world and just because of accessing my data I would have to pay"*. In addition, her understanding of CC is when I am not keeping my data in my hands but spreading onto Internet and accessing those data at any time from anywhere in the world. Especial meaning of Cloud Computing to her is a very helpful or supportive storage medium because we necessarily cannot carry large amount of data and cannot maintain large amount of storage device at all times whereas CC can backup my data and can access indefinitely and can share those data with others whenever needed. The definition of Cloud Computing from her own understanding is *"a very user friendly, accurate and quick storage medium where I can store my necessary data and can access 24/7 with the support of Internet from anywhere in the world"*. She further stated that CC

is kind of storage device on the air and able to store own data on the air and can extract those data and share those data with others with the support of Internet.

This company is not using Cloud Computing in their business because Ms Poddar thinks there is many reasons this company is not using CC such as they do not want to invest more money to make their customers happy. In addition, she said that not only this but also there are some other internal and external things are connected in a parallel way and moreover the concept of CC is not clear to the customers. Moreover, she added that due to the concern of security and privacy this company is not using CC because they are in doubt whether they can provide enough secure service to their customers. Furthermore, she added cost is another biggest factor of not using CC because CC is relatively new so if customers do not like then it would be a big loss for this company. According to her personal view, cost is firstly and huge obstacle and secondly security of CC and thirdly infrastructure is not ready to ensure data security, which are stopping This company to move to CC. However, she is very much hopeful that very soon this company will adopt CC because CC is the demand of time for the business. She personally believed that CC is a kind of backend technical matter therefore as a service provider they need to explain the root cause of using CC to the customers then only they will be interested of it but however, reality is different. In addition, she further added that their suppliers are very positive about CC and they are fully concerned about security and privacy. On the other hand, she mentioned that their business partners also very positive about CC but reality is different in the perspective of Bangladesh; everyone tries to do something different and never want to share their experiences. She believed competitors have to adopt CC in order to stay in the business and challenge back to their competitors otherwise they will slip from the competitive business market.

Ms Poddar's own insight is Bangladeshi SMEs should use the better and advanced technology like CC but need to ensure that technology would be beneficial for them due to their limited investment. However, she believed that SMEs like 10-15 employees do not need to use CC at the moment because of less investment, less annual turnover, less client and less manpower. But in order to get familiar with technology she suggested small SMEs to implement ICT first and later move onto CC. On the other hand, her own thought is medium SMEs should move to CC because she believed that if medium SMEs do not invite CC then they cannot expand their business and cannot runt their business as a large scale and cannot be large business. She is really concerned about using CC into medium

size SMEs for them to survive because she thinks it is a business nature that if you cannot expand your business with the advanced technology then after a certain time there will be decline in business. Her own insight is CC adoption for SMEs is possible or not totally depends on business internal structure, knowledge and method. However, she thinks that for medium type of SMEs this is the time to adopt CC but not for the small size of SMEs because medium size SMEs want to be large where cost and security would not be the factor for them but however small size of SMEs do not have enough money to invest, lack of skilful and knowledgeable staffs, types of customers and of course less capability of taking extra burden on their shoulder.

Ms Poddar's personal views of influencing factors of Cloud Computing are user friendly, security, cost savings and very good accessibility. She also thinks there are lot of affecting factors that failure to adopt CC for SMEs in Bangladesh such as finding knowledgeable persons who really knows about CC, not adequate or less knowledge of CC or customers, cost concern, security concern, network fall, power fall, less IT based education, whole education system, less willingness/initiatives from the authorities and of course less advertising. She believed that there is a vast possibility that CC can be used near future in Bangladeshi SMEs to make SMEs more agile and adaptive and successful because she thinks whenever SMEs bring new technology then accessibility will be very easy to everyone and data will be very handy to the users always and SMEs need to manage less manpower, which she thinks is really a positive side.

Ms Poddar is very concerned about the aim of the future of CC under the Digital Bangladesh context because according to her, aim of DB is not ensuring everyone will be using mobile phones accessing Facebook through Internet and that's it but she believed that could be a part of DB because everyone will come to know about Internet and can access Internet by siting at home even in rural areas. She personally believed that future impact of CC could not be directly beneficial for SMEs in Bangladesh but could be beneficial for large or corporate level of businesses. However, she thinks some of the SMEs would be able to adopt CC by 2021 and she thinks it would be about 50% of SMEs, who would be under the thoughts of CC. Therefore she likes to think that within next four to five years CC will give Bangladeshi SMEs an alternative option, possibly not the best option but surely CC would be an option for them therefore, she believed that government should do more constructive debate, more CC related discussion, and CC related seminars, spread success stories to the nations to encourage SMEs to adopt CC. She also suggested

that government not only take necessary steps only in metropolitan cities but also in rural areas to let mass people know about the advantages and disadvantage of CC how CC could support DB initiatives. In addition, government should focus more on the vision and mission of DB throughout the country via different activities to make DB concept clear to the countrymen. By doing so, government will get more ideas, which they can implement to build DB, believed by Ms Poddar.

4.11: Presentation of the Insights of respondent "K Saha"

K Saha is a manager of one of the famous software firms located in the prime locality of the capital of Bangladesh. This business is mainly providing turnkey solutions to those industries that outsource their customers care division and back office support. This firm provides a unique focus around the customers that supports to gain insight into customers' behaviours and leverage the solutions and services to improve the customers support experiences. As a manager he is responsible for all 130 employees. He is also one of the responsible persons to look after most of the IT operations within the business therefore; he believes that most of his job roles are fully ICT based.

In terms of general understanding of Cloud Computing he thinks that *"Cloud Computing is a model for allowing fitting, on-demand system access to a shared pool of configurable computing properties that can be swiftly provisioned and unconstrained with nominal running effort or service provider communications"*. This firm is using CC into their business and he is also using CC therefore, special meaning of CC to him is *"unbound network storage and services, which can be accessible freely from anywhere anytime worldwide"*. He believed that there are lot of benefits of using CC and the main reason for this firm of using CC is compatibility. He further thinks that apart from compatibility, CC is cost effectiveness and to him security is the prime benefits of CC. In terms of changes that CC brought for this firm, he added CC is fully service oriented and this firm's prime services are mostly web-based as a result, they are providing online-based services along with in house services but by using CC, he believed their business functionalities become smarter than before. According to him, CC is rapid service, which can be available on demand basis with a broad network based accessibility along with effective resource pooling option whereas; traditional technologies are not rapid and does not have broad network based accessibility and less possibility of resource pooling, which are the main differences of CC and traditional technologies. In This firm, their IT consultants made the decision to move to CC but his insight of implementation experience was not highly satisfactory because users were not very friendly with the system but later

all the issue resolved. He remembered that because of the multifunctional advantages of CC, some of their IT supports team members and operation team members' jobs have been affected. According to him, customers now are very much interested of using CC because now they are comfortable with the system and they are more aware about cyber security, which is highly granted and provided from CC. But security and privacy is still a concern for many customers according to him. Suppliers and business partners are very positive about using CC and therefore; they are showing special interest on CC but not too much concern about security added Mr K Saha. Competitors of This firm are also using CC and he believed that they have been showing real interest of using CC into their business by taking into account of the security issues of CC.

K Saha, personally believed that Bangladeshi SMEs need to use more ICT technologies but he believed SMEs need to partially start implementing CC at the same time. Because his insight is ICT is the backbone of Digital Bangladesh therefore; we have to mobilize advanced technology faster and he thinks CC would be more effective and convenient, secure and flexible on information sharing for Bangladeshi SMEs. He personally believed if SMEs do not adopt CC then they will simply go behind because they would not have cost effectiveness and user friendliness into their business. He strongly believed that if Bangladeshi SMEs can bring their self-awareness then definitely CC adoption would be possible for them because after a certain period of time all the business will be Cloud based therefore; SMEs need to be re-structured as well. He does not strongly believe that this is the time for Bangladeshi SMEs to adopt CC but he believes partially it is possible. The reason he thinks so because SMEs need to understand the reality of the advantages of using CC and need to make themselves ready first mentally and infrastructural wise.

Mr Saha is fully aware about various influencing factors of CC that could support Bangladeshi SMEs to step up to adopt CC and according to him, CC is shared based, compatibility, cost saving, technical flexibility, customers choice security and privacy. He thinks that beside influencing factors there are some affecting factors present in Bangladeshi SMEs and they are: knowledge gap, lack of technology awareness, habituates in existing technology, lack of resources availability and some cases high security concern. However, he believed CC could be used to make SMEs successful and more competitive like this firm and have a bright future. He personally thinks in Bangladesh there is a great opportunity of using CC in SMEs specially because he thinks if SMEs moves to CC then much competitiveness will be created in upcoming IT market, information sharing will be

matter of trigger and mobility will be achieved like anything. According to him, the Digital Bangladesh concept is similar to the Cloud Computing concept but government is not using the terminology of CC. He believed, government's vision is pretty clear about DB but they need to work a lot by taking various programs and move on step by step and need to clear fully the whole concept of DB to the countrymen and policy makers. Finally, he added that to him DB initiative is certainly a noble initiative but not fully clear to everyone specially peoples in the rural areas therefore, he is in doubt about the future of DB.

4.12: Presentation of the Insights of respondent "Anjan"

Anjan is a database officer of a reputed telecom companies in Bangladesh, located in Dhaka city, the capital of Bangladesh, where most of his job roles depends on technology (traditional ICT based technologies). Anjan is entirely aware of Cloud Computing and different advantages and disadvantages of Cloud Computing but however, he was not in a position to define it but he has mentioned that special meaning of CC to him is an advanced cloud based storage space that users can use it as per their requirements.

Although Anjan is not using Cloud based services for his workplace but however for his personal life, he is using Cloud services. According to him, Bangladeshi SMEs are not in a position at this point to use Cloud based services and this is because of their lack of understanding. Anjan believed that at present Bangladeshi SMEs need to up skill themselves with the ICT based technologies before moving into Cloud. He further added that not only SMEs but also many big organizations are still not ready to use Cloud services in Bangladesh.

Anjan is not too sure, whether Sheikh Hasina's (Prime Minister of Bangladesh) dream to build Digital Bangladesh will come true or not as he is highly concern about political unpredictability in the country. However, he believed that the concept of Digital Bangladesh is really good and can be implemented with time as he thinks Digital Bangladesh is nothing but just using advance technology into every sectors and bringing countrymen under the umbrella of advanced technology, which is Cloud Computing.

4.13: Presentation of the Insights of respondent "Jahangir Opu"

Jahangir Opu is one of the supervisors of an export/import companies located in the prime location in Dhaka city. He has very clear idea about import and export and the

necessities of using technologies in their business. Some of his job roles depend on ICT based technologies and remaining depends on manual system such as pen and paper. Although he is using some sort of ICT based technologies but however, he did not have much idea about Cloud Computing. Therefore, he was unable to define Cloud Computing and he did not have any special meaning of Cloud Computing. As a result, no further questions have been asked him in regards to Cloud Computing adoption in the SMEs.

He has showed his full interest of the concept of Digital Bangladesh. He believed that this concept could have been a novel concept and Bangladesh needs this kind of concept. In addition, he further added that, this is already late for the country to transform to the Cloud but he believed that never too late to start. However, he was unable to define what is Digital Bangladesh means to him and how this concept could help support Bangladeshi SMEs. He only mentioned that in order to see the outcomes, we need to wait next couple of years as there are lot of developments are happening under this concept and so many are in the process. But he was also concerned about political obstacles, uncertainty, corruptions and bureaucracy. He finally added that if these obstacles can be minimised then building Digital Bangladesh is not a dream but would be reality within next couple of years.

4.14: Presentation of the Insights of respondent "K D Trina"

K D Trina is manager of a residential hotel based on Jessor city in Bangladesh. As a manager, Trina has been using different facilities of ICT. Using ICT based technologies does most of her daily tasks. Although she is using different technologies but however, she is not fully aware of Cloud Computing. She has managed to define CC is a virtual storage space and located somewhere remotely. She was unsure whether she is using any sort of Cloud based services or not. She only said that maybe or maybe not. Although her previous answer did not show her confidence but still I have raised questions about CC but unfortunately, she could not answer properly and therefore, I did not ask any follow up questions to her regarding Cloud Computing.

In terms of Digital Bangladesh, K D Trina was completely unsure. Her opinion was the concept of Digital Bangladesh is clear at all to her. She criticised the approach that BD government has been taken. She has mentioned that government should and must clear the whole concept and what are they going to do and how are they going do to build the Digital Bangladesh to the countrymen. However, she has stated that whatever she has read

and understood about this concept is government is insisting countrymen to be familiar with technologies and use those technologies in everywhere. Overall, she was in doubt about the Digital Bangladesh concept due to the lack of clarity.

4.15: Presentation of the Insights of respondent "Robiul"

Robiul is the manager of a small-scaled pharmacy business located under Jhenaidah district in Bangladesh. He has started using technology in order to perform his daily tasks. According to him, after using technology, his life has changes at some extent. He further added that, he can now do lot extra tasks and all the process are done accurately, which was even impossible to think of while he was not using technology. Although he has now become a fan of technology but he could not differentiate traditional and advanced technologies such as Cloud Computing. He did not even know what is mean by Cloud Computing. Although some hints were given but still he was not too sure and therefore no further questions have been asked about CC.

It has been noted that Robiul is very concerned and interested about Digital Bangladesh concept. He has got very good and clear understanding of the concept of Digital Bangladesh. According to him, Digital Bangladesh concept is not using modern technology contemporarily rather effectively and efficiently in every aspects of our daily lives. He personally believed that building Digital Bangladesh is not a dream but it could be a reality if proper roadmap followed but however, he was also concerned that due to the political instability, and corruptions this building up process might be impacted. He has further included that in Bangladesh, there is not real by the politicians and especially by the opposition parties and their members to support government if something comes up for the interest of the country. He has strongly criticised that due to mind set of the politicians, Bangladesh is still struggling to move forward and develop. Therefore, Robiul mentioned that the future of Digital Bangladesh is uncertain at the moment. However, he has also said that there is a strongest possibility if the current government comes onto the power again in the next general election. Finally, Robiul added that to him DB initiative is certainly a noble initiative but need more focus to everyone specially peoples in the rural areas then the future of DB would be successful.

4.16: Presentation of the Insights of respondent "L K Saha"

L K Saha is the manager of an IT firm located in Magura, Bangladesh. He is one of the IT pioneers in Magura. He has been within this IT firm since 2000 and has been

performing different kinds of IT related tasks. Defining his daily job roles, he has mentioned that he is basically looking after everything such as finance, admin, marketing etc. He has further added that, most of his job roles depends on some kind of traditional and advanced technologies.

It has been noticed that L K Saha has very good understanding of Cloud Computing and its advantages, disadvantages and other aspects. According to him, Cloud Computing is a virtual storage space, which can be used with the support of Internet as per the customers' demand, which means whenever customers want, wherever they want. This definition shows that L K Saha is fully clear about Cloud Computing. However, he could not explain any special meaning of CC to him. In terms of using Cloud Computing or ICT based technologies by the SMEs, he strongly mentioned that at present SMEs are not prepared for CC but he suggested that SMEs can now make themselves familiar with ICT based technologies and then with time, they can move onto Cloud. He strongly believed that CC can have a very bring future especially for the Bangladeshi SMEs but this is not the time. According to him, there are lot of issues such as security, skills, knowledge; setup cost, electricity, political force and resources etc. can affect adoption of CC.

In terms of Digital Bangladesh concept however, L K Saha did not want to say anything as according to him, the whole concept is a political agenda and this has been used for eye washed of the voters (especially young voters) of the Bangladesh. He raised question to me to ask in general to people to see how many of them can define what is Digital Bangladesh? He further emphasized and criticised the policy maker of the BD government that they must have clearly defined Digital Bangladesh to the entire countrymen. Therefore, he even did not show much interest to talk about this concept, as he believed, talking to this concept would be just simple wasted of time. However, finally he has agreed that if all the aspects of DG concept get clearer and government engage more private IT firms and take their advice and work together then there is a possibility that this concept could have been a novel concept for Bangladesh but at the moment he is in doubt due to the actions that have been move forward related to Digital Bangladesh concept.

4.17: Summary of the Chapter

In this chapter I have reviewed the individual thinking of a diverse sample of interview respondents in relation to their understanding of and predictions for the future of

Cloud Computing in their businesses. In addition, I have tried to present the summary of participants' insight of Digital Bangladesh concepts, possibilities, government's initiatives and future of Digital Bangladesh. In the next chapter, I am going to present all the important themes that I have developed from the interview transcripts and respective analyses of all the key findings of the themes.

Chapter – 5.0

Discussion of Themes, Sub-Themes and Interpretations of Data

5.1: Introduction

After reviewing individual insights of the respondents from the earlier chapter (chapter four) of this study, I have systematized various themes along with sub-themes that developed from an exploration of the research text. All the sub-themes are certainly part of the exploration of the respondents' descriptions based on their individual ideas, thoughts, observations and experiences, and of course consciousness of the context; however, my intention was not to quantify them and, therefore, I did not try to enumerate them because I did not want to objectify the research subject. As a social constructivist, the viewpoint should not be objectifying the research subject because it does not pursue to measure data as well as does not relate fixed categories within the group of data (Hackley, 1998). I have only concentrated on the concepts that outline the background of the affecting issues that explain the failure of adoption of Cloud Computing in Bangladeshi SMEs. Thus, I have chosen potential examples from a vast number of narratives from audio recordings and field notes for in-depth discussion.

According to Silverman (2010), *"naturally occurring data shapes the characterization and the context within which the meaning of the research must be constructed"*. Therefore, verbalization of the logically occurring matters and adapting the precise authenticity of the context is greatly highlighted in this research. Instead of entirely depending on various quotations from the interview agenda and answers to develop the concepts and well-generated view of the "show", I have comprised tones and approaches to logic of movement and have observed the authentic reality in the context of Cloud Computing adoption by the Bangladeshi SMEs. Data collection and analysis was one of the important parts that has been emerged, based on the respondents' given information of encouraging issues or affecting issues with respect to Cloud Computing adoption. Understanding both influential and affecting issues along with their respective clarifications enabled me to understand the root cause of the issues, which also helped me to improve a greater understanding of all the issues included in Cloud Computing adoption. Therefore, the necessary data was observed from the structure of subjective judgement. The exploration standpoint was concerned with the improvement of a complete

reflection of the exploration text. I have commenced a study for the sample of similarities through both Cloud Computing adopters and non-adopters to know the issues preventing them from adopting Cloud Computing.

The "emic" feature has been established by the respondents' responses because these replies were highlighted by the respondents' individual communications and views about society, particularly in the context of Cloud Computing adoption within Bangladeshi SME sectors. In qualitative research, both "epic" and "etic" forms of knowledge are significantly important. Because an "epic" form of knowledge is imperative for building up the spontaneous and ethnographic understanding of cultures, whereas an "etic" form of knowledge is imperative for cross-cultural judgement (Leung, Ames & Lickel, 1999). As a researcher, it was obligatory for me to know the differentiating features between respondents' responses and my individual observation of various situations. Therefore, the "emic" form of knowledge has been used in order to highlight fundamental issues, which are significantly meaningful to the respondents. To develop the soundness of the research, on the other hand, an "etic" form of knowledge is required for emphasizing the extrinsic thoughts that encompass special meaning for me as an observer. Based on the above terms, in this research, therefore, various contexts have been adopted.

5.2: Representation of Themes and Sub-themes from Narratives

In qualitative research, thematic analysis is really advantageous in the aspect of socio-political reality. If the analysis is based on narrative and especially on exploration, then thematic analysis potentially generates significant meaning in research. Thematic analysis strongly emphasizes what respondents mentioned by adding value to the meaning formation because it emphasizes how it is mentioned (Brayman, 2015). Across interpretive selections, the research background entails a socio-cultural value system that regularly accomplishes, negotiates and transforms. Therefore, I have attempted a methodical approach in bestowing the contents for the audiences to effortlessly understand and to be familiar with the subjects. Therefore, in this presentation I have used segment captions, namely 'Themes', where dissimilar outcomes along with distinguishing sub-themes contain interpretations in them. A sub-theme involves issues that have been discussed with the respondents about Cloud Computing adoption and its affecting issues within the Bangladeshi SME business background. In addition, I have added additional examples and comments amongst text and themes while describing themes. Uniformity was the key focus at the beginning of this research and, therefore, sequential presentation was the

method for conducting conversations for data collection. As a result, every theme is proportionately important whether they are presented as theme one or theme nine. However, every theme comprises pivotal sub-themes correspondingly within it.

I have followed a coherent process starting with basic information of the business, such as process, attributes, operations and functionalities to relatively complex information such as understanding Cloud Computing, readiness of Bangladeshi SMEs to adopt CC, barriers of Cloud Computing adoption and the future impact of Cloud Computing in Bangladeshi SME environments by using different examples within every single theme. In order to offer a comprehensive view of the existing literature and theory of Cloud Computing adoption to the readers, in Chapter 6, the discussion chapter, I have linked the interpretations with the key points from Chapter 2, the Literature Review. However, this chapter will allow audiences to see and understand respondents' understanding, feelings, thoughts, ideas, reactions, and opinions and so on about Cloud Computing adoption in Bangladeshi SME sectors. This follows the arguments and judgement discussed in Chapter 3, that with the subjective controlling process, all the interviews will be accompanied in a semi-structuredd style, because as a qualitative researcher, I should like to enthusiastically hear the voices of respondents in a specific place advised by Connelly & Clandinin (1990).

Although all of the interviews were conducted on a 'one-to-one' basis, sometimes I had other colleagues present for some of the chosen respondents who showed a positive interest. By allowing and inviting them to join in with us during the conversations, I have enhanced the interviewing atmosphere and added the best value to the interview. Outcomes from the fieldwork are offered in themes, which were developed from the understandings of the meaning through the placement of dialectical following (Copley, 2008). This means that thematic interpretations include noticeable conflicts, approaches of resolution and inconsistencies among texts and other things. In this study, therefore, I pursued insights with respect to the apparent issues that respondents had and the way of interpreting those issues and other issues they expressed in descriptions. I have also stated a respondent's opinion in the conversations with other respondents and sometimes I have placed my own arguments based on the other dialogues in "emic" and "etic" aspects. Readers should note, however, that the analysis of the texts uses some of the basic tools of Thematic Analysis as suggested in the Chapter 3. In the following section, I present all of the themes emerged from the research text and the sub-themes to support every individual theme. However, a precise summary of the key interpretations will only be presented from specific

respondents for all of the themes, as not all the respondents gave similar kinds of responses for a particular area of interview agenda.

5.2.1: How Themes and Citations have been Emerged and Deployed

In this section, I will explain how I have developed all the themes that I have used in this chapter. To me, themes are abstract constructs that link not only expressions found in texts but also expressions found in images, sounds and objects. I know I have found a theme when I can answer the question, what is this expression an example of? Themes may come both from the data and from the investigator's prior theoretical understanding of the phenomenon under study (an a priori approach). *A priori* theme comes from the characteristics of the phenomenon being studied; from already agreed on professional definitions found in the literature reviews; from local, common-sense constructs; and from researchers' values, theoretical orientations, and personal experiences (Maxwell, 1996; Ryan & Bernard, 2015). Not only does this *priori* method but also there are many variations on emerging theme methods and individual researchers have different recipes for arriving at the preliminary set of themes (Tesch, 1990). In order to determine the emerging themes for this study I have considered observational techniques, which consists of eight different steps to look for things in texts and four manipulation steps to process texts. In the below, I will explain all the steps.

Before emerging themes, first, I have marked up transcript individually to identify potential key words (please refer appendix D for detailed mark-up). Then next, I have used the interview questions/topics from my interview guide as a set of pre-defined codes. In addition to my pre-defined codes, I have kept an eye out for patterns and special words and later used observational techniques.

Observational Techniques:

Step 1: Repetitions: I have identified all the repetitions topics or words that have been occurred and reoccurred.

Step 2: Indigenous Typologies or Categories: After identifying all the repeating words or topics, I have looked for all the local terms (in this case, it was Bengali

terms) that was not sound very familiar to me or sometimes respondents used in an unfamiliar way.

Step 3: Metaphors and Analogies: I have strongly observed respondent often represented their thoughts, behaviours, and experiences with analogies and metaphors.

Step 4: Transitions: I have then looked for naturally occurring shifts in content may be markers of themes. In my case, it was written texts, so new paragraphs may have indicated shifts in topics.

Step 5: Similarities and Differences: Then I have used the constant comparison method to find out how are the interviews/marker themes similar or different from the preceding or following statements.

Step 6: Linguistic Connectors: Next I have looked for certain words and phrases such as 'because', 'since', and 'as a result', which often indicated causal relationships. In addition, I have also identified words and phrases such as 'if/then', 'rather than', and 'instead of' signified what should or could happen.

Step 7: Missing Data: At this step, I have used scrutiny-based method, which works in reverse from typical theme identification techniques. Here, I have asked what is missing or what was not discussed instead of asking what is here in order to identify more key words or patterns.

Step 8: Theory-related Material: In this last step, I have examined the setting and context, the perspectives of the informants, and informants' ways of thinking about people, objects, processes, activities, events and relationships. At this step, I was very sensitive to conditions, actions/interactions and consequences of a phenomenon and to order these conditions and consequences into theories.

Deployment Techniques:

Step 1: After the initial pawing and marking of text, I have made a master list of codes/themes and then I did cut and sort those texts and identified quotes or expressions that I have found somehow important and then I have arranged those quotes/expressions into piles of things that go together.

Step 2: While I was reversing the transcript, as soon as I have found a new code/theme, immediately I have opened older transcripts to fit this new code/theme.

Step 3: After coding at least a few transcripts, I have reviewed codes several times to determine a final list of codes by grouping notes and transcripts passages according to codes/themes.

Step 4: Finally, I have extrapolated key findings by combining all the similar codes and made a unique code by considering what I see when I have viewed everything together and looked for contrasts and comparisons. I have also related all the key findings to the literatures and theories that I have used earlier.

Before presenting themes and sub-themes, it is required to clarify how did I use citations under every themes. After collecting all the data, I have written down all the actual words/words or mouths of the respondents in my transcript scripts in a single column. Then from the actual words, I have collected all the possible codes/index, which are basically all the sub-themes that I will be using to support my main theme. This process has been conducted by using the idea of thematic analysis, which has been described in chapter 3 earlier.

During the analysis process, I have used respondents actual words as citations whenever and wherever was required. I have followed the same process for analysing all the main themes and used citations exactly the same way for all the interview transcripts and for all the respondents.

I have clearly discussed above all the steps I have followed in regards to come up with themes, sub-themes and how did I finalize all nine main themes. For interpretation purposes, I have included all the main nine themes along with their sub-themes, which will be presented below.

5.3: Interpretation of Emerging Themes and Chosen Sub-Themes from Research Texts

Here, I am going to present the outline of the developed nine themes that have emerged after constructive thematic analysis of the research text. All of the themes will be supported by various sub-themes.

5.3.1: Theme One: Concepts and General Understanding of Cloud Computing by Bangladeshi SMEs are at an Immature Stage

Sub – Theme 1A: Cloud Computing is a centralised webserver or web protocol

Sub – Theme 1B: Cloud Computing is not an individual visual server but shared server

Sub – Theme 1C: Cloud Computing is easy and a 24/7 accessible Internet based server

Sub – Theme 1D: Cloud Computing is a virtually situated secured storage device or server to store and process data

Sub – Theme 1E: Cloud Computing is the practice of using a network server remotely

Sub – Theme 1F: Cloud Computing is a model for on demand system access with minimum running effort

5.3.1.1: Interpretation of Theme One:

Theme one represents the concept and general understanding of Cloud Computing by the Bangladeshi SMEs. They have understood Cloud Computing in various ways, which we can see from the all of the sub – themes above. Cloud Computing is a centralised database, where all the customers' data will be stored and, therefore, customers necessarily do not need to keep and carry their data with them at all times - stated by respondent "Badhan".

> *".... Cloud Computing means our data are centralised but without keeping those data into us data must be stored into Cloud, which will be available for customers to use...."* (Badhan, see C:4, S:4.2).

Some respondents understood that Cloud Computing is not only a single or individual server but is also a shared server where customers can store their respective data and all of that stored data will be available at the customers' request, from any geographical location, because of the nature of Cloud Computing.

> *".... Cloud Computing is not an individual server but it is a shared server where all the details would be stored and customers can have own access whenever and wherever they want. Cloud Computing is a special type of storage server where everything could be stored and could be used from anywhere in the world not only from Bangladesh...."* (Chakraborti, see C: 4, S: 4.3).

In addition, some of the respondents strongly believed that Cloud Computing is a type of storage server, where people not only can store their data but can also manage and process it by accessing the network remotely and without keeping them in a local or private server.

".... Cloud Computing is the practice of using network from the remote server and it is a kind of storage server, where people can store, manage and process their data instead of keeping them in a local or private server...." (Plabon, see C: 4, S: 4.4).

Moreover, a few respondents added insights of their own understanding of Cloud Computing in a different way. They really believed that Cloud Computing is not only a Cloud server but also a web server or web protocol. They have further added that as long as Cloud Computing provides an opportunity to store data through the web, customers do not necessarily have to have their personal computer or personal storage device. Moreover, they believed that Cloud Computing is a faster Internet based service.

".... Cloud Computing or Cloud server is a kind of faster Internet based server or web server or web protocol, which means whenever you are storing some of your data is not only storing into personal computer but also passing through the web so that other users can access at the same time 24/7...." (Joarder, see C: 4, S: 4.7).

Furthermore, some of the other respondents' understanding of Cloud Computing, i.e. those who haven't adopted it, personally believed that Cloud Computing is a central database and can be accessed by many users for any features and from different viewpoints and locations at the same time but that the database will be unchanged.

".... Cloud Computing is a kind of central database and those database we can use in every aspect and every angle and wherever and whenever we want, however, database will be the same but different users can access the database from different geographical locations at the same time...." (Chaudhury, see C: 4, S: 4.5).

However, respondent "Amir" understood Cloud Computing in a different way. Amir's own view of understanding Cloud Computing is as a virtually situated, secured storage database, which is the latest stage of scientists thinking so far. He strongly believed that in Cloud Computing, customers could store any amount of their data to the Cloud instead of storing into personal storing device. He further added that, at the moment, the status or circumstances of CC in Bangladesh is at its infant stage.

".... The term Cloud Computing is a kind of database that has been stored virtually instead of storing into personal PC or laptop or any other personal storage device but instead, data will be stored virtually may be in Gmail, Dropbox, iCloud or something like that as an example...." (Amir, see C: 4, S: 4.8).

Unlike Amir, on the other hand, some of the non-adopter Cloud Computing participants only understood Cloud Computing as a virtual hard drive but nothing else. They truly believed that nowadays everything is on the Cloud and, therefore, the whole

world is really accessible by sitting at home with the support of the Internet because they believed the Cloud is everywhere.

> *".... Cloud Computing is virtual hard drive but nothing else because Cloud is everywhere therefore, data is everywhere and data can be used from anywhere with the support of Internet…"* (Rozario, see C: 4, S: 4.9).

5.3.1.2: Summary of Theme One:

From the analysis above under theme one, it has been clear that almost all of the participants have some sort of idea and basic understanding of Cloud Computing but it is a mixed understanding of Cloud Computing. Based on their understanding and given responses, it is clear that the understanding of Cloud Computing is really in its infancy or at an immature stage to most of the SMEs from different sectors. Therefore, to conclude the summary of theme one, this study finds that different SMEs from different sectors in Bangladesh have enormous opportunities of understanding of Cloud Computing, in order to adopt Cloud Computing into their businesses.

5.3.2: Theme Two: Meaning and Ways of Defining Cloud Computing by Bangladeshi SMEs Reflects Lack of Clarity

Sub – Theme 2A: Meaning of Cloud Computing is an unbound network storage service

Sub – Theme 2B: Meaning of Cloud Computing is on air, user friendly, accurate, supportive, quick and a 24/7 storage medium

Sub – Theme 2C: Meaning of Cloud Computing is a having a type of on-air based soft copy

Sub – Theme 2D: Meaning of Cloud Computing is keeping all pieces of data, process and information together securely

Sub – Theme 2E: Meaning of Cloud Computing is a convenient and smarter way of doing things

Sub – Theme 2F: Meaning of Cloud Computing is a bunch of highly secured and accurate servers located somewhere in the clouds

5.3.2.1: Interpretation of Theme Two:

By knowing the concept and general understanding of Cloud Computing by the various participants from Bangladeshi SMEs from Theme 1, here we are going to see the special meaning of Cloud Computing to those participants. Here in Theme 2, we are not only going to see the special meaning of Cloud Computing to the participants but we are also going to see how those participants define Cloud Computing in their own way and

from their own understanding. From the sub-themes above, it has been clear that the respondents understand Cloud Computing in a variety of ways.

To many of the participants, the special meaning of Cloud Computing is as a very supportive storage medium. According to them, it is not possible to carry large amounts of data all of the time and moreover, it is difficult to manage and maintain large amounts of storage. They also believe that if data was stored in a local or private storage device, then users necessarily would need to carry something handy with them in order to carry that data. Using Cloud Computing, however, involves no such hassle. Therefore, "Ms Poddar" (see C: 4, S: 4.10) likes to define Cloud Computing as below:

".... Cloud Computing is a very user friendly, accurate and quick storage medium where I can store my necessary data and can access 24/7 with the support of Internet from anywhere in the world, which means Cloud Computing is a kind of storage device on the air and I am able to store my data on the air and can extract my data and share data with others with the support of Internet...."

Whenever "Ms Poddar" thinks Cloud Computing is a helpful storage medium to store data, at the same time, some of the other respondents think Cloud Computing is not only a storage medium but also a secure storage medium. According to them, the special meaning of Cloud Computing is keeping customers' data secure and giving customers access to use their data whenever and wherever they wish. Below is the definition of Cloud Computing from the personal understanding of one of the participants.

".... Instead of keeping all the process separately for the customers we could keep everything together and moreover, instead of keeping all the data pieces separately, the final outcome would be saved in a particular location so that anyone can access...." (Badhan, see C: 4, S: 4.1).

On the other hand, the special meaning of Cloud Computing to the respondent "Chakraborti" is a "huge matter". To him, Cloud Computing means performing his daily tasks in a convenient way by sitting at his own place or convenient place. For instance "Chakraborti" added that Cloud Computing gives him the opportunity to do his office work by sitting at home. Although "Chakraborti" understands the term Cloud Computing and the meaning of Cloud Computing as well, it was very difficult for him to define the term Cloud Computing. The definition of Cloud Computing given by participant "Chakraborti" during his interview is as follows: –

".... Cloud Computing is a huge matter but in a summary, Cloud Computing is kind of using services like Google or Facebook that we are using in very part of business life or even own life...." (Chakraborti, see C: 4, S: 4.3).

While Chakraborti found it difficult to define Cloud Computing, at the same time another respondent, who is one of the Cloud non-adopter participants, defined Cloud Computing as a central database that many users can access at the same time. Although this participant could not provide enough information about the special meaning of Cloud Computing, he tried to define Cloud Computing from his own understanding as follows:

".... Cloud Computing is kind of database that has much functionalities and features that many users can use at the same time from different purposes from various locations in the world...." (Chaudhury, see C: 4, S: 4.5).

Cloud Computing's special meaning to another Cloud Computing non-adopter participant is nothing but a free server provided by a company such as Apple users employ for their phones. They strongly believed that normal storage devices have limited space to store data and, therefore, users cannot store as much of it as they might wish to. Cloud Computing however, gives an opportunity to transfer as much as data (so called contents from phone) as a user might want to, whenever their normal storage device is full. The definition of Cloud Computing from the participant's own understanding is:

".... Cloud Computing is going to be like a hard drive, which is not in your phone or you do not have any hard copy, it is like a soft copy, which is on the air on the Internet and you can put everything there and whenever you need just login and take it from anywhere you like...." (Rozario, see C: 4, S: 4.9).

In addition, some of the other participants see the special meaning of Cloud Computing in an entirely different way. To them, the special meaning of CC is a type of storage computing with bunch of servers that some companies keep them at particular locations in the world and serve us cloudy. What they believe is that Cloud service providers supply unlimited amounts of storage space for users from different locations in the world and users pay for this as and when they require more data space. And they then receive all of the support and facilities from those service providers. The same participant, however, could not define the term Cloud Computing from his own understanding.

Another experienced participant, who has been using Cloud Computing for many years in their business, saw the special meaning of Cloud Computing from a business perspective. According to him, the meaning of Cloud Computing is making businesses smarter and faster without creating any errors. He personally believes that Cloud

Computing is a type of web where communication can be made very easily with different people at different locations, which take less time and effort. The definition of Cloud Computing from the personal understanding of the respondent is:

> *".... Cloud Computing is a time saving and smarter way to do a business to look after customers and everything on the air because whatever users will be doing on air is Cloud Computing because on air personal computer not necessary to perform a task, which means Cloud Computing is wireless computing that customers can use from anywhere at the same time...."* (Joarder, see C: 4, S: 4.7).

Another participant, on the other hand however, looked at Cloud Computing in a different and more advanced way. He thinks Cloud Computing is an-

> *".... Unbound network storage and services, which can be accessible freely from anywhere anytime worldwide...."* (K Saha, see C: 4, S: 4.11).

Finally, another respondent described Cloud Computing as a daily need in terms of operating a business. His own understanding of the special meaning of Cloud Computing is-

> *".... Wherever you are does not matter but your data will be moving/circulating every sides of you. You go anywhere with empty hands but still you can access and use your data from anywhere and anytime but you do not necessarily need carry your personal laptop or anything...."* (Amir, see C: 4, S: 4.8).

5.3.2.2: Summary of Theme Two:

Prior to the analysis above, it has been identified that the meaning of Cloud Computing by many participant SMEs shows an absence of clarity. Though they have mentioned some special meanings of Cloud Computing, this study has found that most of the SMEs have opportunities to understand Cloud Computing in an efficient way. In addition, most of the participant SMEs tried to define Cloud Computing from their own understanding but this study again found that the in-depth knowledge of Cloud Computing is highly unclear. Although participant SMEs have given different definitions of their own understanding, most of them do not reflect on their full understanding of Cloud Computing. Therefore, this study concludes that the summary of the Theme 2 is that there are shortages of knowledge of Cloud Computing, which demonstrate the lack of clarity of Cloud Computing between participant Bangladeshi SMEs.

5.3.3: Theme Three: Opportunities and Drawbacks of Cloud Computing from Different Bangladeshi SMEs are Imprecise

Sub – Theme 3A: Reliable, safer, faster, basic needs for life and easy way to use and communicate to make network bigger

Sub – Theme 3B: Time and money saving multi-tenancy technology for business advertising

Sub – Theme 3C: Minimizing gaps between users and providers

Sub – Theme 3D: Cloud Computing is cost effective, 24/7 availability with more storage space and compatibility

Sub – Theme 3E: Concept of Cloud Computing is still unclear

Sub – Theme 3F: Implement and uses cost is too expensive

Sub – Theme 3G: Full dependency on Internet with lack of features availability

Sub – Theme 3H: Question of high security and privacy issue with lack of firmness support

Sub – Theme 3I: Lack of infrastructure to ensure data security

5.3.3.1: Interpretation of Theme Three:

After knowing the basic understanding, special meaning and ways of defining Cloud Computing of the respondents from the different SME sectors in Bangladesh, it is now necessary to get to know their ability to demonstrate their views, ideas and thoughts about the various opportunities and drawbacks of Cloud Computing. Therefore, in Theme 3, I am going to present the different opportunities and drawbacks of Cloud Computing from the respondent's individual understanding. In order to interpret the opportunities and drawbacks of Cloud Computing, there are a few sub-themes that have been developed: sub-themes 3A to 3D represent the opportunities and sub-themes 3E to 3I represent the drawbacks of Cloud Computing.

In terms of opportunities of Cloud Computing, participant "Badhan" has some clear ideas. He believes Cloud Computing is a much faster, reliable and time saving technology. In addition, he thinks that by using Cloud Computing, users can store any format of data and can get output as they desire, which he thinks of as an advanced feature of Cloud Computing. Badhan also mentioned that Cloud Computing provides facilities of auto software installation, which ensures that the server is always ready for the users to use.

> *".... Opportunities of Cloud Computing is easy and faster way to use because Cloud Computing itself does automatic software installation and keep the server always updated and ready to use and moreover in Cloud Computing users' do not necessarily need to install any hardware to use...."* (Badhan, see C: 4, S: 4.2).

On the other hand, some participants strongly believed that opportunities offered by Cloud Computing are not only that it is easy, convenient and faster to use but also that it is secure compared with traditional technologies. According to Plabon, *"Cloud Computing is*

more secure and processing data is very faster than traditional system and moreover, Cloud Computing is very reliable, secure and providing authenticity of the stored data". Furthermore, Plabon, mentioned that apart from easiness, there are other opportunities offered by Cloud Computing:

> *".... Cloud Computing is safer than in house technology, no software update cost needed, no hardware installation cost needed and of course there is no need for users' to spend money on buying software...."* (Plabon, see C: 4, S: 4.4).

There are limited number of participants who strongly believe that owing to information availability of Cloud Computing, anyone can go through the 'to do list/self help guide' whenever necessary. They believe that Cloud Computing provides an opportunity, not only to minimize the gap between service providers and users but that it also supports users in helping them to understand Cloud Computing clearly. They further believe that Cloud Computing offers the opportunity to manage various business functionalities as below:

> *".... To have clear ideas of total performance management of sales, waste, inventory management, project management, online payment and financial management...."* (Rahman, see C: 4, S: 4.6).

On the other hand, participant Joarder fully believes that Cloud Computing is easy, convenient, secure and faster, and can make communication between different peoples easier, making the network bigger. Moreover, Cloud Computing can offer more storage space in a cost effective way. Defining the opportunities of Cloud Computing, Joarder mentioned that:

> *"Cloud Computing is much reliable, faster and secure. In addition, Cloud Computing can provide multi-tenancy so many users can use at the same time and making business more smarter, organised, accurate and reliable than other business...."* (Joarder, see C: 4, S: 4.7).

Besides the above-mentioned opportunities of Cloud Computing, participant Amir added, *"Cloud is something that you can store your dream somewhere and you can play with your dream whenever and wherever you want...."* (Amir, see C: 4, S: 4.8).

Although participant Plabon is completely aware of the opportunities of Cloud Computing, he is, however, really concerned about its drawbacks, especially in the context of Bangladeshi SMEs. He believes that, at present, the whole Cloud Computing concept is unclear to most of his countrymen, especially the majority of SME owners or managers in rural areas:

"…. The concept of Cloud Computing is not clear to everyone in the SME sectors in Bangladesh because of not having enough Cloud Computing related resources, training institutes, absence of enough Cloud providers and lack of private IT firms' and government initiatives…." (Plabon, see C: 4, S: 4.4).

In order to describe the drawbacks of Cloud Computing, some of the respondents mentioned that initial setup or implementation cost of Cloud Computing is really expensive and how they were very concerned about the financial situation of the Bangladeshi SMEs. Many of them added that most of the Bangladeshi SMEs are not financially strong enough to invest money in implementing new technology and would rather invest money in their businesses. Some of the participants strongly believed that they are right because they need to stay in the business market. However, even after implementing Cloud Computing, there is no guarantee that there businesses would survive because of a lack of skills and knowledge of Cloud Computing.

"….Cloud Computing is so expensive to implement and use so why do I need expensive thing if I can make my customers happy within my limited investment and services. Moreover, there are many things connected in a parallel way that we are not even clear of like skills and knowledge so we cannot make customers full clear about it…." (Ms Poddar, see C: 4, S: 4.10).

In addition, some participants believed that Cloud Computing has huge drawbacks in terms of complete dependency on the Internet. They mentioned that one of the weakest aspects of Cloud Computing is relying fully on the Internet. They further added that if there is no Internet that means no Cloud, and many of them frequently said, "offline Internet means offline Cloud". Moreover, some of the participants added during their interview that there is a possibility that the lower speed of the Internet could affect Cloud, which potentially cannot be beneficial for business, especially SMEs.

"…. Cloud Computing is fully Internet dependent, which is one of the weakest sides of Cloud Computing because without the support of Internet there is no Cloud. Moreover, poor Internet connection may lead to disruption on the Cloud Computing services, which is of course not good for the business…. And in the perspective of Bangladesh, there is always poor Internet connection or no Internet as well so how are they going to use Cloud Computing and without the Internet, Cloud is no use, which would be potentially offline Cloud…." (Joarder, see C: 4, S: 4.7).

Some of the participants mentioned that the question of high security and issue of privacy with a lack of firm support is another drawback of Cloud Computing. They said that Cloud is accessible for everyone, so anyone can use it from anywhere, and so there is a possibility of a data breach. In addition, many of the participants strongly stated that Cloud providers do not offer assurance that business data will not be compromised by their

dissatisfied staff or even the likelihood of compromising data through the practice careless login.

".... Infrastructure is not fully ready yet to ensure customers' data security in Bangladesh.... Moreover, due to open access Cloud is more vulnerable, which is a possibility of data being compromised. In addition, there is no strict law in place in Bangladesh to prevent data breach from open access of data..." (Ms Poddar, see C: 4, S: 4.10).

5.3.3.2: Summary of Theme Three:

From the analysis of the opportunities and drawbacks of Cloud Computing by the Bangladeshi SMEs under theme three above, it has been acknowledged that apart from a limited number of SMEs, most of the participants SMEs have adequate ideas and knowledge. However, some of their responses showed they have less knowledge of the advantages and disadvantages of Cloud Computing and could not articulate properly. In addition, some of their understanding of the benefits and obstacles is too vague. As a result, this study concludes that the findings of the analysis of opportunities and drawbacks of Cloud Computing by the Bangladeshi SMEs are really imprecise.

5.3.4: Theme Four: The Reasons for Bangladeshi SMEs to Adopt or Not to Adopt Cloud Computing are Not Fully Clear

Sub – Theme 4A: Opportunities of storing and managing huge amounts of various types of non-   structured data

Sub – Theme 4B: Offering flexibility, scalability in resource utilization, quick recovery, automatic software updates, cost effectiveness of hardware, compatibility and more team work

Sub – Theme 4C: Lower technology risk and high data security with easy and faster accessibility of data and information and all time availability

Sub – Theme 4D: Can provide effective IT support, technical skills and getting and solving customers' queries

Sub – Theme 4E: Easy communication throughout the world and marketing support for the business

Sub – Theme 4F: Secure and can provide multi-tenancy with accurate inventory management and figures of daily profit and loss

Sub – Theme 4F: Can make business smarter, faster, organised, accurate and reliable

Sub – Theme 4G: Mind set of SME owners or managers are still backdated and no clear idea of all the features of Cloud Computing

Sub – Theme 4H: High implementation and managing cost with ensuring security and privacy

Sub – Theme 4I: Knowledge gap of customers, suppliers and possibility of data misuse

Sub – Theme 4J: Lack of Cloud Computing resources, training institutes, absence of Cloud providers and lack of support from private IT firms and government

5.3.4.1: Interpretation of Theme Four

This is one of the most important themes where readers will come to know respondents' individual feelings or thoughts about transferring or not transferring to Cloud Computing. In order to interpret those feelings, I have divided the respondents into two groups, namely Cloud user respondents and non-Cloud user respondents. The reason I have divided them into two groups is because of my intention to find out the root cause of being in favour of moving to Cloud Computing and opposing moving to Cloud Computing. In order that readers have a clear idea of the differences between traditional technologies and Cloud Computing, and how Cloud Computing changes an SME's internal and external business. Readers will also come to understand respondents' feelings of why they do not want to move to Cloud Computing owing to various obstacles.

At first I wanted to know why respondents think Bangladeshi SMEs should move to Cloud Computing. Therefore, I asked them why they thought SMEs needed to move to Cloud and almost all of the respondents from the Cloud users group mentioned the various advantages of Cloud Computing. In addition, some of them also mentioned some of their businesses' internal and external changes that they could now see after implementing Cloud Computing. Respondent Plabon (see C: 4, S: 4.4) came up with many of the benefits of Cloud Computing. He believes that Cloud Computing has a large range of advantages, which are really supportive for SMEs if they can use all of them effectively. This statement was fully supported by the respondent Badhan (see C: 4, S: 4.2).

> *"….Cloud Computing is more secure and processing data is very faster than traditional systems and moreover, Cloud Computing is very reliable. Mainly we have move to Cloud Computing because of security and authenticity of the stored data…."* (Plabon, see C: 4, S: 4.4).

Some of the respondents further believed that owing to the high security facilities of Cloud Computing, their storage system would become highly secure, which they admitted was one of the dramatic changes within the business. A few of the participants strongly emphasised that traditional systems were not so secure and, therefore, they had faced hacking problems several times. After having implemented Cloud Computing, they

did not face any hacking problems. They believe that they are now in a position to ensure that their storage data is fully safe and secure.

> *"....there are some changes like our storage system/database systems are highly secure now in our business, which is definitely dramatic changes within the business. This is because, previously we used to use traditional database, which was not highly secure but now we can offer highly secure storage guarantee to our clients. And in terms of improvement, I would like to say while we use to use traditional system we have faced lot of hacking problems due to less security but since we have started using Cloud Computing, we have not faced any hacking problem and the main difference is security because in the local server there is very low security but Cloud Computing provides high security...."* (Plabon, see C: 4, S: 4.4).

However, on the other hand, respondent Ms Poddar (see C: 4, S: 4.10), as well as other Cloud non-users, strongly opposed the security issue. They strongly believed that there are many issues connected in a parallel way, which are obstacles to adopting Cloud Computing and one of them is the security and privacy of Cloud Computing. They admitted that from the perspective of Bangladeshi SMEs, security and privacy is a huge question. Some of them confessed that, at present, Bangladeshi SMEs are not in a position to use Cloud Computing. This is because there are not enough reliable Cloud providers available in Bangladesh:

> *"....we are not in a position to offer all the features that Cloud Computing offers and there are huge question about security and privacy. Moreover, we are not sure whether can we provide enough security to the customers data or not...."* (Ms Poddar, see C: 4, S: 4.10).

Moving onto a second important question, which is related to cost, I wanted to know the impact that cost is having. Is cost convincing SMEs to adopt Cloud Computing or not? So, in relation to cost, almost everyone from the Cloud users group acknowledged that using Cloud Computing is cost effective. They strongly believed that maintaining Cloud Computing in business is not too expensive because within the Cloud environment, users do not need to spend money on upgrading software or installing hardware. They all strongly believed that because of this, SMEs could save lot of money, which they could invest in other areas of their businesses.

> *"....in general, I would say opportunities of Cloud Computing are easy way to use and cost saving because Cloud Computing updates software automatically and updated server is always ready to use and moreover, in Cloud Computing, users' do not need to install any hardware to use and no need to spend money...."* (Badhan, see C: 4, S: 4.2).

However, again there were some opposite thoughts from some of the non-Cloud users' group. Some of them strongly believed that cost is the first obstacle encountered by SMEs in their adoption of Cloud Computing. According to some of them (example: Ms Poddar), Cloud Computing is too expensive for Bangladeshi SMEs. She further added that,

in general, SMEs have less money to invest and adopting Cloud Computing initially requires a huge amount of money. There is also the issue that later on, they would need to continuously invest money for maintenance of the system, which would be very difficult for them. Some of the participants who are non-Cloud users confessed that Cloud Computing is a relatively new technology and, therefore, if users did not show an interest in using it, then Cloud Computing adoption would be a big loss for the SMEs, because system will not be accepted by the users and therefore CC would be no use for SMEs. And there is a possibility that they would not even be able to survive.

> *"....from the business perspective firstly cost is a huge obstacle to stopping us to move to Cloud Computing because Cloud Computing is relatively new and expensive technology so if customers do not like the system then it would be a big loss for our business...."* (Ms Poddar, see C: 4, S: 4.10).

I have, in addition, raised questions about other business changes that Cloud users could really think off. Almost all of the Cloud user participants strongly agreed that, because of Cloud Computing, their methods of communication have been changed dramatically. They mentioned that previously it was difficult for them to see, from their head offices, how the different branches of their businesses were doing? But because of the easy accessibility of Cloud Computing, available for 24 hours per day, seven days per week with IT support and different kinds of file sharing facilities, communication became very easy for them. Some of them further confessed that Cloud Computing made their lives easier because Cloud Computing provides a multi-tenancy facility and by using this facility, many of the staff in the business could perform tasks collectively, which was impossible for them previously.

> *"....think about the nature of business now days. It is very competitive world where we are running business. Previously we were unable to communicate with other branches in terms of file sharing, product information or any other queries but by using Cloud Computing, it is become very easy for us to communicate and one branch is now able to transfer data to other branches or factory and then we could supply the product as quickly as possilbe...."* (Charkraborti, see C: 4, S: 4.3).

In addition, respondent Chakraborti who is a Cloud user, added that by using Cloud Computing, they are now managing their production department in the factory, managing their customer care by providing online solutions, managing their HR system, logistics and other departments very quickly. Moreover, respondents like Chakraborti also mentioned that Cloud Computing gives them an opportunity to complete their marketing, which was not possible for them when using traditional technology. On these points, there were no

thoughts from the Cloud non-users respondents. They mentioned that they did not have any real ideas about this because they were not using the Cloud system in their businesses.

I further asked if they could tell me about other business functions that have been changed because of introducing Cloud Computing. Some of the respondents from the Cloud users group mentioned that, after implementing Cloud services, they had managed to improve their whole system, such as inventory management, faster services, accurate price and daily statistics of profit and loss. They mentioned that performing these tasks was really difficult for them while they were using a traditional system.

> *"....in terms of business improvement and changes, we have found accurate inventory management, can find profit and loss daily basis and providing really faster and accurate service to the customers...."* (Rahman, see C: 4, S: 4.6).

By supporting participant Rahman's statement, respondent Joarder further added that he has found many changes in their business since implementing Cloud. He stated that by using Cloud Computing, their business had become smarter, faster, organised, accurate and more reliable. He mentioned that converting from the traditional system to Cloud Computing is a smart way of doing business.

> *"....of course huge changes and I do feel that compared with others in the market my business is more smarter than others and very organised and accurate and reliable. And the main change compared with others is our business is much faster and though they are doing business but we are doing business in a smart way...."*(Joarder, see C: 4, S: 4. 7).

However, on the other hand, all the Cloud non-user participants emphasised that there is a high risk of customer data being compromised by dishonest staff employed by Cloud providers. Therefore, customers' sensitive or even personal data could be shared amongst other users, which non-user participants described as a huge risk associated with Cloud Computing. They have further admitted that Cloud Computing is open to everyone, so anyone can access personal and confidential data, which they mentioned as one of the main reasons for not moving to Cloud.

> *"....Cloud is open for everyone so anyone can access data from anywhere and moreover, within business there is a possibility that staffs can misuse customers' data...."* (Ms Poddar, see C: 4, S: 4.10).

In addition, respondent Ms Poddar strongly acknowledged that most of the Bangladeshi SME owners or managers have a very old fashioned mentality and believe that they can

only rely on their existing system and do not want to change this owing to fear of losing business. Moreover, Ms Poddar added that most of the Bangladeshi SME owners do not want to spend money on anything else apart from buying material items. She believes this is because of an out-of-date mentality. Furthermore, she mentioned that there is a lack of understanding of Cloud Computing and that this is a reason for using it or not using, according to the customers, suppliers, competitors or even business partners. Beside these, there are not enough training resources or institutions available for SME owners or managers to up skill themselves with Cloud Computing. On top of this, all the Cloud non-users admitted that there are not enough Cloud providers available in Bangladesh who can support them in understanding Cloud Computing and its various benefits in the business, because the whole concept of Cloud Computing is unclear to most of the SME owners. They also mentioned that in order to move onto a Cloud solution, they need a helping hand from private IT firms and the Bangladeshi government, which has been entirely agreed with by respondent Plabon from the Cloud user group. He confessed that:

> *".... Cloud Computing was not so straightforward to the Bangladeshi SMEs due to lack of skills, knowledge and of course infrastructures. Moreover, concept of Cloud Computing is not clear to everyone in the SME sector in Bangladesh because of not having enough Cloud Computing related resources, training institutes, absence of enough Cloud providers, lack of private IT support and of course government's support...."* (Plabon, see C: 4: S: 4.4).

5.3.4.2: Summary of Theme Four:

From the interpretation of Theme Four, it has been revealed that most of the participants have a mixed understanding of whether they should move to Cloud Computing or not. Although most of the Cloud user participants have access to the various advantages of Cloud Computing and changes of internal and external business functionalities that they have been enjoying, they were not fully confident about some of the changes they have mentioned and what those changes have brought about. On the other hand, Cloud non-user participants mainly focused on the security and privacy aspects of Cloud Computing. It has come to my attention that they were not so sure of what to do if there was a loss of data or if a compromise occured. Moreover, they have added that in terms of any transformation brought about by Cloud computing, they need to have a basic understanding of the necessary skills and knowledge that it requires. It was also clear to me that if Cloud non-users managed to get all the relevant support from private IT firms, financial authorities and the Bangladeshi government, then they might move onto Cloud Computing. But based on the reality of the situation of Bangladeshi SMEs skills, knowledge, financial condition, government's support, this study has concluded this theme with the understanding that

there is a great deal of opportunity amongst Bangladeshi SMEs to either move to Cloud Computing or not to move to Cloud Computing.

5.3.5: *Theme Five: Understanding the Influential Issues of Cloud Computing Adoption by Bangladeshi SMEs is Unclear*

Sub – Theme 5A: Providing customisation of various network functions with technical flexibility

Sub – Theme 5B: Providing stable and immense data storage space with multiple user access

Sub – Theme 5C: Offering high security with business adaptability, agility and flexibility

Sub – Theme 5D: Offering marketing facility with faster, time saving and easy multi-access & multi-shared database

Sub – Theme 5E: Offering faster data recovery, automatic software update with better teamwork

Sub – Theme 5F: Ecology friendly, accessible from anywhere, accurate technology with less possibility of data loss

5.3.5.1: Interpretation of Theme Five:

This is one of the most important themes for this study, where the respondents' knowledge of understanding all of the possible influential issues of Cloud Computing adoption will be explained. This theme is very significant for this study because 1) the findings of this theme will support me in developing a framework in order to provide the answers to the research questions. 2) To analyse the participants' understanding of all of the possible influential issues of Cloud Computing adoption, there are six sub-themes I have used to support the main theme. All of the sub-themes reflect the possible advantages that Cloud Computing offers. From the research text and individual insights of the participants, it has been identified that the majority of the respondents have some sort of idea of the influential issues of Cloud Computing, but some of them were not sure about them.

Some of the participants believed that the influential issues of Cloud Computing adoption are concerned with the customisation of various network flexibility combined with an extensive amount of technical support. Some of the participants believed that customisation of the network is one of the most important advantages of Cloud Computing, so that users do not need to think about it, as Cloud Computing providers

ensure that customisation. In addition, many of them emphasised that Cloud Computing always provides technical flexibility and support and, therefore, users do not need to think about any sort of problem, as there is always someone to offer guidance.

> *".... Influencing factor that Cloud Computing has to influence SME sectors especially SME owners or managers to influence adopting Cloud Computing is customisation of network functions with data caching and compression...."* (Plabon, see C: 4, S: 4.4).

Respondent Plabon further believed that provision of not only customisation of network functions but also Cloud Computing can offer huge storage space with multiple user access at the same time. According to Plabon (see C: 4, S: 4.4), *"Cloud Computing always ready to offer stable and immense amount of data storage space as well as offers many users to use the same system at the same time"*.

Almost all of the respondents' agreed fully that security is one of the most important influential issues of Cloud Computing. They strongly believed that the Cloud system is highly secure, so that there is very little possibility, or sometimes zero possibility, of data being lost or compromised.

> *".... Security and privacy is one of the biggest advantages that Cloud Computing offers and due to having wide-ranging security, customers data will be highly secure and there is no way users' personal stored data will be shared with other...."* (Amir, see C: 4, S: 4.8).

Some of them further added that Cloud Computing offers not only high security and privacy but is also ready to offer speed and flexibility to businesses. In addition, respondent Joarder, who is a managing partner, mentioned that Cloud Computing works much faster, in a more secure and reliable way. He also added that owing to the provision of multi-user access, at the same time in different topographical areas, many users can have the same type of access to data and, therefore, they can share that data with others, which Joarder believed is timesaving technology.

> *".... Apart from many influential factors of Cloud Computing very specifically quick and flexible services support users to resolve any particular issue straightaway. Moreover, Cloud Computing offers multiple users access to use the same system from anywhere in the world at the same time and can exchange their respective data amongst groups or transfer data from one department to another...."* (Joarder, see C: 4, S: 4.7).

Moreover, respondent Chaudhury (see C: 4, S: 4.5), who is a Managing Director of a business and a Cloud non-adopter, strongly believed that *"advertising or marketing*

could be the best influencing issues of Cloud Computing". This statement is fully supported by respondent Ms Poddar (see C: 4, S: 4.10) who is also a Cloud non-adopter.

Many respondents strongly agreed that the most influential factor of Cloud Computing is auto installation or auto update of software. They truly believed that by having 24/7 automatic hardware or software installation facilities, users do not necessarily need to wait for an updated version of the software or even need to pay for hardware installation. For example, respondent Joarder (see C: 4, S: 4.7) mentioned:

> *"To me, the best influencing factor of Cloud Computing is automatic software update, which always updating software by itself so Cloud users do not need to wait for updated software to use. Moreover, Cloud Computing provides opportunity of doing considerable amount of greater team work compared with traditional technology".*

Respondent Joarder (see C: 4, S: 4.7) further added that Cloud Computing is not only flexible, faster, accessible anywhere, and has automatic software update technology, but also has green technology. According to Joarder,

> *"....Cloud Computing is ecologically friendly technology....".*

5.3.5.2: Summary of Theme Five:

From the responses of the participants, this study has acknowledged that not all of those taking part have a clear idea about the influential issues of Cloud Computing. Although most of the participants tried to mention a list of influential issues, they could not, however, explain how those issues would support their businesses. Therefore, this summary finds that the participants' understanding of the influential issues of Cloud Computing adoption is still unclear.

5.3.6: Theme Six: Understanding of the Factors Affecting Cloud Computing Adoption by Bangladeshi SMEs is Impeccable

Sub – Theme 6A: Lack of skilful and knowledgeable IT workforce owing to fewer opportunities

Sub – Theme 6B: Less interest in adapting to new technology owing to less understanding

Sub –Theme 6C: Absence of guaranteed supply of electricity combined with a high Internet price, poor speed and a lack of Internet management skills

Sub–Theme 6D: Absence of continuation to follow-up work owing to political unpredictability, corruption and bureaucracy

Sub–Theme 6E: Lack of public awareness and less support, guidelines and slow development policy from Bangladeshi government and Private IT firms

Sub – Theme 6F: Lack of IT-based education systems with inadequate training

Sub – Theme 6G: Extra VAT on computer accessories and high cost of business plans

Sub – Theme 6H: Lack of availability of IT expertise, motivating people and accessing information

Sub – Theme 6I: Absence of the right people at the right place with no faster networking plan

Sub – Theme 6J: High possibility of data being compromised owing to lack of security

Sub – Theme 6K: Lack of financial resources' support from financial organizations

Sub – Theme 6L: Absence of proper infrastructure and telecommunication systems for adoption of Cloud Computing

5.3.6.1: Interpretation of Theme Six

Theme six is the key theme for this research because it represents the respondents' ideas and knowledge about all the factors affecting the failure of Cloud Computing adoption in Bangladeshi SMEs. This theme is completely based on the respondents' own understanding and perceived experiences within their businesses. In order to give me the most relevant affecting factors, I have helped participants by giving them hints but not real reply/answers at times as a prompt to give them a chance to think in more depth. As stated above, this theme is the key theme of this study because it will help me in answering the questions posed in the research aims and objectives. In addition, it will completely support me in identifying all of the possible issues affecting the failure of Cloud Computing adoption, as primary data from the respondents, which will further support me in the discussion chapter.

To support the main theme, there are several sub – themes have been emerged from the respondents' answers and from the research texts. All of the sub-themes, therefore, are collectively the respondents' own words because some of the similar responses were mentioned by different respondents. By reviewing the individual insights and interpretations, it has become clear to me that almost all of the respondents are fully aware of most of the issues affecting Cloud Computing adoption for SMEs in Bangladesh.

During the interview the participants revealed many of the affecting factors. Initially, Badhan mentioned that he thinks the first and foremost affecting factors are a lack

of awareness amongst Bangladeshi people, and especially those in the Bangladeshi SME sectors, of using technology in business. He further added that at present in Bangladesh there is not enough IT knowledgeable people owing to a lack of opportunities. Those who are knowledgeable about IT are migrating to oversees countries and, therefore, their skills are not being used in Bangladesh, which Badhan thinks is one of the possible affecting factors. He stated:

> *".... Most of the Bangladeshi peoples are not aware about advantages of using technology into business and specially most of the SMEs in rural areas are running by elderly peoples and most of theme are uneducated so they even do not know the basics of technology but no relevant authorities are thinking about it taking care of them. Moreover, skilful and knowledgeable manpower are not staying in Bangladesh because of not having any support or initiatives from the Government therefore, young and enthusiastic IT educated peoples are moving to oversees countries and using their skills there but not in Bangladesh...."* (Badhan, see C: 4, S: 4.2).

At the same time that Badhan mentioned the lack of awareness of Bangladeshi people, respondent Chakraborti gave me the literacy figures for Bangladesh, which clearly showed me that about half of the total population is not literate, as well as being uneducated. Therefore, Chakraborti exhibited his concern that unless his countrymen were fully literate and educated, development of the country would be very difficult, and impossible.

> *".... Actually public awareness in Bangladesh is really low; although we say about 60% peoples in Bangladesh are literate and around 50% of them are educated so you could easily imagine there is a gap of understanding and if 50% of peoples are in a country are not educated then how are you going to develop the country...."* added by Chakraborti (see C: 4, S: 4.3).

Respondent Chakraborti, however, mainly focused on some external and technological factors that explain the challenges of adoption of Cloud Computing by Bangladeshi SMEs. Another respondent also agreed with Chakraborti said on the external and technological points. Whereas, some of the respondents made a unique comment by strongly believing that the absence of a guaranteed, full supply of electricity with high Internet costs, a poor speed and a lack of Internet management skills are the main factors affecting adoption of Cloud Computing. They believed that the main weakness of Cloud Computing adoption in Bangladeshi SMEs is not having a guaranteed, 24/7, full supplies of electricity and in some of the rural areas there is no electricity at all.

> *".... of course electricity is one of the major factors. I can remember, still not whole Bangladesh covered by electricity and there is not 24/7 electricity supply. And running*

Cloud Computing you need Internet and without electricity how are going to use Internet....” question asked by Joarder (see C: 4, S: 4.7).

They have further added that the current Internet price is too high and that Internet providers are not providing a high enough speed, which is one of the biggest problems and moreover, there are not enough technology experts available to support people in managing the Internet in an efficient way.

“....In our country, Internet connections/speed is really poor. We need to massively improve this in order to adopt CC or relatively new technologies. Moreover, we have got huge lacking in managing Internet because we do not have enough skilful manpower or guidance to support and guide SMEs to move on to the right path, which is a huge gap in Bangladesh....” (Chakraborti, see C: 4, S: 4.3). He also strongly suggested that *“....if we cannot improve it then we would not be able to come out from the problem....”*.

However, respondent Badhan did not fully agree with most of the respondents and he partially disagreed about the electricity issues. He did, however, agree with the Internet issues of the other respondents.

“....electricity is much better position now but however that could be affecting factor as well because we do not get continuous supply of electricity 24/7 but I believe, within next couple of years electricity would be stable....” (Badhan, see C: 4, S: 4.2).

In addition, almost most of the respondents agreed that political unpredictability; corruption, bureaucracy and non-execution of one government's plans by a following government are also factors affecting the non-adoption of Cloud Computing. Almost all of the participants strongly emphasised that, in Bangladesh, corruption and bureaucracy are everywhere, which can dissuade many people's interest in doing something exceptional. All of the participants mentioned that owing to political instability, almost every sectors are affecting and they strongly added that because of a lack of political stability and no continuation of government work, businesses and especially SMEs are extremely concerned about investing money in using technology in their businesses because uncertainty creates anxiety.

“.... we have got very huge problems in our countries politics and those problems in IT sectors are massively impacted because in government level, we do not have enough IT-skilled manpower, who can come up with excellent ideas for the country. Moreover, due to the different views of political parties, if one government takes some initiatives to develop some areas e.g. ICT then another government would stop those projects....” (Chakraborti, see C: 4, S: 4.3).

However, only respondent Joarder was not so convinced with the other respondents' opinions about political unpredictability and, therefore, he just simply disagreed with the others by mentioning that:

".... Yes some sort of but I do not think so that much because whatever initiatives have been taken by the present government will be fully stopped or partially stopped or delayed by the other political parties if they come on the power in next term because their way of thinking and dealing things could have been different compared current government's initiatives...." (Joarder, see C: 4, S: 4.7).

Although Joarder did not fully agree with the others, he still added that there might be some changes if a government changeover happened during the next parliament elections. He believed those slight changes could be an affecting factor.

Another respondent was very optimistic about the adoption of Cloud Computing by SMEs but he thinks there are mainly three factors that could affect the adoption process. The same respondent strongly believed that Bangladesh is not ready yet and this is not the time for Bangladeshi SMEs to adopt Cloud Computing, unless corruption and bureaucracy ceases everywhere.

"....to me, the biggest affecting factor is time and I believed that is what it is. In addition, I would say corruption and bureaucracy are another affecting factors that I could think of...." (Rozario, see C: 4, S: 4.9).

Another respondent further added that corruption and bureaucracy in both the private and public sectors are not the only factors having an impact on the adoption of Cloud computing. They mentioned that the government and private IT firms' guidelines and slow moving development policies are the biggest impacting factors.

"....guidelines from private IT firms and slow moving development policies are not well articulated therefore, whole process take lot of times, which some times frustrating...." (Rahman, see C: 4, S: 4.6).

Some of the respondents were highly focused on the current education system in Bangladesh, which is really very old fashioned and not technology-based. Therefore, students are not getting IT based education from their foundation level. They all somehow agreed that the traditional education system should be replaced with an IT based education curriculum. According to some of them, the traditional education system is also a factor affecting the adoption of Cloud Computing.

> *"....traditional education system cannot help you to understand what is going on all over the world. But unfortunately, in Bangladesh, our primary, secondary, higher secondary education systems are still very academic based rather practical...."* (Joarder, see C: 4, S: 4.7).

And respondent Chakraborti (see C: 4, S: 4.3) further added that:

> *"....there is no alternative of education. But our education system is still very backdated. They are not focusing on practical life related lesson but still relying on theory. Unless a student comes to know about IT/ICT/CC from the school how they would be interested on it? They are not showing their real interest on it because they were not told, there were not shown. So this is another factor that massively affecting peoples in Bangladesh to accept something new like Cloud Computing...".*

A few of the respondents further added that accessing the right information is one of the main affecting factors owing to not having a central database. Moreover, it is very difficult, especially for SMEs, to find knowledgeable persons who are Cloud Computing specialists and know Cloud Computing thoroughly.

> *"....main barriers are accessing right information as; no one is working or making a central database for the business owners or even government and first and foremost affecting factors are finding those knowledgeable persons who know about Cloud Computing properly...."* (Chaudhury, see C: 4, S: 4.5; Ms Poddar, see C: 4, S: 4.10).

Apart from above-mentioned possible factors affecting the adoption of Cloud computing, almost all of the participants' entirely agreed that currently in Bangladesh there is high VAT on all computer accessories, which does not encourage people to buy a computer. Therefore, they are indirectly forced to stay away from using technology, which is really not bringing them closer to the technology:

> *"....of course VAT is an issue. Now we have to pay minimum 4% VAT on buying computer accessories. So obviously, especially lower level customers going to think twice before they buy any computer accessories...."* (Chakraborti, see C: 4, S: 4.3).

Chakraborti personally strongly believed that in order to influence more people and bring them closer to technology, all computer-related technologies and IT related infrastructures should be either VAT free or have a low VAT rate. Therefore, he strongly suggested that:

> *".... Personally I believe, that to influence more customers of buying IT infrastructures and get used to with ICT there should not be any VAT on it....".*

Respondent Joarder clearly stated that the problem in Bangladesh, at the moment, is that there is no right person sitting in the right place to make something new or implement some new ideas. Therefore, the country is way behind, specifically at the top-

level of governmental organizations, where there are not enough IT educated personnel who understand the importance of technology (such as SME foundation). Therefore, they are unable to support rural SME owners or managers in their efforts to implement technology into their businesses.

> *"....in order to adopt or implement some new ideas you have to ensure right people will be there for that to deliver. But in Bangladesh, there is no right people sitting on the right place. Therefore, new initiatives are either criticising or stopping at the beginning. For an example, a student completed MBA but working in an IT firm without studying the basics of IT. Then how would that person going to welcome IT related new initiatives...."* (Joarder, see C: 4, S: 4.7).

In addition, respondent Ms Poddar strongly emphasised that the lack of assurance of security is another factor that affecting the adoption of Cloud Computing. She believed that the infrastructure of most of the Bangladeshi SMEs is not ready to provide a 100% secure service and, therefore, they are not showing an interest in adopting new technology like Cloud Computing.

Furthermore, respondent Plabon added a very strong point. He actually criticised Bangladeshi private and public financial organizations. He mentioned that for reference reasons, most of the time, most of the Bangladeshi SMEs do not get any financial support from financial organizations. Therefore, even after showing a real interest in using technology in business, most of the SMEs just stood back because they do not have that much of their own money to invest. Plabon strongly suggested that there should be some sort of basic criteria for the SMEs to fulfil in order to get some support from banks and other financial organizations. Only then would SMEs be able to invest money in adopting something new:

> *"....but do not forget that Bangladeshi SMEs are not getting adequate support from the financial organizations, which also stopping them expand their business...."* (Plabon, see C: 4, S: 4.4).

Furthermore, respondent K Saha agreed with respondent Plabon and they both mentioned that Bangladeshis are in the habit of using their existing technology. Therefore, their mind-set just relies on the on going system and process. They do not want to accept something new. However, Badhan mentioned that although Bangladeshis are not leaving their old-fashioned mind set behind, they like to criticise whenever something new comes up, which he believed another is affecting factor:

"....we do not want to adopt new things into our life or business because we do not want to try but ready to say 'NO' to any new technologies to adopt...." (Badhan, see C: 4, S: 4.2).

Finally, almost all of the participants mentioned that there is lack of government support and initiative to try to influence SMEs, especially in adopting new technology and use it in their businesses. Moreover, there are no influential advertisements from governmental level institutions or from the private level to make technology a buzzword to all of the country, which most of the respondents also believed was an affecting factor:

"....to be honest, government is thinking about development of SMEs to adopt ICT but in reality, government do not have adequate focus on it. Especially, if I talk about rural area where education percentage is really low but they are running most of the SMEs but how can they adopt new technology government is not talking about it. Government is only focusing on division and district levels. They are not publicly spreading their goal and vision that what are they going to do and how are they going to support SMEs? So, how SMEs will adopt CC...." (Chakraborti, see C: 4, S: 4.3).

5.3.6.2: Summary of Theme Six

To conclude theme six, having identified the factors affecting the adoption of Cloud Computing by the participating respondents of this study, it has become clear to me that all of them have enough understanding, ideas and knowledge about the different factors that might possibly affect Cloud Computing adoption by SMEs in Bangladesh. As a result, this study summarises the findings of the participants' understanding of the factors affecting Cloud Computing adoption as impeccable.

5.3.7: Theme Seven: Awareness of Digital Bangladesh and Government Initiatives are Not Yet Well Disseminated Amongst Bangladeshi SMEs

Sub – Theme 7A: Concept of Digital Bangladesh is unclear in general

Sub – Theme 7B: Vision and mission of Digital Bangladesh is not clear to the nation

Sub – Theme 7C: Government initiatives of Digital Bangladesh are not influential

Sub – Theme 7D: Government's Digital Bangladesh Initiatives are not fully implemented

Sub – Theme 7E: Less initiative from the government for the SMEs to use Internet

Sub – Theme 7F: Inadequate government initiatives for digitalization process

Sub – Theme 7G: Focus of Digital Bangladesh Initiatives are not microeconomic based

Sub – Theme 7H: Continuation of Digital Bangladesh initiatives are uncertain

Sub – Theme 7I: Initiatives of Digital Bangladesh are based on metropolitan cities

5.3.7.1: Interpretation of Theme Seven

To understand the Digital Bangladesh concepts, the government's initiatives and focus of Digital Bangladesh will be presented under Theme Seven. This is another important theme because under this theme, participants' individual thoughts of Digital Bangladesh will be presented as a whole. In order to support the main theme's claim, there are a few sub – themes, which have been developed based on the participants' responses. The main intention of developing sub – themes here are to support the main theme by providing the key findings from the interview. After completing the whole interpretation of this theme, readers will be able to understand what the "Digital Bangladesh" concept is, how the government is thinking, planning and implementing their initiatives to build Digital Bangladesh. In addition, this theme will provide a debate on whether the "Digital Bangladesh" concept is only for large organizations or for small business organizations. Moreover, this theme will provide an answer based on the participants' thoughts, on how governments should carry out and implement their initiatives to build Digital Bangladesh by 2021.

Before proceeding with the main discussions about "Digital Bangladesh", I asked a simple question to the participants about how they define Digital Bangladesh. In line with the responses to this question, almost all of the participants replied that the concept of Digital Bangladesh is not totally clear to them. Why is the concept not clear? Whenever I raised this question, most of them mentioned that the term 'Digital Bangladesh' was brought to the nation by the current Bangladeshi government but they still could not define the term. Therefore, Bangladeshis are not so sure about the term 'Digital Bangladesh', what its aims and objectives might be, and how the government is going to build Digital Bangladesh remains unclear. Whenever I asked respondent Badhan to define Digital Bangladesh, he was not so sure about how to define the term. However, he mentioned that:

> *"....Digital Bangladesh does not mean that I am using Wi-Fi and chatting on Facebook or others is Digital Bangladesh but to me, Digital Bangladesh is as a person what am I thinking how much am I modern and how much am I digital and how much can I adopt new technologies...."* (Badhan, see C: 4, S: 4.2).

Some of the respondents defined Digital Bangladesh in a different way. They mostly focused on what they had heard from the government and from the media. They were not sure, however, whether the meaning of Digital Bangladesh is exactly like that or not. For example:

> *"....Digital Bangladesh is a process of digitalisation where government will support countrymen to be more smart by using Internet and businessmen will be using technology (ICT) into their business rapidly to expand their business...."* (Joarder, see C: 4, S: 4.7).

Joarder, however, could not explain how Bangladeshis might be smarter or in what sense they will be smart. In addition, Joarder mentioned that like himself, most of the SME owners or managers are not sure about how they are going to use the technology in their businesses because he strongly believes that there are no business technology guidelines for SMEs. Whenever I mentioned ICT policy and further reminded them that how government is going to support SMEs to use technology within the policy then Joarder just criticised the government saying that they should not keep it only in their minds but should broadcast it publicly. Otherwise, making and keeping this policy as a document is not going to support SME businesses. Participant Joarder added this. In order to support the unclear mission and vision of the Bangladeshi government's Digital Bangladesh initiatives, respondent Chaudhury very strongly mentioned that:

> *"....I really do not know where are you going to use this information but on God and on behalf of other SMEs and countrymen I am ensuring you that we are not still clear about their vision and mission of Digital Bangladesh...."* (Chaudhury, see C: 4, S: 4.5).

So, at this point it has come to my attention that none of the respondents (examples given above) were aware of the whole concept of 'Digital Bangladesh'. Moreover, they were not sure about the goals of the 'Digital Bangladesh' well. So, the next question that came to mind was "how is the government taking initiatives to build Digital Bangladesh and how influential are those initiatives for the countrymen?" In response to this question some of the respondents remained very positive about the initiatives but on the other hand, some of them were very critical and negative. For example, respondent Chakraborti strongly supported the government's initiatives for "Digital Bangladesh". He mentioned that:

> *"....Bangladesh government has taken many initiatives to build Digital Bangladesh for example reforming ICT policy, which gives us enough ideas about their vision of 2021...."* (Chakraborti, see C: 4, S: 4.3).

With Chakraborti, respondent Badhan further added that as most of the people are not sure about the term "Digital Bangladesh", the government needs to define the term first to the countrymen, and then the countrymen will be more interested in moving towards new technologies such as Cloud Computing. They were both very concerned about "Digital Bangladesh" and mentioned that the country would not become digital by itself.

For that to happen, the countrymen would need to change their thinking. Moreover, Badhan also mentioned that the government would need to make changes to the education system to make it more technology-based. This would make technology more interesting to young students. In addition, Chakraborti stated that the government's focus is mainly on the ICT sectors instead on people, and therefore, the government is clearly missing the opportunity of taking ideas and feedback from the people.

> *"....Government is trying to focus on the ICT sectors but however, their initiatives have to be more people focus and have to give them opportunities to work with the government then only they will work hard to build Digital Bangladesh and can support expansion of ICT use in business...."* (Chakraborti, see C: 4, S: 4.3).

On the other hand, respondent Chaudhury expressed his opinions with too much negativity. He believes that the Bangladeshi government has not got any initiatives for building "Digital Bangladesh". He strongly opposed other participants' thoughts. He personally believes that under the "Digital Bangladesh" context, the government is not doing anything for small or medium-sized businesses and that they do not even have any plan to support SMEs. Their focus is specifically on the ICT sectors and the reason for this is because in Bangladesh, there are lot of multi-national IT companies that are running their businesses. So to keep them happy and continuing with their businesses, the government takes its initiatives from them. Chaudhury strongly denied that the Bangladesh government's "Digital Bangladesh" is really influential for SMEs to expand ICT in their businesses.

> *"....I really do not think that Bangladesh government has got any initiatives to expand ICT in SME sectors. I can see only initiative Bangladesh government taken that is in ICT sectors and this is because there are lot of multinational IT companies are doing business here. So to make them happy government took some initiatives but in terms of SMEs development, government is just making fake sound of ICT expansion, nothing else...."* (Chaudhury, see C: 4, S: 4.5).

Respondent Rahman showed his positive thinking about the initiatives from the government so far in building "Digital Bangladesh". Rahman strongly believed that there is something will gradually happen and at this stage it is hard to see the outcomes, but with time Bangladeshis will appreciate the government's "Digital Bangladesh" initiatives. He personally believed that by focusing on ICT, at least all of the countrymen are currently talking about ICT and technology, which is definitely a positive move.

> *"....In terms of government's initiatives, they just recently announced that they are going to reduce the price of Internet. I may say initially, this is a good movement for the*

government to influence more SMEs to bring under the ICT based services and just because of them I salute them….” (Rahman, see C: 4, S: 4.6).

On the other hand, participant Ms Poddar was very critical at the same time as being very constructive when mentioning "Digital Bangladesh" initiatives. She criticised the government's approach of focussing on "Digital Bangladesh". She strongly emphasised that owing to a wrong approach, the key message of "Digital Bangladesh" is not spreading all the over the country and, in particular, to people living and running businesses in rural areas. She further added that the government's current approach and most of the initiatives will be helpful to those people living in the metropolitan cities and working in multinational companies, but not in rural areas, which she is really concerned about. She strongly emphasized that just because of this biased approach, the whole meaning of "Digital Bangladesh" is not achieving. However, she was hopeful that even if a few SMEs adopt Cloud Computing under "Digital Bangladesh", it would still be beneficial because those SMEs could be role models and others would be able to follow them in using Cloud Computing in their businesses.

> *"….what is advertising about Digital Bangladesh is placing mobile phone in the very rural areas and ensuring Internet access throughout the country and available for everyone but the vision of Digital Bangladesh is not like this that I have got a mobile phone and I am getting Internet connection and that is Digital Bangladesh. To be honest that is not Digital Bangladesh but that could be a part of Digital Bangladesh that someone who did not have mobile or did not know about Internet now know how to access but in a bigger picture that is not the aim of Digital Bangladesh….”* (Ms Poddar, see C: 4, S: 4.10).

Ms Poddar further added that if the digitalization process continues, then there is vast possibility that within the next 4 to 5 years, Cloud Computing will give an alternative option to the SMEs, but she was not in a position to say that Cloud Computing would be the best option for SMEs. She evaluated how Cloud Computing might support SMEs under "Digital Bangladesh" as follows:-

> *"….To me, I would like to think in a different way and that is maybe out of 10 SMEs, 3 of them can adopt Cloud Computing and 7 of them cannot but however, with time those 3 SMEs can influence another 3 SMEs. It does not mean and we should not believe that government would be able to make country digital by 2021 but we need to think almost 50% of SMEs would not be able to be digitalised but if other 50% SMEs can adopt Cloud Computing then of course that would be a positive sign because at least 50% SMEs would be under the thoughts of Cloud Computing. Therefore, I would like to say, within next 4/5 years Cloud Computing would not be the best option for SMEs but surely would be an option for SMEs….”* (Ms Poddar, see C: 4, S: 4.10).

Some of the respondents, on the other hand, fully agreed and strongly criticised government's digitalization process. They did not like government's initiatives. They

thought that the government was not focusing on the right place and instead were focusing somewhere else. Therefore, the government is struggling to convey the "Digital Bangladesh" message to the people of Bangladesh. Those participants mentioned that digitalization is important as well but that this is not the time to focus on land digitalization or making an examinations result sheet as an example. Therefore, some of the participants suggested that the government should focus on "Digital Bangladesh" pillars to achieve the goal of their dream vision 2021: Digital Bangladesh. They strongly pointed out that if the government can focus on the four pillars of "Digital Bangladesh" then citizens will automatically be connected with the technology and, therefore, citizens will support the human resource development, which will support to build Digital government. Moreover, focusing on and influencing technology (ICT) uses in business will support SMEs to expand their businesses. Collectively the government can build "Digital Bangladesh", which was strongly emphasised by the participants.

> *"....to be honest with you, as per my knowledge at present there is no initiatives from the Bangladeshi government to adopt Cloud Computing but their focus is on other side like land digitalization, making result sheets and etc….."* (Plabon, see C: 4, S: 4.4).

Some of the respondents were very unhappy and they have mentioned that the government's "Digital Bangladesh" approach is entirely macro-economic based rather micro-economic. In order to support this statement, they mentioned that whatever initiatives the government has taken so far are mainly in favour of the large organizations and not for the individual or groups of small-scale SMEs. Therefore, they have asked the question that, without focusing on the micro-economic level of business, is it possible for the Bangladesh government to build "Digital Bangladesh"? They have emphasised that SMEs are the backbone of micro-economics but without developing SMEs, completing "Digital Bangladesh" would not be possible. They strongly believed that large business organizations cannot contribute to the national economy as a whole.

> *"....to be honest, Bangladesh government is taking so many initiatives but however, sorry to say that most of the times they do not implement their initiatives and government is always thinking for the large businesses but unfortunately, not for the SMEs or small entrepreneurs. To me, their whole focus is on large enterprise and not in small enterprise…."* (Amir, see C: 4, S: 4.8).

Finally, whenever I asked participants what they really think about the future of "Digital Bangladesh", all of them agreed that if the present government is not able to return to power, then there is a possibility that this digitalization process might stop. They

all mentioned that this is reality in Bangladesh. Therefore, they were all highly concerned about the future of "Digital Bangladesh" and its continuation.

> *"....reality is in the perspective of Bangladesh, if current government cannot come onto the power by next election then the new government will not continue this Digital Bangladesh initiatives. Therefore, I am in a doubt that this initiatives would not be successful but however, if this government carry out and stay on the power then there is a possibility to build Digital Bangladesh by 2021....."* (Amir, see C: 4, S: 4.8).

5.3.7.2: Summary of Theme Seven

From the analysis above, it is now clear to me that although the government has not clearly defined "Digital Bangladesh", the respondents have understood "Digital Bangladesh" in their own way. Therefore, the objectives of "Digital Bangladesh" have been changed and no one knows what the outcome might be. Although respondents mentioned that "Digital Bangladesh" is a noble initiative and it could be a blessing for the people of Bangladesh, in particular the ICT and business sectors. The government of Bangladesh, however, needs to play a vital role in passing a clear message to Bangladeshis about "Digital Bangladesh" and what would the benefits might be if the country goes digital. In addition, the government needs to focus on the four pillars of "Digital Bangladesh" because those pillars are the backbone of "Digital Bangladesh". In addition, the government needs to take special steps and they need to go step-by-step to engage more Bangladeshis and influence them to support the digitalization process. Furthermore, the government must not ignore SMEs and they must take the necessary steps to ensure that strong micro-economics come out from rural businesses. Based on the above interpretation, it has become clear to me that there are gaps in public awareness and government initiatives in building "Digital Bangladesh". Therefore, this study might suggest that, in order to build "Digital Bangladesh", the Bangladeshi government must effectively disseminate their initiatives amongst countrymen and in particularly SMEs.

5.3.8: Theme Eight: ICT Adoption is the Pre-requisite to Understanding the Readiness of Bangladeshi SMEs For Cloud Computing in the Context of "Digital Bangladesh"

Sub – Theme 8A: Bangladesh is not ready yet to move to Cloud Computing owing to a lack of skills, basic knowledge and skilful manpower

Sub – Theme 8B: Current infrastructure of Bangladesh is not up to standard for adoption of Cloud Computing

Sub – Theme 8C: SMEs have limited investment and turnover and no adequate support from financial bodies to adopt Cloud Computing

Sub – Theme 8D: Issues with continuous supply of electricity and Internet

Sub – Theme 8E: Foundation for adopting Cloud Computing is not ready

Sub – Theme 8F: Uncertain future of Bangladeshi Politics

Sub – Theme 8G: Not enough support and initiatives from government or private IT firms to adopt Cloud Computing

Sub – Theme 8H: ICT is the key to understanding Cloud Computing

4.3.8.1: Interpretation of Theme Eight

In order to understand the ability of Bangladeshi SMEs for adopting Cloud Computing, I have asked all of the respondents several questions relating to the of SMEs' current understanding of Cloud Computing, ICT status, infrastructures, government initiatives, as well as support from other private IT firms. In addition, I have asked the participants about the reasons why they might think in favour of or against the adoption of Cloud Computing. Most of them gave me a reasonable response regarding understanding the facts that could theoretically prevent Cloud Computing adoption. They also added some issues that could be barriers to Cloud Computing adoption.

In Theme Eight therefore, I am going to discuss how prepared Bangladeshi SMEs are regarding adopting Cloud Computing in their businesses. In order to support the main theme, I have developed several Sub–themes based on the respondents' replies. The Sub–themes, therefore, will provide additional information that the respondents have given during their interviews. This extra information will support the main theme in relation to their understanding of its meaning.

Some of the respondents, including respondent Badhan, mentioned that Bangladesh is not yet ready, as a country and especially SMEs, to adopt Cloud Computing owing to lack of skilful and knowledgeable people in the workforce. A few of them further added that most of the SMEs are in rural areas and they emphasised that those SME managers or owners do not even have a basic understanding or knowledge of information technology. Some of them also added that owing to not having clear ideas of the term "Digital Bangladesh" or the Digital Bangladesh slogan, SME owners or managers do not know

exactly what is going to happen exactly to them. They strongly believed Bangladeshis, and especially SMEs; need to have a basic knowledge of the technologies and their advantages for the business community before they move onto some advanced technologies.

"....this is true that Bangladeshi government is trying to make Bangladesh "Digital Bangladesh" but to me, at present Bangladesh is gradually developing and that's why I would say Bangladesh is not in a position now that Bangladesh can move to Cloud Computing. Countrymen need to understand first how and why technologies are changing and its benefits first. Therefore, not rapidly but stable changes needed at the moment in Bangladesh. In addition, Bangladeshis have not that level of knowledge; skills or manpower (engineer) and highly qualified peoples are really less to support Bangladesh to move towards Cloud Computing. Based on the circumstances, I would like to say, at first SMEs need to adopt ICT based technologies or traditional technologies first to get used to with technologies and make themselves ready to move something relatively new such as Cloud Computing...." (Badhan, see C: 4, S: 4.2).

Many of the respondents believed that, at present, the current infrastructure of Bangladesh is not yet ready to move onto Cloud because hey believed that the foundation of technology is not set yet to move onto Cloud. Some of the participants mentioned that they believe within the next 5-7 years, Bangladeshi SMEs will adopt Cloud Computing completely. They further emphasized that within this time period, Bangladesh needs to create a more knowledgeable IT workforce in order to support the adoption of Cloud Computing.

"....if you think about the current infrastructure of Bangladesh definitely is not up to the standard to move onto Cloud but for SMEs to adopt ICT completely and then move to Cloud Computing will take about 5/7 years. In the mean time, of course Bangladesh have to create skilful manpower who will have enough knowledge and skills to identify the benefits and barriers of technology and when to move, where to move...." (Badhan, see C: 4, S: 4.2).

However, regarding whether or not the infrastructure is prepared for the adoption of Cloud Computing, along with many other participants, Chaudhury was very diplomatic and completely disagreed with Badhan. Chaudhury mentioned that with regard to the infrastructure, Bangladesh is fully ready to adopt Cloud Computing or a related technology. He strongly believed that Bangladeshi SMEs do not need to use anymore ICT-based technologies. He also added that owing to the many limitations of ICT-based technologies, it is time for SMEs to look for something new. However, he also mentioned that for SMEs, both ICT and Cloud Computing, are important and further added that knowledge of ICT could be a fundamental in the adoption of Cloud Computing.

".... I think both are important. ICT is already in used properly. Personally, I do not think we need anymore use of ICT because Cloud Computing is the new part and the world is

changing and considering all new innovations everyday. Everyone wants to break the traditional system because by using traditional system, you can only do one thing or maybe couple of things but using advanced technologies (CC), you can even do many things in an easier way. To me, knowledge of ICT is essential but we do not need to use them anymore but ICT could be a helping hand of using Cloud Computing because ICT is already in use and infrastructure is already ready here…." (Chaudhury, see C: 4, S: 4.5).

In terms of readiness, respondent Chaudhury further strongly added that Bangladesh is fully ready and that there are many opportunities available for using advanced technologies. He was deeply concerned about the time and the method of using Cloud Computing. He believed that now is the perfect time for Bangladeshi SMEs to adopt Cloud Computing, as otherwise it would be too late to do so. He strongly suggested that there is no way that Bangladeshi SMEs can ignore Cloud Computing.

"….yes, of course Bangladesh is completely ready. You have move opportunities here because no one is actually using database or advanced technology properly here so to me, if you start using Cloud Computing now then you will be the beginner, you will be the pioneer. So, I think, Cloud Computing or for any other advanced technologies, Bangladesh is a better place and market to adopt. And I may not say it is too late but it is late because if you think about other countries in South Asia, advanced technology is already adopted but still we are working on ICT. To me, it is not the time for using ICT but time for moving forward to adopt Cloud Computing. To be honest, there is no way SMEs can ignore Cloud Computing and SMEs must need to adopt in order to survive for long run and whoever is going to adopt, they only can survive and they will be profited…." (Chaudhury, see C: 4, S: 4.5).

There are a few participants who were strongly passionate about focusing on SMEs' small investments and their annual turnover. They strongly believed that, owing to their not having enough money to invest, there is an indirect pressure on SMEs to ignore implementing new technologies into their businesses. Some of them also pointed out that SMEs are, most of the time, overlooked by financial organizations because most of the financial bodies are not prepared to take the necessary risks of relying on SME owners or managers to pay back their loans. Therefore, SME owners or managers are not in a position to think further about investing their limited amounts of saved monies to adopt something new - rather they simply rely on their existing systems.

"….well, I would recommend SMEs to adopt Cloud Computing but there is no doubt that it is tough for them because they do have limited investment and no financial support from financial bodies. Therefore, SMEs need to depends on ICT technologies first and with the support of ICT based knowledge and skills SMEs can adopt Cloud Computing…." (Chakraborti, see C: 4, S: 4.3).

On the other hand, respondent Ms Poddar was very critical but also constructive. She strongly believed that SMEs should understand how to use more advanced

technologies and how those technologies will be better for them. She was very concerned about the limited annual turnover of SMEs but has suggested, however, that businesses with 10-15 employees do not necessarily need to adopt Cloud Computing at the moment, owing to many limitations. Medium-size businesses should however move onto Cloud Computing because Ms Poddar believed that if they did not, they would not be able to expand and transform into large-scale businesses. Moreover, she was very realistic regarding whether SMEs can adopt Cloud Computing or not. She strongly suggested that whether Cloud Computing adoption is possible or not entirely depends on the companies' internal structure, knowledge and methods. According to her:

> *"....if I use the word should/would then I would say of course SMEs should use the better and advanced technology. But we need to see how advanced technology (CC) will be beneficial for them because they have got lot of limitation such as annual turnover. Personally, I think company like 10 - 15 employees running business do not necessarily need CC at the moment because they cannot survive due to less investment, less annual turnover, less client and less manpower. To be honest, this is the reason, in terms of Digital Bangladesh context, small SMEs do not need to adopt advanced technology but what they can do is get used to with ICT based technology. But medium business should move to Cloud Computing because if medium businesses do not invite Cloud Computing then they cannot expand their business and cannot run their business in a large scale and cannot be large business...."* (Ms Poddar, see C: 4, S: 4.10).

Most of the participants emphasised that although, at present, electricity supply is much better compared with the last few years, but there is still no continuous supply. According to those participants, electricity is a key to using the Internet and the Internet is the backbone of Cloud Computing. They pointed out that without electricity there is no Internet and without the Internet there is no Cloud Computing.

> *"....electricity is in a better shape now in the country but still there are lot of places especially in the rural area where there is no continuous supply of electricity, which could affect the adoption of CC because CC is fully Internet based and without electricity Internet cannot run...."* (Badhan, see C: 4, S: 4.2).

Respondent Joarder, on the other hand, explained the readiness status of Bangladeshi SMEs for Cloud Computing adoption in a completely different way. According to him, for Bangladeshi SMEs, whether ICT or Cloud Computing completely depends on the types of business. He strongly believed that IT-based SMEs definitely need to move onto Cloud Computing now but other types of SMEs need not to do so. He further added that, at present, IT foundation is not ready to adopt Cloud Computing in Bangladesh. He believed that ICT skills and knowledge is the key to understanding the term Cloud Computing. Like most of the other participants, Joarder further believed, Bangladeshi

SMEs need to build up a foundation of knowledge first in order to understand more about the differences between traditional technology and Cloud Computing technology. SMEs, therefore, should adopt ICT first and then move onto Cloud Computing.

> *"....I think it depends on the types of business you are running. If you are in IT sector then of course you need to adopt CC but if you are in other sectors then you might need to use ICT first to know about ICT and its various advantages first before move to CC. This is because knowledge of ICT is the key of understanding advanced technologies such as Cloud Computing. Because IT sectors need to quickly adopt with advanced technology otherwise, they will be looser and other SME business are already way behind and they do not need to worry about to lose anything now because they already lost. But however, if SMEs uses ICT properly then within next 4/5 years Cloud Computing adoption would be possible...."* (Joarder, see C: 4, S: 4.7).

Another respondent brought to my attention that Cloud Computing is safer, easier, cheaper, more hassle-free and accessible from anywhere, and so today or tomorrow SMEs need to adopt it. The political situation of Bangladesh, however, is completely unpredictable and completely uncertain. In addition, politics and politicians have a massive impact on almost everything. The same participant strongly emphasised that if another political party were to be elected, the whole digitalization process might stop. If that were to happen, adopting Cloud Computing would be delayed. Respondent Rozario mentioned this.

> *"....it is not like what we are but it has to be that today or tomorrow SMEs need to adopt Cloud Computing because now days we are in an age of globalization and world is moving with Cloud so you have to move to Cloud. That is how it is and that will happen. However, political situation has got very huge impact on everything. We do not know who is coming next onto the power so I do not know what will happen if another party comes onto the power. They might completely change the Digital Bangladesh policy or they might stop the whole digitalization process...."* (Rozario, see C: 4, S: 4.9).

In conclusion, the majority of the participants completely agreed and criticised the government when talking about "Digital Bangladesh" in order to support SMEs to adopt technology. They strongly believed that the government's behaviour is completely contradictory when compared with one of the "Digital Bangladesh" pillars, *'using ICT in business'*. Some of the participants further pointed out that the government's initiatives are not SME friendly but instead are friendly to multinational businesses. The government's main focus is there. They also mentioned that even the SME Foundation and private IT firms are not stepping up to support SMEs to move forward in the use of advanced technology in their businesses.

"....to be honest, Bangladesh government is taking so many initiatives but however, sorry to say that most of the times they do not implement their initiatives. Government is always thinking about large businesses but unfortunately, not for SMEs or small entrepreneurs. To me, their whole focus is on large enterprise and not in small enterprise. And just because of biased decision, I would say government is kind of destroying small medium enterprise...." (Amir, see C: 4, S: 4.8).

However, all of the participants agreed that if Bangladeshi SMEs do not adopt Cloud Computing, then they will not be able to compete and will possibly they will be wiped out from the business market. They all believed that without using technology in their businesses, they will not be able to continue for very long. They strongly emphasised that within the next few years, traditional technologies will disappear from the market and, therefore, SMEs will definitely need to move onto advanced technologies such as Cloud Computing.

"....today or tomorrow we all need to start using Cloud Computing. No matter how small, medium or large enterprise we are. At this competitive business market, within few years those traditional technologies will be disappeared due to the demand of the advanced technologies such as Cloud Computing. And Cloud Computing could be the best and next choice for the SMEs because of its availability, cost effectiveness, reliability, security and faster service and that's why I think personally all SMEs need to move our business into Cloud otherwise we have to quit our business due to high competiveness...." (Plabon, see C: 4, S: 4.4).

5.3.8.2: Summary of Theme Eight

From the detailed analysis of the readiness status of Cloud Computing adoption, it was clear to me that currently there are many obstacles present in Bangladesh, which can possibly stop or at least delay the adoption process. Therefore, at present, Cloud Computing adoption is uncertain. From the respondents' constructive responses and comments, however, it was clear that if Bangladeshi SMEs were to follow certain steps, then it would be possible for them to overcome those challenges and to adopt Cloud Computing. In order to follow those steps, SMEs need to have support from the Bangladeshi government, financial organizations, as well as private IT firms. The main focus, however, would need to be the creation of a skilful, knowledgeable IT workforce to support the nation and particularly SMEs in the adoption process. Based on the interpretations, this study concludes that Cloud Computing adoption is possible for SMEs in Bangladesh but, in order for that to happen, SMEs need to implement and practice ICT-based technologies completely in order to gain their basic skills and knowledge, which will be the key to Cloud Computing adoption.

5.3.9: Theme Nine: Future Impact of Cloud Computing for SMEs in Bangladesh is Optimistic in the Context of "Digital Bangladesh"

Sub – Theme 9A: Future of Cloud Computing is brighter due to multiple advantages

Sub – Theme 9B: Cloud Computing will add a new dimension into SME businesses

Sub – Theme 9C: Cloud Computing can give SMEs an overall competitive advantage

Sub – Theme 9D: Cloud is a business necessity to keep SMEs alive in the business market

Sub – Theme 9E: Cloud will expand SME business to earn revenue and to make the market less competitive

Sub – Theme 9F: Cloud Computing will support SMEs e-business functionalities to build "Digital Bangladesh"

Sub – Theme 9G: Cloud Computing will give support to open many business doors globally

Sub – Theme 9H: Cloud Computing would be a game changer for SMEs in the future

Sub – Theme 9I: Cloud Computing will make business smarter and easier

5.3.9.1: Interpretation of Theme Nine

This is the last theme for this research. This theme contains the respondents' understanding of the future of Cloud Computing in Bangladesh, in particular, Bangladeshi SMEs. Under this theme, there are various sub-themes that have been developed in order to support the main theme. All the sub-themes are the respondents' ideas, knowledge, skills and thinking on how Cloud Computing can be used in Bangladeshi SMEs and how SMEs will benefit from Cloud Computing. In addition, all of the sub-themes will give an overall idea of how SMEs are going to support the Bangladeshi government in building "Digital Bangladesh" after implementing Cloud Computing into their businesses.

Whenever I have asked the question 'How successful do you think the future of Cloud Computing in Bangladesh will be'? Almost all of the respondents emphasised very strongly that they think the future of Cloud Computing for SMEs in Bangladeshi will be bright, as well as the government's "Digital Bangladesh" initiatives. In relation to their statement, they also added that they think Cloud Computing could bring many transformations within the shared environment, which would be really supportive for Bangladeshi SMEs. They further added that to get the best, positive, fastest, most reliable and secure output from the Cloud Computing, Bangladeshi SMEs should adopt it either individually or in a shared environment so that SMEs can save a lot of money for the initial

set-up and later maintenance costs. Some of them were very positive about Cloud Computing and the "Digital Bangladesh" initiatives. They positively described the strongest aspects of Bangladeshi SMEs using Cloud Computing. They emphasized many times that after replacing traditional IT systems with Cloud Computing, the e-business functionalities of SMEs will improve a great deal, which they could use over the long term to attract more foreign revenue, as well as national revenue, for expanding their businesses. This would also support the country's national GDP. From their ideas and descriptions, it was clear to me that the respondents were trying to express ideas of how Cloud Computing could be used in the SME sectors and how those sectors could give partial support to the Bangladesh government to build "Digital Bangladesh".

> *"....for Bangladeshi SMEs, Cloud Computing could bring many changes as an example, if I use shared Cloud, my service cost would be less but output would be faster and secure. Overall, if I think about every aspects of Cloud Computing then I would say yes there is a bring future of Cloud Computing in Bangladeshi SMEs in the context of Digital Bangladesh...."* (Badhan, see C: 4, S: 4.2).

Respondent, Chakraborti was very ambitious regarding the bright future of Cloud Computing, Bangladeshi SMEs and the government's Digital Bangladesh initiatives. He strongly emphasised that the whole of Bangladesh has stepped up under the "Digital Bangladesh" slogan and that there is no way that Bangladesh can now step back. Therefore, he suggested that it is now time for Bangladeshi SMEs to move onto Cloud in order to support the Bangladeshi government in building "Digital Bangladesh".

> *"....yes, by adopting Cloud Computing it is possible to develop our SME sectors and in terms of building Digital Bangladesh, of course Cloud Computing could play a vital role because whole world is entirely relying on Cloud Computing so we cannot step back from where we are standing at the moment to build Digital Bangladesh and moreover, world is moving faster so what else is left for us apart from Cloud Computing adoption to build Digital Bangladesh...."* (Chakraborti, see C: 4, S: 4.3).

Many of the participants strongly believed that if Cloud Computing could be used in Bangladeshi SMEs, then all of the SME sectors would benefit. They mentioned that after implementing Cloud Computing, SMEs traditional business functionalities would be transformed into e-business. When I asked question on how this transformation would support SMEs, respondent Plabon, for example, was highly ambitious. He stated that if SMEs started implementing the various services of Cloud Computing, then traditional SME businesses would possibly move to being e-businesses and, therefore, they would be able to complete their business activities over the Internet. The whole nation and people overseas would be able to make transactions because of the existence of the Internet, which

would create a new dimension for Bangladeshi SMEs, and this was really a very valid point for me. However, along with some of the other respondents, Plabon also criticised the Government's initiatives of supporting SMEs in using technology in their businesses, but not focusing on the term "advanced technology" such as Cloud Computing under the "Digital Bangladesh" concept.

> *"....the future impact of Cloud Computing on Bangladeshi SMEs could be influential and brighter in the context of Digital Bangladesh because under the context of Digital Bangladesh, everything in Bangladesh will be digitalised and whole Bangladesh will be covered up by Internet services with minimum prices, which will create a total new dimension in the business sectors specially in the SME sectors. In that case, Bangladeshi government has to take right initiatives, which will influence and support Bangladeshi SMEs to adopt advanced technology such as Cloud Computing. Bangladeshi government should pass the message of Cloud Computing and its various advantages to the SMEs so that hopefully, within next 3/4 years Bangladeshi SMEs would be ready to adopt Cloud Computing, which will make SMEs stronger and knowledgeable with the uses of expansion of ICT...."* (Plabon, see C: 4, S: 4.4).

I have tried to identify how respondents think about the advancement that will be added to SME businesses when using Cloud Computing. On this point, the majority of the participants gave me an exclusive response. I was told emphatically by all of them that if Cloud Computing could be used in SMEs, then all of the SME sectors would be more agile and adaptive, and SMEs would gain more competitive advantages from the business market. I wanted to know more about the term 'agile and adaptive' and, therefore, asked them what they mean by that. I was given the response that their businesses would faster, more reliable, and their business functionalities would be user-friendlier. The respondents said that businesses would be able to adapt quickly to the advanced technologies used in their businesses because their staff would all have the relevant skills and knowledge. This really attracted my attention, for example:

> *"....of course SMEs will be more benefitted if all the functionalities or features of Cloud Computing is implemented and used in its own way. I do not think there would be any differences between SMEs if they can adopt Cloud Computing in their business and large business because large business already adopted Cloud Computing and using all the advantages of it. So, it would be exactly same for the SMEs if they can adopt and therefore, SMEs will not only get competitive advantages but also rule the business market. And if they adopt then their business would be more agile and adaptive, no doubt about it...."*
> (Chaudhury, see C: 4, S: 4.5).

On the same point, however, another respondent, Ms Poddar's view was slightly different. She emphasised that there are certain things associated with whether a business is agile and adaptive or not. She mentioned, however, that if SMEs were to adopt Cloud Computing, then there is a vast possibility of their being agile and adaptive, and of course,

successful. In addition, she slightly disagreed with the others' views and mentioned that competitiveness completely depends on clients. Her point of view was that if customers do not want to accept a new technology adopted by SMEs, then SMEs will lose entirely. In that case, SMEs would not gain any advantages from Cloud Computing.

> *"....whether business will be agile and adaptive or not then I would rather say there is a vast possibility of becoming agile and adaptive and more successful because, whenever I will bring new technology then accessibility or usability will be very easy to me and my data will be handy to me always, which is surely a positive side. And I think competitive advantage depends on clients. That is what I believe because, what types of customers I have and what types of customers I would like to add into Cloud services and as an example, if I have huge customers and they need Cloud based services and my competitors are providing a mixture of services then of course I will get competitive advantages compared with my competitors. However, on the other hand, if my clients do not show interest of using Cloud based services then of course I would not be able to handle Cloud for them and they would not be able to use Cloud solutions therefore, we will be looser…."*
> (Ms Poddar, see C: 4, S: 4.10).

From the discussion with Ms Poddar, I have a clear idea of a valid point that whether a business is successful or not depends on the acceptance of the technology that the business uses and customers interest, which most of the other respondents overlooked. What I have understood is that if customers do not wish to accept new technology then no matter how good and advanced that technology is, it will not be useful and will result in failure.

A few of the respondents, on the other hand, were not too sure about whether the future of Cloud Computing would be beneficial or not for Bangladeshi SMEs because they mentioned that, at present in Bangladesh, Cloud Computing is not yet popular and not even a highly discussed topic. As a result, most of the people do not even know about it. Moreover, some of them further added that SMEs infrastructure and mind set is not ready to move on to Cloud Computing. Therefore, the future of Cloud Computing is uncertain to them. However, they were hopeful for a good future:

> *"....future of Cloud Computing I cannot tell you exactly but I could hope it would be good and then I would be able to expand my business, which will bring more revenue for myself as well as government and less competitive products will come into my country from oversees, which will support Bangladeshi SMEs to expand their business therefore, I would say future of Cloud Computing would be profitable for the SMEs and it cannot be negative…."* (Charudhury, see C: 4, S: 4.5).

In addition, respondent Joarder added that personally he is very hopeful because of Cloud Computing's various advantages. He was also optimistic about Cloud Computing and its uses for SMEs. He mentioned that if everyone and especially SMEs were to start

using Cloud Computing then businesses would be smarter, faster and more secure and in time Bangladesh would be one of the richest countries in the world. Many online or e-business doors would be opened, which could support the Bangladesh government in building "Digital Bangladesh".

"....I am personally really too much hopeful of Cloud Computing because, if everyone implement this system then Bangladesh is going to be on of the richest countries in the world and if our government can implement this Cloud services then lot of business doors will be opened in Bangladesh and for Bangladesh...." (Joarder, see C: 4, S: 4.7).

Furthermore, some of the respondents strongly emphasised that owing to the many advantages of Cloud Computing, its future is really positive. They have interpreted that if Bangladeshi SMEs really want to expand their businesses and want to be successful, then SMEs will need to gradually move onto Cloud (possibly some parts of their business functionalities). In order to support this statement, participant Rozario emphasised that Cloud Computing could be a game changer for Bangladeshi SMEs in the "Digital Bangladesh" context because one of the pillars of "Digital Bangladesh" is using ICT in business, which he described as the foundation of using technology in business. Cloud Computing is a very advanced technology, and Rozario believed that the government would slowly move on to it in order to fulfil their dream by 2021.

"....future impact of Cloud Computing I would say depends on the time but however, if SMEs can adopt Cloud Computing then it would be a game changer for them because their business will be more online based and they will get more customers and support. Moreover, by adopting Cloud Computing SMEs will potentially support Bangladesh government to strongly build up the ICT in business pillar, which is one of the Digital Bangladesh initiatives pillars...." (Rozario, see C: 4, S: 4.9).

5.3.9.2: Summary of Theme Nine

From the interpretation of the above theme, it has come to my attention that almost all of the respondents directly or indirectly think that there is a bright and influential future for Cloud Computing in Bangladesh, particularly in the SME sectors. From the above interpretation above of the participants, it has become clear that if Bangladeshi SMEs can manage to adopt Cloud Computing, then they will gain more competitive advantages from the business market and their businesses will be smarter, faster, more agile and adaptive. Moreover, if SMEs can adopt Cloud Computing, then there is a vast possibility for the transformation of their business functionalities (e-business), which they would be able to create and implement individually. Beside this, e-business functionalities will create a new

business dimension by opening new business doors, which will in turn support SMEs in gaining more online customers, more revenue and support globally. By earning extra revenue, SMEs will partially support the Bangladeshi government to improve the country's Gross Domestic Product (GDP) rate, which will support the Bangladeshi government in building "Digital Bangladesh". Therefore, this study concludes that the summary of the interpretation of the above theme is that the future impact of Cloud Computing for SMEs in Bangladesh is really positive in the "Digital Bangladesh" context.

5.4: Summary of the Chapter

From the discussion above, it has been identified that there are huge opportunities for understanding Cloud Computing, its advantages and disadvantages amongst Bangladeshi SMEs. Therefore, they need to understand the foundation of the technology, which is Information & Communication Technology (ICT). Moreover, it has also been identified that awareness of the concept of Digital Bangladesh amongst Bangladeshi SMEs are not well disseminated. So, in order to understand all the findings from the best of our knowledge and ability, it was required to put them in order, means categorising them. Therefore, all the findings have been categorised into three issues namely, internal, external and technological issues for challenges of the adoption of Cloud Computing. In addition, form the same findings, there are significant amount of influencing issues have been developed as well. For all the influential issues, again I have categorised all the findings and put them accordingly, as these issues can positively influence SME owners or managers to adopt Cloud Computing into their business. In order to categorised all the findings, I have used the concept of TOE framework developed by Tornatzky and Fleischer in 1990. To make it clear, I have not used the same headings that Tornatzky and Fleischer have used such as Technological, organizational and environmental issues rather I have used internal issues as organizational issues and external issues as environmental issues but used technology as technological issues from TOE model. In the chapter below (chapter 6), I will discuss those affecting issues as well as influential issues in order to support me to build up frameworks to present the answers of the research aim, objectives and question.

Chapter – 6.0

Presentation of the Data Discussion

6.1: Introduction

I have stated earlier that the aim of this exploration is to build a well-defined understanding and explanation of the adoption of Cloud Computing for SMEs in Bangladesh. To achieve the aim of this study and to explore those issues, a qualitative research method was used in the form of semi-structured interview questions (mentioned in Chapter 3). In addition, a qualitative research method was used to explore how Bangladeshi SMEs see those challenging issues, as well as influencing issues that explain SMEs' success in line with participant's individual experiences in order to answer the research question. This chapter, therefore, is a reflection of the outcomes from the interpretation of the themes and sub-themes of the research texts, in accordance with the references to the theoretical overview outlined in the methodical literature presentation in Chapter Two. As such, this discussion will synergise those findings in a sequence of discussion points that builds up the argument of the Cloud Computing adoption in the Bangladeshi SMEs. As a result, in the following sub-sections, I will discuss the overall outcomes of all of the challenging issues that I would say are "barriers" to Cloud Computing adoption, which I will call internal, external and technological barriers. And all the Influential issues that I would say are "incentives" to Cloud Computing adoption in SMEs in Bangladesh will be discussed separately.

6.2: Internal Barriers of Cloud Computing Adoption

Size and Duration of the SMEs

The findings suggest that size of the SMEs has a significant impact on Cloud Computing adoption, which is suggested as a moderate impacting issue. This is because there is a significant relationship between the size of a business and business achievement. Findings revealed that if the size of the SME is bigger such as mid-sized SMEs then more likely it is that they would be successful. However, if the SMEs have more employees such as more than 10 employees then they will need to invest more money in training and development whereas SMEs with a smaller number (less than 10) of employees will need to invest less. The findings of this study verify the findings of Khan (2013), who discovered that the larger size of the SMEs, the more likely that they will be successful. But Gupta *et* al. (2015) opposed Khan's (2013) findings. Gupta *et* al. (2015) concluded that

the smaller size of SMEs whoever has less revenue and employees got more opportunities to grow faster because they less impact on business growth, but the larger the size of the SMEs, the higher the negative impact on growth of the business. In my study, I have further discovered from the participants' point of view that those Bangladeshi SMEs become successful who have existence of a larger size.

On the other hand, another finding suggested that the age of a business (an SME) has a significant impact on its technology adoption and that older SMEs gradually become more successful. This study found that older SMEs learn how to be more successful with time, which appears consistent with Sultan (2011) investigation. He discovered that newly built SMEs are more likely have a higher rate of failure. The findings of my study therefore, verify that there is a great relationship between the age of a business and its success.

Culture and Structure of the SMEs

Findings from the analysis in Chapter 5 revealed that the culture of the SMEs can have a significant negative impact on Cloud Computing adoption. Based on the attributes of the participant SMEs, it has become clear that they have a variety of characteristics and culture, in particular with relation to IT development. This study found that there are two types of thinking from participants. Some of them, especially those who are directors or CEOs, think of the existing culture of SMEs as an affecting issue, which stops SMEs adopting Cloud Computing. The rest of the participants (Managers/Software Engineers), however, do not think that culture is an affecting issue if SME owners or managers take part in training to improve awareness. In addition, there are various thoughts on this matter, which have been revealed in this study. This study concludes that although culture has a small impact on adoption, it could still be an affecting issue, which seems to be consistent with some previous investigations, where researchers (Kamal, 2006 & Sultan, 2011) have strongly highlighted an SME's culture is vitally affecting Cloud Computing adoption.

Although most of the participants believed that an SME's structure can have a potential negative impact on Cloud Computing adoption some did not think so. They mentioned that the structure of a business would not have any impact on Cloud Computing adoption. Findings for this study also discovered that structure of a business is a vital issue that possibly impacts upon the adoption process within the SME sectors. This study also

found that the nature of SME structures possibly influences or prevents the adoption process, which means an appropriate structure can positively impact upon SMEs to move towards Cloud, whereas a poor SME structure can have a negative impact. These findings also reflect the findings from researchers like Abdin (2011) and Ahmed & Chowdhury (2009) who have strongly emphasised an SME's structure as a vital issue of Cloud Computing adoption.

Location of the SMEs

In this qualitative study, analysis of the data has mentioned extensively that the location of the SMEs only used to categorize the importance of a business. Despite all of the facts, it has also been identified that the location of SMEs is sometimes hinder the business success. For instance, businesses located in the rural areas do not have Internet facilities or electricity supply. Findings from the analysis further revealed that SMEs located outside of the metropolitan cities are less likely to get as much financial and governmental support compared to SMEs within the metropolitan cities. In addition, SMEs situated in rural areas do not get adequate support from Cloud service providers owing to a lack of facilities. This study suggests, therefore, that the location of an SME has a significant impact on Cloud Computing adoption and that this is one of the key affecting issues of Cloud Computing adoption, which shows the great likenesses of the findings of Adam & Musah (2015).

Lack of awareness

The findings of this exploration have revealed that most of the SME owners and managers in rural areas do not have a satisfactory level of awareness of using technology in their businesses. Even some of the respondents have mentioned that they were completely unaware of the advantages of technologies, which can benefit their businesses. This findings confirm the findings of Apulu and Latham (2009), who have concluded that SME owners or managers located in rural areas are not aware of the prospective benefits of using technology in their businesses. Apulu and Latham (2009) also found that awareness could influence SMEs so that they adopt technologies but a lack of awareness of the benefits of using technology or advanced technology, such as Cloud Computing, can hinder a possible adoption process.

Lack of necessary Skills and Knowledge

A lack of the necessary skills, knowledge and experience has been identified as a considerable issue affecting the failure of Cloud Computing adoption. This study has

discovered that most of the Cloud non-users believed that it is difficult for SMEs to continue with their businesses without having the appropriate technological knowledge. The findings also found that although Cloud non-users have shown an interest in using technologies, they are unable to do so, owing to not having the knowledge of how to use a computer, which has clearly shown up as an issue of Cloud Computing non-adoption. This finding strongly supports the findings of Hartman (2009), who have mentioned that a lack of technological skills, knowledge and experience are the main challenges for SMEs. The findings of Hartman (2009) study also supported by the findings of Lee and Khan (2015) who advocated that a lack of technological skills and experience amongst SME staff is the main obstacle to the adoption and extension of information technology in business. This study also identified that most of the SME staff in rural areas are not computer literate and are fearful of using technology. This finding was supported by the findings of Abdin (2010) who have mentioned that a lack of knowledge, a fear of using technology and low computer literacy are other key features affecting the issue of Cloud Computing adoption. This study suggests, therefore, that for a successful transformation from traditional technologies to advanced technologies such as Cloud Computing in Bangladeshi SMEs, both technical skills and IT knowledge are needed for SME owners and managers.

Poor Interest for Achievement

This study has identified that an interest in achieving something new in business has a very positive impact on an SME's success in Bangladesh. By analysing primary data, however, this study found that most of the Bangladeshi SME owners or managers do not want to try something different in order to achieve something new for their businesses. They like to rely on existing processes or systems so that their businesses run as usual and there is no need to try something new, which they are not familiar with and uncertain about. This outcome conforms to the result of Ahmed & Chowdhury (2009), who identified that owing to a lack of interest in achievement, technology adoption is hindered. This study, therefore, recommends that if Bangladeshi SMEs want to be successful, then SME owners or managers need to demonstrate a real interest in doing something new and different by using technology.

Less Interest in Risk Taking Tendency

In this study, risk-taking tendency was found another important affecting issue. My study revealed that both Cloud adopters and non-adopters believed that there are risks associated with every business success and in order to cope with the upcoming pressure

they need to take risks. This study identified, however, that most of the SMEs in metropolitan areas are more likely to be willing to take risks compared with SMEs in rural areas. This is because of information availability. As a result, SMEs outside of the metropolitan cities are less successful and way behind those using the advancement of technology. This finding, therefore, shows a similarity of outcomes with Arif (2012) who discovered that a lack of interest in taking risks would potentially hinder the process of adoption of technology into businesses by the SME owners or manager, which will make it difficult for them to be successful.

High Cost of Initial Setup, Maintenance and Training

The findings in this study also identified that issues like initial setup costs, maintaining the system and staff training costs are internal affecting issues, which can also be identified as obstacles of Cloud Computing adoption. Most of the Cloud user participants' strongly stated that implementation costs are too high for the SMEs especially for those who are running a small-scale business. They also advocated that implementation costs are really a serious issue for implementing Cloud Computing for those outside of the metropolitan cities because they do not have enough money to invest. Some of the participants further mentioned that although they have implemented Cloud Computing, they have found that it is difficult for them to upgrade their system owing to extreme adoption charges. This finding shows a strong similarity with the study of Lee and Kim (2004), who have emphasised, even after adopting Cloud Computing, that sometimes Cloud adopters do not show their willingness to upgrade or adopt further advanced technology services or applications owing to high implementation costs.

In addition, this study found that most of the SMEs do not have big enough budgets to invest in increasing the skills of their staff, which is one of the major issues in Bangladeshi SMEs. Moreover, no plans have been developed for staff training because of the fear of losing staff in the future. This finding was also supported by Abdin (2010) & Ahmed & Chowdhury (2009) investigation, where it is mentioned that owing to not having enough training, learning and development plan, most of the SMEs' staff are unaware of technology, which in turn creates a lack of willingness to adopt technology.

Moreover, some of the participants' stated that maintaining employees, business and infrastructures require a considerable amount of money that many of the SMEs do not have because many SMEs in Bangladesh are struggling with insufficient money to run

their businesses. This result confirms the suggestion that Apulu *et* al. (2011) made in their study. They have suggested that owing to high costs, most of the time SME owners or managers simply try to avoid or ignore the adoption and use of advanced technology.

High Business Tax for Business Plan

This is another significant affecting issue related to cost, which most of the Bangladeshi SMEs are really struggling with. Some of the participants strongly stated, no matter if someone wants to start a new business outside of their home, they need to pay very high business taxes for their business plan. This study found that due to high business tax, most of the time, SME owners do not think of expanding their businesses and this is again because of a shortage of money. Some of the participants mentioned that everyday they are struggling financially and, in addition, if they have to pay extra money for expanding business then how will they be able to run the business and how can they begin to think about using technology. They further added that they want to stay longer in the business market and do not want to quit. They are, therefore, very unwilling to spend extra money to adopt technology to expand businesses. This finding is consistent with Abdin (2010) & Venkatesh *et* al. (2011), a study, which mentions that owing to high tax on business, plans, most of the time SMEs do not want to expand their businesses because of a shortage of money (Rahman, Ch: 4, Sec: 4.6).

Management Decision

In the culture of Bangladesh, it is obvious that most of the times employees' voices are ignored. Almost all the times, top management peoples make their own decision. Although sometimes they take wrong decisions and make mistakes but however, still they do not discuss with their employees'. It is their tendency that employees cannot make any decision but however, this cannot be true all the times. This is because, everyone can have some sort of ideas and those ideas could be better for the businesses. This finding is very much similar with Ahmed & Chowdhury (2010) investigations, where they have mentioned that owing to not listening and valuing employees' voice, managements of SMEs are not making the right decision, which is negatively impacting their businesses.

6.3: External Barriers of Cloud Computing Adoption

Lack of Financial Organizations' Support

A lack of public and private financial organizations' support has been rated as the greatest issue explaining the failure of adoption of Cloud Computing. Very specifically,

regulations of financial organizations have also been identified as a key affecting issue. Most of the respondents in this study have emphasised strongly that financial support is the number one key influencing factor of Cloud Computing adoption. They have also, however, mentioned that owing to regulations, high lending charges and lack of references, they are not getting adequate or even any support from the banks, which is also confirmed in the literature review. This finding demonstrates similarity with the study conducted by Bannerman (2010), where he revealed inadequate financial support was amongst the failure issues of SMEs.

On the other hand, the repayment of loans is normally a burden because most of the SMEs in Bangladesh have exhausted their incomes and occasionally they seek additional funds from non-governmental financial bodies (ex: micro financing companies) in order to repay those loans. Lending monies from micro-financing companies incurs interest that is sometimes even higher than the public or private banks. In order to repay public or private banks' high interest rates, SME owners or managers have limited options and, therefore, they borrow money from micro-financing companies. As a result, they cannot escape from their financial crises and thus are prevented from further developing their businesses, including the adoption of new technology. In addition, Bangladeshi banks require guarantees, for example land property, shares or capital, which most of the Bangladeshi SMEs do not have. Owing to the lack of guarantees, Banks' authorities find offering loans to the SMEs are potential risk and, therefore, do not give loans to the SMEs. This finding also supports the findings from Uddin (2014), who discovered similar issues for SMEs in Bangladesh. The tightest regulations, lack of collateral, high interest rates on loans and not having a good business plan gives SME owners or managers emotional pressure. They do not, therefore, demonstrate an interest in expanding their businesses, and concentrate more on day-to-day survival. Thus, this study describes the lack of financial organizations' support as the most visible of all the growth constraints regarding Bangladeshi SMEs.

Absence of Efficient Taxation Systems

This study found that the absence of an efficient taxation system, especially in the SME segments, inhibits the adoption of technology. Some of the participants stated that numerous taxes such as business tax, business plan tax, computer accessories tax are not within the limit to encourage SME owners or managers' to take decision to adopt technologies such as ICT or Cloud Computing. This finding shows great similarity with Islam (2010) findings, who revealed that high and numerous taxes are a significant

affecting issue that causes the failure of adoption of Cloud Computing for SMEs. In addition, owing to some dishonest tax officers, taxpayers are paying unauthorised taxes on top of the government's announced tax rate. This is one of the key external challenges that SME owners or managers are facing on a daily basis and it has formed an extremely unfavourable business culture for many SME owners or managers. This study, therefore, suggests that the absence of an efficient taxation system is discouraging SME owners or managers to expand their businesses with the use of technology.

High VAT on Computer Related Accessories

This is one of the key findings of this study, where almost all participants strongly stated that owing to high VAT on computer related accessories most of the SMEs are not showing interest in buying and using computers. They are, therefore, not getting any of the advantages of using technology in their businesses. All of the participating respondents mentioned that at present, the Bangladesh government is asking buyers to pay about 4% VAT on computer-related accessories, which they describe as an extra burden on SME owners or managers. They have further added that SME owners have less money or capital to invest. Therefore, they must look for VAT free or very minimal margins of VAT, so that they can buy computer-related accessories and use technology in their businesses. For instance, *"....now we have pay minimum 4% VAT on buying computers accessories. So obviously, especially lower level customers going to think twice before buying any computer accessories. Personally I believe, to influence more customers of buying IT infrastructures and get used to with ICT or other technology there should not be any VAT on computer accessories...."* (Charkraborti, C: 4, S: 4.3).

Unclear Vision from Government/SME Foundation

The findings revealed, in order to influence SME owners or managers, the government needs to take the lead and play a pivotal role. But most of the respondents strongly criticised the government stating that it does not have a clear vision of supporting SMEs in order to influence them to use technology in their businesses. Some of the respondents added that although the government has built up an SME foundation to promote Bangladeshi SMEs, the reality is that the authorities of the SME foundation are not sure what to do owing to not having a proper plan or vision. As a result, SME owners or managers are not getting adequate support such as sources of funding, technological skills or knowledge and so on, from the SME foundation. A few of the respondents mentioned that the SME foundation is just a building and is there to be 'shown off' by the

government, and nothing else however, they believed that Bangladesh government can really play a lead role to support Bangladeshi SMEs, which shows the similarity of findings of Abdin (2010).

Lack of Private IT Firms' Support

The findings of this study revealed that there is a huge lack of private IT firms' support for promoting SME sectors. This exploration has identified that most of the time, private IT firms are busy with their businesses and are focussed on how to make their individual profits rather than supporting other small IT firms or other types of businesses. Some of the respondents strongly emphasised that privates IT firms are working for themselves only and there is no support from them to up skill SME owners or managers. Some of the participants mentioned that it is not the private IT firms' fault because the government is not engaging them into their Digital Bangladesh initiatives to support SMEs to use ICT in business. SME owners or managers, therefore, are not getting any sort of information either from individual private IT firms or from Digital Bangladesh initiatives. They believe that a lack of support from IT firms is also discouraging SME owners or managers not to step up and use technology in their businesses. Some of the participants suggested, however, that in order to promote SMEs to use technology, large and well established IT firms should not think of SMEs as their competitors, but rather they should provide a helping hand to support SMEs to move further forward. For example, *"....large IT business necessarily do not need to think SMEs as their competitors but they could provide supporting hands to SMEs to promote them to support DB...."* (Rahman, C: 4, S: 4.6).

High Presence of Corruption and Fraud

From the findings in the semi-structuredd discussion, it has been demonstrated that there were two different views from the respondents. The majority of the respondents believed that corruption can improve efficiency of business growth. As corruption become part of the system and therefore, for every single thing peoples (specially SME owners/managers) are ready to pay monies to the authority to get their job done. Some of the respondents further added that SME owners or managers are fully aware that corruption is a serious issue and that somehow they have to deal with it. They do not think, however, that it is an inhibitor because they like to see corruption as a part of their business, which shows similarity with the work of Bhattacharya (2009) and Khan (2015).

They discovered that unplanned ways of economies growth over time becomes less binding in the long run.

On the other hand, however, my study also discovered that the majority of the respondents strongly believed that corruption is everywhere in Bangladesh and may occur especially in the public/private higher administrators. In addition, some of the respondents mentioned fraud is another inhibitor because they are always anxious of fraud and therefore SME owners are unwilling to adopt technology in their business. A few of the respondents further added that they are very concerned about security, which they described as fraud and a key barrier, which obstructs technology adoption. These findings demonstrate a similarity with the findings of Sultan (2009), who discovered that risks of security included fear of fraud, which is an inhibitor to the adoption of technology in business.

Presence of Bureaucracy

The high presence of bureaucracy has been an interesting finding mentioned by almost all of the participants. They mentioned that bureaucracy is typically predominant amongst non-educated bureaucrat administrators but they have to deal with them. This finding shows that education is a vital factor in bureaucracy. This study also identified that owing to not having had a proper education, most of the time, it is difficult for SME owners or managers to negotiate regulations with bureaucrat officials. This wastes a great deal of time. This finding demonstrates a parallel with the outcomes from Abdin (2010), Wang and Tsai (1995) & Rozario (Ch: 4, Sec: 4.9) who mentioned that education can play a vital role to diminish bureaucracy by educating SME owners/managers. In addition, the majority of participants further proclaimed that in order to run their day-to-day business, they sometimes have to deal with a chain of corrupt bureaucrats, which has a negative impact on their businesses and creates unnecessary problems.

Absence of Continuous Electricity Supply

From the analysis of the qualitative data, it has come to my attention that the key prevalent issue stopping the adoption of Cloud Computing by Bangladeshi SMEs is the absence of electricity. Most of the participants strongly emphasised that there are two main aspects, such as a continuous supply of electricity and its high costs. These are key issues. The majority of the participants further added that it is very rare in Bangladesh to live either in the cities or rural areas without an uninterrupted electricity supply. Although

some of the participant mentioned that supply of electricity is much better now days but still however, there is no continuous supply in rural areas. Therefore, it is very difficult to adopt and use technology for those SMEs who are running businesses in rural areas mentioned by few of the participant. It has come to my attention that the absence of a continuous electricity supply in Bangladesh, particularly in SME sectors, has remained an impacting issue regarding the adoption and use of Cloud Computing.

On the other hand, some of the participants mentioned that although there is not a continuous supply of electricity, the costs are too high and costs increase approximately four to five times every year. SME owners/managers thought it is kind of pressure for them because they need to pay high amounts for electricity usage. Moreover, some of the participants added, especially in the rural areas, SME owners or managers need to spend extra money on alternative arrangements, when there is no supply of electricity. These findings show the practicality of the facts that have been identified by many researchers, such as Abdul (2008), who has presented that a lack of continuous electricity supply is a major problem in the country, especially for SMEs in the rural areas, where there are often total blackouts.

Presence of Poor Communication/Transportation System

The findings of this study have highlighted that a good communication or transportation system has a very positive impact on an SME's business success. This study revealed that smooth transportation systems allow a meaningful reduction in conveyance price and can save time. A majority of the participants, however, has mentioned that the reality of the Bangladeshi transportation system is really vulnerable. This study identified that although most of the main roads throughout the country are satisfactory, outside of the metropolitan areas this is not the situation. In the rural areas, the transportation systems are really poor. Most of the roads are not in a good condition. It has been shown, therefore, that SME owners or managers need to pay extra money for conveying goods and need to spend extra time on this, which really does not support SMEs. Some of the respondents have added that although port services in Bangladesh are in good locations, owing to traffic congestion, goods cannot be distributed on time, which significantly reduces the performance of the flow of trade. This finding shows a similarity with the Abdin (2010) findings, where poor transportation systems are mentioned as potentially reducing the performance of business. In addition, the stifling transportation overcrowding in the metropolitan cities delays the productivity of SMEs, which is a negative impact as well.

This is supported by the findings of Ahmed & Chowdhury (2009), where they present the noteworthy effect on the impact of poor communication systems on SMEs' growth.

Absence of Political Steadiness

The absence of political steadiness has been identified as a major external issue affecting the failure of adoption of Cloud Computing for SMEs in Bangladesh. Most of the respondents strongly emphasised the continuous changeability of the political situation. Every business owner or manager is extremely anxious about political uncertainty. Therefore, they do not want to invest money or show their willingness to expand their businesses. Some of the respondents were very worried about the future of their businesses. They mentioned that if the current government does not continue in power, then it would be a problem because if another political party comes into power, they will have different policies, which may not be equal to current policies. It has been found that almost all the participants felt unsure about the future of their businesses because of political uncertainty; for instance, *"....political situation in our country has huge impact on everything. We do not know who is coming next onto the power and I really do not know but if another party comes onto the power then they might completely change current policies or maybe they will be dealing things differently, which may be good or maybe extremely dangerous for SMEs...."* (Rozario, C: 4, S: 4.9).

Absence of IT Based Education System

It has been identified that the current education system in Bangladesh is not completely information technology based. Students are, therefore, not learning about information technology at an early stage. As a result, most of the students, whenever they leave primary level education, are doing so without IT knowledge, which does not encourage them later on to learn more about IT or ICT. Some of the participants strongly emphasised that the Bangladesh government should implement changes in the curriculum for primary level students so they come into contact with technology. A few of the participants have stated that, in the Digital Bangladesh context, the current government has started digital contents at the entry-level syllabus, which will support students in becoming familiar with technology. Not all of the schools have qualified and/or IT-knowledgeable teachers, especially in the rural areas, who can support students in education or, in particular, SME owners or managers privately. This study further identified that very elderly persons, who do not know anything about IT or technology, run most of the SMEs. Moreover, they are very afraid of using technology. Therefore, they are unable to use

technology in their businesses. Some of the participants clearly stated that this situation varies when comparing metropolitan areas with rural areas. They have added that in metropolitan areas people can get all the technological support that they need from different institutions, which rural people do not have, access to.

Absence of Advertisement

Another interesting finding that has been revealed is that there is no advertisement for the use of technology in small and medium sized businesses. Therefore, SME owners or managers in rural areas do not receive proper information about the advantages of using technology in the businesses. Some of the respondents such as (Chaudhury, Ch: 4, Sec: 4.5) suggested that if the government took some steps to ensure that electronic or print media could telecast or publish advantages and disadvantages on a regular basis, then it would be easier for everyone to learn about it. The social culture of Bangladesh, however, is that almost all family members watch television or read newspapers on a daily basis. This study has been identified that in order to generate more awareness of using technology in business, advertisements could play a vital role.

Absence of ICT Platform

The findings from the qualitative data analysis in Chapter Five have revealed that an ICT platform has a significant positive influence on Cloud Computing adoption. The findings also identified that lack of IT platform is considered a serious issue, and this reflects the findings that emphasized that an appropriate ICT platform is necessary before the adoption of Cloud Computing. Some of the respondents agreed on the significance of an ICT platform and mentioned that having appropriate ICT platform would increase the intention of adopting Cloud Computing. However, concerns regarding the skill and competence of the service providers have been expressed in terms of the readiness of the ICT platform. In addition, this study further identified that some of the participants believed there must be some sort of IT infrastructure, which must be ready on the organizational side to complete online service properly but unfortunately, at the moment the ICT platform is not completely ready. The outcomes from this study reflect those from the study conducted by Khan (2015) and K Saha (Ch: 4, Sec: 4.11), who have explained that the readiness of the ICT platform is a motivating issue for Cloud Computing adoption.

Absence of External Pressure

The findings of this study also found that the presence of a ruling authority and citizens' pressures have a significantly positive influence on Cloud Computing adoption.

Unfortunately, however, from the perspective of Bangladesh, no pressure has been applied from the ruling parties or people generally to SME owners or managers to use technology. The findings also revealed that the Bangladesh government should apply some indirect force onto SME owners or managers to move towards Cloud Computing, because as per their Digital Bangladesh initiatives, they are gradually moving towards Cloud. So by setting an example, they can put some pressure onto SMEs to move towards Cloud. On the other hand, people en masse can refuse the traditional system, which can place some indirect external force onto SME owners to move towards to Cloud. Some previous investigations, such as Kamal (2006), Fatai (2010) & Suh (2010) have also emphasized that the absence of external pressure is one of the key issues affecting Cloud Computing adoption.

6.4: Technological Barriers of Cloud Computing Adoption

Absence of Quality of Internet

The qualitative data analyses from the previous chapter (Chapter 5) has revealed that the high quality of Internet is absence in Bangladesh, which strongly affects the implementation and utilisation of Cloud Computing for SMEs in Bangladesh. Bangladeshi Internet Service Providers (ISP) (public & private) still need to improve the quality of the Internet. The current service, at present provided by the various service providers, cannot satisfy the users' demand. These services are, therefore, discouraging SME owners or managers not to adopt technology into their business. Some of the respondents have mentioned that they were not interested in wasting their monies on poor Internet services. This finding demonstrates a similarity with the findings of Ghaffari *et* al. (2014) who have found that the most important barrier was a lack of ISPs. This study also discovered that during last few years there has been a revolution in terms of broadband and mobile Internet. They are, however, still very slow and very expensive. Slow speed and high prices are discouraging SMEs from Cloud Computing adoption and/or the adoption of any sophisticated technology. In addition, the findings of this study present that there are still problems for end users, who are facing challenges of a lack of availability of Internet, low bandwidth, regular interruption, very slow connectivity speed, and these are very much inhibiting Bangladeshi SMEs from advancing in the use of technology.

Presence of High Internet Price

This study discovered that the costs of the Internet in Bangladesh at present are really too high, and this is one of the issues affecting the adoption of Cloud Computing.

Almost all of the respondents such as (Rahman, Ch: 4, Sec: 4.6 & Joarder, Ch: 4, Sec: 4.7) have strongly emphasised that, based on the speed of the Internet, service providers are charging too much. They have further added that owing to the high price of the Internet, people are not showing their willingness to use it. This finding shows that if the price of Internet was reasonable, then there is a possibility that more people could and would have adopted Cloud Computing.

Absence of ICT/CC Knowledge

It has unfolded from the analysis chapter that there is a lack of ICT or Cloud Computing knowledge amongst Bangladeshi SMEs. This knowledge gap has been considered as one of the major obstacles of Cloud Computing adoption. Some of the participants have mentioned that using technology in their business is difficult for them because they do not have proper skills or knowledge to use it effectively, which is clearly an inhibitor. On the other hand, a few participants stated that if they had the appropriate IT or ICT knowledge, then they could have easily adopted and used technology in their businesses. This finding suggests that Bangladeshi SMEs are more than willing to adopt technology into their businesses but a lack of knowledge prevents them from stepping up and being brave enough to do so. Many participants admitted that they are very concerned about implementing technology because of the fear of the users' reaction. This finding validates Lee and Kim (2004) outcomes, where they have identified that some SME managers are not sure whether they will implement new technology or not owing to the fear that their employees may not be familiar with it. This finding also corroborates the findings of Gupta *et* al. (2007), where they have identified that a lack of knowledge regarding the use of technology is a factor that may affect the adoption of technology. This study suggests, therefore, that in order for Bangladeshi SMEs to adopt Cloud Computing, the managers' or employees' ability to use ICT or Cloud Computing is really vital.

Apprehension of Security and Privacy

The findings of this study showed that issues of security and privacy have a highly negative impact on Cloud Computing adoption. This is one of the key issues having a negative impact on the adoption of Cloud Computing in Bangladeshi SMEs. This is because; most of the SME owners or managers are not sure whether their data or information will be exposed to others thus compromising their privacy. In addition, this study also identified that most of the SME owners or managers do not like the idea that persons or organizations unknown to them will monitor their data. This finding shows that

there is lack of trust between service providers and users. The finding showed, therefore, that a lack of trust and apprehension of security and privacy could delay or indeed stop the adoption of Cloud Computing. This issue, is therefore, considered as a significant hindrance to the adoption of Cloud Computing and has also been demonstrated by findings in some of the previous studies by various researchers such as Ghaffari *et al.* (2014), Zissis and Lekkas (2012) and Bannerman (2010).

Concern of Cloud Computing Quality

The findings of this study have been found in the interpretation from the previous chapter where it has been identified that the quality of Cloud Computing has a positive and significant impact on its adoption. This study revealed, however, that any understanding of Cloud Computing varies from person-to-person and position-to-position. Moreover, owing to a lack of knowledge of Cloud Computing, most Bangladeshi SMEs are not sure what they need to know about it, which makes them doubtful about investing in it. This confusion has a negative effect in that SME owners are not willing to adopt Cloud Computing. This study found that due to many explanations and terminology used in Cloud Computing, SME owners or managers wanted to make sure that they understood it all before moving onto Cloud. The reality identified in this investigation, however, is that there are not enough technical skills and knowledgeable people available in Bangladesh at present to explain all of the terminology with practical examples. Just because of this, the quality or overall advantages or benefits of Cloud Computing are not spreading to the SME owners or managers. This finding echoes that of previous studies by Voorsluys, Broberg and Buyya (2011), Zissis and Lekkas (2012) and Ghaffari *et al.* (2014), who have shown that concern about the quality of Cloud Computing is key inhibitor regarding Cloud Computing adoption.

Lack of Initiatives to Eradicate Fear of Complexity of Cloud Computing

The findings from the interpretation of qualitative data have revealed that the complexity of Cloud Computing has an important and negative impact on its adoption. The analysed interview data showed that this issue needs very close attention from Bangladeshi SMEs, where most of the staff is not familiar with advanced technologies. In addition, it has come to my attention that almost all the respondents entirely agreed that Cloud Computing must be very user-friendly and there should not be any fear of complexity. Moreover, this study has further revealed that owing to complexity and not receiving any economic encouragement or budgets for using Cloud Computing, SME owners, managers

and staff will not be encouraged to use Cloud Computing. This finding has highlighted similarities with some of the existing literature such as Chinyao *et* al. (2011) where it has been identified that fear of using Cloud Computing because of complexity is a key barrier to Cloud Computing adoption.

Lack of Information Access Facilities

This study has identified that findings regarding lack of information accessibility is one of the key barriers to Cloud Computing adoption. The findings revealed that well-structured information could play a vital role in the Bangladeshi SMEs' success. Findings also indicated that SME participants, both those who have adopted Cloud and those who haven't noticed that having access to proper information is the key to their business success. This exploration has further identified the similarities of some existing literatures where Ahmed & Chowdhury (2009) and Abdin (2010) strongly claimed that in the perspective of Bangladeshi SMEs, access to information such as financial sources, technologies, policies and so on, is highly unsatisfactory and sometimes unavailable or even inaccessible. This finding suggests that if the information were available and easily accessible, then more SME owners or managers would be more interested in adopting Cloud Computing. This was strongly emphasised by some of the participants.

Lack of Technology Access Facilities

Findings from the qualitative study provided a clear idea about technology access. Almost all of the participants agreed that easy access to technology could bring success to any business. The majority of the participants agreed that technology is an important issue that directly contributes to the success of a business. However, this study discovered that at present in Bangladesh, and in particular Bangladeshi SMEs, do not have easy access to technology because of its high price and the lack of enough knowledge about its use. This result demonstrates that because of the lack of accessibility to technology, SMEs are not only missing their opportunity to maximise their business growth but also putting themselves at possible risk of quit. This finding shows a similarity with the findings of Miah (2006) & Ahmed & Chowdhury (2009), who claimed that technology not only supports developing a multi-pronged strategy but also maximising opportunities of business growth. In addition, some of the participants mentioned that they are running successful businesses because they have a vast amount of technology access. On the other hand, a few unsuccessful SME participants stated that they do not have access to

technology and are entirely dependent upon traditional systems. This finding suggests that access to technology has a crucial impact on Cloud Computing adoption.

6.5: Developed Conceptual Framework (TOE Concept) Based on the Findings Related to the Barriers

Following the discussion above of the various barriers to Cloud Computing adoption, this study has therefore developed a conceptual framework by considering TOE framework, which shows all of the Technological, Organizational and Environmental barriers. In my research though I have used the TOE concept but however, I have not used similar terminologies but instead I have used internal barriers, which represents Organizational barriers, external barriers, which represents Environmental barriers and technological barriers that explain the challenges of Cloud Computing adoption for SMEs in Bangladesh. Please see the developed conceptual framework below in the next page.
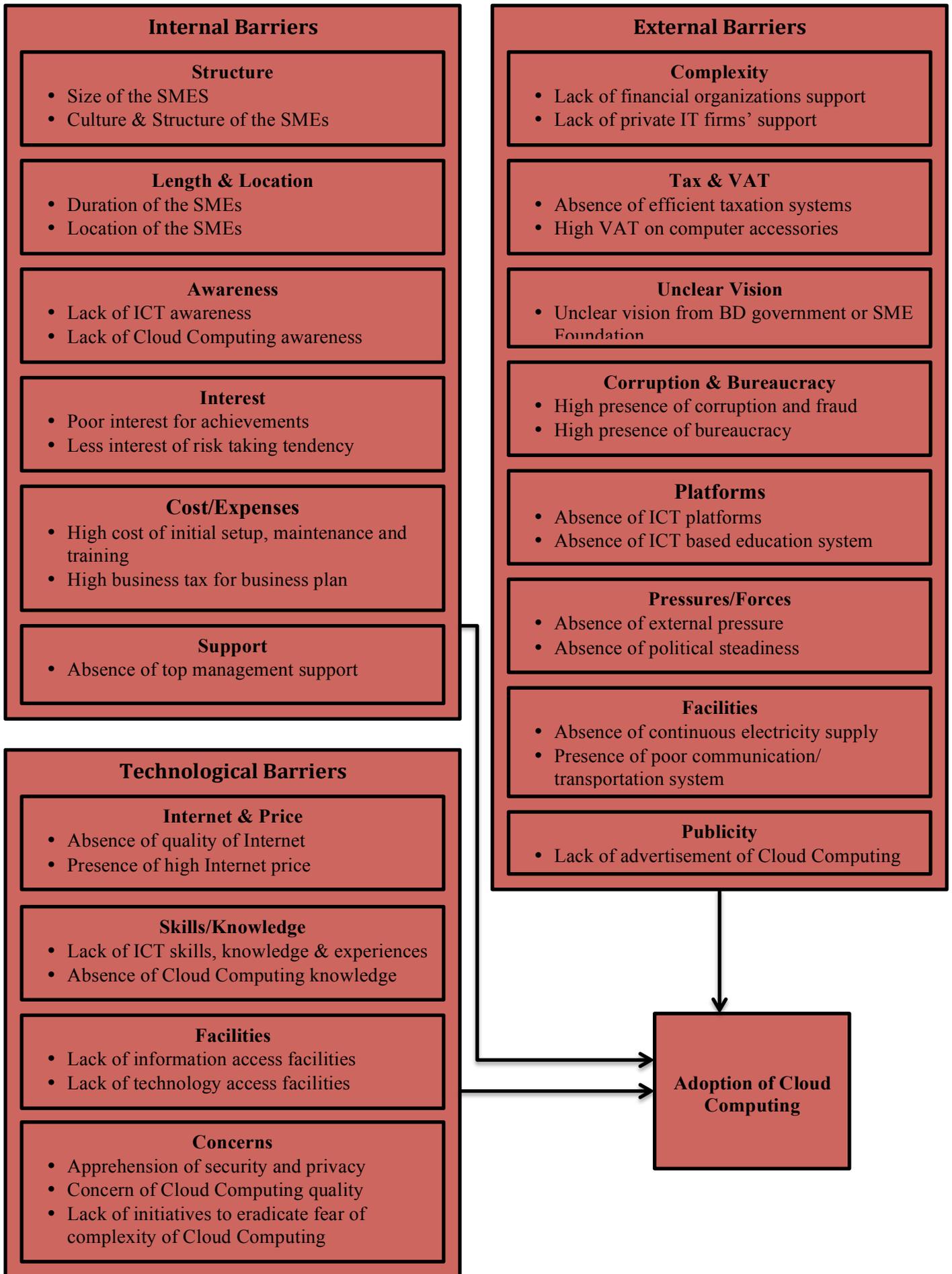
Figure 16: Adapted TOE Conceptual framework representing barriers to CC adoption

6.6: Internal Incentives of Cloud Computing Adoption

Raising Awareness of ICT/Cloud Computing within SMEs

The findings in this study have revealed that there are huge opportunities for raising awareness of ICT or Cloud Computing within SME sectors in Bangladesh (please see analysis chapter, chapter 5). Most of the participants have admitted that they have a very limited amount of knowledge of ICT or Cloud Computing. A few of them mentioned that they have a vast understanding of advanced technologies such as Cloud Computing. They have strongly emphasised that without technology in a competitive business market, it is not possible to run a business successfully. Raising ICT awareness, therefore, is much needed in terms of Cloud Computing adoption because it has been identified that ICT is the pre-requisite for the adoption of Cloud Computing in Bangladeshi SMEs. This finding suggest that if SME owners or managers are fully aware of ICT/Cloud Computing, then there is a possibility that they might transform their traditional businesses to online-based businesses, which will support SMEs to expand their business functionalities. This finding is supported by the findings of Abdin (2010), who has identified that a greater awareness of ICT will bring more SMEs success.

Building ICT Based Cultures within SMEs

It has also been identified that, at present, there is an opportunity within most of the Bangladeshi SMEs to build ICT based culture. The findings revealed that currently there is a gap in ICT based culture. However, this study further identified from the responses of the participants that if they could build an ICT-based culture within their businesses then they would benefit and their businesses would be successful. They have admitted that if the business culture is based on ICT-based technology then all business functionalities would be complete through ICT technology. This approach would support staff as well as customers in using technology, which would influence them to both use technology and adopt technology. This finding has demonstrated that SME owners or managers can support staff or customers and influence them in the use of technology by creating an ICT-based culture within their businesses. The findings from Khan (2015) have shown similarity with this finding. Khan (2015) identified that ICT-based culture within business plays a vital role regarding the adoption of technology.

Up skilling of SME Owners/Manager/Staffs through Internal ICT-based Training and Development

The findings in this study has also identified that currently there is an opportunity for Bangladeshi SMEs to upskill owners, managers or employees through internal ICT-based training and development. The majority of the participants have stated that if they had been given enough ICT-based training then they could have improved their performance. Some of the participants further added that if they had training and development facilities within their businesses then they could have overcome their fear of using technologies. This finding suggests that if employees had ICT-based training, they could contribute more to the SMEs, which would be supportive for their business growth. However, this study has found some opposite views from some of the participants. From their responses, the finding has revealed that some of the SME owners are concerned with losing their staff should they be given the necessary ICT-based training. This study found that some of the participants were extremely worried about losing their staff. They mentioned that if their staff received all of the relevant training then they might move on to larger companies. They all agreed, however, that in terms of running businesses in a competitive market, technology training and development is necessary for SME owners/managers and staff. This finding showed a similarity with the findings of Gupta *et* al. (2013), where they identified that ICT-based training and development for the SMEs staff can significant effect an SME's business growth.

Building Networking Between Various SME Owners/Managers

The findings of this study have revealed that networking properly can bring innovative change within a business. Some of the respondents strongly emphasised that although Cloud Computing is relatively new, it offers users (managers/owners/staff) to create a network with others. This investigation has identified that having Cloud Computing networking facilities can bring innovative change to a business. A few of the participants stated that if they had used networking with other SME owners or managers then they could easily share information with others and vice versa. As a result, everyone would have the same information about upcoming changes and policies and so on. This finding corroborates the findings of Khan (2015) and Alshamaila *et* al. (2013), where they mentioned that Cloud Computing can bring many changes which can support SMEs in making a real-time network, as well as innovation to help their business flourish

Creating Indirect Pressure on SME Staff to Use Technology

This study has identified that, at present, there is direct and indirect pressure on SME staff to use technology. They have, therefore, been found to be very reluctant to use technology for their daily activities. Regarding this point, some of the participants criticised the culture of SMEs in Bangladesh. They emphasized that if the culture was created with ICT based skill, knowledge and technologies then there was an indirect or direct pressure to the SME owners, managers and staff to use technologies. They have interpreted this issue as one of the key influential issues regarding the adoption of technology. This investigation also discovered that owing to not having any direct or indirect force from the government, SME owners/managers are not willing to implement technology at all. This study, however, has further identified that various kinds of SMEs are very positive about using technology. They have additionally added that if they had some kind of influential pressure from the government or people then it would have been quicker for them to adopt technology in their businesses. These findings are similar to those from Khan (2015) who also mentioned that indirect pressure could influence SME owners or managers to adopt technology.

More Agility in Business Functions

The findings from the interpretation of the previous chapter identified that if SME owners or managers were aware of the transformation that Cloud Computing could bring to their businesses, they would have thought to move to Cloud Computing. The findings have revealed that agility brings not only competitive advantages for SMEs but also that it is vital for SMEs to keep functioning in fast moving business markets. The findings also demonstrated that if SMEs manage to adopt Cloud Computing then Bangladeshi SMEs would be more agile and adaptive, and could support the country's financial growth. These findings show a similarity with the findings of Berman *et* al. (2012), where they mentioned that Cloud Computing increases the agility of businesses by enabling them to adjust processes speedily to fulfil the changing requirements of the business market.

Shared Resources with Minimum License Cost

This is a fascinating finding and has been revealed from the interpretation of the participants' interview scripts. Some of the participants strongly emphasized that owing to the available shared resource facilities, they have moved to Cloud Computing. They have further added that by adopting Cloud Computing, they could help save the environment by using fewer servers and other necessary resources, which also has the advantage of being

less expensive. This study further revealed that owing to the shared facilities, many SMEs could use the same server at the same time from different locations, which also helps them to save money. This finding again validates the findings of Berman *et* al. (2012), who has recommended that by adopting Cloud Computing, SMEs can help save the environment, as well as saving a good deal of money and increasing their return by 200%. This study further identified that Cloud Computing provides an opportunity to save more money on using less software and hardware, which also supports users in that they spend less money on buying licences. This finding also validates the findings of Lawton (2008) who has stated that business firms need minimum licensed software and, therefore, business firms can grow without investing huge amounts on licences.

6.7: External Incentives of Cloud Computing Adoption

Raising ICT Awareness through Government Initiatives/Media

This study has identified that in order to adopt technology in the SME sector, governments can play a vital role by taking the right initiatives. A majority of this study's respondents strongly emphasised that SMEs are way behind in adopting technology because of fewer initiatives from the Bangladesh government. Some of them strongly criticised the government because of their slow movement in support of SMEs. A few of the participants have mentioned, however, that the government is doing nothing for SMEs. Surprisingly, this study has revealed that almost all the respondents feel sure that if the government take the right initiatives then by 2021 almost 50/60% of SMEs will be able to adopt Cloud Computing. In addition, this study further identified that the media, in particular the electronic media, can play an influential role here by telecasting various influential videos of Cloud Computing that can influence many people over time. This finding supports Abdin's (2010) findings, where he stated that the government and electronic media can play a significant role in the adoption of technology in Bangladeshi SMEs.

Influential Advertisement through Print/Electronic Media

The findings of this study identified that print or electronic media has a significant role to play in influencing SME owners or managers to adopt ICT or Cloud Computing. Based on the majority of the participants' responses, this study has revealed that if the print media published influential advertisements on their front pages, this would likely attract large numbers of people and encourage their interest in ICT or Cloud Computing. In addition, some of the participants strongly emphasised that if the electronic media came up

with some mini advertisement and telecast it several times then many people would become interested in using ICT/Cloud Computing. The findings of this study also acknowledge that in order to move forward, the country and especially the SME sectors, influential advertisements could play a vital role. This finding was supported by the findings of Islam (2010) who mentioned that this is an opportunity to support Bangladeshi SMEs.

Constructive Initiatives from SME Foundation

Constructive initiatives by the SME foundation can play a significant role in the adoption of technology by the SMEs. This study identified that the SME foundation came into being to support SMEs throughout the country, but the reality is different. Some of the participants mentioned that, owing to the location of the SME foundation most of the rural SMEs do not get support from them. This study found that the majority of the participants are not satisfied with the SME foundation's initiatives. They mentioned that the SME foundation is 'Good for nothing' and they cannot get any support at all. Few of the participants were very critical of the SME foundation's activities. They added that the SME foundation does not direct SME owners or managers towards the right path and sometimes they even misguide SME owners or managers. This study further identified, however, that almost all of the participants strongly believed that if the SME foundation could support SME owners or managers by providing financial resources, technological information and solutions then SME owners or managers would find this helpful and would show a positive attitude towards the adoption of technology. This finding is similar to those of Abdin's (2010) findings, who encouraged constructive initiatives from the SME foundation.

Support from the ICT Ministry

The findings of this study identified that in order to adopt ICT/Cloud Computing; the ICT ministry in the Bangladeshi government can play an influential role. Some of the participants strongly emphasized that the ICT ministry's initiatives are really influential but a few respondents, added that although the ICT ministry's initiatives are influential they need to be very precise. The findings also revealed that the ICT ministry could take further steps to support not only SMEs located in metropolitan cities but also those located in rural areas. This would help ensure that there would be a balance between rural and metropolitan areas' SMEs. The findings also identified that the ICT ministry has a great opportunity to support SME owners or managers by educating them through ICT training

that can support them in developing their IT skills and knowledge. They could then use their new knowledge and experience in their businesses to help make those businesses more successful. This finding again validates the findings of the researcher, Sultan (2011) who identified that in order to adopt Cloud Computing in Bangladeshi SMEs, the ICT ministry has a very influential role to play.

Support from Private IT Firms

It has been identified that private IT firms' in Bangladesh can influence Bangladeshi SMEs in a significant way which would encourage them to adopt technology in their businesses. Many of the participants have mentioned that there are many private IT firms in Bangladesh who could organize various seminars or technology fairs which would influence their countrymen and, in particular, SMEs in Bangladesh. However, this study further discovered that not many IT firms are located outside the metropolitan cities and, therefore, SME owners or managers are not getting their support in rural areas. Almost all of the participants, however, have agreed that although IT firms are located mostly in the metropolitan areas, they could still influence students by arranging IT-related seminars in different educational institutes or by providing training from different locations in the rural areas. This study, therefore, suggests that although there are many IT firms available, to provide the best and easier services to rural areas' SME owners or managers, the government should encourage private IT firms to locate outside of the metropolitan cities.

Support from Private/Public Financial Organizations

The findings of this study have revealed that financial support from private or public financial organizations has a very positive influence on the adoption of technology. Some of the respondents mentioned that Bangladeshi SMEs have very limited amounts to invest, so if they receive a tax free loan or pay a very minimal amount of tax on a loan then they can expand their businesses by implementing technologies. There was some opposition to this however from a few of the respondents. They stated that it is very difficult for Bangladeshi SMEs to get a loan from the banks owing to strict regulations and, therefore, this influential issue cannot be used by the SMEs. This study has revealed, however, that if banks could come up with a 'softer' loaning system for SMEs then most of those seeking finance to expand their businesses will take a loan. This study further identified that this support has a very positive influence on Cloud Computing adoption, and has shown a similarity with the findings of Uddin (2014), who stated that Bangladeshi SMEs need banking support in order to expand their businesses.

Low Cost/VAT-Free Computer Accessories

VAT free or low cost computer accessories are what the customers are demanding according to the findings of this study. This study has identified that owing to the high costs of computer accessories, many people are not showing any interest in buying computers or computer-related accessories, which means that users are not using new technology and not getting an opportunity to familiar with the technology. In addition, the findings of this study also acknowledged that owing to not having computers, peoples are not becoming used to knowing how to operate a computer and, therefore, they find themselves in a position where they are fearful of using technology. These findings demonstrate a similarity with the findings of Uddin (2014) who mentioned that from the perspective of Bangladeshi SMEs, if the price of a computer or computer related items remain low or VAT free then more SME owners/managers will buy and use computers, which in turn will encourage them to adopt technology in their businesses. In line with this finding, a few respondents strongly emphasized that the government should consider this and make computer-related accessories VAT free in order to encourage more SMEs to use technology.

6.8: Technological Incentives of Cloud Computing Adoption

Easy Access of Information Availability

The findings of this study have revealed that easy access of information is the key to an SME's business success. This study identified, however, that at present Bangladeshi SMEs do not have a satisfactory level of information access and information available to them. Many of the participants strongly emphasized that if they needed any kind of information they could not find it and because of this issue, they cannot even come to know what is going to happen or what the latest news about technology is. A few of the participants described this issue as a "game changer". They mentioned that if they had proper information, they could implement technology into their businesses and could come to know how those technologies might be supportive. This finding is similar to those of Yassine (2013) where he commented that easy access and information availability is essential to the success of SMEs.

High Speed Internet through ISPs

The findings that have been discovered in this study via the interpretation of Chapter Five demonstrate that there is a serious issue regarding the speed of the Internet in

Bangladesh at the moment. All of the participants unsatisfied with the speed of the Internet. In addition, this study also identified that apart from mobile Internet, there are no broadband connections in rural areas. Most of the people living in rural areas are not getting Internet facilities but almost all of the participants have agreed that if Internet Service Providers (ISP) looked at this issue and ensured high speed Internet everywhere then more people would find the Internet influential and would use it more frequently. This could potentially encourage them to do something with the support of Internet. This finding, therefore, suggests that if Internet service providers reduced the price of the Internet that would encourage SME owners or managers to adopt it more quickly. This finding is similar to those of Yassine (2013) where he mentioned that low or poor speed of Internet potentially discourages the adoption process of Cloud Computing by SMEs.

Low Cost of Internet with Good Quality

This was another interesting finding in line with the speed of the Internet. Most of the participants have admitted that at present the condition of the Internet is really poor. They have mentioned that the Internet Service Providers (ISP) are not providing a high enough Internet speed but are charging users a high price, which is discouraging many people from using it. In addition, this study has further discovered that owing to the poor quality of the Internet, many people find it difficult to complete a task on time. Moreover, this study has found out that there is not a single day when a disconnection does not happen, which also discourages people from using the Internet. However, this study has identified that almost all of the participants strongly believed that if the cost of the Internet was lower and it was of a higher quality, this could really influence users to use it because they know that without the Internet there is no Cloud Computing. This finding was very similar to the findings of Uddin (2014) who has added that the high cost of the Internet deters users from using it. This study suggests, therefore, that if ISPs can ensure a minimum price for the Internet with good quality then this would be very influential for Cloud Computing adoption.

Building ICT Training Institutes/IT Park

This has been found as yet another influential issue regarding the adoption of Cloud Computing for the SMEs in Bangladesh. It has been identified that if the government can build many training institutes throughout the country and train masses of people then the people who have been trained will discover IT, ICT or Cloud Computing's advantages and disadvantages. This study found that many respondents believed if there was an option for

the countrymen to know more about ICT/CC then obviously they would have used it. This finding shows that there is willingness from the SMEs to take part in technology training. This study further identified that in order to support SMEs to know more about technology, the government has taken several steps such as building a Union Information Centre and IT park in most of the key places throughout the country, in order to provide the necessary information and training to up skill people in improving their knowledge about technology. This will definitely encourage some of the SME owners or managers to boost their IT knowledge. This finding therefore discovered that having an IT training institute and IT park and using these effectively would certainly influence SME owners or managers to take part in technology training, which will then help them to understand technology adoption process and its importance.

ICT Based Education System

ICT based education system also found as another influential issue of technology adoption. The finding of this study identified that the education system in Bangladesh needs modernising and there were no opportunities for ICT based education. Some of the respondents mentioned that the government has recently realised the importance of ICT and that is why they have added some digital content onto the syllabuses. Moreover, this study found that the government has already implemented a separate subject into the curriculum called ICT into the higher education programme. Students have found this is very influential because they are learning about technology from the beginning. This study also found out that the government is trying to bring more people in metropolitan areas, as well as rural locations, to connect with ICT to help ensure there any ICT knowledge gaps are minimal. Therefore, this study can suggest that if ICT based education was fully implemented then in the near future it would be one of the most influential issues regarding the adoption of Cloud Computing.

Consistent, Reliable and 24/7 Services

This investigation has also identified that Cloud Computing provides consistent, reliable and 24/7 services and users, therefore, do not need to wait a long time to get the service. Most of the respondents have clearly stated that these are the most influential issues that Bangladeshi SMEs should accept. They further added that Cloud Computing is not too popular in Bangladesh therefore, SME owners or managers may make errors at any point during implementation and therefore, they need help. So if SME owners or managers get 24/7 supports, which are reliable and consistent, then obviously SME owners or

managers will be more encouraged. The majority of the respondents, therefore, strongly believed that SME owners or managers would be influenced to adopt Cloud Computing.

6.9: Developed Conceptual Framework (TOE Concept) Based on the Findings Related to the Incentives

Following the discussion above of the various incentives regarding the adoption of Cloud Computing adoption, this study has therefore developed a conceptual framework by considering TOE framework, which shows all of the Technological, Organizational and Environmental incentives. In my research though I have used the TOE concept but however, I have not used similar terminologies but instead I have used internal incentives, which represents Organizational incentives, external incentives, which represents Environmental incentives and technological incentives that explain Cloud Computing adoption for SMEs in Bangladesh will take place where, ICT adoption is a prerequisite. Please see the developed conceptual framework below in the next page.

Internal Incentives

Awareness
- Raising awareness of ICT within SMEs
- Raising awareness of CC within SMEs

Building Platform
- Building ICT based culture within SMEs
- Building networking amongst SMEs

Training & Development
- SME owners/manager up skilling themselves
- Staffs are receiving training within SMES

Indirect Pressure
- Top managements are creating indirect pressure on SME staffs to use technology

Agile/Adaptive
- More agility in the business functions.
- Evolving ICT based business functionalities into e-business

Tendency
- SMEs started sharing resources
- Establishing goals for long term vision

External Incentives

Initiatives
- Raising ICT awareness through government's initiatives/media
- Constructive initiatives from SME Foundation
- Influential advertisement initiatives through print/ electronic media

IT Support
- ICT ministry is supporting SMEs
- Private IT firms are supporting SMEs

Financial Support
- Support from private financial organizations
- Support from public financial organizations
- Interest free loan from the financial organization

Cost Savings
- Low cost/VAT free computer accessories

Competitive Advantage
- Benefits technology is creating for facilitating the processes (e-business)
- Technology making SMEs business easier, smarter, fast and efficient
- Enhancing SMEs productivity, performance and profitability

Technological Incentives

Availability
- Easy access and availability of information
- Consistent, reliable & 24/7 services

Internet Speed and Cost
- High speed Internet through ISPs
- Low cost Internet with good quality

Platform
- Building ICT training Institutes by the government in every Union
- Building IT park by the government
- Building ICT based education system

Expansions of ICT Skills & Knowledge
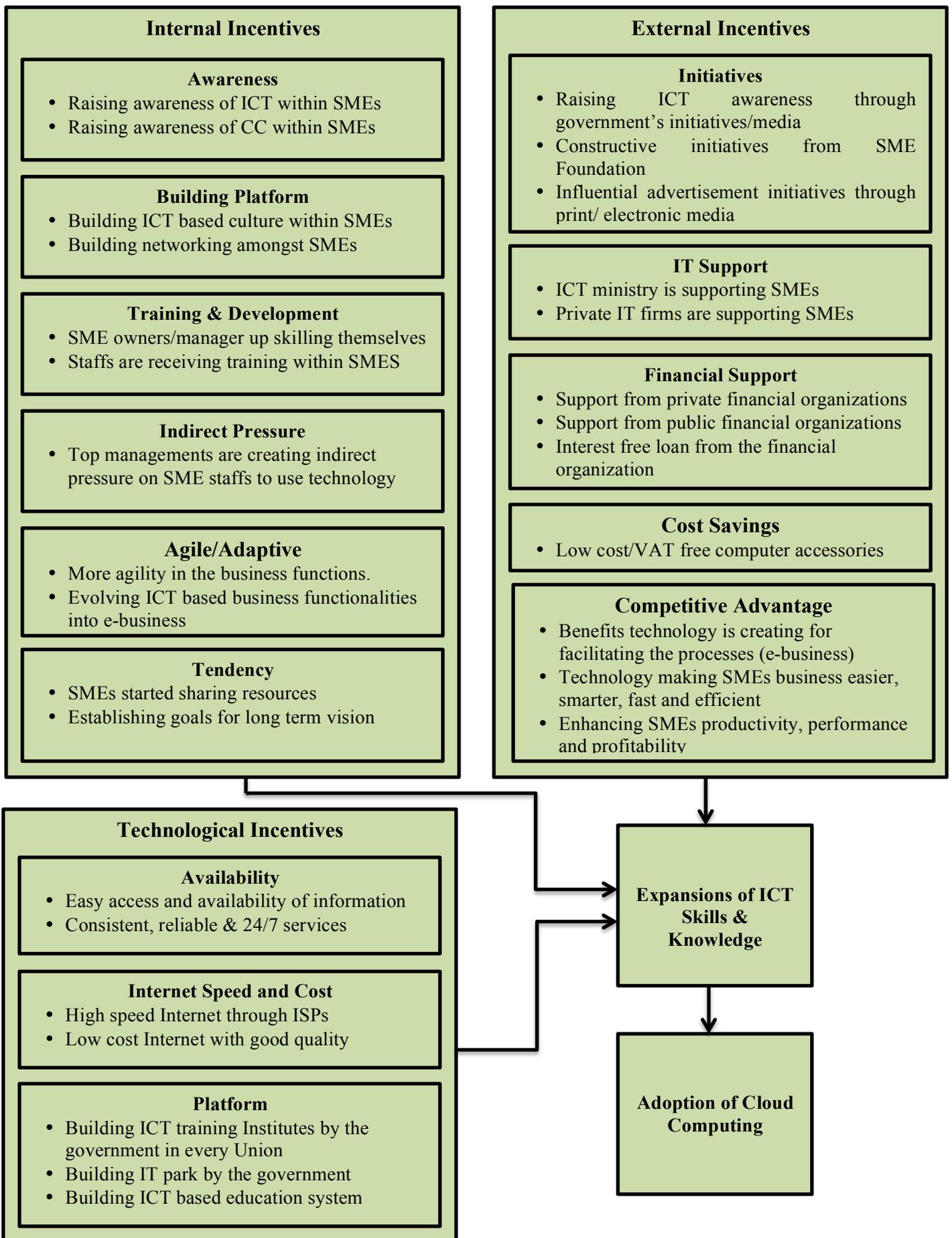
Adoption of Cloud Computing

Figure 17: Adapted TOE Conceptual framework representing incentives of CC adoption

6.10: Summary of the Chapter

This chapter endeavoured to discuss profoundly and briefly all of the outcomes of the explorations from the interpretations to provide a comprehensive understanding of the barriers that explain challenges of adoption to Cloud Computing by SMEs in Bangladesh. This chapter also considered some of the incentives that offered possible success of Cloud Computing adoption. In addition, this chapter tried to bring theoretical relevance to the research outcomes in relation to the literature. Moreover, this chapter identified some of the new issues for both barriers and incentives of Cloud Computing compared with some of the previous studies and, therefore, two revised/adapted conceptual frameworks have been presented separately in figures 16 and 17 for clear understanding of all the existing and new issues that explain both the challenges and incentives of Cloud Computing adoption. This chapter does not, however, give a roadmap of how those frameworks could be implemented by the Bangladeshi SMEs to adopt Cloud Computing. In the next chapter therefore, I am going to present a proposed integrated framework to explain how Bangladeshi SMEs can adopt Cloud Computing to expand their e-business functionalities and support the Bangladesh government to achieve one of the Digital Bangladesh pillars (ICT in business) to build Digital Bangladesh.

Chapter – 7.0

Presentation and Discussion of the Proposed Conceptual Framework

7.1: Introduction

I have stated earlier that the aim of this study is to develop a conceptual framework to represent the adoption issues of Cloud Computing for Bangladeshi SMEs. In order to provide the answer to those barriers, I have already developed a partly revised framework in the previous chapter. In order to provide the answer to the research question "How do SMEs overcome those barriers to adoption of Cloud Computing under the Digital Bangladesh context?" I am going to present an integrated framework where I have both an integrated TOE framework and a Cloud lifecycle model. Here, I am going to present a comprehensive discussion with a roadmap showing how Bangladeshi SMEs can adopt Cloud Computing by using the various incentives offered by Cloud Computing. In addition, I am going to discuss all of the phases and how they will work collectively with moderators and connectors.

7.2: Proposed Integrated Framework for Cloud Computing Adoption

From the discussion above, it has emerged that owing to an extensive number of external barriers, as well as internal and technological barriers, currently Bangladeshi SMEs are struggling to adopt Cloud Computing. The current age of globalization requires all businesses to adopt some strategies to support them in operating businesses by using high-level technologies to carry out their processes in international measure. Many researchers, such as Turan and Ürkmez (2010), have mentioned that technology adoption is really important for businesses because it always introduces the opportunities of the advanced qualities and attractiveness of. Therefore, in order to overcome all of the barriers regarding Cloud Computing adoption, Bangladeshi SMEs need both strategies and a roadmap. Findings suggest that if the majority of the barriers can be resolved then Bangladeshi SMEs will be able to adopt Cloud Computing, which can support the further business expansion of SMEs.

In addition, findings also suggest that there are many incentives that can support SMEs in adopting technology to create and implement e-business strategies and develop e-business functionalities, which could play a significant role in the country's economy and support the Bangladeshi government in building Digital Bangladesh. Findings also suggest that the understanding of Cloud Computing by Bangladeshi SMEs is at an immature stage.

Therefore, there is a vast possibility that SME owners or managers will make mistakes at any point when implementing Cloud Computing in their businesses. In order to support SMEs in their adoption of Cloud Computing, this study has, therefore, proposed a systematic approach, which can support them in adopting ICT, with the support of incentives of Cloud Computing, by using a TOE framework. They can then move onto Cloud Computing adoption with the expansion skills and knowledge of ICT. However, during this migration process, SMEs need to follow certain processes.

The cloud lifecycle model will provide opportunities where SMEs can move forward or backward at any time to see the experimentation, migration and transformation processes offered by Cloud Computing adoption. Therefore, in this study, I have integrated the TOE framework and Cloud lifecycle to provide a vast understanding of how Bangladeshi SMEs might adopt Cloud Computing in a systematic way with the support of the Bangladeshi government, private IT firms, and private and public financial organizations. In figure 18 below, I show the developed framework for Bangladeshi SMEs to provide a roadmap for Cloud Computing adoption. This framework suggests possible strategies to assist with the successful adoption of Cloud Computing by Bangladeshi SMEs, since their development is an important element in the growth strategy of the Bangladeshi economy, as well as a strategy for building Digital Bangladesh. Therefore, I will discuss step-by-step process of how Bangladeshi SMEs can implement this framework in order to understand the whole adoption process. First (step 1) I will discuss all the possible incentive/influential issues taken from the findings of the TOE framework (figure 12) and the purposes of using them. Secondly, in step 2, I will discuss all the phases of Cloud Lifecycle model and their contributions (explained in figure 7) by following migration process. Finally, in step 3, I will explain all the adoption process of Cloud Computing and building Digital Bangladesh by integrating both TOE and Cloud Life cycle model (please see the figure below (figure 18) for all the steps, which has been colour coded under the term key).

Key:

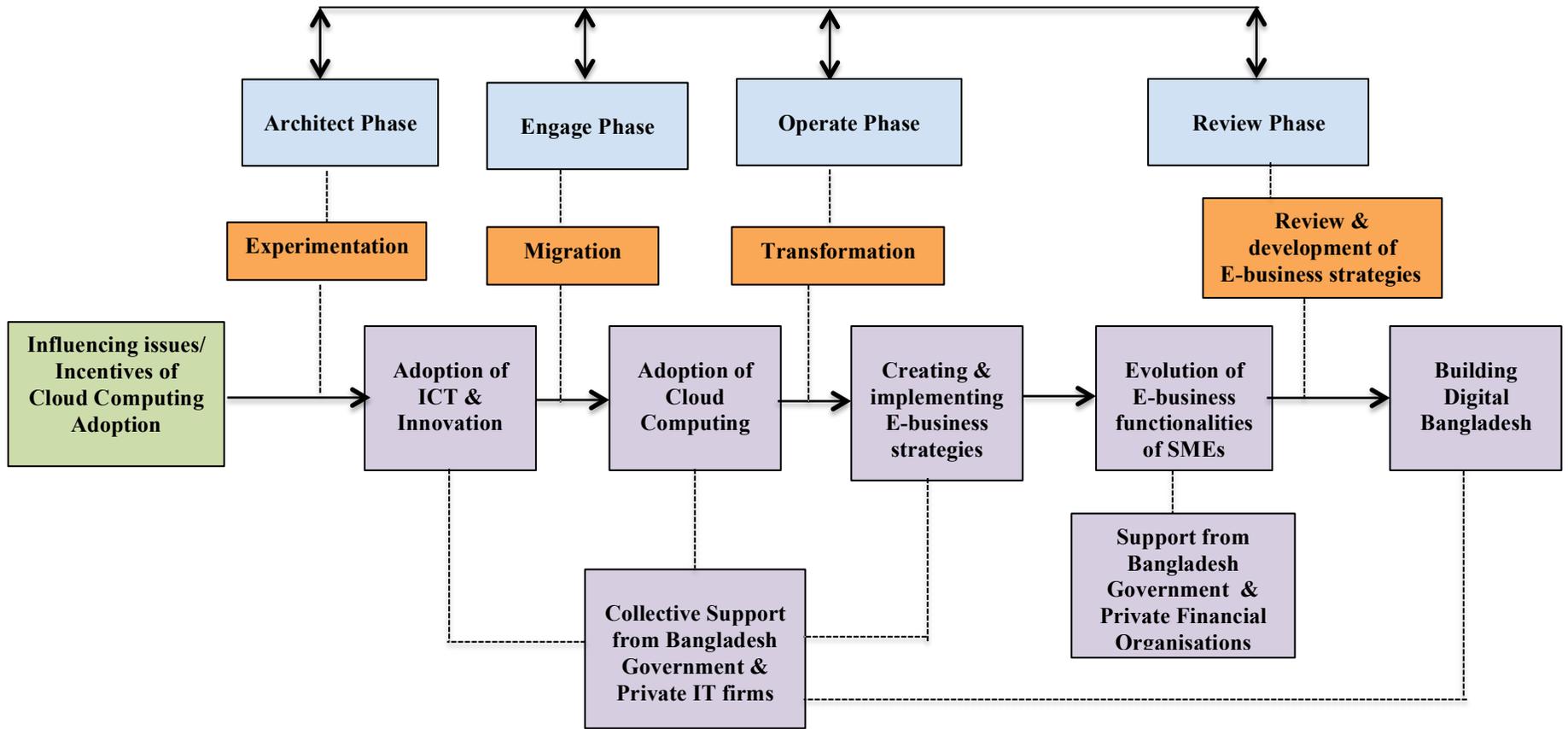| Symbol	Description		Color	Description
....	Moderator of transformation process		(light blue)	Cloud Lifecycle Phases
→	Connector between transformation steps		(orange)	Migration Steps
↔	Connectors of different phases of Cloud Lifecycle model		(green)	Issues taken from TOE framework
			(purple)	Adoption steps of CC & DB

Figure 18: Proposed Integrated framework of Cloud Computing adoption to support SMEs in their support of the Bangladeshi government in building Digital Bangladesh

Step 1: The framework will start with all of the possible incentives of Cloud Computing, which will support Cloud Computing adoption. All the incentives will be used here based on the findings of the incentives of Cloud Computing adoption, which has been presented in the figure 12 above in chapter 6. The purposes of using these incentives are to initially encourage Bangladeshi SMEs to be familiar with the technologies and to up skills themselves to expand their ICT skills and knowledge, which would be part of the adoption process. In addition, purpose of using those initiatives/influential issues are to give Bangladeshi SME owners' or managers' to understand how to use technology (ICT) in their businesses and how these technologies can bring innovation. This process will be explained later in this explanation under the step 4, which is an adoption step of Cloud Computing and Digital Bangladesh.

Step 2: In this step, I will explain all the phases that Cloud Life cycle model (CLM) provides and their contributions. This model has divided into four different phases namely, 'Architect Phase', 'Engage Phase', 'Operate Phase', and 'Review Phase' (all the phases have been explained in detail in chapter 2 by using figure 7). The first phase of the CLM model is 'Architect Phase', which will be used first in this framework. Under the 'Architect Phase', SMEs will have opportunities to take various steps such as investigate, identify and implement business design to decide and to assess and experiment all of the best possible incentives for the adoption. Through investigating each step, SME owners and managers will have an insight into and understanding of what business wants to achieve and what specific goals, objectives and expectations are to be met by moving into the Cloud. This investigation will be performed based on the analysis of the accurate business division, with perceptions from specialists and from peer SMEs experiences, along with the skills and knowledge of potential suppliers. By investigating each step, SMEs will have the opportunity to assess, which areas of the business are suitable for transforming and what the impact would be on the existing system. From the investigation, SMEs will discover the impact upon the service, people, cost, infrastructure readiness, stakeholders, as well as ways to manage that impact. The implementation steps, on the other hand, will define strategies on staffing, communication and organizational guidelines to assess how Cloud services will be outsourced and rolled out. Finally, under the business design step, SMEs can design their businesses for the new services and how those services will be managed, observed and tested. All these steps will be carried out through experimentation because, at present, Bangladeshi SMEs are at the experimentation stage of adopting Cloud Computing and most of them do not have any e-business strategies.

As soon as SMEs gain enough skills and ICT knowledge from the Architect phase through experimentation, they will move to 'Engage Phase', which is the second phase of the CLM model. Under the Engage Phase, SMEs will have opportunities to select the best suppliers based on their quality, value and sustainability depending on the requirements and other principles outlined in the Architect Phase. In addition, the Engage Phase will further offer SMEs an opportunity of negotiation. By using the negotiation step, SMEs will be able to complete the convincing negotiation to choose the right suppliers to sign the contract. All these steps will be carried out through the migration process because migration process will allow SMEs to think and prepare of migrating from their traditional systems or ICT based systems to an online-based system or e-business. In addition, migration process will also offer efficiency and effectiveness of business process by decreasing costs and increasing income, which will be highly required by the Bangladeshi SMEs.

The third phase of the CLM models is 'Operate Phase'. This phase will provide opportunities to the SME owners'/managers' to create and implement more e-business strategies, which will support the development of their e-business functionalities. This phase will further offer couple of steps to the SME owners'/managers', such as Operational Roll-out and Managing Supply Chain. SMEs will have opportunities to put together a shared team who will manage the changeover of the new e-business strategies under Operational Rollout. This step would be highly relevant to the most of the Bangladeshi SMEs because, most of the Bangladeshi SMEs cannot spend enough money individually due to the limited capitals therefore, if they can work through a shared team then it would be easier for them to transform their business strategies to e-business strategies and can save money as well. Managing Supply Chain, on the other hand, will offer SMEs the opportunity to manage e-business functionalities as effectively and efficiently as possible by hiring the Cloud Computing knowledgeable staffs. By using Transformation process, SMEs can carry out these two steps because under Transformation process, SMEs can use e-business approaches to organise the organization's strategy. In addition, Transformation process will also support SMEs in creating information asymmetries to create the growth of e-business functionalities by the resulting new income flows with customers' satisfaction and with improved customer services.

The last phase of the framework is the 'Review Phase', which will provide an opportunity to SME owners and managers to review the whole process of migration and transformation. This phase will allow SME owners/managers to see changes within the business and other business related organizations by moving backwards from the Review Phase to any other phases and vice versa. SME owners/managers will be able to perform these checks by using the review and development of e-business strategies process. Including the last phase and other three phases of the CLM models are highly important for the SMEs because these phases will give opportunities to SME owners and managers to stop at any point of the implementation/transformation process as soon as they discover that an error has occurred. In addition, these phases will further allow SME owners and managers to start their implementation steps/process at any time from where they have stopped. All these phases can provide excellent opportunity for Bangladeshi SMEs, as they are at an immature stage of understanding this whole transformation process.

Step 3: This is the final step of the proposed framework or roadmap. In this step, Bangladeshi SME owners or managers will have an opportunity to integrate both TOE and Cloud lifecycle model and their contribution in order to continue the CC adoption, migration and transformation of their businesses. In order to integrate these two models, SME owners/managers will consider all the possible identified influencing/incentive issues from the TOE framework to make themselves familiar and up skill themselves with ICT adoption, innovation and expansion, which is the fundamental requirements for the CC adoption. SME owners/managers will have an opportunity to use experimentation process to find out and consider the best influencing issues from the TOE framework under the Architect phase of the Cloud lifecycle model. In order to adopt ICT, SME owners/managers will receive collective support from the Bangladesh government and Bangladeshi private IT firms to up skill themselves by taking relevant training and guidance.

After adopting ICT, Bangladeshi SMEs will have an opportunity to experiment all the possible options to engage themselves to identify how they can migrate from their traditional ICT based business to Cloud based (online based business). This is because, after adopting ICT, SME owners/managers will receive more information about adopting technology and the benefits of using technology into their business, which will increase their confidence to adopt technology into their businesses. By knowing all the pros and cons of the technology adoption, and by using all the advantages of the ICT, this is now

time for SME owners/manages to adopt Cloud Computing and move their traditional ICT based business to cloud based business through the migration process under engage phase of the Cloud lifecycle mode. In order to carry out this migration process, SME owners/managers will receive collective support from the Bangladesh government and Bangladeshi private IT firms, who will support SME owners/managers all the required trainings and guidance.

After adopting Cloud Computing and completing all the migration process, this is the time for the SME owners/managers to think how to create and implement e-business strategies in order to prepare them for the entire transformation. This is very important for the SME owners/managers because after migration, they are required to use updated business strategies for the Cloud based business. This can be done under the operate phase of the CLM model. However, again SME owners/managers will receive adequate training and guidance from the Bangladeshi government and private IT firms collectively. After creating Cloud based business strategies, now Bangladeshi SMEs need to develop their e-business functionalities in order to complete the entire transformation process and to expand their businesses. In order to develop and expand their businesses, SME owners/managers needs more financial support resources rather up skill training. Therefore, additional financial support and resources will be received from the Bangladesh government's supporting organizations, such as the SME Foundation, public and private financial organizations.

Last step of this roadmap is the review of entire adoption, migration and transformation process. These tasks can be done through review and development of the e-business strategies under the review phase of the CLM model. After developing the SMEs' business growth, they can contribute significantly to building Digital Bangladesh by adding more GDP to the country's economy and making the 'ICT in business' pillar of the Digital Bangladesh especially stronger. Moreover, to build Digital Bangladesh, the government can take support from private IT firms and collectively they can build Digital Bangladesh.

Finally, All the dotted lines (moderator) in the framework shows that Bangladeshi SMEs can receive collective support from the Bangladeshi government, private IT firms and private and public financial organizations along with the integration process. On the other hand, all the arrows (connector) show the connection between different phases and

steps in the framework. This developed framework shows that if Bangladeshi SMEs follow all of the steps, one by one, they will be able to adopt Cloud Computing easily with the support from the Bangladeshi government, as well as private IT firms.

7.3: Summary of the Chapter

To summarise this chapter, SMEs are a really vital component of the Bangladeshi economy and have a significant role to play in building Digital Bangladesh. This chapter has presented a proposed framework, which Bangladeshi SMEs can use as a roadmap for the successful adoption of Cloud Computing, which can support SMEs in creating e-business functionalities to support the Bangladeshi government in building Digital Bangladesh. In this chapter, it has also been presented that if Bangladeshi SMEs properly use all of the incentives of Cloud Computing, then there is a vast possibility that those incentives will enable their e-business functionalities. These functionalities not only increase SMEs' national level competitiveness but also enable them to compete globally. Moreover, this chapter demonstrated that if SMEs get the appropriate level of support from the Bangladeshi government and other supporting organizations, then they could play a significant role in the country's economy, as well as helping to build Digital Bangladesh. Finally, this chapter clearly indicated through the framework that in order to build Digital Bangladesh, the Bangladeshi government should work collectively with other IT organizations to fulfil their dreams by 2021. This chapter did not, however, present the justification of my research claim. Therefore, in the next chapter, this will be addressed.

Chapter – 8.0

Presentation of the Research Justification

8.1: Introduction

This chapter is based on the justification of the exploration of the framework developed for Bangladeshi SMEs. Based on the research findings and commendations this framework has been designed to put together to support in adoption and effective utilisations of Cloud Computing in Bangladeshi SMEs. After developing a framework it is important to test its acceptability before disseminating extensively because it is too vital to expose the possible fairness and consistency of the research. The purpose of the justification is to see whether findings of the research and commendations are made for emerging the framework are sound as well as to establish whether findings and commendations are consistent. In addition, justification delivers solid contextual in contradiction of which the outcomes of the exploration could be comprehensive. Therefore, in the next section I am going to discuss the concept of justification and the methods implemented for undertaking the justification practice.

8.2: The Justification Concept

According to Kennedy *et* al. (2005), justification is *"a key part of the framework development process, which increase confidence in the framework and makes it more valuable".* Justification establishes whether research has been truly measured that it was supposed to measure and how reliable the findings of the research (Golafshani, 2003). In qualitative research, the term justification is described as a wide range of meanings such as conceptual, methodological and empirical (McGrath and Brinberg, 1985). Under conceptual meaning justification can be recognised through assessing the internal consistency, adaptability, effectiveness and testability whereas; un-biasness, competence and firmness can be expected in the methodological meaning of justification. And research outcomes would be beneficial in terms of possible realistic applications would be expected from empirical meaning. There are many qualitative scholars (such as Winter, 2000) who did not agree that justification is applicable in qualitative research but however they could not ignore the importance of the requirement for some qualifying test or measure their research (Golafshani, 2003).

On the other hand, however researcher like Bryman (2008) strongly claimed that the best way of measuring quality of the qualitative research is by the findings of the

justification. In addition, researchers McGrath and Brinberg (1992) and Walliman (2001), further advocated on three areas such as value, robustness and correspondence could be integrated for justification of the research where value deals with the routineness, robustness deals with examination the reliability of the empirical findings and correspondence deals with the features of the relations in different areas that fitting collectively. Scholar Winter (2000) further acknowledged, *"justification is not a single, fixed or universal concept but rather a contingent construct, inevitably grounded in the process and intentions of particular research methodologies and projects"*. From the discussion above it has been identified that justification of the research is a significant part of the development process of framework that could explore and explain findings of the research and make the findings more valuable. Therefore, in the heading below, I am going to discuss justification of the framework.

8.3: Justification of the Framework

According to Frees (1996), justification of the framework is the way of corroborating whether the suggested framework is showing the precise meaning in line with the purpose of the exploration. In addition, scholar, Egbu (2007) mentioned that justification of the framework is the method of assessing overall capability of the proposed framework's to do what it sets out to accomplish. The justification of the framework however Hair *et* al. (1998) further described as a process to make sure that proposed framework signifies overall populations characteristics but not to the only samples cast-off in the research. Furthermore, Ankrah (2007) described framework justification *"as to assess the extent to which the framework predict the results in terms of performance above or below average"*. The scope to which the outcomes of the research can be reliable or not completely depends on the procedures of the justification undertaken to confirmed or unverified the outcomes of the research. The proposed framework has been resultant from the thematic analysis of the qualitative study in this research. Having established a framework presenting how Cloud Computing can be adopted to enhance Bangladeshi SME sectors and to support Bangladesh government to build Digital Bangladesh, there was a requirement to verify the soundness of the research outcomes to the wider population amongst Bangladeshi SMEs.

In order to carry out the justification of the outcomes of the research, postal surveys (mainly email) have been taken into account. Due to the cost and time limitations use of interviews or focus groups have not been selected. However, because of the limiting type

questionnaires and shortage of opportunities to explain participants' misgivings, questionnaires have been redesigned along with the proposed framework to clarify misunderstanding participants' had earlier. It was really important to justify the outcomes of the research with the participants in the Bangladeshi SME segments in order to establish the claim that research outcomes were valid based on their experiences. As a result, a covering letter has been emailed to all the SMEs were chosen initially and selected participants as well and by requesting their generous support in the justification of the outcomes and determination of the research. In addition, redesign questionnaires have also been attached to the framework to highlight what was anticipated from participants' for this justification process. These have been emailed to all the SMEs and polite reminders have also been made over the mobile. The reason of using the entire participant SMEs is based on their previous participation in the earlier interviews that made them familiar with the exploration, which ensure adequate responses. This participant justification can give an opportunity to the participants' to go back to the subjects being studied where participants' can justify the outcomes but however, Silverman (2006) has been argued as being that one can be more confident of their validity.

Justification of the framework has been supported to confirm this exploration has actually been revealed all the barriers of the Cloud Computing adoption amongst Bangladeshi SMEs and it has pursued to evaluate the scope to which the framework endeavours to resolve those issues facing by the SMEs. That is, if the framework has offered precise suggestions on how the barriers impeding Bangladeshi SMEs to adopt Cloud Computing with respect to their Cloud Computing adoption can be spoken as well. In the section below therefore I am going to describe the justification methods have been implemented in this study, which will support us to understand the usefulness of the research outcomes.

8.4: Methods Implemented for Justification

Methods of justification of the research findings can be divided into two major components such as internal justification and external justification and these methods have effectively employed by many qualitative researchers such as Ikpe (2009) and Egbu (2007). These two methods have also been adopted for the justification of the outcomes of this study. Many researchers have been agreed that both justification methods equally important for confirming a research procedure (Fellows *et* al., 2002). Below I am going to discuss how internal and external justification has been used in this study.

8.4.1: Internal Justification

According to Egbu (2007), *"internal justification seeks to outline the strength of the framework as well as assess the literature search"*. Internal justification deeply concerns about the reliability of the interpretations made from the interview data. To achieve internal justification of this exploration, this study has been accepted several measures and the key measure was feeding back the interview transcripts along with findings to the participants, which assisted two determinations. The first determination was for the participants' to verify the accurateness of the transcript, which improved the expressive soundness of the study (Maxwell, 1992). And the second determination was to present an opportunity to the participants' to offer feedback to the researcher's interpretation of Cloud Computing adoption and practice. This feedback therefore enhanced this research's interpretive soundness (Maxwell, 1992). Internal justification has been used in this exploration only to corroborate strength of the framework conceptually and methodologically.

8.4.2: External Justification

According to Eisenhardt and Howe (1992) and Fellows and Liu (1997), external justification is fully concerns about the generalizability of the research findings and to gain the confidence in the outcomes and what they actually mean. Healy and Perry (2000) stated that the determination of the external justification in the qualitative research is to simplify the findings methodically whereby the researchers' simplify a specific set of outcomes to some wider concept. However, this statement was opposed and argued by Eisenhardt and Howe (1992), who stated external justification is not vital for qualitative study. To achieve external justification, outcomes of this study have been compared with similar outcomes from previous investigations. Different opinions and thoughts have been collected from the participated participants about the findings and recommendations of this study. Though there was a relatively small size of sample has been used for this justification process but however, the feedback was received from them was really inspiring, which advocated that the outcomes of this research have the probable of being well established. In addition, outcomes of this study suggested that Cloud Computing adoption would be useful for Bangladeshi SMEs in order to expand their e-business growth.

Although, internal and external justifications have been explained above to provide ideas what areas of my research outcomes have been justified but however, it is not clear so far how the whole process has been conducted. Therefore, in the below, I will discuss the whole process that have been taken into considerations.

Step 1: Firstly, I have contacted through email and telephone to all the respondents who have been included directly into my research as my final sample.

Step 2: I have discussed with them with the findings and given them little hints, which they have found very interesting and showed their interest to look for all the outcomes.

Step 3: Then I have requested them by mentioning that if they could kindly look at my findings with the entire developed theoretical framework and give me their feedback by including their thoughts.

Step 4: I have then prepared a password protected electronic file with all the findings, framework and explanations of all the steps of developed framework and emailed to all the respondents.

Step 5: After emailing them, I have contacted with all of them through phone in order to ensure that they all have received my email and they all have confirmed me that they have received my email with the attachment.

Step 6: About two week later, I have contacted with them again and five of them said they have gone through the entire findings and the framework. They have also mentioned that all steps were very clear in order to understand the framework. In addition, they have confirmed me that they will email me with their feedback.

Step 7: About couple of days later, I have received email from eight of them with their feedback along with their evaluation. However, owing to the time limitations and busy business period, couple of my respondents could not email me but they have given me their evaluations over the phone.

Summary of the respondents' evaluation:

The feedback was received from the participants' makes assurance that the proposed framework would not only be able to assist SME owners/managers but also government and other stakeholders to adopt Cloud Computing. Furthermore, the feedback further assured that proposed framework would support government specifically to build up Digital Bangladesh with the support of SMEs. On top of these, some of the participants' recognised that the proposed framework is really useful and could assist as a comprehensive roadmap to the SMEs. As my intention was not to know respondents' only

justification about the findings and the proposed roadmap rather I was looking for their individual evaluation. This is because, to me only knowing yes or no or perhaps types of answer would not meet the requirements of my study rather I was interested to know why and how do they think my findings are relevant and proposed roadmap (framework) is realistic. Summary of their evaluation is the entire findings are very specific, which they think highly relevant for the perspective of Bangladeshi SMEs, Bangladesh government and Digital Bangladesh. They have further evaluated that the developed framework (roadmap) is not only realistic but also implementable as all the steps are very clearly described and given all the breakdown and options, which could definitely help SME owners'/managers and Bangladesh government to adopt Cloud Computing in order to support SMEs and to build Digital Bangladesh.

8.5: Summary of the Chapter

The chapter above explained the justification of the research outcomes and proposed framework by describing the justification procedures that included internal and external justification methods. From the both validations, it has been identified that findings are valid and proposed framework would be very beneficial for SME owners or managers as well as Bangladesh government. And the outcomes have been agreed to a large extent by most of the participants who were given their opinions, thoughts and feedback. Therefore, the findings could be comprehensive amongst the entire Bangladeshi SME sectors gradually. In the chapter below, therefore I am going to present original contribution, reflections, implications, limitations and recommendations based on the research findings and justification.

Chapter – 9.0

Conclusions, Original Contributions, Reflections, Limitations and Implications for Future Research

9.1: Introduction

The purpose of this chapter is to present the concluding summary of this research and to reflect on the overall process of the exploration that was carried out throughout this study. Particularly, this chapter will emphasise how the research aims and objectives have or have not been achieved and how the research question was addressed. This chapter will further provide a wide-ranging clarification of the complete study, which identified the various issues that can support improving the adoption and effective utilization of Cloud Computing in Bangladeshi SMEs in the Digital Bangladesh context. To address the whole process, this chapter first provides discussions grounded on the fulfilment of the research aims; objectives and questions are in section 9.2. Reflection on the overall findings and outcomes of this research are in section 9.3. The fourth section (9.4) explains the original contribution of this research in four main aspects namely: theoretical, practical, knowledge and methodological. This leads to the research reflection in section 9.5, which will be followed by various implications arising from this research in section 9.6. The next section (9.7) will present some of the research limitations that I have observed throughout the journey and in section 9.8; consideration of future research will be presented. Finally, a chapter summary will be presented.

9.2: Accomplishing Research Aims, Objectives and Question

The primary aim of this study is to investigate and identify issues that explain the challenges of the adoption of Cloud Computing by SMEs in Bangladesh. This study has discovered that some of the issues (internal, external and technological) that affect Cloud Computing adoption by Bangladeshi SMEs are very similar to those already acknowledged in the existing literature, while some of them are particular to the Bangladeshi context. From an investigation of the current literature, an inclusive understanding of the adoption of Cloud Computing by SMEs in the Digital Bangladesh context was achieved. Most of the current literature, however, is based on the specific context of Western countries and their experiences, and very few researchers have focussed on the adoption of Cloud Computing and its use by SMEs in developing countries in South Asia. With regard to Bangladesh specifically, this is limited to only a few scholars.

In order to address the second research aim and the second part of the research objectives, this study has confirmed some of the issues that hinder the adoption of Cloud Computing by Bangladeshi SMEs. Likewise, some of the participating SME owners and managers have indicated similar reasons for not adopting and using Cloud Computing in general. For instance, political instability, corruption, bureaucracy, a poor electricity supply and the high cost of the Internet were found to be prominent issues discouraging many SME owners and managers. This research has shown that owing to political unpredictability and the presence of political party members interference everywhere, business owners and managers are consistently seeing uncertainty when investing money to adopt something new. The study has further demonstrated that the issue associated with the electricity supply pays vast investments in power producing sets to many SMEs. One of the major issues emerging from this study is the poor service offered by the Internet service providers and its associated high costs. On top of this, other issues, which were identified, include a lack of requisite knowledge, for instance staff inexperience with the Internet, insufficient computing literacy, high implementation and training costs and, of course, maintenance costs. Correspondingly, the absence of IT awareness amongst SME owners and managers of the importance of using sophisticated technology such as Cloud Computing in their day-to-day business functions was regarded as another issue. Moreover, the lack of government support to promote ICT and Cloud Computing and its policy failure to implement IT that can stimulate the uptake of Cloud Computing in Bangladesh was identified as another issue. Obtaining bank loans, an inadequate tax system and the anxiety of online scams were also found to be inhibitors, especially with respect to the adoption of advanced technologies. All of the inhibiting issues are collectively presented with an explanation presented in figure 14 in Chapter 6.

To overcome all the inhibiting issues of Cloud Computing adoption, all the incentives of Cloud Computing is considered to develop the research question. The question was answered fruitfully, as this study has identified several key issues that can motivate Bangladeshi SMEs to adopt Cloud Computing, where ICT adoption is the pre-requisite. ICT has been acknowledged as an important tool, which every SME needs to use in its organizational strategy although the results have indicated that the benefits that result from ICT investment vary significantly between the participating SMEs. However, to a large extent, almost all of them mentioned that their businesses have experienced at least one benefit since they have begun to use technology. Some of the incentives that SMEs

have attributed their use of IT, ICT and Cloud Computing to include better communication, easy access to information, improved planning methods, increased awareness, increased competitive advantages, improved efficiency and a higher potential to increase business profits and promote business confidence.

In response to the third aim of the research and in order to answer the research question effectively, this study identified several strategies that can support Bangladeshi SMEs in overcoming issues that they are currently experiencing. Some commendations were put forward which lead to the development of a conceptual framework that can assist SMEs in a successful and effective adoption and utilization of Cloud Computing in the Digital Bangladesh context. The framework describes the enhancement and upsurge in ICT and Cloud Computing use in Bangladeshi SMEs.

9.3: Summary of the Research Findings and Outcomes

This exploration has played a pivotal role in investigating issues that explain the challenges of Cloud Computing adoption by SMEs in Bangladesh. The significant objectives of this research are an exploration of the issues that affect the adoption of Cloud Computing by SMEs in Bangladesh and an evaluation of how those issues will be resolved by those SMEs in the context of Digital Bangladesh. By reviewing the existing literature in the area of information technology in general and specifically in the area of ICT, Cloud Computing, and the adoption of Cloud Computing and Digital Bangladesh, it has been exposed that there is a lack of an achievement plan, which could serve as a roadmap in promoting the adoption and effective use of Cloud Computing by Bangladeshi SMEs.

Since the aim of this research was not to test a hypothesis or force the data to fit any fixed framework, in this exploration the developing themes of evidence from the respondents in respect of their business's Cloud Computing adoption and practices were not limited by any precise hypothetical viewpoint. Each section briefly discussed and presented the important outcomes of each phase and then observed whether research aim (set out in Chapter one) was achieved or not. Academic contributions and suggestions for further research have also been discussed. Finally, the confines and considerations for possible further research directions have been addressed.

9.4: Original Contributions of the Research

In this section of the chapter, I am going to present all of the contributions of this research, which I have divided into three types of contributions, namely the theoretical contribution, practical contribution and contribution to the general body of knowledge. In the section below I focus on those contributions.

a) Theoretical Contribution

This research contributes to literature concerned with Cloud Computing adoption in the Digital Bangladesh context, by reviewing the literature about the adoption of Cloud Computing in SMEs. By looking at SMEs' overall adoption of innovative technology, knowledge and insights of the modernization procedure in the age of swift development of innovative technologies can be supported and improved. Likewise, this research has attempted to develop and explore an integrated conceptual framework that is theoretically grounded in the TOE framework and Cloud Lifecycle model.

The framework is based on current literature on information technology innovation and dissemination, which claims that the choice to adopt Cloud Computing is a purpose of a variety of issues. This framework has added some new insights into the current literature and has offered new insights for future study. To the best of my knowledge, this research is amongst the first research to look at Cloud Computing adoption in the context of Bangladeshi SMEs. The nature of Cloud Computing offers adequate scope to generalise outcomes beyond the geographical location considered and to SMEs in other areas in Bangladesh, as well as those in other countries, as Cloud Computing transcends boundaries and regional ICT infrastructures are not considered as key obstacles to the adoption process.

Most of the significant elements of this framework, cited in the literature, have been taken into account to elaborate a business's adoption of Cloud Computing innovations. It is important to note that this research did not aim to pick and choose between specific issues that have been empirically tested and validated as having influenced the adoption of innovations. Therefore, this research commenced with a qualitative research design to ensure the trustworthiness and applicability of the framework. It is significant to note that this framework is based on the findings of the qualitative study and, therefore, it should be seen as

exploratory framework but not a perspective one. The developed framework was constructed by integrating the TOE framework developed by Tornatzky & Fleischer (1990) and the Cloud Lifecycle model developed by Lindner *et* al. (2011), and by incorporating Cloud Computing specific constructs that represent the unique characteristics of Cloud Computing, which is an iterative process. Previous studies have not pointed out the significance of this characteristic. It was identified that Bangladeshi SMEs need to have some kind of iterative process in place during the adoption process. Therefore, this research has tried, to some extent, to enhance our insights of Cloud Computing by adding an iterative dimension to the debate.

This study further identified that some of the researchers like Berman *et* al. (2012) who have found out in their study that adoption of Cloud Computing or advanced technology only relates to the larger firms. However, in this study, I have identified that not only larger firms can adopt Cloud Computing but also SMEs can adopt Cloud Computing as well. From my findings it has been noted that when Bangladeshi SMEs owners' or managers' will up skill themselves with the process of ICT skills and knowledge through the ICT expansion (please see figure 12), then they would be in a position to adopt advanced technologies than the ICT and in that case, it could be Cloud Computing for sure, which shows the limitations of the Berman *et* at. (2012) study but his finding is another theoretical contribution in my study.

b) Practical Contribution

This study has contributed to the policies and practices of by adding healthy insights into Bangladeshi SMEs' experiences in relation to the adoption and use of ICT and Cloud Computing. This has become evident based on the insights of the individual contributors who contributed to this research. The investigation of the contributors' insights has opened up some areas for the attention of the Bangladeshi government, private IT firms, and public and private financial organizations, as mentioned in Chapters 4, 5, 6 and 7. As a result of this research, Bangladeshi SMEs can gain more benefits and support from the Bangladeshi government, IT firms and banks that are involved in SME businesses. Therefore, Bangladeshi SMEs can become more enlightened about specific government policies, IT firms' support

and banking facilities in a fascinating way, and the implications of such policies, support and facilities for their businesses.

This study has made suggestions on how the Bangladeshi government and other key stakeholders can assist ICT development in SMEs, which is the pre-requisite of Cloud Computing adoption, which can also help to expand the country's economy. In addition, in view of the issues that have been identified as issues affecting the adoption and use of ICT and Cloud Computing by Bangladeshi SMEs and given the present effort of the Bangladeshi government to formulate a new ICT friendly policy, IT firms' support and other stakeholders facilities and initiatives, adopting the proposed integrated framework in this study will bring about praiseworthy socio-economic growth and double the GDP figure that the Bangladeshi government is eager to achieve in the Digital Bangladesh context.

c) Contribution to the General Body of Knowledge

This study has positively contributed to the existing body of literature and the area of information and communication technology by investigating the insufficiencies of previous research concerning ICT and Cloud Computing adoption in developing nations, with particular focus on Bangladesh. This study has identified some key issues that explain the challenges of Cloud Computing adoption in Bangladeshi SMEs in some specific geographical areas. No single previous research has considered how Bangladeshi SMEs use ICT and Cloud Computing, nor has it acknowledged the kinds of ICT and Cloud Computing applications commonly used by Bangladeshi SMEs. It has been clearly identified that there is an absence of academic articles on the level of ICT and Cloud Computing usage by Bangladeshi SMEs. This research, therefore, adds to the existing body of literature and makes a precise contribution to the area of ICT and CC by providing significant insights on the use of ICT and CC by Bangladeshi SMEs.

It was observed in this study that there is no previous study that has put forward success strategies or a clear roadmap for resolving issues facing Bangladeshi SMEs in relation to ICT and CC adoption and use. Henceforth, this study is considered as one of the pioneer studies in the area of information technology because it has put forward a step-by-step strategy in the form of a framework that can support the Bangladeshi government, key stakeholders and SME owners and managers to resolve the issues faced by SMEs.

This research contributes to the existing literature as it offers suggestions to bridge the digital gap by emphasising the requirements for relatively new and advanced ICT and CC infrastructures in Bangladesh that can speed up the improvement of ICT and CC in both metropolitan and rural areas. Requirements for other stakeholders such as private, commercial and public financial organizations to support the developing capabilities of SMEs in Bangladesh. Findings showed that issues impacting upon the adoption and use of ICT and CC in every country are highly dissimilar but some issues are probably similar. From the previous research, it has been identified that a lack of finance and bank loans are one of the main issues that hinder the adoption of ICT and CC by Bangladeshi SMEs. In this research, however, apart from finance, high Internet costs, poor Internet service, political instability, a lack of government policies and fewer initiatives from the SME Foundation, more predominant inhibitors for adoption have been identified. The outcomes of this study suggested that if the Internet service and prices were reasonable then many SMEs would have adopted Cloud Computing. This exploration has provided a better view of the issues that explain the challenges of Cloud Computing adoption in Bangladeshi SMEs than is found in the existing studies discussed in the review of the present literature.

9.5: Suggestion for further Research

Having assumed the importance of adoption of Information and Communication Technology (ICT) and Cloud Computing and the level of its effective use in Bangladeshi SMEs, it has been outlined that for Bangladeshi SMEs there is a great requirement to understand better the key issues relating to the adoption and implementation of Cloud Computing, which this study has endeavoured to investigate. In addition, the outcomes of this research provide numerous essential implications that might support Bangladeshi SME owners and managers, the Bangladeshi government, strategy makers, as well as Internet and Cloud service providers to simplify the adoption of Cloud Computing as stated earlier. Other important implications of this study are highlighted below:

- **Suggestions for Practice**

    In terms of suggestions for practice, the developed framework in this study provides an appropriate guide and roadmap for the Cloud Computing adoption process, which will be certainly beneficial for those SMEs who wish to expand

further and influence other SMEs, to move from traditional systems to more advanced Internet-based systems, i.e. Cloud Computing. The commendations and policies for success were considered to be very useful by the participants, and therefore, the adopted integrated framework could be a suggested roadmap to other Bangladeshi SMEs in different locations both in Bangladesh and other developing countries in South Asia. The integrated framework would support other SMEs in understanding how the incentives of Cloud Computing could support them to adopt and make effective use of it. Moreover, this framework will describe all of the steps that SMEs need to follow in order to adopt Cloud Computing and how to deal with errors surrounding the whole process.

- **Suggestions for Leaders**

    The outcomes of this research have led to significant suggestions for business owners and managers who are making efforts to adopt Cloud Computing solutions. They are the people who are very interested in expanding their businesses in order to earn more revenue. Certainly this study aimed at supporting Bangladeshi SMEs becoming more successful by migrating from in-house traditional systems to more sophisticated systems such as Cloud Computing. The results also demonstrated that SME owners and managers played a significant role in inspiring the adoption of information technology within their businesses. The findings further suggested that without the support of SME owners and managers, the adoption and utilization rate of Cloud Computing would certainly remain low. Support, suggestions and motivations from the top levels of management are truly vital in order to enhance the level of Cloud Computing deployment. Owners and managers need to provide continuous support in order to motivate employees to increase their use of Cloud Computing.

- **Suggestions for Management and Strategy Makers**

    The findings of the research have showed that regulatory bodies and strategy makers have enormous influence that could support Bangladeshi SMEs to adopt and implement Cloud Computing in their business. In addition, it has been discovered that in order to influence SMEs to use information technology, regulatory bodies must have appropriate policies, regulations, guidelines and support in place because they will assist SMEs in improving their effectiveness in the current, competitive, digital economy. Therefore, the Bangladeshi government

now need to review their existing policies in order to make it more SME favourable and to introduce more SME friendly initiatives, which will increase the probability of promoting Cloud Computing adoption within Bangladeshi SMEs.

- **Implications for Private IT firms/Internet Service Providers**

    This research has also lead to significant practical suggestions for IT firms, Internet providers or Cloud service providers. It revealed that Bangladeshi SMEs are representing majority of businesses in most economies in Bangladesh and therefore represent an essential market segment for IT firms or service providers. Findings further suggested that Internet and Cloud service providers play a pivotal role in adoption when the firm and community arbitrators know each other's individual input and operational connections are established. The research outcomes also suggested Cloud Computing providers need to improve their interaction with SMEs who are involved in the Cloud Computing experience, in an effort to create a healthy environment for Cloud Computing adoption and to remove any vagueness surrounding this type of technology. Moreover, service providers need to ensure that users come to know about all of the advertising efforts because this will direct a faster and more integrated adoption. The results have shown that in many cases, SME owners and managers are not aware at all of the potential incentives of Cloud Computing adoption, which sometimes does not encourage them to adopt this technology.

    By taking all of the points into account, it can be claimed that the contributions of this study are significant to Bangladeshi SME owners and managers, the government and policy makers. As a result, this study is considered as being relevant to the present age of faster development of Cloud Computing. The outcomes acquired will help to fulfil the literature gap in the academic world. The developed framework in this study will assist SMEs to migrate from traditional technologies to Cloud Computing, not only in Bangladesh but also in other developing countries.

9.6: Confines of the Research

    There is no research without limitations and, therefore, in common with other research, this study has confines, which it is essential to address and discuss. These confines mainly result from the systematic literature review and theories, issues in the research methodology and the interpretation and discussion of the findings. Consequently,

while outcomes of this study are very interesting and valuable, the outcomes should be observed in the light of the confines of the research. When interpreting these findings, great care should be employed. The key confines of this research are as follows.

- This exploration tried to expand knowledge about Cloud Computing adoption amongst Bangladeshi SMEs in the context of Digital Bangladesh. Although this exploration has achieved its aims and objectives, there are some areas where further investigation is needed. To me, this study represents only a small portion of the vast knowledge available regarding both Cloud Computing adoption and its being used effectively. I have, however, considered it as having a significant impact on the quest of fulfilling knowledge about Cloud Computing adoption particularly by Bangladeshi SMEs. I mentioned earlier that not much research has been conducted on Cloud Computing from the perspective of Bangladesh and particularly from the perspective of Bangladeshi SMEs. There are, therefore, vast opportunities to discover more about how different SMEs can adopt Cloud Computing and its different services. Notwithstanding this, my research investigation has mainly focused on certain issues that explain the challenges of Cloud Computing adoption by SMEs in Bangladesh but this study could not identify all of the issues and, therefore, some areas need further investigation.

- This study was conducted primarily in several geographical locations in Bangladesh including the capital, Dhaka; the port city, Chittagong, and one of the renowned cities, Jessore. Most of the findings are relatively particular to these locations but outcomes, however, may not be suitable for the whole population of SMEs in Bangladesh or for further afield. Several of the outcomes may reflect the wider contexts of other metropolitan cities in Bangladesh and possibly some outcomes may be shared by some developing countries. Therefore, generalization of the outcomes is limited. As a result, further investigation is required to cover other cities in Bangladesh and, more particularly, the rural areas. Although a process has been followed to analyse and discuss the outcomes in the light of their overall applicability but still some confines present.

- In this study, the adopted data collection method was selected with only semi-structuredd, open-ended interview questions in order to explore the decision-making process of SMEs regarding the adoption of Cloud Computing. This is

because of a number of the limitations outlined in the methodology chapter and in particular for a DBA researcher time was very limited and cost constraints were obligatory upon the study. Although this approach is beneficial when exploring business-related, decision analysis, other approaches could also be used. They are, however, omitted here. For instance, focus groups could have been employed for more SME owners and managers, and IT knowledgeable staff, to discuss the issues related to the currently adopted technology and Cloud Computing. This would have not only highlighted the issues that explain the failure of Cloud Computing adoption but also probe further into the reasons behind the adoption of the new technologies.

- Another confine of this research is that participants have been selected from only a few SME sectors. Therefore, some of the outcomes are very particular to those sectors. Thus, generalization of such outcomes would not be appropriate to other SME sectors in Bangladesh. In wide-ranging terms, location and culture issues are more likely to vary between the different SME sectors while regulatory, financial and competitive issues are more likely to be sector specific.

- Another confine of this research relates to the literature review. Although many relevant websites were checked for relevant information regarding Cloud Computing in Bangladesh and Digital Bangladesh, owing to there not being enough studies covering the perspective of Bangladesh and particularly Cloud Computing in Bangladesh and Digital Bangladesh, it was difficult for me to obtain as much information for this research as I would have liked. Although, I was confident enough that I had fully searched the selected websites but however, other sources and websites may have been left unidentified or may not have been reviewed owing to a shortage of time.

- This investigation was based on semi-structuredd, face-to-face interviews and, therefore, all of the data that has been collected is still subject to memory and the recall bias of the participant'. This was unavoidable owing to the nature of the methods used. Therefore, there is a possibility that some of data may be biased. Moreover, almost all of the data was collected in Bengali and, therefore, whenever data was translated into English, some special meanings may have been misinterpreted.

- Another confine were the difficulties associated with the independent assessment because, in this study, I adopted a self-reporting approach to collect data from the participants. Therefore, it must be recognized that this approach may encourage bias as collected data could be subject to response misrepresentations. Moreover, the qualitative dialogues may have suffered from overemphasis in the creation of their narrative by the interviewees.

- The samples were chosen to include various sectors of SMEs and at various stages of their business growth but owing to the nature of the qualitative study, the sample size was very small. Therefore, there is a possibility that the outcomes may only offer a partial picture of the real issues that explain the challenges of Cloud Computing adoption. Moreover, this research was designed to explore participants' individual perceptions that explain the issues impacting upon the adoption of Cloud Computing. As a result, the overview of such outcomes to other stakeholders beyond this kind of individual engagement is limited.

- The final confine that I have observed is the validity of the developed integrated framework. Again owing to the time constraint, this study did not have enough opportunity to justify whether the developed framework would work for Bangladeshi SMEs in their adoption of Cloud Computing with the support of the government and private IT organizations or not. At the same time, it was not possible to see whether it would be possible for the Bangladeshi government to implement this framework in order to build Digital Bangladesh.

9.7: Deliberations for Future Research

The research findings, outcomes and confines of this research have resulted in the relationship of some advice for potential future exploration. As a result of this exploration, the deliberations of future research are presented below.

- Future research could be conducted by investigating and examining the adoption of Cloud Computing in other SME sectors in different cities and, in particular, in rural areas in Bangladesh, in a qualitative as well as a quantitative way in order to better understand the root cause of the challenges of Cloud Computing adoption for

SMEs. In addition, a similar kind of exploration needs to be conducted in other developing countries in order to identify the relevance of this study.

- Future researchers need to be very careful about selecting the size of their samples because given that SMEs are present in all economies, this will call for careful selection of samples that can provide a representative picture of Cloud Computing, which could use many of the existing SMEs as an example. Having more respondents from different sectors would provide better illustration trends within every sector, which would in turn provide more consistent evaluations.

- This study mainly focused on active SME industries, and therefore, I suggest that future investigations focus on other industries in order to add other valid points and knowledge about the adoption of Cloud Computing.

- In order to improve the generalization of the outcomes in various areas within Bangladesh, more exploration is required to achieve credibility of further outcomes. Trustworthiness will support the understanding of whether the outcomes will have a similar impact or fewer consequences in other areas.

- Future investigators need to investigate more in order to understand the business functionalities of the pre and post Cloud Computing adoption phases. As Cloud Computing is relatively new in Bangladesh, and particularly in Bangladeshi SMEs, further investigations should incorporate this measure in order to identify how Bangladeshi SMEs sees Cloud Computing and its benefits into their business functionalities and their willingness to adopt Cloud Computing into their businesses.

- Future researchers need to conduct a comparative study to identify the key differences of Cloud Computing adoption between developing countries and developed countries to see whether Bangladeshi SMEs can replicate other countries' strategies.

- From the literature, it has been identified that Cloud Computing and Digital Bangladesh initiatives are at immature stage in Bangladesh, and therefore, it would be beneficial for future researchers to conduct further research in these areas.

- Future researchers need to investigate more about the integration of the TOE framework and the Cloud Lifecycle model in order to achieve the best outcomes from them to support existing theories.

9.8: Summary of the Chapter

Conclusively, it can be said that future research will somehow extend the knowledge of both the adoption and effective utilization of Cloud Computing in some metropolitan cities and rural areas of Bangladesh, beyond the areas that this research has covered. Visions from the investigation advocated that there are many issues that stand as barriers to Bangladeshi SMEs adopting and using Cloud Computing. However, owing to the wide range of incentives of Cloud Computing, some SMEs are showing their willingness to adopt Cloud Computing. In addition, this study discovered that owners and managers of Bangladeshi SMEs play a significant role in promoting Cloud Computing within the business and effective using it.

Researchers Harindranath *et* al. (2008) mentioned that within SMEs, only an individual who has vision and can take the initiative and responsibility, could progress the development and deployment of information technology adoption. In relation to Harindranath *et* al's (2008) statement, it is very much expected that the outcomes acquired in this research will be supportive for those SMEs in developing countries, especially in Bangladesh whose government is eager to adopt Cloud Computing. This research has successfully fulfilled its aims and objectives and has answered the research questions that were outlined at the beginning of this study. This study has delivered noteworthy contributions concerning the barriers and incentives to the adoption and effective use of Cloud Computing by Bangladeshi SMEs in the context of Digital Bangladesh. Although many scholars in Bangladesh have talked about the issues that affect Cloud Computing adoption by SMEs, no roadmap has yet been put forward for use as a guide in order to overcome those issues. In this investigation, I have provided a clear roadmap for SME owners and managers, as well as for the Bangladeshi government, to show them how can they adopt Cloud Computing to support Digital Bangladesh concepts.

References

Abdin, M. J. (2010). Bangladesh's SMEs facing so many Challenges. [Adapted from: <https://joynal.wordpress.com/2010/08/01/bangladeshs-smes-facing-so-many-challenges/> Accessed on 07/01/2016]

Abdin, M. J. (2014). Vision-2021: The role of small and medium enterprises [Retrieved from: <https://joynal.wordpress.com/tag/smes-in-bangladesh/> Accessed on 04/01/2016]

Abdollahzadegan, A., Hussin, C., Razak, A., Moshfegh Gohary, M., & Amini, M. (2013). The organizational critical success factors for adopting cloud computing in SMEs. *Journal of Information Systems Research and Innovation* (JISRI), 4 (1), 67 – 74

Access to Information Programme, Prime Minister's Office (2009). Digital Bangladesh: Concept Note. [Retrieved from: <http://www.a2i.pmo.gov.bd/sites/default/files/resource_docs/Digital%20Bangladesh%20

Concept%20Note_Final.pdf > Accessed on 10/07/2016]

Access to Information Programme, Prime Minister's Office (2011). Bangladesh: Access to Information Programme (A2I) Evaluation Report [Retrieved from: <http://www.a2i.pmo.gov.bd/sites/default/files/resource_docs/a2i%20Evaluation%20Report.pdf> Accessed on 10/07/2016]

Adam, I. O., & Musah, A. (2014). Small and Medium Enterprise (SMEs) in the Cloud in Developing Countries: A Synthesis of the Literature and Future Research Directions. *Journal of Management and Sustainability,* 5 (1), 115 – 139

Agarwal, S.P. (2006). Technology Capacity Building of SMEs: Leveraging International Networks and Resources. A paper presented in the workshop organised by United Nations Economic and Social Commission for Asia and Pacific. Dec 21-22

Ahmed, K. & Chowdhury, T. A. (2009). Performance Evaluation of SMEs of Bangladesh. *International Journal of Business and Management* Vol. 4, No. 7

Ahmed, M. U. (1999). Development of Small-scale Industries in Bangladesh in the New Millennium: Challenges and Opportunities. *Asian Affairs,* vol. 21, no. 1

Ahmed, M. U. (2001). Globalization and Competitiveness of Bangladesh's Small Scale Industries (SSIs): An Analysis of the Prospects and Challenges, Chapter 7 in Rehman Sobhan (ed.) *Bangladesh Facing the Challenges of Globalization: A Review of Bangladesh's Development 2001,* Centre for Policy Dialogue and University Press Limited, Dhaka

Ahmed, M. U. (2003). The Economics of Small-scale Industries Revisited. Dhaka, Bangladesh

Ahson, S. A., & Ilyas, M. (Eds.) (2010). Cloud computing and software services: theory and techniques. CRC Press, p. 59

Akbari M. (2012). Cloud Computing Adoption of SMEs: Challenges, Barriers and Outcomes. Masters Dissertations. Dublin Institute of Technology. School of Technology. [Retrieved from: <http://arrow.dit.ie/cgi/viewcontent.cgi?article=1053&context=scschcomdis> Accessed on 23/12/2015]

Akintoye, A., Mclntosh, G., & Fitzgerald, E. (2000). A survey of supply chain collaboration and management in the UK construction industry. *European Journal of Purchasing and Supply Chain Management,* 6 (3-4), 159 – 168

Alatawi, F. M. H., Dwivedi, Y. K., Williams, M. D., & Rana, N. P. (2012). *Conceptual model for examining knowledge management system (KMS) adoption in public sector organizations in Saudi Arabia.* Paper presented at the tGov Workshop' 12 (tGOV12), Brunei University, West London

Alshamaila, Y. Y. (2013). An empirical investigation of factors affecting Cloud Computing adoption among SMEs in the North East of England. Newcastle University Business School, Newcastle upon Tyne. [Retrieved from: <https://theses.ncl.ac.uk/dspace/bitstream/10443/2080/1/Alshamaila%2013.pdf> Accessed on 23/12/2015]

Alshamaila, Y., Papagiannidis, S., & Li, F. (2008). Cloud computing adoption by SMEs in the north east of England: A multi-perspective framework. *Journal of Enterprise Information Management,* 26 (3), 250 – 275

Alshamaileh, Y., Papagiannidis, S. and Li, F. (2012). 'Cloud Computing Adoption by SMEs in the North East of England: A multi-perspective framework', *Journal of Enterprise Information Management*

Amaratunga, D., Baldry, D., Sarashar, M. and Newton, R. (2002). Quantitative and qualitative research in the built environment: Application of "mixed" research approach. *Work Study Journal,* 51 (1)

Ankrah, N. A. (2007). An Investigation into the Impact of Culture on Construction Project Performance. PhD Thesis, University of Wolverhampton

Applegate, L., Austin, R., & Soule, D. (2008). Corporate information strategy and management: Text and business execution . Boston, MA: Harvard Business Review Press.

Apulu, I and Latham, A. (2009). Information and communication technology adoption:

Challenges for Nigerian SMEs, *TMC Academic Journal,* 4(2), pp. 64-80

Apulu, I. (2012). Developing a Framework for Successful Adoption and Effective Utilisation of ICT by SMEs in Developing Countries: A Case Study of Nigeria. PhD thesis. School of Technology, University of Wolverhampton

Aravind, R. G., Sampath, M. K. and Venkatesh, V. G. (2013). Opportunities for Cloud based Software as a Service (SaaS) Warehouse Management System: An Indian Industry Insight. SIBM, Vol. VI, No. 2, pp. 43 – 54

Asian Development Bank (ADB) (2001). High Level Workshop on Strategic Issues and Potential Response Initiatives in the Finance, Industry and Trade Sector. November, Dhaka

Asian Development Bank (ADB) (2002), Bangladesh, Strategic Issues and Potential Response-Small and Medium Enterprise Development and Export Expansion, Dhaka

Australian Bureau of Statistics (2012), Australian Small Business Key Statistics and Analysis. Department of Industry, Innovation, Science, Research and Tertiary Education, Australian Government

Aveek, M. A. and Rahman, Md. S. (2011). "Implementing E-Governance in Bangladesh Using Cloud Computing Technology", BRAC University, Dhaka, Bangladesh.

Awa, H. O., Eze, S. C., Urieto, J. E., and Inyang, B. J. (2011). Upper echelon theory (UET): A major determinant of information technology (IT) adoption by SMEs in Nigeria. *Journal of Systems and Information Technology,* 13 (2), 144 – 162

Azarnik[a], A., Shayan[a], J., Alizadeh[b], M., & Karamizadeh[a], S. (2012). Associated Risks of Cloud Computing for SMEs. *Open International Journal of Informatics (OIJI),* Vol. 1 (2012)

Azodolmolky, S., Wieder, P., & Yahyapour, R. (2013). Cloud computing networking: challenges and opportunities for innovations. Communications Magazine, IEEE, 51 (7), 54 – 62

Babbie, E. R. (2010). *The practice of social research* (12 ed.). Belmont: Wadsworth, Cengage Learning

Babcock, C. (2010). *Management strategies for the cloud revolution: how cloud computing is transforming business and why you can't afford to be left behind.* London: McGraw-Hill

Baker, J. (2011). 'The Technology-Organization-Environment Framework', in Dwivedi, Y., Wade, M. and Schnegerger, S. (eds.) *Information Systems Theory: Explaining and Predicting Our Digital Society.* New York: Springer

Baker, J. (2012). The Technology-Organization-Environment Framework. *Information Systems Theory,* 28, 231 – 245

Banerjee, P. (2017), "An intelligent IT infrastructure for the future", Proceedings of 15th International Symposium on High-performance Computer Architecture, HPCA, Raleigh, NC, USA.

Bangladesh Awami League Election Manifesto (2008) [Retrieved from: <http://www.albd.org/autoalbd/index.php?option=com_content&task=view&id=367 &Itemid=1> Accessed on 24/06/2016]

Bannerman, L., P. (2014) Cloud Computing Adoption Risks: State of Play. NICTA and School of Computer Science and Engineering, University of NSW, Sydney, Australia

Bazeley, P., & Richards, L. (2000). *The Nvivo qualitative project book.* London: Sage Publications

Becker, J., Knackstedt, R., Pöppelbuß, J. (2009) Developing Maturity Models for IT Management – A Procedure Model and its Application, in Business & Information Systems Engineering, Vol. 1(3), p 213-222.

Bell, J. (1993). *Doing your research project.* Buckingham, England: Open University Press

Bell, J. (2005). *Doing your Research Project: A guide for first time researchers in education. Health and social science.* 4th ed. Open University Press

Benzing, C., Chu, H. M., & Kara, O. (2009). Entrepreneurs in Turkey: A factor analysis of motivations, success factors, and problems. *Journal of small business management,* 47 (1), 58 – 91

Berisha, G., Pula, J. Shiroka (2015). Defining Small and Medium Enterprises: a critical review. *Academic Journal of Business, Administration, Law and Social Sciences.* Vol. 1, No. 1.

Berman, S., Marshall, A., and Srivathsa, R. (2012). "The power of cloud-Driving business model innovation", *IBM Institute for Business Value*

Beynon, H. (2002). *Managing Employment Change: The New Realities of Work.* Oxford University Press

Bharati, P. and Chaudhury, A. (2006). 'Studying the current status of technology adoption', *Communications of the ACM,* 49(10), pp. 88-93

Biggs, S., & Vidalis, S. (2009). Cloud Computing: The impact on digital forensic investigations. International Conference for Internet Technology and Secured Transactions, 2009. ICITST 2009, 1-6.

Blaxter, L., Hughes, C. and Tight, M. (1996). *How to Research,* Buckingham, Open University Press

Bloor, M. and Wood, F. (2006). Keywords in Qualitative Research: A Vocabulary of Research Concepts. London: Sage

Böhm, M., Leimeister, S., Riedl, C., and Krcmar, H. (2010). Cloud computing: Outsourcing 2.0 or a new business model for IT provisioning? In Keuper, F., Oecking, C., and Degenhardt, A., editors, *Application Management.* Gabler, Wiesbaden

Boodhoo, R. and Purmessur, R. D. (2009). Justification for Qualitative Research in Organizations: A Step Forward. *The Journal of Online Education,* New York, January 2009

Borangiu, T., Curaj, A., & Dogar, A. (2010). Fostering innovation in services through open education and advanced IT. International Joint Conference on Computational Cybernetics and Technical Informatics (ICCC-CONTI), 2010, 437-444.

Boyatzis, R. E. (1998). *Transforming Qualitative Information.* Sage: Publications

Boyce, C. and Neale, P. (2006). Conducting In-Depth Interviews: A Guide for Designing and Conducting In-Depth Interviews for Evaluation Input. *Pathfinder International.* May 2006

Brandic, v. and Dustdar, S. (2011). 'Grid vs Cloud – A Technology Comparison', *it – Information Technology* (4)

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology,* 3 (2), 77 – 101

Bridge, S., O'Neill, K. and Cromie, S. (2003). *Understanding Enterprise, Entrepreneurship and Small Business.* Palgrave MacMillan

Brink, P. J., & Wood, M. J. (1998). *Advanced design in nursing research* (2 ed.). Thousand Oaks: Sage

Brownhill, B., Gravesen, K. Jan., Sarkar, S. and Williams, P. (2014). The economy of cloud, *How cloud helps government drive economic vitality* [Retrieved from: <http://www.ibm.com/cloud-computing/bin/chrome/site-chrome/src/au_en/html/the_economy _of_cloud.pdf> Accessed on 18/07/2016]

Brun, A., Caridi, M., Fahmy Salama, K. and Ravelli, I. (2006). Value and Risk assessment of Supply Chain Management improvement projects. *International Journal of Production Economics,* 99 (1-2), pp. 186 – 201

Bryman, A. (2001). *Social Research Methods.* Oxford, UK: Oxford University Press

Bryman, A. (2004). *Social Research Methods.* 2nd ed. Oxford University Press

Bryman, A. (2006). Integrating quantitative and qualitative research: how is it done? *Qualitative Research,* 6(1), pp. 97 – 113

Bryman, A. (2008). *Social Research Methods.* 3rd ed. Oxford University Press

Bryman, A. (2008). *Social Research Methods.* 3rd ed. Oxford: Oxford University Press

Bryman, A. and Bell, E. (2007). *Business Research Methods.* Revised edition, Oxford University press

Bryman, A. and Bell, E. (2011). *Business Research Methods.* 3rd edn. Oxford University Press

Bryon, A. (2015). Digital Bangladesh: an ICT revolution. *The Worldfolio: ICT in Bangladesh* [Retrieved from: <http://www.theworldfolio.com/news/digital-bangladesh-an-ict-revolution/3603/> Accessed on 30/06/2016]

Buyya, R., Broberg, J. & Goscinski, M. A. (2011). Cloud Computing: Principles and Paradigms. Hoboken, New Jersey: John Wiley and Sons

Buyya, R., Broberg, J. and Gościński, A. (2011). *Cloud Computing: Principles and Paradigms.* John Wiley & Sons

Byrd, M. (2009). *Small Business Management: An Entrepreneur's Guidebook.* McGraw-Hill Higher Education

Cafaro, M. and Aloisio, G. (2010). *Grids, clouds and virtualization.* Springer Publishing Company, Incorporated, 1st edition

Camron, K. S., and Quinn, R. E. (2005). *Diagnosing and Changing Organizational Culture: Based on the Competing Values Framework,* Wiley

Carcary M (2011) Design Science Research: The Case of the IT Capability Maturity Framework (IT CMF), The Electronic Journal of Business Research Methods, 9 (2), pp. 109-118

Cassell, C. and Symon G. (2004). *Essential guide to qualitative methods in organizational research.* Sage Publications. pp. 323 – 333

Cellary, W. and Strykowski, S. (2009). "E-Government Based on Cloud Computing and Service-Oriented Architecture" *International Conference on Theory and Practice of Electronic Governance*, PP. 5 – 10

Chell, E., Haworth, J. M. and Brearley, S. (1991). *The Entrepreneurial Personality: Concepts, Cases, and Categories.* Routledge

Chong, A., Ooi, K., Lin, B. and Raman, M. (2009). 'Factors affecting the adoption level of e-commerce: An empirical study', *Journal of Computer Information Systems,* 50 (2), pp. 13 – 22

Choudhury, J., R., (2008) Proposed National ICT Policy 2008 [adapted from: <http://unpan1.un.org/intradoc/groups/public/documents/un-dpadm/unpan041046.pdf> accessed on 01/11/2018]

Chowdhury, M. (2009). Digital Bangladesh: Going Beyond the Rhetoric. *Forum, A monthly publication of The Daily Star, Vol. 4 No. 2* [Adapted from: <http://archive.thedailystar.net/forum/2009/february/digital.htm> Accessed on 27/06/2016]

Chowdhury, M. S. A., Azam, M. K. G. & Islam, S. (2013). Problems and Prospects of SME Financing in Bangladesh. Asian Business Review, vol. 2, no. 2/2013 (Issue 4) [Retrieved from: <http://oaji.net/articles/2014/800-1398829325.pdf> Accessed on 06/01/2017]

Cloud Security Alliance (2010). "Top threats to cloud computing" [Retrieved from: <http://www.cloudsecurityalliance.org/topthreats/csathreats.v1.0.pdf> Accessed on 04/02/2016]

Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education* (6th ed.). London: Routledge-Falmer

Collis, J., & Hussey, R. (2003). *Business research: A practical guide for undergraduate and postgraduate students* (2nd ed.). Basingstoke: Palgrave Macmillan

Conway, G., & Curry, E. (2012). Managing cloud computing: A Life Cycle Approach. In *2nd International Conference on Cloud Computing and Services Science (CLOSER 2012)* (pp. 198 – 207). Porto, Portugal

Conway, g., Curry, E., & Donnellan, B. (2014) Cloud Computing Adoption: An SME Case Study [adapted from: http://www.edwardcurry.org/publications/IAM_2014_SMECloudAdoption.pdf accessed on 20/12/2018]

Conway, G., Curry, E., & Donnellan, B. (2014). Cloud Computing Adoption: An SME Case Study. [Retrieved from: <http://www.edwardcurry.org/publications/IAM_2014_SMECloudAdoption.pdf> Accessed on 02/02/2016]

Cooray, M. N. R., & De Silva, K. R. (2007). Facilitating the development of SMEs of Sri Lanka through sustainable consumption and production. [Retrieved from: <http://www.ncpcsrilanka.org/Rountalbe> Accessed on 04/12/2015]

Cornford, T. and Smithson, S. (1996). *Project research in Information systems: a student's guide.* Published by Palgrave

Costello, P., Chibelushi, C. and Sloane, A. (2007). ICT adoption issues in ICT SMEs in the West Midlands UK: beyond the differences. Proceedings of the European Conference on Information Management and Evaluation (ECIME), University Montpellier 1, Montpellier, France, 20-21 September 2007

Crabtree, B. and Miller, W. (1999). *Doing Qualitative Research.* 2nd ed. London

Creswell, J. (2007). *Qualitative inquiry and research design: Choosing among five approaches.* Sage Publications

Creswell, J. W. (1994). Research design: *Qualitative & quantitative approaches.* Thousand Oaks, CA: Sage

Creswell, J. W. (2002). Research design: qualitative, quantitative and mixed methods approach. Thousand Oak, London, Sage Publications

Creswell, J. W. (2003). *Research Design: qualitative, quantitative and mixed methods Approaches.* 2nd ed. Sage Publications

Creswell, J. W. (2013). Qualitative Inquiry & Research Design: Choosing Among Five Approaches. SAGE Publications, London

Crowther, D. and Lancaster, G. (2008). *Research methods: a concise introduction to research in management and business consultancy.* USA: Butterworth – Heinemann

Cullen, S., Seddon, P., & Willcocks, L. P. (2005). Managing Outsourcing: The Lifecycle Imperative. *MIS Quarterly Executive,* 4 (1), 229 – 256

Curan, J., Great Britain. Dept. for, E. and Employment (1996). *Establishing Small Firms' Training Practices, Needs, Difficulties and Use of Industry Training Organisation.* H.M. Stationery Office

Curry, E., Guyon, B., Sheridan, C., and Donnellan, B. (2012) Developing an Sustainable IT Capability: Lessons From Intel's Journey," MIS Quarterly Executive (11:2), pp. 61–74.

Damanpour, F., and Gopalakrishnan, S. (1998). 'Theories of organizational structure and innovation adoption: the role of environmental change', *Journal of Engineering and Technology Management,* 15 (1), pp. 1 – 24

de Vaus, D. A. (2001). *Research Design in Social Research.* Sage Publications: London

de Vos, A. S., Strydom, H., Fouche, C. B. and Delport, C. S. L. (2002). *Research at grass roots for the social sciences and human professions.* Pretoria: Van Schaik

Denscombe, M. (2007). *The Good Research Guide for small-scale social research projects.* Berkshire: Open University Press

Denzin, N. K. and Lincoln, Y. S. (1994). *Handbook of Qualitative Research.* Sage Publications

Denzin, N. K. and Lincoln, Y. S. (2000). *Handbook of Qualitative Research* (2nd ed.), USA: Sag

Denzin, N. K. and Lincoln, Y. S. (2005). *Handbook of Qualitative Research* (3rd ed.). USA: Sage

Dillon, T., Chen, W. and Chang, E. (2010). *Advanced Information Networking and Applications (AINA), 2010 24th IEEE International Conference on*. 20-23 April 2010

Dillon, T., Wu, C., & Chang, E. (2010). Cloud computing: issues and challenges. In Advanced Information Networking and Applications (AINA), 2010 24th IEEE International Conference on (pp. 27-33). IEEE

Doherty, E., Carcary, M. and Conway, G. (2012) Risk Management Considerations in Cloud Computing Adoption

Donelaicio, K. (2012). Cloud Computing Based Accounting for Small to Medium Sized Business, Inzinerine Ekonomika Engineering Economics, 23 (1), 14 – 21, ISSN: 1392 – 2785

Donnellan, B., Sheridan, C., and Curry, E. (2011) A Capability Maturity Framework for Sustainable Information and Communication Technology, IEEE IT Professional (13:1), pp. 33–40.

Duan, Y., Mullins, R., Hamblin, D., Stanek, S., Sroka, H., Mavhado, V., and Auaujo, J. (2002). Addressing ICTs Skill Challenges in SMEs: Insights from three country investigations. *Journal of European Industrial Training,* 26(9), pp. 430 – 441

Duchesneau, D., & W. Gartner. (1990). A profile of new venture success and failure in an emerging industry. *Journal of Business Venturing,* 5(5), 297-312

Dunn, K. A., & Huss, H. F. (2004). Mail survey reliability through follow-up mailings: The case of auditor changes. *Managerial auditing journal,* 19 (8), 1048 – 1054

Durkee, D. (2010). Why cloud computing will never be free. Queue, 8 (4), 20

Durrani, M. and Boocock, G. (2006). *Venture Capital, Islamic Finance and SMEs: Valuation, Structuring and Monitoring Practices in India.* Palgrave Macmillan

Easterby-Smith, M., Thorpe, R. and Jackson, P. (2008). *Management Research,* 3rd ed. Sage Publications Ltd, London

Easterby-Smith, M., Thorpe, R. and Lowe, A. (1991). *Management Research: An Introduction.* London. Sage Publications Ltd

Ebrahim, Z. A. (2005). THE ADOPTION OF E-GOVERNMENT KINGDOM OF BAHRAIN IN THE A Thesis Submitted for the Doctor of Philosophy By. , (May)

Egbu, A. U. (2007). Impact of Land Use Planning on Urban Housing Development in Nigeria. PhD Thesis, University of Wolverhampton

Eisenhardt, K. M. and Howe, K. R. (1992). Validity in educational research. In LeCompte, M. D. Millroy, W. L. and Preissle, J. (Eds.). The handbook of qualitative research in education (pp. 643-680). San Diego, CA: Academic Press

El Hamzaoui, A. (2006). Les PME au Maroc: états des lieux et conditions d'émergence. *Thesis.* Casablance, Morocco: Institut Supérieur de Commerce et d. Administration des Enterprises

El-Gazzar, R. F. (2014). A Literature Review on Cloud Computing Adoption Issues in Enterprises. In Creating Value for All Through IT (pp. 214 – 242). Springer Berlin Heidelberg

Erlichman, J. (2009). "Special report: Cloud Computing". [Retrieved from: <http://www.1105govinfo.com/pdfs/custom/Snap-Cloud-final.pdf> Accessed on 19/07/2016]

Ernesto, R. W. and Hansen, N. (2005). Innovation in Large versus Small Companies: Insights from the US Wood Products Industry. *Management Decision.* Vol. 43, No. 6

Etro, F. (2009). "The Economic Impact of Cloud Computing on Business Creation, Employment and Output in the E.U.", *Review of Business and Economics,* 54(2), 179-208

Faber, N., de Koster, M. B. M. and van de Velde, S. L. (2002). "Linking warehouse complexity to warehouse planning and control structure: an exploratory study of the use of warehouse management information systems", *International Journal of Physical Distribution & Logistics Management,* Vol. 32 No. 5, pp. 381 – 95

Fatai, A. (2010) Small and Medium Scale Enterprise in Nigeria: The Problems and Prospects. *The Collegiate Journal of Economics,* 1, 16 -18

Fellows, R. and Lui, A. (1997). *Research Methods for Construction.* Blackwell Science, Oxford: Maiden, MA, USA

Fellows, R., Langford, D. Newcombe, R. and Urry, S. (2002). *Construction Management in Practice.* 2nd ed. Oxford. Blackwell Science Ltd. UK

Foster, I., Zhao, Y., Raicu, I., and Lu, S. (2008). Cloud computing and grid computing 360- degree compared. In *GCE'08: Proceedings of the Grid Computing Environments Workshop, 2008,* pages 1 -10

Frees, W. E. (1996). *Data Analysis Using Regression Models: The Business Perspective.* Prince Hall, Englewood Cliffs, USA

Furht, B. and Escalante, A. (2010). Handbook of Cloud Computing. New York: Springer.

Galliers, R. D. and Land, F. F. (1987). Choosing an appropriate information systems research methodology. *Communications of the ACM,* 30 (11), pp. 900 – 902

Ghauri, P. and Grønhaug, K. (2005). *Research Methods in Business Studies: A Practical Guide.* 3rd ed. Essex, UK: Pearson Education Limited

Giessmann, A., & Stanoevska-Slabeva, K. (2012). Business models of platform as a service (PaaS) providers: current state and future directions. JITTA: *Journal of Information Technology Theory and Application,* 13 (4), 31

Gill, P., Stewart, K., Treasure, E. and Chadwick, B. (2008). Methods of data collection in qualitative research: interviews and focus groups. British Dental Journal 204 (6). March 22, 2008

Gillham, B. (2005). *Research Interviewing: the range of techniques.* Maidenhead: Open University Press

Golafshani, N. (2003). Understanding Reliability and Validity in Qualitative Research. *The Qualitative Report,* 8(4), pp. 597 – 607

Gong, C., Liu, J., Zhang, Q., Chen, H., & Gong, Z. (2010). The characteristics of cloud computing. In Parallel Processing Workshops (ICPPW), 2010 39th International Conference on (pp. 275 – 279). IEEE

Graneheim, U. H., & Lundman, B. (2004). *Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. Nurse Education Today,* 24 (2), pp. 105 – 112

Gray, K., Foster, H., & Howard, M. (2006). Motivations of Moroccans to be entrepreneurs. *Journal of Development Entrepreneurship,* 11 (4), 297 – 318

Greenberg, A. (2009). "IBM's Chinese Cloud City". Forbes [Retrieved from: <http://www.forbes.com/2009/07/27/ibm-china-computing-intelligent-technology-ibm.html> Accessed on 06/09/2016]

Grossman, R. L. (2009). The case for cloud computing. IT Professionals

Grossman, R.L., Gu, Y.H., Sabala, M. and Zhang, W.Z. (2013), "Compute and storage clouds using wide area high performance networks", Future Generation Computer Systems, Vol. 25, pp. 179-83.

Gupta, P., Seetharaman, A., & Raj, J. R. (2013). The usage and adoption of cloud computing by small and medium business. *International Journal of Information Management,* 33 (5), 861 – 874

Hair, J .F., Bush, R. P., & Ortinau, D. J. (2003). *Marketing research: Within a changing information environment* (2 ed.). New York: McGraw-Hill/Irwin

Hair, J. F., Andeson, R. E., Tatham, R. L. and Black, W. C. (1998). *Multivariate data analysis.* Upper Saddle River, N. J., Prentice Hall

Hakim, C. (1987). *Research design. Strategies and choices in the design of social research.* Boston: Urwin Hyman

Halim, H., A. (2017) Digital Bangladesh initiatives halfway to completion [Adapted from: https://www.dhakatribune.com/bangladesh/2017/12/09/digital-bangladesh-initiative-halfway-completion/ accessed on 10/10/2018]

Harabi, N. (2003). Determinants of firm growth: An empirical analysis from Morocco. *MPRA Paper.* Switzerland: University of Applied Sciences

Harabi, N. (2003). Determinations of firm growth: An empirical analysis from Morocco. *MPRA Paper.* Switzerland: University of Applied Sciences

Hardy, M. and Bryman, A. (2004). *Handbook of data analysis.* London: SAGE Publications

Harindranath, G. (2014). ICT Adoption and Use in UK SMEs: A Failure Initiatives? *Electronic Journal of Information Systems Evaluation,* 11 (2), pp. 90 - 95

Harindranath, G., Dyerson, R. and Barnes, D. (2008). ICT in small firms: factors affecting the adoption and use of ICT in Southeast England SMEs. 16th European Conference on Information System [Retrieved from: < http://is2.lse.ac.uk/asp/aspecis/20080076.pdf> Accessed on: 15/08/2017]

Hasan, M., (2013). Goodness of Cloud Computing: does Bangladesh ready for it. *Global Disclosure of Economics and Business,* Vol. 2, No. 2.

Hashemi, S., Monfaredi, K. & Masdari, M. (2013). Using Cloud Computing for E-Government: Challenges and Benefits. World Academy of Science, Engineering and Technology. *"International Journal of Computer, Electrical, Automation, Control and Information Engineering".* Vol. 7, No. 9

Hashim, K., M. and Abdullah, S., M (2000). A Proposed Framework for Redefining SMES in Malaysia: One Industry One Defintion? [Retrieved from: <http://web.usm.my/aamj/5.1.2000/5-1-6.pdf> Accessed on 03/12/2015]

Healy, M and Perry, C. (2000). Comprehensive criteria to judge validity and reliability of qualitative research within the realism paradigm. *Qualitative Market Research – An International Journal,* 3(3), pp. 118-126

Hennink, M., Hutter, I. & Bailey, A. (2011). *Qualitative Research Methods,* Sage Publications Ltd. London

Hevner, A. R., March, S. T., Park, J., Ram, S., (2004) Design Science in Information Systems Research, MIS Quarterly, Vol. 28(1),p 75-105.

Hicks, R. (2009). "Thailand hatches plan for private cloud" [Retrieved from: <http://www.futuregov.net/articles/2009/may/25/thailand-plans-private-cloud-e-gov/> Accessed on 19/07/2016]

Hoover, J. N. (2009). "Japan hopes IT investment, private cloud will spur economic recovery: The Kasumigaseki Cloud is part of a larger government project that's expected to create 300,000 to 400,000 new jobs within three years" [Retrieved from: <http://www.informationweek.com/shared/printableArticle.jhtml?articleID=217500403> Accessed on 19/07/2016]

Hossain, S. S., Deb, U., & Amin, M. (2009). Impact of information technology in trade facilitation on small and medium-sized enterprises in Bangladesh, Centre for Policy Dialogue, Dhaka, Bangladesh

Hossain, S., Syed (2010). The impact of information technology in trade facilitation on small and medium-sized enterprises in Bangladesh. Studies in trade and investment. Economic and social commission for Asia and the Pacific

Hussain, I., Farooq, Z. & Akhtar, W. (2012). SMEs development and failure avoidance in developing countries through public private partnerships. *African Journal of Business Management.* Vol. 6(4), pp. 1581-1589

Hussey, J., & Hussey, R. (1997). *Business research: A practical guide for undergraduate and post-graduate students.* London: MacMillan Press Ltd.

Ikpe, E. O. (2009). Development of cost benefit analysis model of accident prevention on construction projects. PhD Thesis: University of Wolverhampton

Innovation, Science and Economic Development Canada (2015). SME Research and Statistics. [Retrieved from: <http://www.ic.gc.ca/eic/site/061.nsf/eng/Home> Accessed on 21/12/2015]

Islam, A., Md., Keawchana, T., and Yusuf, H., M., D (2011). Factors Affecting Business Success of Small & Medium Enterprises (SMEs) in Thailand. "*Asian Social Science*", vol. 7, No, 5

Islam, M. A., Khan, M. A., Obaidullah, AZ. M., & Alam, M. S. (2011). Effects of Entrepreneur and Firm Characteristics on the Business Success of Small and Medium Enterprises (SMEs) in Bangladesh. *International Journal of Business and Management,* Vol. 6, No. 3

Islam, M., Sirajul & Grönlund, Åke (2011). Digital Bangladesh – A Change We Can Believe in? [Retrieved from: <https://www.researchgate.net/publication /225100289_Digital_Bangladesh_-_A_Change_We_Can_Believe_in> Accessed on 24/06/2016]

Islam, S. (2018) Digital Bangladesh a reality now [adapted from: <https://www.dhakatribune.com/bangladesh/2018/07/11/digital-bangladesh-a-reality-now> accessed on 01/01/2019]

Ismail, W. N. S. W., Ali, A. (2013). Conceptual model for examining the factors that influence the likelihood of computerised accounting information system (CAIS) adoption among Malaysian SMEs, *International Journal of Information Technology and Business Management,* Vol. 15, No. 1

Iyer, B., & Henderson, J. C (2010). Preparing for the future: Understanding the seven capabilities cloud computing. MIS Quarterly Executive, 9 (2), 117 – 131

Jalil, M. A. (2014). 'SME: An Instrument for Encouraging Rural Employment Generation and Contributing More to Export Earnings [Retrieved from: <http://bea-bd.org/site/images/pdf/060.pdf> Accessed on 04/01/2016]

Jamsa, K. (2013). Cloud Computing SaaS, PaaS, IaaS, Virturalization, Business Models, Mobile, Security, and More. Jones & Bartlett Learning, United States of America, pp: 05 – 15

Jayarante, T. (1993). Quantitative methodology and feminist research. In: Hammersley, M. (ed) Social Research: Politics and Practice, pp. 109 – 123. Sage: London

Jolanta, S. (2015). Use of Cloud Computing in Project Management [Retrieved from: <https://www.researchgate.net/publication/282124755_Use_of_Cloud_Computing_in_Project_Management> Accessed on 13/09/2016]

Josyula, V., Orr, M., and Page, G. (2012). Cloud Computing Automating the Virtualized Data Center. Cisco Press, Unite States of America, pp: 09 – 16

Kamal, M. M. M. (2006). *IT innovation adoption in the government sector: identifying the critical success factors.*[Available from: <http://www.emeraldinsight.com/10.1108/17410390610610645085> Accessed on 10/01/2017]

Kamal. K. U. (2014). Bangladesh government to move to cloud computing [Retrieved from: <http://hifipublic.com/2014/09/13/bangladesh-government-to-move-to-cloud-computing/> Accessed on 18/07/2016]

Kaplan, J. (2009). "Five myths about SaaS. [Retrieved from: < http://www.cio.com/article/print/486091> Accessed on 19/07/2016]

Kennedy, R. C., Xiang, X., Madey, G. R., and Cosimano, T. F. (2005). Verification and validation of scientific and economic models. Agent 2005 Conference Proceedings. Chicago, IL, October 2005.

Kepes, B. (2011). "CLOUDONOMICS": The Economics of Cloud Computing [Retrieved from:

<http://broadcast.rackspace.com/hosting_knowledge/whitepapers/Cloudonomics-The_Economics_of_

Cloud_Computing.pdf> Accessed on 10/09/2016]

Khan, I. (2015). Why Business (SMEs) Should Adopt Cloud Computing. Business Information Technology, Oulu University of Applied Sciences [Retrieved from: <https://www.theseus.fi/bitstream/handle/10024/101464/Khan_Imran.pdf?sequence=1> Accessed on 04/02/2016]

khorshed, T., Ali, S., & Wasimi, S. A. (2012, June). A survey on gaps, threat remediation challenges and some thoughts for proactive attack detection in cloud computing. Future Generation Computer Systems, 28(6), 833-851.

Kim, W. (2011). Cloud computing adoption. International Journal of Web and Grid Services, 7(3).

Kim, W., Soo Dong, K., Eunseok, L. and Sungyoung, L. (2009). 'Adoption issues for cloud computing', *Proceedings of the 7th International Conference on Advances in Mobile Computing and Multimedia*. Kuala Lumpur, Malaysia. ACM.

King, N. (2004). *Using templates in the thematic analysis of text.* In: Essential Guide to Qualitative methods in Organizational Research. Sage publications, pp. 256 – 270

Kirk, J., and Miller, M. L. (1986). *Reliability and validity in qualitative research.* Beverly Hills: Sage Publications

KPMG (2011). The Cloud: Changing the Business Ecosystem [Retrieved from: <https://www.kpmg.com/IN/en/IssuesAndInsights/ThoughtLeadership/The_Cloud_ Changing_the_Business_Ecosystem.pdf > Accessed on 19/07/2016]

Kristiansen, S., Furuholt, B., & Wahid, F. (2003). Internet café entrepreneurs: pioneers in information dissemination in Indonesia. *The International Journal of Entrepreneurship and Innovation,* 4(4), 251-263

Kundra, V. (2010). *State of Public Sector Cloud Computing,* US Chief Information Officers Council [Retrieved from: <www.cio.gov/documents/StateOfCloudComputingReport-FINALv3_508.pdf> Accessed on 19/07/2016]

Kushnir, K. (2010). A Universal Definition of Small Enterprise: A procrustean bed for SMEs? [Retrieved from: <http://blogs.worldbank.org/psd/a-universal-definition-of-small-enterprise-a-procrustean-bed-for-smes> Accessed on 03/12/2015]

Lawton, G. (2008). Moving the OS to the Web. Computer, (3), 16 – 19

Lee, S. W. and Kim, D. J. (2004). Driving factors and barriers of information and communication technology for e-business in SMEs: A case study in Korea. IADIS International Conference e-Society.

Leedy, P. D. (1997). *Practical Research Planning and Design,* 6th Edition, Prentice-Hall Inc.

Leimeister, S., Riedl, C., Böhm, M. and Krcmar, H. (2010). 'The Business Perspective of Cloud Computing: Actors, Roles, and Value Networks', *In Proceedings of 18th European Conference on Information Systems ECIS 2010.* [Retrieved from: <http://home.in.tum.de/~riedlc/res/LeimeisterEtAl2010-

preprint.pdf> Accessed on 25/06/2016]

Lertwongsatien, C & Wongpinunwatana, N. (2003). E-commerce adoption in Thailand: An empirical study of small and medium enterprises (SMEs). *Journal of Global Information Technology Management,* 6 (3), 67 – 83

Levy, M., Loebbecke, C. & Powell, P. (2003). SMEs, Cooperation and Knowledge Sharing: the Role of Information System. *European Journal of Information System,* Vol. 12

Lewis, J., & Ritchie, J. (2003). *Generalizing form qualitative research.* In J. Ritchie, & J. Lewis, *Qualitative research practice: a guide for social science students and researchers* (pp. 260 – 285). London: Sage Publications

Leyden, D. and Link, A. (2004). 'Transmission of Risk-Averse Behavior in Small Firms', *Small Business Economics,* 23(3), pp. 255-259

Lincoln, Y. S. and Guba, E. G. (1985). *Naturalistic Inquiry.* Beverly Hills, CA: Sage

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry.* Sage Publications

Lindner, M. A., McDonald, F., Conway, G., & Curry, E. (2011). Understanding Cloud Requirements: A Supply Chain Lifecycle Approach. In *2th international conference on cloud computing, grids, and virtualization (cloud computing 2011)* (pp. 20 – 25). Rome, Italy

Liu, H., & Orban, D. (2010). Remote network labs: An on-demand network cloud for configuration testing. ACM SIGCOMM Computer Communication Review, 40 (1), 83 – 91

Low, C., Chen, Y., & Wu, M. (2011). Understanding the determinants of cloud computing adoption. Industrial Management & Data Systems, 111(7).

Low, C., Chen, Y., & Wu, M. (2011). Understanding the determinants of cloud computing adoption. Industrial Management & Data Systems, 111(7).

Lyer, B. and Henderson, J. (2010). 'Preparing for the future: understanding the seven capabilities of cloud computing', *Management Information Systems Quarterly Executive*, 9(2), pp. 117-131

Mack, N. Woodsong, C. MacQueen, K. M. Guest, G. and Namey, E. (2005). *Qualitative Research Methods: A Data Collector's Field Guide.* North Carolina: Family Health International

Magoulès, F., Pan, J., and Teng, F. (2013). Cloud Computing Data-Intensive Computing and Scheduling. CRC Press, Taylor & Francis Group, 6000 Broken Sound Parkway NW, Suite 300, Boca Raton, FL 33487-2742, pp: 01 -17

Malhotra, N. K. (1999). *Marketing research: an applied orientation* (3rd ed.). New Jersey: Prentice Hall

Manerikar, V. and Manerikar, S. (2014). A Note on Exploratory Research. [Retrieved from: <http://www.welingkar.org/Corporates/pdfs/aWEshkar/march2014/aWEshkar_11_R esearchCommunication_VijayaManerikarNSumeetManerikar.pdf> Accessed on 25/12/2016]

Marks, A. E. & Lozano, B. (2010). Executive's Guide to Cloud Computing. Hoboken, New Jersey: John Wiley and Sons, PP. 40 – 102

Marks, F. and Yardley, L. (2010). *Research for Clinical Health Psychology.* London: Sage

Marshall, C. and Rossman, G. B. (1999). *Designing Qualitative Research.* 3rd ed. Newbury Park. Sage Publications

Marshall, C., & Rossman, G. B. (2010). *Designing qualitative research* (5th ed.). Thousand Oaks, CA: Sage Publications

Marshall, M. N. (1996). Sampling for qualitative research. *Family Practice,* 13 (6), pp. 522 – 525

Marston, S., Li, Z., Bandyopadhyay, S., Zhang, J. and Ghalsasi, A. (2011) 'Cloud computing — The business perspective', *Decision Support Systems*, 51(1), pp. 176-189

Marston, S., Li, Z., Bandyopadhyay, S., Zhang, J., & Ghalsasi, A. (2011). Cloud Computing – the business perspective. Decision Support Systems, 51 (1), 176 – 189

Mason, J. (2005). *Qualitative Researching.* 2nd edn. Sage: London

Mason, M. (2010). Sample size and saturation in PhD studies using qualitative interviews. Paper presented at the Forum Qualitative Sozialforschung/Forum: Qualitative Social Research.

Matthew, K., Bhatia, N. and Chang, J. (2010). "Cloud Computing Return on Investment (ROI) Methodology and Recommendations." IBM Corporation [Retrieved from: <http://public.dhe.ibm.com/software/dw/wes/hipods/CloudROILessonsLearned_11O ct_final.pdf> Accessed on 29/07/2016]

Maxwell, J. 1996. Qualitative research design: An interactive approach. Thousand Oaks, CA: Sage

Maxwell, J. A. (1992). Understanding and validity in qualitative research. *Harvard Educational Review,* 62, pp. 279 – 300

Maxwell, J. A. (1992). Understanding and validity in qualitative research. *Harvard Educational Review,* 62, pp. 279 – 300

Maxwell, J. A. (2005). *Qualitative research design: An interactive approach.* 2nd ed. Thousand Oaks, CA: Sage Publications

Maylor, H. and Blackmon, K. (2005). *Researching Business and Management.* London: Palgrave

McCline, R., Bhat, S., & Baj, P. (2000). Opportunity recognition: An exploratory investigation of a component of the entrepreneurial process in the context of the health care industry. *Entrepreneurship Theory and Practice,* 25 (2), 81 – 94

McGratch, J. E. and Brinberg, D. (1985). *Validity and the Research Process.* Beverly Hills, CA: Sage Publications

McGratch, J. E. and Brinberg, D. (1992). Validity and the research process, Beverly Hills; London, Sage Publication Ltd

McMahon, R. G. (2001). Growth and performance of manufacturing SMEs: The influence of financial management characteristics. *International Small Business Journal,* 19(3), 10 -28

McMahon, R. G. P. (2001). Growth and performance of manufacturing SMEs: The influence of financial management characteristics. *International Small Business Journal,* 19(3), 10-28

Megginson, W. L., Nash, R.C. and Van Randenborgh, M. (1994). 'The Financial and Operating Performance of Newly Privatized Firms: An International Empirical Analysis', *The Journal of Finance,* 49(2), pp. 403-452

Mehrtens, J., Cragg, P. B., & Mills, A. J. (2001). A model of internet adoption by SMEs. *Information & Management,* 39 (3), 165 – 176

Mell, P. and Grance, T. (2010). *The NIST Definition of Cloud Computing* [Retrieved from < http://www.newinnovationsguide.com/NIST_Cloud_Definition.pdf> Accessed on 09/11/2015]

Merriam, S. B. (1997). *Qualitative research and case study applications in education.* Jossey-Bass, Rev Sub Edition

Mettler, T., & Rohner, P. (2009). Situational Maturity Models as Instrumental Artefacts for Organizational Design, DESRIST'09, Malvern, PA, USA.

Miah, M. A. (2006). Key Success Factors for National SME Development Program; Lessons for OIC Member Countries from Bangladesh Experience, *SME Foundation,* Dhaka, Bangladesh

Miles, M. B. and Huberman, A. M. (1994). *Qualitative data analysis.* 2nd ed. London: Sage

Minichiello, V., Aroni, R., Timewell, E., and Alexander, L. (1995). In-depth interviewing: Principles, techniques, analysis. Melbourne: Longman Australia

Misra, S.C. and Mondal, A. (2010), "Identification of a company's suitability for the adoption of cloud computing and modelling its corresponding return on investment", Mathematical and Computer Modelling, Vol. 53, pp. 504-21.

Morse, J. M. (2003). A review committee's guide for evaluating qualitative proposals. *Qualitative Health Research,* 13 (6), pp. 833 – 851

Morse, J. M. and Mitcham, C. (2002). Exploring qualitatively-derived concepts: Inductive-deductive pitfalls. *International Journal of Qualitative Methods,* 1 (4), Article 3

Morse, J. M. and Richards, L. (2002). *Readme First: for a user's guide to qualitative methods.* London: Sage

Mosby, Inc. (2009). *Mosby's Medical Dictionary* (8th ed.). Mosby/Elsevier

Murphy, G. B., Trailer, J. W. and Hill, R. C. (1996). 'Measuring performance in entrepreneurship research', *Journal of Business Research,* 36(1), pp. 15-23

Myers, C, B. (2001). A case in case study methodology. *Fields Methods,* 13 (4), pp. 329 – 352

Myers, M. (1997). Interpretive research in information systems. In: Mingers, J. and Stowell, F. (eds.), Information systems: An emerging discipline, McGraw Hill, London, pp. 239 – 266

Myers, M. D. (2009). *Qualitative research in business and management.* London, UK: Sage Publications

Niehaves, B. and Stahl, B. C. (2006). Critically, Epistemology and Behaviour Vs. Design – Information Systems Research across different sets of Paradigms [Retrieved from: <http://www.cse.dmu.ac.uk/~bstahl/publications/2006_paradigm_ecis.pdf> Accessed on 20/01/2017]

Nuseibeh, H. (2011). Adoption of Cloud Computing in Organizations. Proceedings of the

Ojukwu, D. (2006). Achieving Sustainable Growth through the Adoption of Integrated Business and Information Solutions: A Case Study of Nigerian Small & medium Sized Enterprises. *"Journal of Information Technology Impact",* vol. 6, no. 1, pp. 47-60

Oliveira, T., & Martins, M. F. (2010). Understanding e-business adoption across industries in European countries. Industrial Management & Data Systems, 110 (9), 1337 – 1354

Oliveira, T., & Martins, M. F. (2011). Literature Review of Information Technology Adoption Models at Firm Level. *The Electronic Journal Information Systems Evaluation,* 14 (1), 110 – 121

Opengroup (2016). Characteristics comparison of Cloud Computing and Traditional IT [Retrieved from: <http://www.opengroup.org/cloud/whitepapers/ccroi/intro.htm> Accessed on 15/03/2016]

Orange, K. (2010). Research proposal: Kathryn Orange. Bolton Business School: Examples of Research Proposals. Paper 2. [Retrieved from: <http://ubir.bolton.ac.uk/index.php?action=fileDownload&resourceID=23&hash=fal dd1435cc7a56f645df2e8f90341a6cf11615a&filename=bbs_proposals-2.pdf> Accessed on 10/02/2017]

Pandit, G. L. (1983). *The Structure and Growth of Scientific Knowledge: A Study in the Methodology of Epistemic Appraisal,* D. Reidel Publishing Company, Holland

Pathirage, C. P., Amaratunga, R. D. G and Haigh, R. P. (2008). The Role of Philosophical Context in the Development of Theory: Towards Methodological Pluralism. *The Built & Human Environment Review,* 1 (2008)

Patton, M. Q. (1987). *How to use qualitative methods in evaluation.* Sage Publications

Patton, M. Q. (1990). *Qualitative education methods* (2nd ed.). Newbury Park, CA: Sage Publications

Patton, M. Q. (2001). *Qualitative evaluation and research methods.* 3rd ed. Thousand Oaks, CA: Sage Publications, Inc.

Pauly, M. (2011). T-Systems Cloud-Based Solutions for Business Applications. Cloud Computing: Principles and Paradigms. John Wiley & Sons, Inc, Hoboken. 461 – 503

Pearlson, K., & Saunders, C. (2007). Managing and using information systems . Hoboken, NJ: John Wiley

Peiris, C., Sharma, D., & Balachandran, B. (2011). C2TP: a service model for cloud computing. International Journal of Cloud Computing.

Peng, J., Zhang, X., Lei, Z., Zhang, B., Zhang, W., & Li, Q. (2009). Comparison of several cloud computing platforms. In Information Science and Engineering (ISISE), 2009 Second International Symposium on (pp. 23 – 27). IEEE

Petticrew, M., & Roberts, H. (2006). *Systematic reviews in the social science: A practical guide.* Malden, MA: Blackwell Publishing Co

Petttigrew, K. E., & McKechnie, L. (2011). The use of theory in information science research. *Journal of the American Society for Information Science and Technology,* 52 (1), pp. 62 – 73

Plummer, D., Cearley, D, and Smith, D. (2008). Cloud computing confusion leads to opportunity. Technical Report G00159034, Gartner Research

Polit, D. F., & Hungler, B. P. (1999). *Nursing research: Principles and methods* (6th ed.). Philadelphia: Lippincott

Pollard, J. S. (2003). 'Small firm finance and economic geography', *Journal of Economic Geography,* 3(4), pp. 429-452

Prasad, A. (2009). Understanding successful use of technology in organizations in developing countries: a structurational perspective. *The Electronic Journal on Information Systems in Developing Countries (EJISDC),* 37 (3), pp. 1 – 9

Prokopp, C. (2012). Cloud Computing And China: Two Sides Of A Digital Bangladesh [Retrieved from: <http://www.semantikoz.com/blog/cloud-computing-and-china-two-sides-of-a-digital-bangladesh/> Accessed on 24/06/2016]

Prokopp, C. (2012). Cloud Computing and China: Two Sides of A Digital Bangladesh [Retrieved from: <http://www.semantikoz.com/blog/cloud-computing-and-china-two-sides-of-a-digital-bangladesh/> Accessed on 12/07/2016]

Pyke, J. (2009), "Now is the time to take the cloud seriously", White Paper, [available a: <www.cordys.com/cordyscms_sites/objects/bb1a0bd7f47b1c91ddf36ba7db88241d/time_t o_ take_the_cloud_seroiusly_online_1_.pdf > accessed on 10/12/2018]

Rachdi, F. (2006). L'entrepreneuriat feminine au Maroc: une etude exploratoire. *Congrès International Francophone en Entrepreneuriat et PME* (pp. 1 – 19). Fribourg: Association Internationale de Recherche en Entrepreneuriat et PME

Radford, K. (2012). HP ASE Cloud Architect. Official Exam Certification Guide (Exam HPO – D14). HP Press, San Francisco, 1st edition. pp: 07

Raj, P. (2013). Cloud Enterprise Architecture. CRC Press Taylor & Francis Group, Great Britain. pp: 231 – 236

Ramdani, B., Kawalek, P. & Lorenzo, O. (2009). Knowledge management and enterprise systems adoption by SMEs: Predicting SMEs' adoption of enterprise system. *Journal of Enterprise Information Management,* 22 (1/2), 10 – 24

Rashid, M., Md (2012). Proposed Research Direction for Sustainable SMEs in Bangladesh. *"Bangladesh Research Publications Journal",* vol. 6, issue. 3, page. 317-329, ISSN: 1998-2003

Rath, A., Mohapatra, S., Kumar, S., & Thakurta, R. (2012). Decision points for adoption cloud computing in small, medium enterprises (SMEs). In Internet Technology and Secured Transactions, 2012. *International Conference for* (pp. 688 – 691). IEEE

Repschlaeger, J., Wind, S., Zarnekow, R., & Turowski, K. (2012). A reference guide to cloud computing dimensions: Infrastructure as a Service Classification Framework. 2012 45th Hawaii International Conference on System Sciences.

Rhodes, C. and Brown, A. D. (2005). Narrative, organizations and research. *International Journal of Management Reviews,* 7, 3, September, pp. 167 – 188

Robinson, B. (2009). "3 steps to lift the cloud" [Retrieved from: <http://fcw.com/articles/2009/01/12/3-steps-to-lift-the-cloud.aspx> Accessed on 19/07/2016]

Robson, C. (2002). *Real World Research.* 2nd ed. Blackwell Publishing

Rogers, E. M. (1983). *Diffusion of innovations* (3rd ed.). New York: Free Press

Rogers, E. M. (1995). *Diffusion of Innovations* (4th ed.). New York: Free Press

Rosenberg, D. (2009). "Supercloud looms for Japanese government" [Retrieved from: <http://news.cnet.com/8301-13846_3-10241081-62.html> Accessed on 19/07/2016]

Ross, J., Weill, P., & Robertson, D. (2006). Enterprise architecture as strategy: Creating a foundation for

Rui, G. (2007). *Information systems innovation adoption among organizations a match-based framework and empirical studies.* National university of Singapore

Rummler, G., & Brache, A. (2012). Improving performance: How to manage the white space in the

Saeed, I., Juell-Skielse, G., & Uppström, E. (2011). Cloud Enterprise Resource Planning Adoption: Motives and Barriers . International Conference on Research and Practical Issues of Enterprise Information Systems, (pp. 99-122).

Sarantakos, S. (2005). *Social Research* (3rd edition ed.). New York: Palgrave Macmillan

Sarantakos, S. (2005). *Social Research.* 2nd ed. Palgrave Macmillan Hampshire.

Sarbin, M. (2012). Write a short composition on Digital Bangladesh [Retrieved from: <http://archive.ittefaq.com.bd/index.php?ref=MjBfMTJfMjRfMTJfMV8yOF8xXzU 3NTc=> Accessed on 27/06/2016]

Sarder, J. H., Ghosh, D., & Rosa, P. (1997). The importance of support services to small enterprises in Bangladesh. *Journal of Small Business Management,* 35 (2), 26 – 36

Saunders, M. Lewis, P. and Thornhill, A. (2007). *Research Methods for Business Students.* 4th ed. Prentice Hall: London

Saunders, M., Lewis, P. and Thornhill, A. (2009). *Research Methods for Business Students.* 5th ed. Prentice Hall: London

Schurr, A. (2008). "Keep an eye on cloud computing: Cloud computing confusion leads to opportunity". [Retrieved from: <http://www.networkworld.com/ newsletters/itlead/2008/070708itlead1.html> Accessed on 19/07/2016]

Schwandt, T. A. (2007). *The Sage dictionary of qualitative inquiry* (3rd ed.). Thousand Oaks, CA: Sage Publications

Schwandt, T. A. Lincoln, Y. S., & Guba, E. G. (2007). Judging interpretations: but is it rigorous? Trustworthiness and authenticity in naturalistic evaluation. *New Directions for Evaluation,* 2007 9114), pp. 11 – 25

Seale, C. (1999). *Quality in qualitative research.* Qualitative Inquiry, 5 (4), pp. 465 – 480

Sefiani, Y. (2012). A quantitative approach to understanding business success in Tangier. *International Journal of Research in Management,* 4 (2), 87 – 103

Sefiani, Y. (2013). *Factors for success in SMEs: A Perspective from Tangier.* A PhD thesis in the faculty of Business, Education and Professional Studies submitted to the University of Gloucestershire

Sekaran, U. (2003). *Research methods for business: a skill-building approach,* volume 1 (4th ed.). Wiley

Sekaran, U., & Bougie, R. (2010). *Research methods for business: a skill building approach* (5 ed.). New York: John Wiley & Sons

SeventeentAmericas Conference on Information Systems, AMCIS. Detroit, Michigan: AIS Electronic Library (AISeL).

Sharma, M., Mehra, A., Jola, H., Kumar, A., Misra, M., & Tiwari, V. (2010) Scope of cloud computing for SMEs in India. *Journal of Computing,* 2 (5), 144 – 149

Shimba, F. (2010). Cloud Computing: Strategies for Cloud Computing Adoption Cloud Computing: Strategies for Cloud Computing Adoption

Shrish, C. S. & Thompson, S. H. T. (2010). E-Government, E-Business, and National Economic Performance. *Communications of the Association for Information Systems,* 26 (Journal Article), p. 43

Siddiqui, S. M. (2013). Cloud computing and cloud economy [Retrieved from: <http://www.thedailystar.net/news/cloud-computing-and-cloud-economy> Accessed on 09/09/2016]

Silverman, D. (2000). *Doing Qualitative Research: A Practical Handbook.* London: Sage Publications Ltd.

Silverman, D. (2006). *Interpreting Qualitative Data.* 3rd ed. London: Sage

Simpson, M. and Docherty, A. (2004). 'E-commerce adoption support and advice for UK SMEs', *Journal of Small Business and Enterprise Development,* 11(3), pp. 315 – 328

Singh, Jitendra and Vikas Kumar (2013). "Business Opportunities and Challenges for cloud based ERP Solutions", *Asia-Pacific Marketing View,* Vol. 2, No. 1, pp. 86 – 95

Smallbone, D. and Wyer, P. (2000). 'Growth and development in the small firm', in *Enterprise and Small Business.* Financial Times/Prentice-Hall, pp. 409-433

Smallbone, D., Leig, R., & North, D. (1995). The characteristics and strategies of high growth SMEs. *International Journal of Entrepreneurial Behaviour and Research,* 1(3), 44

SME Foundation (2010). Definition of SMEs [Retrieved from: <http://www.smef.org.bd/v2/index.php/definition-of-smes-as-of-industrial-policy-2010> Accessed on 03/12/2015]

SME Foundation (2014). *"International Journal of SME Development",* vol. 01, issue. 01, Small & Medium Enterprise Foundation, Dhaka, Bangladesh. [Available at:

<http://www.smef.org.bd/v2/smef_download/journal.pdf>, retrieved on: 03/12/2015]

Smith, P. L., & Ragan, T. J. (2005). *Instructional Design* (3rd ed.). Hoboken, NJ: John Wiley & Sons

Smith, Y. and Watkins, J. A. (2012). A literature Review of Small and Medium Enterprises (SME) risk management practices in South Africa. *Africa Journal of Business Management,* 6, 6324 – 6330

South Asia Enterprise Development Facility (SEDF) (2013). The SME Sector: Taking Stock of the Present Situation, mimeo, Dhaka

Srivastava, V. (2012). Impact Of Cloud Computing On Supply Chain Management [Retrieved from:<https://www.academia.edu/4782186/Impact_Of_Cloud_Computing_On_Supply_Chain_Management?auto=download> Accessed on 14/09/2016]

Stake, R. E. (1995). *The art of case study research.* London: Sage

Stallings, W. (2007). Data and computer communications. Pearson/Prentice Hall, 202 – 245

Staten, J. (2009). *Hollow Out The MOOSE: Reducing Cost With Strategic Rightsourcing.*

Storey, D. and Sykes, N. (1996). 'Uncertainty, innovation and management.', in Burns, P. and Dewhurst, J. (eds.) *Small Business and Entrepreneurship.* Basingstoke, UK: Macmillan

Storey, D. J. (1994). *Understanding the Small Business Sector.* International Thomson Business Press

Strauss, A. L. and Corbin, J. (1990). *Basics of qualitative research: Grounded theory procedures and techniques.* Newbury Park, CA: Sage

Suh, J. D. (2010). Risks and Opportunities facing SMEs in the post-crisis Era. Poster presented at the *APEC SMEs Training Workshop, Taipei, Korea May 24th – 28th, May.*

Sultan, N. A. (2011). Reaching for the "cloud": How SMEs can manage. *International journal of information management,* 31 (3), 272 – 278

Sumanasean, Keith. (2005). Country Paper-Sri Lanka [Retrieved from: <http://www.sphconsultants.com/icsi/papers/SriLanka> Accessed on 04/12/2015]

Supriay, B. A. and Djearamane, I. (2013). "RFID based Cloud Supply Chain Management", *International Journal of Scientific & Engineering Research,* Volume 4, Issue 5, pp. 2157 – 2159

Sykes (1990). Validity and reliability in qualitative market research: a review of the literature. *Journal of the Market Research Society,* 32 (3), pp. 289 – 328

Talukder, A., Gandham, S., Prahalad, H., & Bhattacharyya, N. (2010). Cloud-MAQ: The Cloud-Enabled Scalable Whole Genome Reference Assembly Application. Seventh International Conference On Wireless And Optical Communications Networks (WOCN), 2010 (pp. 1-5). Bangalore: IEEE.

Taylor, S. J. and Bogdan, R. (1998). *Introduction to qualitative research methods: A guidebook and resource.* 3rd ed. New York: John Wiley & Sons

Taylor, S., Young, A. and Macaulay, J. (2010). Small Business Ride the Cloud: SMB Cloud Watch – U.S. Survey Results, Cisco Internet Business Solutions Group (IBSG).

Tehrani, S. R. (2013). "Factors Influencing the Adoption of Cloud Computing by Small and Medium-Sized Enterprises (SMEs)". *Thesis and dissertations.* Paper 1179. [Retrieved from: <http://webcache.googleusercontent.com/search?q=cache:YLfoTo6Bx_YJ:digital.library.ryerson.ca/islandora/object/RULA:1630/datastream/OBJ/download/Factors_Influencing_the_Adoption_of_Cloud_Computing_by_Small_and_Medium-Sized_Enterprises__SMEs_.pdf+&cd=1 &hl=en&ct=clnk&gl=uk> Accessed on: 26/10/2016]

Tellis, W. (1997). Introduction to case study. *The Qualitative Report,* 3 (2) [Retrieved from: <http://www.nova.edu.ssss/QR/QR3-2/tellis1.html> Accessed on 11/11/2016]

Tesch, R. 1990. Qualitative research: Analysis types and software tools. New York: Falmer

Tetteh, E. and Burn, J. (2001). 'Global strategies for SMe-business: applying the SMALL framework', *Logistics Information Management,* 14(1/2), pp. 171 – 180

Thomas, J. and Davies, A. (2005). What have feminists done fore us? Feminist theory and organizational resistance. Organisation, 12, 5, pp. 711 – 740

Tiwari, A. and Jain, M. (2013). Analysis of Supply Chain Management in Cloud Computing. *International Journal of Innovative Technology and Exploring Engineering (IJITEE).* ISSN: 2278-3035, Vol. 3, Issue. 5

Tobin, G. A., & Begley, C. M. (2004). Methodological rigour within a qualitative framework. *Journal of Advance Nursing,* 48 (4), pp. 387 – 395

Tornatzky, L, G., & Fleischer, M. (1990). *The process of Technological Innovation.* Lexington: Lexington Books

Tornatzky, L. G., & Fleischer, M. (1990). *The process of Technological Innovation.* Lexington: Lexington Books

transforming organizations. IBM Systems Journal , 32 (1), 4-16.

Tripathi, A. and Parihar, B. (2011). "E-governance challenges and cloud benefit", *IEEE International Conference on Computer Science and Automation Engineering,* Publisher: IEEE, pp.: 351 – 354

Turan, A. T. and Ürkmez, T. (2010). Information Technology Satisfaction of Small and Medium Sized Enterprises in Turkey. *International Bulletin of Business Administration,* 9(2010), pp. 43-55

Uddin, M., Kamal (2014), *"International Journal of SME Development",* vol. 01, Issue. 01, Small & Medium Enterprise Foundation, Dhaka, Bangladesh. [Available at: <http://www.smef.org.bd/v2/smef_download/journal.pdf>, retrieved on: 03/12/2015]

United States International Trade Commission (USITC) (2010). Small and Medium-Sized Enterprises: U.S. and EU Export Activities, and Barriers and Opportunities Experienced by U.S. Firms. Investigation No. 332 – 509, Publication: 4169 [Retrieved from: <https://www.usitc.gov/publications/332/pub4169.pdf> Accessed on 21/12/2015]

Unknown (2015). Definition of SMEs in Australia. [Retrieved from: <http://dnbsmallbusiness.com.au/News/SMEs_call_for_universal_definition_of_small_business/indexdl_8518.aspx> Accessed on 21/12/2015]

Unknown (2015). Definition of SMEs in Canada. [Retrieved from: <http://www.ic.gc.ca/eic/site/061.nsf/eng/Home> Accessed on 21/12/2015]

Unknown (2015). Definition of SMEs in India. [Retrieved from: <http://dcmsme.gov.in/ssiindia/msme_overview09.pdf> Accessed on 22/12/2015]

Unknown (2015). Definition of SMEs in USA. [Retrieved from: <https://www.usitc.gov/publications/332/pub4169.pdf > Accessed on 21/12/2015]

Unknown (2015). Small & Medium Size Enterprises (SMEs) Definition. [Retrieved from: <https://www.ucl.ac.uk/procurement/suppliers/sme> Accessed on 03/12/2015]

Unknown (2016). Cloud Computing adoption security. [Retrieved from: <http://www.cloudsecurityalliance.org/topthreats/csathreats.v1.0.pdf> Accessed on 04/02/2016]

USAID (2001). Bangladesh Enterprise Development Assessment Report, Vol. 1

Velte, T., Velte, A., & Elsenpeter, R. (2009). Cloud computing, a practical approach. McGraw-Hill, Inc

Ven, K. & Verelst, J. (2011). An empirical investigation into the assimilation of open source server software. *Communications of the Association for Information Systems,* 28(9), 117 – 140

Vouk, A. M. (2008). Cloud computing-issues, research and implementations. CIT. *Journal of Computing and Information Technology,* 16 (4), 235 – 246

Walliman, N. (2001). *Your research project: A step-by-step guide for the first-time researcher.* London: SAGE Publications

Walliman, N. (2001). *Your research project: A step-by-step guide for the first-time researcher.* London: SAGE Publications

Wang, J. C. and Tsai, K. H. (1995). Strategies to Lift R & D Expenditure in Taiwan. *Journal of Industry Studies,* Vol. 2, No. 1

Waring, T. and Wainwright, D. (2008). Issues and Challenges in the Use of Template Analysis: Two Comparative Case Studies from the Field. *The Electronic Journal of Business Research Methods,* 6 (1), pp. 85 – 94

Weinhardt, C., Anandasivam, D. I. W. A., Blau, B., Borissov, D. I. N., Meinl, D. M. T., Michalk, D. I. W. W., & Stober, J. (2009). Cloud computing-a classification, business models, and research directions. Business & Information Systems Engineering, 1 (5), 391 – 399

Welsh, J. A., White, J. F. and Dowell, P. (1982). 'A Small Business is not a Little Big Business Harvard Business Review, Vol. 59. No. 4, July/August, 1981, pp. 18 (9 pages), *International Small Business Journal,* 1(1), p. 95

Wikipedia. (2012). *Data analysis.* [Retrieved from: <http://en.wikipedia.org/wiki/Data_analysis> Accessed on 08/02/2017]

Williamson, K., Burstein, F. and McKemmish, S. (2002). The two major traditions of research. In: Williamson, K., Research methods for students and professionals: Information management and systems (2nd ed.) Wagga Wagga, Australia: Centre for Information Studies, Charles Sturt University

Winter, G. (2000). A Comparative Discussion of the Notion of 'Validity' in Qualitative and Quantitative Research. *The Qualitative Report,* 4(3 & 4), March 2000

Winter, G. (2000). A Comparative Discussion of the Notion of 'Validity' in Qualitative and Quantitative Research. *The Qualitative Report,* 4(3 & 4), March, 2000

Wolcott, H. F. (1994). On seeking and rejecting validity in qualitative research. In H. F. Wolcott (1994), Transforming Qualitative Data – Description, Analysis and Interpretation. London: Sage, pp. 337 – 373

World bank (2015). Overview of Bangladesh. [Retrieved from: <http://www.worldbank.org/en/country/bangladesh/overview> Accessed on 03/12/2015]

World bank (2015). Population, GDP, GDP growth and inflation of Bangladesh. [Retrieved from: <http://www.worldbank.org/en/country/bangladesh> accessed on 03/12/2015]

Wu, Y. (2007). Implications of Case Study Research in Information Systems in Supply Chain Management. 16th EDAMBA Summer Academy, Soreze, France, July 2007

Wyld (2010). *Moving to the Cloud: An Introduction to Cloud Computing in Government* [Retrieved from: <http://www.businessofgovernment.org/sites/default/files/Moving%20to%20the%20Cloud.pdf> Accessed on 10/09/2016]

Wyld, D. C. (2010). The Cloudy Future of Government IT: Cloud Computing and the Public Sector Around the World. *International Journal of Web & Semantic Technology (IJWesT),* Vol. 1, Num. 1

Wymer, S. and Regan, E. (2005). 'Factors Influencing e-commerce Adoption and Use by Small and Medium Businesses', *Electronic Markets,* 15(4), pp. 438-453

Yang, H., & Tate, M. (2009). Where are we at with cloud computing? A descriptive literature review. In 20th Australasian conference on information systems, Melbourne (pp. 2-4)

Yin, R. K. (2002). *Applications of case study research (Applied social research methods series,* volume 34. 2nd ed. Sage Publications

Yin, R. K. (2003). *Case study research: design and methods.* 3rd Edition, Applied Social Science Methods Series. Sage Publications, Thousand Oaks, CA

Yin, R. K. (2009). *Case Study Research: Design and methods.* 4th ed. Applied Social Science Research Methods, Vol. 5. Sage Publications, Thousand Oaks, CA

Youseff, L., Butrico, M., & Da Silva, D. (2008). Toward a unified ontology of cloud computing. In Grid Computing Environments Workshop, 2008. GCE'08 (pp. 1 – 10). IEEE

Youseff, L., Butrico, M., & Da Silva, D. (2008). Toward a Unified Ontology of Cloud Computing. Grid Computing Environments Workshop, 2008. GCE '08, (pp. 1-10).

Zhang, Q., Cheng, L. and Boutaba, R. (2010). 'Cloud computing: state-of-the-art and research challenges', *Journal of Internet Services and Applications*, 1(1), pp. 7-18

Zhang, Q., Cheng, L., & Boutaba, R. (2010). Cloud computing: state-of-the-art and research challenges. *Journal of internet services and applications,* 1 (1), 7 – 18

Appendix – A

Participation Consent Form

University of Wales Trinity Saint David (London Campus)
Winchester House
11 Cranmer Road
London – SW9 6EJ
Tel: +442075667600
Email: info.london@uwtsd.ac.uk

Rhif Adnabod Cyfranogwr:

Participant Identification Number:

FFURFLEN GANIATÂD CYFRANOGIAD	PARTICIPATION CONSENT FORM

Teitl Y Prosiect: / Project Title: The adoption of Cloud Computing in the SMEs:

an exploration of the factors affecting adoption of Cloud Computing in SME's in Bangladesh

Enw'r Ymchwilydd / Name of Researcher: Anupam Mazumdar

1	I confirm that I have read and understand the information sheet dated _____ for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	
2	I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason.	
3	I understand that any information given by me may be used in future reports, articles or presentations by the research team.	
4	I understand that my name will not appear in any reports, articles or presentations.	
5	I agree to take part in the above study.	

Name of Participant		Signature
Researcher		Signature

You may decline to participate in this study. You may end your participation in this study at any time. If you decide to remain anonymous, maintaining your anonymity will be a priority and every practical precaution will be taken to disguise your identity. If you prefer anonymity, there will not be any identifying information on audiotapes or transcripts of this or any interview. No one will hear any audiotapes or see any transcripts without your prior consent. All materials generated from this or any interview will remain confidential.

When completed please return in the envelope provided. One copy will be given to you and the original to be kept on the file of the research team at:

NAME & ADDRESS OF RESEARCHER

Anupam Mazumdar

University of Wales Trinity Saint David (London Campus)

Winchester House

11 Cranmer Road

London – SW9 6EJ

Tel: +442075667600

Email: info.london@uwtsd.ac.uk

———: londonstudentservice@uwtsd.ac.uk

Appendix – B

Sample Participant Information Sheet

University of Wales Trinity Saint David (London Campus)
Winchester House
11 Cranmer Road
London – SW9 6EJ
Tel: +442075667600
Email: info.london@tsd.ac.uk
londonstudentservice@tsd.ac.uk

Rhif Adnabod Cyfranogwr:
Participant Identification Number:

FFURFLEN GANIATÂD CYFRANOGIAD	SAMPLE PARTICIPANT INFORMATION SHEET

Teitl Y Prosiect: / Project Title: The adoption of Cloud Computing in the SMEs:

an exploration of the factors affecting adoption of Cloud Computing in SME's in Bangladesh

Dear Sir/Madam,

My name is Anupam Mazumdar and I am a Doctor of Business Administration (DBA) student in the School of Business, Finance and Management (London Campus), Faculty of Business and Management in University of Wales Trinity Saint David, United Kingdom. At present, I am conducting a research on adoption of cloud computing in Bangladeshi SMEs. The purpose of this research is to identify the factors affecting the adoption of cloud computing and how SMEs will overcome those challenges in the context of "digital Bangladesh".

I would like to invite you to participate in my research project by answering the attached short questionnaires developed by the researchers. Those questionnaires will assess your opinions, experiences, knowledge, suggestions and views. Through your participation in the questionnaires and/or interviews, I hope to ascertain my research purpose to get the best opinion from you. I believe your opinion will be extremely helpful to me to carry out this research.

All questionnaires will be kept strictly confidential to the researchers involved and at **NO** time will individual questionnaires will be released to the general public. This gives you a chance to express your views on your programme a confidential and anonymous forum and still be able to make a difference. Your participation in this study is completely voluntary so you can withdraw from the questionnaire at any stage.

Please note, questionnaire should take no more than 30 minutes to complete but however, there is no time constraint. There are also no right or wrong answers. Attached to this letter along with the questionnaire there is a consent form where you will better understand researchers intension As this

is a new project, your feedback is also important to me and I would be much obliged if you could also complete the feedback sheet along with the questionnaire. I understand that your time is at a premium but your opinions are very valuable to me.

After careful and precise analysis of the data obtained from this questionnaires/interviews, I will be happy to provide you with a copy of the findings at your request. The results of this questionnaire will hopefully enhance my understanding of current level of knowledge and future findings. The results of the research will be feedback to Director of Studies, Supervisor, University and British Library.

I thank you in advance for your time and participation. If any questions do arise, feel free to contact me at your convenience.

NAME & ADDRESS OF RESEARCHER

Anupam Mazumdar

University of Wales Trinity Saint David (London Campus)

Winchester House

11 Cranmer Road

London – SW9 6EJ

Tel: +442075667600

Email: info.london@tsd.ac.uk

londonstudentservice@tsd.ac.uk

Appendix – C

Interview Questions

Block – 1: Business and You

1) Could you please tell me a little about your business?

   - Goals and objectives of your business

   - How long in business?

   - Who are your main competitors?

   - Number of employees do you have?

   - What types of service do you provide? Who for?

   - Which types of service (especially IT-based services) do you use in the business?

   - What do you use these services for?

   - Applications you provide to others: do you build/make these yourselves or do you buy them in from third-party developers?

   - Applications you use in the business: do you develop these yourselves or buy them in form third-party developers?

   - What types of products do you offer?

   - What types of customer do you have? Are they overseas customers/clients or mainly local?

   - Do you export goods/services? Where to? Or only sell in local markets?

   - Do you have overseas suppliers (or only local)? How do you identify and interact with suppliers?

2) Could you please tell me about you and your roles in the company?

   - Your position

   - Your main roles and responsibilities

   - How many staff are you responsible for?

   - How much does your job role depend on the use of ICT technologies? Which one?

Block – 2: IT services and Cloud Computing

1) What kinds of IT operations are there in your business?

2) What do you understand by the term "Cloud Computing"? Please illustrate or explain what you understand of CC?

3) Very specifically, what does Cloud Computing mean to you? Any particular definition from your own understanding that you think best describes CC?

4) Are you using Cloud Computing in your business? If answer is YES, then Block-2A otherwise Block-2B

5) Do you use any other services like CC for your business?

6) What was the decision your business made before adopting CC?

   - Who took the decision?

   - What research or evaluation of CC system/operations was made prior to adopting CC?

   - How were the potential benefits to the business identified/ assessed?

7) As a user, how did you perceive/experience the implementation of CC?

   - Was it painful?

   - Did it cause much disruption?

   - Whose jobs were most affected?

   - Was any training given when the business converted to CC?

8) How would you describe the customers vies of your using CC in your business?

   - Are they more willing to use services of CC when interacting with your business?

   - Have they shown any special interest in your businesses' use of CC?

   - Are they concerned about the security and privacy?

   - How secure are your CC services and do you think they are safer than having them in house?

9) How would you describe the suppliers' views of your using CC in your business?

   - Are they more willing to use services of CC when interacting with your business?

   - Have they shown any special interest in your businesses' use of CC?

   - Are they concerned about the security and privacy?

   - How secure are your CC services and do you think they are safer than having them in house?

10) How would you describe the business partners' views of your using CC in your business?

   - Are they more willing to use services of CC when interacting with your business?

   - Have they shown any special interest in your businesses' use of CC?

   - Are they concerned about the security and privacy?

   - How secure are your CC services and do you think they are safer than having them in house?

11) How would you describe the competitors' views of your using CC in your business?

   - Are they more willing to use services of CC when interacting with your business?

   - Have they shown any special interest in your businesses' use of CC?

   - Are they concerned about the security and privacy?

   - How secure are your CC services and do you think they are safer than having them in house?

Block – 2A: Follow-up questions of CC (If the answer of question 4 Block – 2 is YES)

- How and when did you get into Cloud Computing?
- Why did you choose to use Cloud Computing (reasons/benefits) for your business/ in your job role?
- Ease of converting from previous system?
- How do you see the ease of use of CC?
- Do you think CC services have changed your business processes within the business? Which ones? What improvements can you tell me about?
- What did you use to use before Cloud Computing?
- How would you differentiate Cloud Computing and traditional technologies you used to use?

Block – 2B: Follow-up questions of CC (If the answer of question 4 Block – 2 is NO)

- Why do you not use CC? Which are the most important obstacles to using CC? Please give examples?
- Do you think there is any particular problem (challenges/barriers) for your business that stops you using CC?
- Are you planning to adopt CC in the near future?

Block – 3: ICT, Digital Bangladesh & SMEs

1) As you know at present in Bangladesh, ICT sectors are massively developing. Do you think SMEs need to use -

   a) More ICT technologies?

   b) Need to adopt CC more rapidly?

   Based on the answer of the above questions -

   - Why do you think so?

   - What may happen if businesses do not or cannot adopt CC solutions for ICT processes (systems)?

   - Do you think in the context of Digital Bangladesh, it is possible for SMEs to adopt CC?

   - Is now the time for SMEs in Bangladesh to adopt CC?

   - Why/Why not please give your reasons in details?

2) How would you describe the factors of CC that influence SMEs to adopt CC?

   - Please state those factors and give some examples if you can

3) What are the possible factors that you think affect adoption of Cloud Computing in Bangladeshi SMEs?

   - Please state those factors and give some examples if you can

4) Do you think Cloud Computing can be used to make businesses like yours more agile and adaptive to make Bangladeshi SMEs successful (when compared with bigger Bangladeshi and overseas companies?

   - Why/why not?

   - Please state reasons of your thinking

5) Do you think adopting CC can give SMEs an overall competitive advantage?

   - Why/why not?

   - Please state the reasons

6) How would you describe the future impact of CC on Bangladeshi SMEs in the context of Digital Bangladesh? For example -

   - Are you aware of it?

   - Have you read about Bangladeshi government initiatives to support expansion of ICT use in SMEs and of CC in particular?

Thank you for helping me with my research. If you are interested in my findings, please let me have an e-mail address and I will send a summary of my conclusions. Also, if I have any follow-up questions after today's interview, would you object to my contacting you again?

Appendix – D

Sample Interview Transcript

Transcript of the interview

Name of the interviewer: Anupam Mazumdar
Name of the interviewee: Joarder (Managing_Partner)
Date of Interview: 21/09/2015

Q. No.	Interview Scripts/ Actual Words	Transcripts/ Interpretation	Coding/ Indexing	Themes/Categories
1.0	**About Business:** We are ….., which is "…….". We are actually running the business in Bangladesh. This is a partnership business and kind of sole proprietors. We are doing (importing and selling) electronics goods, which is mostly required for our daily needs. Our first preference is tablet PC, second phase of our business is mobile and third phase of our business is mobile accessorises and recently we have added into our business is computer services and servicing and selling some parts of computers (motherboard), LCD television etc. Well, in terms of saying type of business I would say it is B2B and B2C as well. We are selling our products to the customers through our chain shop and	……. is one of the B2B and B2C types of electronic goods selling businesses in Bangladesh. Their main business is importing and selling electronics goods to the countrymen for their day-to-day use. This business is selling various kinds of Tablets PC, mobile and mobile related accessories and computer and computer accessories as well as LCD type of televisions from their chain shops and also do provide home delivery. Moreover, …..'s distribution centre distributes products to others businesses as well.	• B2B and B2C types of business • Selling daily needs of electronic goods	• **Business process, attributes, operations and functionalities of Bangladeshi SMEs = "A"**

1.1	**Goals and Objectives:** From the business perspective I would say main goal of our business is making profit and secondly our objective is to create customer-oriented business in a smartest way to get more customers. Smartest way means giving good products with the good price so that customers will get faith on you and then from there you will get the output, which is profit. What we believe is "more sales, more profit".	Like other business …. believes 'more sales, more profit' and therefore, their goal is to make profit by creating customer friendly business in a smartest and trustworthy way to gain more customers.	• Goal of this business is to make profit • Objectives of this business is to be more friendly and trustworthy to the customers	
1.2	**Involvement in Business:** Running the business last almost 3 and half years.	Last 3 and half years …… is in the business market in Bangladesh	• This business is running in the Bangladeshi business market last 3 and half years.	
1.3	**Competitors:** In Bangladesh as a small country, we have got more competitors because earlier during my father's time or grandfather's time I believe there were fewer competitors. In this allocation, now we have young generation, who are totally motivated by the project of the Prime Minister's Office "Digital Bangladesh". So IT sectors are totally our focused competitors.	…….. believe that due to the project Digital Bangladesh, whole IT sectors are their focused competitors as more young generations are becoming entrepreneurs and showing interest of doing business and especially in IT business.	• All the IT businesses are potential competitors of this business	
1.4	**Employee Numbers:** At present we have 37 staffs in our 6 different showrooms in Dhaka, Chittagonj and Jesosre.	Currently …… has 37 employees in their 6 showrooms in different places	• Currently, this business has 37 staffs	
1.5	**Service Offer:** There are two ways we are doing our business. One is service part, which is sales service that is what we have service centre and second things we do is importing, which is one job and second thing is retail sales directly to the customers and the wholesales systems. Basically we are importing different electronics goods and selling to the local market and local businesses as well. **Our main services are for consumers only because they are our**	……… is basically selling their goods to the local customers directly as retail sales as well as wholesales to other businesses. In addition, ……. does import electronic goods.	• There are two ways this business are offering service i.e.: selling goods to the local market and importing electrical goods	

	main customers.		
1.6	**IT-Based Services:** Yes. Of course we do have. Well, we have got small IT sector and from where we do domain hosting, designing, online shop and software business for the niche retailers and small types of businesses. We make software and sell to the retailers who are making business in rural area mainly. We do use these services for maintain accounting and maintain our business very smoothly. To me IT based services are the strengths or our business because without maintain your business you cannot make your business profitable. As an example just think about webcam. By connecting webcam I can even arrange a group meeting with all the showrooms to get all the information because I cannot go to every showroom daily basis to get the information. In that case I have to rely on email or phone or webcam, which I personally believe is IT based services.	..... currently does have small IT services from where they do domain hosting, designing, online shop and software business for entrepreneurs and small types of business. ..... also makes software for maintaining accounting tasks and to ensure swift business, which they are selling to the businesses in the rural areas. Respondent believed that, IT-based services are supporting them to manage their businesses, which are the strength of their business.	• Does domain hosting, design, online shop building software • Making software for maintaining accounting tasks, • For running the business smoothly • Using IT based services to support to manage business
1.7	**Applications to Others:** Actually we do not build any applications by ourselves but building by third party developers. Developers from different countries like India, Bangladesh and Pakistan are writing code for us by using free launcher web source.	..... does not build any applications but they do build their applications from third party developers using free launcher web source from different countries.	• ..... does not build applications for customers • Build applications for themselves only by the third party
1.8	**Applications to Business:** Well very interesting, we are using all the applications for our business built by ourselves.	..... uses all the applications for their business built by themselves	• All applications used in the business built by .....
1.9	**Offering Products:** Tablet Pcs are our mother products and others like data cables, memory sticks/flash drive, mobile phone accessories like charger, data cable, battery and so on. In addition, we are offering our	..... offers different sort of electrical products such as Tablet PC, cables, storage device along with touch panel, LCD, solar panel, solar light, solar fan, solar TV etc.	• Offering various electronic products

	own brand like TP/touch panel, LCD, RN motherboards and circuits and solar panel, solar light, solar fan, solar TV, solar pump, which is very popular.		
1.10	**Types of Customers:** We have got both local and foreign customers. I may say we have got about 95% of local customers and 5% are overseas customers like from Sudan, Somalia and South Africa. But those foreign customers are visiting us not regularly. And in Bangladesh, we do have both types of customers like from lower level to upper level.	This business has both local and oversees customers. Respondent revealed that 95% of local customers from upper level to lower level and remaining 5% are oversees customers from various oversees countries like Sudan, Somalia and South Africa.	• 95% are local customers • 5% are irregular oversees customers
1.11	**Goods/Services Export:** We do import Tablet PC and other mobile and laptop and computer accessories from China and export our own brand goods in South Africa and China but amount of export is not too much and the growth is not faster as well.	..... exports their brand products to South Africa and China.	• ..... exporting their own brand of products to China and South Africa
1.12	**Overseas Suppliers:** Yes we do have overseas suppliers. Through different sites and books like Yellow book we have identified and interacted with those suppliers as an example www.alibaba.com. Under this site I think around million of suppliers are there to contact for your queries.	..... has oversees suppliers and by accessing different sources like Yellow book they have identified those suppliers	• Do have oversees suppliers • Through Yellow books suppliers has been identified contacted
1.13	**You, Roles & Responsibilities:** I am the Managing of Partner of the business. My responsibilities are managing the business in a whole like finance, purchase, export, import and total supply change, customer change and so on. I may say from A to Z I manage in within the business along with two other partners. I am responsible for all 37 staffs.	Respondent is Managing of Partner (MP) of the business. Respondent is the key person of managing business as a whole and responsible for all 37 staffs.	• The respondent is the Managing Partner (MP) of the business • Job roles are managing the business as a whole • Looking after/responsible of 37 staffs
1.14	**Job Depends on ICT:** Well, out of my total job roles I would like to say around 25% job roles are totally depends on ICT. I make all	Respondent believed that almost 25% job roles are ICT dependent. By using ICT, respondent make communications via	• 25% of job roles are ICT dependant

	communications through Internet such as, communication, ordering, sample collection, delivery process etc. we maintain by using ICT or online. And my office work is totally 100% depends on ICT.	Internet for placing order, collecting samples and processing deliveries. Apart from these, respondent believed that all their office work are 100% ICT dependable	• Making communications with suppliers/customers, placing orders, collecting samples and processing deliveries • 100% ICT dependent of office work	
2.1	**Kinds of IT Operations:** Our total stocks maintains by the software. Total sales maintains by the software. Salary, banking system and HR system is also maintains by the software. Our staffs' attendance also maintains by software as well.	Maintaining stocks, sales, salary, banking and HR systems, and attendance systems types of IT operations are present in the business according to the respondent	• IT operations are present in the business	
2.2	**Understanding of CC:** According to me, the Cloud Computing or Cloud server is kind of web server or web protocol. So whatever you are doing and storing some of your data is not only storing in your personal computer but it will pass through the web. So that other computers or users can access those data as well at the same time. I may say CC is kind of faster Internet based service.	According to respondent, *"Cloud Computing or Cloud server is a kind of web server or web protocol, which means whenever you are storing some of your data is not only storing into personal computer but also passing through the web so that other users can access at the same time at any time (24/7)"*. On other word, '*CC is kind of faster Internet based services"* according to the respondent	• *Cloud Computing or Cloud server is a kind of web server or web protocol, which means whenever you are storing some of your data is not only storing into personal computer but also passing through the web so that other users can access at the same time* • *CC is kind of faster Internet based services*	• **Concept and general understanding of Cloud Computing by Bangladeshi SMEs = "B"**
2.3	**Specifically CC means & Definition:** In business perspective CC means to me, making me smarter and faster and without any error, which I believe is web as well. And web is helping me to communicating and compares all the activities of different	The meaning of CC to the respondent is to making business smarter and faster without any errors. According to respondent, CC is kind of web, where communication can be made very easily with different peoples from different	• *CC is a time saving and smarter way to do a business to look after customers and everything*	

	branches and making less effort than the traditional way. In CC, we are doing errorless and real time hit and time saving. **So I think I can define CC is a time saving and smarter way to do a business to look after customers and everything.** I could also say that whatever we will be using on the air is Cloud Server or Cloud Computing. Because on air you do not need to use your own computer to do a particular job. More specifically, CC is wireless computing, which customers can access from different locations at the same time.	locations, which takes less time and effort compared with traditional technologies. Respondent's personal view of defining CC is doing tasks errorless and within the real time. Therefore the definition of CC from the respondent is, *"CC is a time saving and smarter way to do a business to look after customers and everything"*. Respondent also added that, whatever users will be doing on air is Cloud Computing because on air personal computer not necessary to perform a task, which means CC is wireless computing that customers can use from anywhere at the same time.	• Works done on air is CC • Without having personal computer jobs could be done on the air • Can be accessible from anywhere	• **Ways of defining Cloud Computing by Bangladeshi SMEs = "C"**
2.4	**Using CC:** Yes we are using CC in our business. And I may say we are using CC 100% in our business.	This business is using CC services 100% but however respondent did not articulate which Cloud services are specifically they are using.	• 100% CC dependent	• **The reasons of Bangladeshi SMEs to move/ not to move to Cloud Computing = "E"**
2.4.1	**How and When moved to CC:** After completing my Studies (BBA) in India I went to another country to do a job. And from where I used to use CC for my daily needs. Upon returning and before started business I felt we need to use those sort of advanced technologies into our business. Therefore, I have started business in BD, since beginning we are using CC. I mean last 3 and half years. To me, we are fully depended on CC in our business. And just **because of using CC, my business, personal life is become easier and smoother. Moreover, using CC is cost effective and more storage space.** Imagine, you lost your laptop or mobile or damaged then you can easily get your database through web. Because in Cloud server you can store all your data but does not matter whether you lost your phone or damaged but you can still	From the beginning of the business, this business is using CC because of the respondent's personal views of advantages of advanced technology could bring more benefit into the business.	• From day 1 using CC • Various advantages of CC	

	access your database. To me, if someone says I do not want CC then they would be looser. **I can say CC is now part of life and daily needs.**			
2.4.2	**Reasons of using CC:** Well, if I use only Intranet then only I can use within house but for business I need to communicate through the world. So I need Internet. If Intranet damaged or cut off then there is a possibility that your data may lost and you cannot recover those data. But if you use CC then even in terms of loosing data from your personal computer still your data will be saved. Moreover, CC is much reliable, faster and secure. In addition, CC can provide multi-tenancy so many users can use at the same time. And that is why I have been using CC.	Due to various advantages of CC such as data recovery, reliable, faster and secure and multi-tenancy, ... is using CC	• Many advantages of CC	
2.4.3	**What did you use before CC:** Well, as I have mentioned you earlier that I did start using CC since the beginning. So I did not have an opportunity to using any other services I mean like traditions system or others. But that does not mean that we are not using any manual system. Of course we are using manual system as well because of the nature of business we need manual system sometimes. But in manual system you need to spend more time, and possibility of making errors because computer is blind. But problem in manual system is there are human interactions. And we all know human make many mistakes while inputting some data into systems.	This business started with the support of CC therefore this business could not use any other traditional technology into their business but however they do have traditional technology as well. But however, because of the nature of the business, ... sometimes depends on traditional system, which is more time wasting and possible error making because in traditional system, human interactions would be present.	• Using CC from the beginning • Have additional support of traditional technology • Disadvantages of using traditional technologies • Concerns of having human interaction	• **Changing attitudes (Internal/External) of SMEs Focusing on Cloud Computing = "F"**
2.4.4	**Ease of Converting and Changes of using CC:** Of course huge changes and I do feel that compared to others in this market my	According to the respondent, by using CC, their business become smarter, organised, accurate and reliable. In	• Potential changes within the business • Differences of	

	business is more smarter than others and very organised and accurate and reliable. And the main changes compared others is our business is much faster than others. Though they are doing business but we are doing business in a smart way.	addition, business is faster compared with some other traditional technology usages business.	traditional technology users • Improvement of business process and functionalities
2.4.5	**Differentiating CC and traditional technologies:** Well, traditional technologies are old fashion cars and CC is advanced model of cars or trains as an example. Old fashion cars have done the jobs but worked very slowly and spent more time. But on the other hand, cars with new technologies are more fasters and doing the same job compared with old cars by spending less time. Hope you can understand what I am trying to say. But though I am saying CC is faster, reliable and relatively new but however, CC is fully Internet dependent, which is the one of the weakest sides of CC. The reason I am saying because if you think without the support of Internet there is no Cloud. Moreover, poor Internet connection may lead to disruption on the CC services, which is of course not good for the business. And think about our country. Almost all the times we have got poor Internet connection and some places even there is no Internet connection. So, how are they going to use CC? So to me, CC providers must find out some solutions to overcome this Internet dependency otherwise, there is no point of having "offline Internet = offline Cloud".	Respondent differentiated traditional technology as an old fashion car whereas CC is advanced model of cars of trains. According to respondent, old fashion car does work but work very slowly and take longer time than usual, which is similar to traditional technologies where as cars with advanced technologies are faster and taking less time to complete the same job like CC.	• Traditional technology is old model car • CC is advanced model car • Differences of various aspects of traditional technology and CC
2.5	**Any other services like CC:** Well, in perspective of Bangladesh, I have been using kind of CC for my own purposes and sometimes for business purposes as well. As an example, if you want to go from here to	Respondent view is entirely different here because respondent opinion is if you do not have your own car then you need to hire a car and for doing so now in Dhaka city where respondent running the	• Potential examples of CC in Bangladesh

	another market in another part of Dhaka city then you might need a car unless if you have your own then you can book a car through web, which I believe is kind of Cloud services that we are using. Moreover, online shopping, booking a cab, booking your appointment everything we are using by using CC. To me, which one cannot we do???	business can book the car through web, which respondent believed works as CC. in addition, respondent mentioned about online shopping, booking hospital appointment, booking train or bus tickets etc. works exactly same way like CC.		
2.6	**Decision made:** Well, as I fully knew the benefits of using CC into business from my own experience so that I have decided to use CC into the business. But obviously I have discussed with my partners as well before implemented it. In terms of research, as I have mentioned I knew about CC and used it earlier so I was not needed for any research or evaluation of CC.	Respondent personally made the decision of using CC into the business. This is because respondent has earlier knowledge of benefits of using CC into the business. However, respondent also discussed with other business partners as well. But they were not needed to evaluate of using CC because respondent had full knowledge about CC.	• Easy implementation decision by MP	
2.7	**Implementation Experience:** Well, this is natural that if you want to implement something new then lot of complexities come up and various opinions come. And exactly the same things happened from my partners and competitors as well. But initial experience was too painful. Well as you know Bangladesh is developing country where ICT skills and knowledgeable labours are very less. So to train them and up skill them to using CC was not easy. Therefore, first 1 year we had to struggle a lot but now we are in a better position I may say. Well, but no ones job has been affected because of CC and there was not much disruption identified. However, we had to train all the staffs of different ways of using CC such as how to use web protocol and etc.	Unlikely, ... also discovers implementation difficulties because of not having ICT skills and knowledgeable workforces. Therefore, up skilling them of using CC was not easy for ...... However, ... management was concern about their staffs and as a result, none of their staffs' jobs have been affected and not much disruption happened.	• Difficulties in implementation • Lack of skills and knowledge • No disruption • No job affects	
2.8	**Customers Views of using CC:** Customers always requires the best and the quickest	According to the respondent, customers found .....'s business if much faster,	• Positive customers view	• **Opportunities and Drawbacks of**

				Cloud Computing from Different Point of Views in Bangladeshi SMEs = "D"
	service. Therefore, whenever they have been started using our services they found that we are really faster than others and providing accurate information and taking less time. I think they took our services very willingly to use. To be honest customers do not need to know how are we providing them our services so that they really did not show any interest of how we are using CC in our business. And of course security and privacy is not their major concern but I can assure that our Cloud services is very secure and safer than in house systems.	accurate and time-savings. Therefore, customers have showed their interest but they did not show any interest of security or privacy of our systems, as they really do not potentially need to know about it. But respondent assured that their Cloud services are highly secure and safer than in house technology.	• More willingness of using CC • Not concern about CC • Assurance of secure service	
2.9	**Suppliers' Views of using CC:** As we have got overseas suppliers and it is not possible for them or for us to travel so we need to depend on Cloud to done our job quickly. Therefore, suppliers' views of using CC are very positive because of its various benefits. They showed very positive attitudes towards CC. And it is very obvious because they have been using CC into their business for long period of time. So whenever we have stared using CC they really welcomed us. But yes of course they are very concerns of security and privacy. We have even sometimes met with them to know more about security and privacy.	Suppliers' view of using CC is really positive due to many advantages of CC, according to the respondent. Respondent highly mentioned that, due to their usages experiences they are really concern about the privacy and security of our system. In order to overcome any security issue, respondent mentioned that they have met with their oversees suppliers to ensure how their system would be highly secure.	• Positive suppliers' view • Experiences of using CC • Concerns about security and privacy • Willingness of overcome safety issue	
2.10	**Business Partners' View of using CC:** In traditional business system, partners will never know what I am doing by sitting here. But using CC all your information would be kept centrally therefore, they would come to know from different location that whether I am doing what. So I can say yes business partners are very positive about CC and they have showed their real interest of using it. They are fully concerned about their data and	According to the respondent, their business partners' are very positive about CC and they are also concerned about security and privacy.	• Positive business partners' view • Curious about way of using CC • Concern about security and privacy	

		information and reliability.			
2.11	**Competitors Views of using CC:** Yes competitors are the main part of business. But in terms of using CC they are very keen to know how are we using it and what kind of advantages are we getting from it. But you know the culture in Bangladesh. We really do not want to share our systems with someone else. Therefore, we are not giving that much of information and vice versa. But however, while I have met some of my competitors and discussed about CC the first thing they asked how secure would be our system? That means they are concerned about security and privacy.	Respondent believed that competitors are the key part of their business. In terms of using CC, they are very much interested to know the way ..... is using CC. But competitors are concern about security of the system according to the respondent.	• Interested competitors of using CC • Concern of security	
3.1	**For SMEs – ICT based or CC based:** Well, I think it depends on the types of business you are running. If you are in IT sector then of course you need to adopt CC but if you are in other sectors then you might need to use ICT first to know about ICT and its various advantages first before move to CC because ICT skills are the foundation knowledge of understanding advanced technologies. Adoption of ICT or CC is depends on user basis. But both are equally required like water and food.	Respondent was very diplomatic; as respondent believed whether SMEs need ICT-based or CC-based is totally depends on the types of business. According to the respondent, for IT types SMEs of course CC need to adopt but for other sector, ICT needs to adopt first and then move onto CC. But both ICT and CC are equally required for the business	• ICT or CC depends on nature of business • IT related SMEs need to adopt CC • Basic knowledge of ICT needed for other SMEs first then move to CC	• **Readiness for Bangladeshi SMEs to adopt Cloud Computing where ICT adoption is the pre-requisite = "H"**
3.1.1	**Why/Why not CC:** The reason I have said that IT sectors need to adopt CC because they need to quickly adopt with the advanced technology otherwise, they will be looser but on the other hand, other SME business are already way behind so they really do not need to worry about to lose anything now because they already lost. So in order to come out from those situations, IT sectors business owners need to adopt CC and others need to adopt ICT first then CC.	The reason of adopting CC for IT-based SMEs is they need to quickly adjust with the advanced technology otherwise they will be looser according to the participant. On the other hand, other SMEs are not up to the mark of adopting CC; as they are way behind and already lost their way therefore, they need to adopt ICT first then move to CC.	• IT SMEs need to survive • Criticism and root cause of not using advanced technology	

3.1.2	**Consequences of not adopting CC:** It is very simple to be honest, if you are in the IT sector and if you do not have the CC and need to use everything manually then there is a possibility that you might lost your database in case of any server crash. Then your business will be dying immediately without performing any results. So I personally do not think that without Cloud business can survive for long time.	Participant strongly believed that if an IT business try to manage everything manually then there is a possibility that they might lost their stored data in a whole if server crash happens and therefore, their business will potentially die and cannot perform any functionalities. Respondent's own view is without CC in future business cannot survive for long run.	• Possibilities of data loss • Difficulties of survival	
3.1.3	**Possibility of SMEs to adopt CC in the Context of DB:** I personally do not think so.	Participant personally do not believe that currently there is a possibility of Bangladeshi SMEs to adopt CC in DB context because they are not ready yet in terms of knowledge or infrastructure.	• Limitations of infrastructure and knowledge of adopting CC	
3.1.4	**Is now time for SMEs to adopt CC:** Yes it is not time for Bangladeshi SMEs to adopt CC because it is possible to survive some sort of but not 100%. As an example, if you want to adopt CC all over Bangladesh, is not possible because, not in everywhere in Bangladesh has got moderate speedy network connection (3G at least). In order to SMEs adopt CC, first of all Bangladeshi Government should take initiatives to ensure all the sectors will have Internet connection then only SME sectors will think of CC and they might go for that. But it is not possible now but I think within 4/5 years it would be possible.	Respondent personally do not think that this is the time for Bangladeshi SMEs to adopt CC because not all over Bangladesh there is a supply of moderate speed (at least) of Internet. And without Internet, it is not possible to use CC. Respondent suggested that, BD government should take initiatives as per their DB initiatives to ensure all the rural and metropolitan areas are covered with Internet so that SMEs might go to Cloud computing within next 4/5 years of time according to the participant.	• Readiness of Bangladeshi SMEs to adopt CC • Limitation of Internet and its speed • Encouraging initiatives needed from BD government • Expected time limit to move to CC	
3.1.5	**Readiness of SMEs/Bangladesh:** To me, our country is not ready for adopting CC. The reason I am saying because there is not adequate infrastructure in SMEs to adopt CC. In addition, skills and knowledge is not in a level that SMEs can cope up and implement.	Participant strongly think that Bangladesh as whole is not ready yet to adopt CC because infrastructures are not in a satisfactory level to adopt CC. Moreover, there is a knowledge gap, which is not up to the level of accepting something new.	• Current status of Bangladesh to adopt CC • Inadequate foundation of moving to CC	

	What I am trying to say that at present the base is not ready for adopting CC in Bangladesh.	Moreover, for adopting CC in SMEs, the foundation is not ready mentioned by the participant.		
3.1.6	**Possibility of adopting CC with the support of ICT:** Yes of course. To me, ICT technology is relying on database and database is collecting from the root level to higher level and analyse them properly and use them accordingly and take the right decision then I believe it is possible in a faster way because there is not too much work left but they should work in a proper way but you know that government staffs are not proper trained. But however, I still believe that it is possible with the involvement of young generation in the ICT sectors who loves technology.	Participant's own view is that with the support of ICT and involvement of young generations, it is possible to adopt CC but it would not be worthy to relying on the government staffs; most of the government staffs are not IT skilful criticised by the respondent.	• Positive movement expected for CC with the support of ICT • Criticism of government staffs' skills and knowledge	
3.2	**Influencing factors of CC:** All the benefits mentioned earlier are the influencing factors of CC. If I say very specifically, then flexibility, faster recovery, automatic software updates, free capital-expenditure, better teamwork, anywhere accessibility, well document control, attractiveness/competitiveness, ecologically friendly and of course security.	Respondent mentioned a bunch of influencing factors of CC that could potentially influence SMEs to adopt CC.	• List of influencing factors of CC adoption in general	• **Influencing and Affecting factors of CC adoption in Bangladeshi SMEs = "G"**
3.3	**Affecting factors of CC:** I will give you a list, which I believe will help you to get the details: 1) **Networking:** To me adopting CC needs proper network because network is the base. If you cannot go a good way then you cannot do a good job/work. So network should implement in a faster way. 2) **Skills and knowledge:** In the root level SME business owners or managers are not highly skilful or	Respondent very organized way articulated several affecting factors of CC in the perspective of Bangladeshi SMEs.	• List of possible affecting factors of CC adoption of Bangladeshi SMEs.	

knowledgeable of IT.

3) **Motivator/Motivating Person:** In Bangladesh, it is one of the biggest problems that we have very less motivating person. Even though if I have got knowledge still I do not want to share my knowledge with others.

4) **Not right people in the right place:** In order to adopt or implement some new ideas you have to ensure right people will be there for that to deliver. But in Bangladesh, there is no right people sitting in the right place. Therefore, new initiatives are either criticising or stopping at the beginning. For an example, a student completed MBA but working in an IT firm without studying the basics of IT. Then how would that person going to welcome IT related new initiatives.

5) **Inadequate training of rural business owners/managers:** There is not enough training institutes or providers available in rural areas to provide training to the rural people so that they will come to know about IT or ICT.

6) **Electricity:** Of course electricity is one of the major factors. I can remember, still not whole Bangladesh cover by electricity. In addition, there is no 24/7 electricity supply. As you know that running CC you need Internet and without electricity how are you going to use Internet?

	7) **Political instability:** Yes some sort of but I do not think so that much because whatever initiatives have been taken by the present government will be fully stopped or partially stopped or delayed by the other political parties if they come on the power in next term because their way of thinking and dealing things could have been different compared current government's initiatives. Therefore, this is another issue in order to bringing some new ideas in Bangladesh. 8) **Unavailability of high speed Internet:** by using slow speed Internet it is not possible to do all the tasks all the time. 9) **High price of Internet:** We are still paying very high price of using Internet. That should stop now otherwise, people will not feel interest of using it. 10) **Traditional education system:** Tradition education system cannot help you to understand what is going on all over the world. But unfortunately, in Bangladesh, our primary, secondary, higher secondary education systems are still very academic based rather practical.		
3.4	**CC can be used to make business successful/agile/adaptive:** Yes of course. In this modern age, you need to do things in a smart way. If you do smart way then more benefits will come and you will be benefitted.	For doing your business in a smarter way to get more benefits then of course CC can be used into the business to make business more agile and adaptive.	• Highly ambitious of being more agile and adaptive	• **Changing attitudes (Internal/External) of SMEs Focusing on Cloud Computing**
3.5	**CC can give Competitive advantages:** Yes I do believe that CC can give SMEs a	Respondent very nicely explained the reasons of why CC can give SMEs a	• Reasons of being more competitive	

	competitive advantage because only Cloud could make your business healthier competitors comparing bigger businesses. Because CC can provide more information to the customers to let them know more about the benefits and barriers of it. So that customers will have clear idea of it they will go for the good one. And I believe, by adopting CC, SMEs will start using all the advantages of it and so that they will competitive advantages from the market. In addition, **not everyone has got time to physically go and see a particular product but CC can offer you to see the product and make a judgement by sitting at your home or on your way going home. You can do many things by using CC even by sitting in the rural areas.** So of course CC can give competitive advantages.	competitive advantage over large organizations. Because, respondent believed at present Bangladeshi SMEs as well as customers are not fully aware of all the benefits of CC. So with time they all will come to know about CC and all its benefits then they will find CC is useful and they will be using the same benefits as large organizations are currently using and offering. Moreover, you can do many things by sitting at home even in rural areas and you do not need to go physically to see a particular product according to the respondent.	• Lack of awareness of using CC and its benefits • Benefits of CC	
3.6	**Future impact of CC & DB:** Well, I am personally really too much hopeful of CC. **Because if everyone implement this system then Bangladesh is going to be one of the richest countries in the world. I think you will be laughing by hearing that if our government can implement this cloud service then lot of business doors will be opened for Bangladesh.** As you know our populations are not blessing for the country. But if you/government can make them use for the country by implementing CC. Because CC can offer them to access total global/world. **If you see other countries like China or Korea then you will see they work in practical basis or field basis but in Bangladesh there is no practice like that.** If Education Ministry can take some initiatives	Respondent personal view is really positive about CC because respondent believed; if everyone (SMEs and large organizations) starts using CC then Bangladesh will be one of the richest countries in the world. If BD government starts using CC into their administrative tasks and ensure they can handle it then many business doors will be opened according to the respondent. Respondent strongly believe that by changing the education system from more academic to practical then CC will have bright future for sure. Respondent is also hopeful for the DB but however, respondent also concern about the Government's taken initiatives so far and the future of these initiatives.	• Highly ambitious to see richest Bangladesh • Hoping for the new business doors to be opened • Criticism of current working practice • Criticism of BD governments' current initiatives of implementing DB concepts • Suggestions for BD government to build DB • Advantages of	• **Perception of Cloud Computing and Digital Bangladesh in the context of Bangladeshi SMEs = "I"**

along with ICT ministry to change the education system then I can see the future impact of CC is very bright. And **I believe Bangladesh will be Digital Bangladesh if Government take the right decision at the right time implement those decisions by involving more people to educate them and offer them something good.** Whatever initiatives they have taken so far they need to continue to finish then Bangladesh not only will become Digital Bangladesh but also will become an example country in the world. **If you see in developed countries peoples are living their life in a smart way. But how are they living in a smart way? The answer is with the support of Internet. And CC is giving them all the opportunities because they have high-speed Internet connections and low cost. Moreover they do not have electricity problem and their education systems are more practical based. So what I believe is from now Bangladeshi government along with private companies need to take initiatives to up skills countrymen to learn more about IT, ICT and of course CC. Then within next 4/5 years CC could have been positively impacted in every sector of SMEs as well as CC could support to build Digital Bangladesh.**	Respondent highly believed that if BD government can ensure high speed Internet with low cost and continuous electricity supply and can add some practical based education system to up skills young students to use more technology then within 4/5 years CC can be positively implemented in every sectors of SMEs then growth of SMEs will be improved, which will positively support to build DB.	Internet, education system and electricity • Hoping to see DB within next 4/5 years	

Appendix – E

Supporting Literatures of SMEs

Small & Medium Enterprises (SMEs): What are the Contributions in the National Economy of Bangladesh?

Last few years, Bangladesh has been trying every single possible effort in a faster pace to become combined with the world economy (Hossain, Deb & Amin, 2009). At present, the Bangladeshi economy is comparatively more employment reliant on comparing to its relief dependency since 1980s (Hossain, Deb & Amin, 2009). In the state level Bangladeshi SMEs importance is excluded by the non-availability of inclusive numerical information about SMEs industries (Islam *et* al., 2011). Bangladesh Small and Cottage Industries Corporation (BSCIC) suggested that at present in Bangladesh, there are about 55,916 small and 511,612 cottage industries available with the exception of handlooms. However, with the handlooms total number of cottage industries moves up to 600,000, which clearly indicates arithmetical profusion of Small and Cottage Industries (SCIs) in Bangladesh (Islam *et* al., 2011).

According to Islam *et* al (2011), *"the most recent private sector survey estimates the contribution of the micro, small, and medium enterprises (MSMEs) is 20 – 25% of gross domestic products (GDP) in Bangladesh".* With the conjunction of Planning Commission Bangladesh, South Asia Enterprise Development Facility (SEDF), Dhaka, Bangladesh, total number of medium enterprise in Bangladesh around 20,000 and Small and Cottage Industries (SCIs) are about 100,000 to 150,000 (Islam *et* al., 2011). These huge variations between BSCIC and Planning Commissions estimation of the amount of SMEs could be just because of (a) diverse meanings of SMEs and (b) diverse exposure of small and medium enterprise families (Islam *et* al., 2011).

Notwithstanding of the precise extent in Bangladesh, SMEs are playing a pivotal role in the national economy undoubtedly in terms of employment creation, poverty mitigation, and output and private subdivisions events (Ahmed, 2003). In terms of contributions of Bangladesh national economy, SMEs are playing relatively predominant roles comprising above 90% of overall industrial units under industrial structure (Islam *et* al., 2011). According to South Asia Enterprise Development Facility (2013), with the combination of different categories, SMEs testified to contribute from 80% to 85% of

business employ and about 23% overall citizen service. But however, there are thoughtful disagreements of the contributions of the industrial sectors output just because of scarcity of consistent information and various methods to measure the greatness (Islam *et al.*, 2011). According to Islam *et* al (2011), the maximum commonly mentioned figures mentioned by Asian Development Bank (ADB), World Bank, Planning Commission and Bangladesh Institute of Development Studies (BIDS) relating to the SMEs value added contributions diverge between 45% – 50% of the overall manufacturing value added (Islam *et al.*, 2011). According to Ahmed (1999), the strengths of SMEs contributions for a country like Bangladesh is to employment generation, which is a very common phenomenon and the magnitude/greatness differs around the world such as in Africa this range is between 70% to 95% and in Asia Pacific regions countries this range varies between 40% to 70%. According to South Asia Enterprise Development Facility (SEDF) sources and quoted from Asian Development Bank (2002), *"food and textile units including garments account for over 60% of the registered SMEs but however, recent studies (Ahmed, 2001; ADB, 2001 and USAID, 2001) proved that in Bangladesh, SMEs have undergone significant structural changes in terms of product composition, degree of capitalization and market penetration in order to adjust to changes in technology, market demand and market access brought by globalization and market liberalization"*.

Small & Medium Enterprises (SMEs): What are the opportunities of Cloud Computing in Bangladesh?

Discussion above in my research it is clearly mentioned that Cloud computing play a pivotal role for the business organizations especially for the SMEs. However, the opportunities of Cloud computing in regards to SMEs are not clearly clarified. We know that Cloud computing is an up-to-date technology and at present Cloud Computing is using by diverse range of business organizations especially middle and large organizations. In Bangladesh, small business firms are also started using Cloud Computing but still most of the Bangladeshi SMEs are not fully aware of the benefits of Cloud Computing. Different study (such as Oliveira & Martins, 2010 & Adam & Musah, 2014) suggests that Cloud Computing guarantees in the vital competitiveness and expansion of SMEs and after adopting Cloud computing SMEs could effectively use the up-to-date technology. Therefore it is now really important to discuss the overall opportunities of Cloud computing, in regards to the Bangladeshi SMEs. Donelaicio (2012) and Taylor *et* al. (2010) summarised the following opportunities of Cloud Computing for the SMEs.

- **Cost Savings/Reduction:** According to Oliveira & Martins (2010), *"after the adoption of Cloud Computing, SMEs can be able to effectively utilize mode.....nology along with cutting upfront cost"*. Khan (2015) also focused that Cloud Computing is customarily supportive for business firms in IT expense cutting. The reason it is supportive because cost cutting always supports any types of business to maintain processes and capital outlay to smallest amount. In addition, Cloud Computing further saves considerable cost laterally with the needs of applications and zero in-house server storage (Gupta *et* al., 2013). Moreover, Cloud Computing reduce operational costs of the firms due to using minimum on-premises infrastructures such as power cost, administration cost or even air conditioning cost (Zhang *et* al., 2010), which could be really beneficial for the Bangladeshi SMEs because of their less investments.

- **Scalability/Suppleness:** According to Khan (2015), now day's majority of the business firms are keen on data management centres. This is because of the heavy suppleness and the nature of the Cloud Computing. As a result, Cloud Computing experts always maintain private or hybrid or even shared Clouds to get the quickest possessions distribution in a precise environment. By using this controlled environment process, overloading does not occur because all the systems are accomplished appropriately at all the times (Conway *et* al., 2014). Bangladeshi SMEs could use advantages of shared Clouds to get all the necessary resources quickly and properly in order to reduce the Cloud maintaining cost individually.

- **Consistency:** Consistency is one of the best advantages of Cloud Computing because CC service providers are exceedingly reliable on their services. Cloud Computing is so consistent compared to in-house IT substructures. Most of the Cloud service providers are 99.99% reliable and they provide 24/7 services in 365 days (Khan, 2015). In case of any difficulties such as system failure or applications failure, Cloud services could be straightforwardly moved to the next available servers, which provides zero risks of service users (Gupta *et* al., 2013). In terms of Bangladeshi SMEs, consistency of Cloud Computing services is must needed because most of the SMEs owners are not highly computer literate to understand the problems. So, they must need consistency services of Cloud Computing into their businesses.

- **Maintenance:** Maintenance is another important opportunities of Cloud Computing for the business firms. This is important because Cloud Computing does not necessarily need to install every computer. In addition, Cloud Computing

is easy to accomplish and could be reached from anywhere in the world (Khan, 2015). There are lot of supportive features available of Cloud Computing and by using those features CC supports Cloud providers to uphold, host, enhance and examine the applications in Cloud. Weinhardt *et* al. (2009) strongly mentioned in their study that by using features of Cloud Computing, designers could adapt and unveil diverse programs as compared to 'setting up systems' and 'substructures themselves'. Bangladeshi SMEs could be beneficial of it because they have got very limited investments and resources to maintain. As Cloud Computing offers the advantages of not installing them in every single computer so that SMEs owners do not need to hire any IT experts to install for them. In this way, Bangladeshi SME owners could save lot of money, which they could reinvest into their business.

- **Innovation:** Cloud Computing is relatively new concept for the Bangladeshi SMEs but it is very innovative. Because Cloud Computing always offers business firms to network with their customers, staffs and business partners in a new and innovative way (Khan, 2015). By using Cloud Computing services, every business firms could possibly get extremely incredible business chances. These chances could support business firms to make real-time network and innovation to flourish their business (Alshamaila *et* al., 2013). Bangladeshi SMEs could also get this benefit of Cloud Computing to boost up their business and to make their business innovative.

- **Numerous Operators at Same Time:** I have mentioned earlier that Cloud Computing is really good for using shared resources, which increase the effectiveness. Cloud Computing offers numerous operators accessibility at the same time and by doing so, users not only shares only computing resources but also "allocate dynamically as per demand" (Khan, 2015). Moreover, Cloud Computing always support users to access or update their data via only one server deprived of purchasing certificate (Zhang *et* al., 2010). For Bangladeshi SMEs, this is the perfect benefit that they can be use of because many SME owners can share the same shared Cloud and can get and exchange all the resources and data for their businesses. Again, SME owners do not need to necessarily pay extra money for buying license so that they could save that money and could reinvest into their business.

- **Agility:** In today's competitive financial situation, the skill to retort to quickly shifting customers' requirements is a vital competitive differentiator (Azarnik[a] *et* al., 2012). However, agility for SMEs is not only a competitive advantage rather it is vital for SMEs to survive in nowadays-fast moving business environment. Cloud

Computing increase the agility of business by enabling businesses to speedily adjust processes, products and services to fulfil the changing requirements of the business market (Berman *et* al., 2012). This is perfect for the Bangladeshi SMEs because at present Bangladesh is economically growing faster and recently the country achieved low-middle income countries status by the World Bank. So Bangladeshi SMEs need to be more agile and adaptive in order to support the state's economic growth.

- **Minimize Licensing New Software:** According to Khan (2015), *"Cloud Computing strategies are used to custom tailor solutions to the company and thus company needs Cloud IT with fully integrated, dynamic and robust computer systems with completely web based".* By using this strategy, files, applications and emails could be accessed quickly and easily over the Internet so the requirement of software and hardware is decrease. As a result, business firms' needs minimum licensed software therefore; business firms could grow without investing huge amount on licenses (Lawton, 2008).

- **Cloud Computing is Green:** At present in Bangladesh, Cloud Computing is not a hot topic but near future Cloud Computing could be a hot topic and most of the businesses will be using Cloud services. This is because Cloud Computing is the finest and the greatest and effective future use in any kind of businesses (Khan, 2015). According to Blaisdell (2014), *"companies can increase their return by 200% by using Cloud Computing".* On the other hand, software firms and IT firms are essentially changing to adopt advanced technology such as Cloud Computing. In this way, software and IT firms could really save the environment by utilizing less amount of servers and other necessary resources. This is also important for Bangladeshi SMEs because Bangladesh is highly populated country where green environment is must needed. So by using Cloud Computing services Bangladeshi SMEs could save the environment, which would be really good for the country and the countrymen as well.

Small & Medium Enterprises (SMEs): What are the drawbacks of adopting Cloud Computing in Bangladesh?

I have already discussed earlier in detail of various potential opportunities or advantages of Cloud Computing that Bangladeshi SMEs should and could get. However, there are still some factors that could be worrying owners or management of the

Bangladeshi SMEs. Hence, it is now necessary for me to discuss below those drawbacks in my research that Bangladeshi SMEs possibly could have after adopting Cloud Computing.

- **Absence of Control:** As I have mentioned earlier in the above sub-heading that Cloud Computing is fully controlled and monitored by the Cloud service providers and therefore, consumers do have very less amount of control over Cloud Computing services such as data and applications (Khan, 2015). Moreover, consumers do not have any access of organizational tasks such as access to server, updating managerial tasks or updating even firmware (Gong *et* al., 2010). In terms of Bangladeshi SMEs, it could be real concern because most of the SME owners would have loved to do their managerial tasks by themselves but however; Cloud Computing would not give them those opportunities. As a result, they might have thought Cloud Computing is not important because physically they cannot resolve any issues and they need to rely on service providers, which will make them less interested of using Cloud Computing.

- **Reliance of Network and Fundamentally Need an Internet Connection:** Network dependence is one of the biggest drawbacks of Cloud Computing. Because Cloud Computing is entirely rely on Internet. Due to full network reliance on Internet controlled to lying service outage at any time (Khan, 2015). Moreover, there is a possibility of service interruption during file transmission, transactions or some other tasks. Therefore, daily tasks could be delayed (Stallings, 2007). This is the real time drawback for the Bangladeshi SMEs because at present there is not strong enough Internet coverage all over Bangladesh. Although nowadays countrymen are using mobile Internet but however, those Internet service providers cannot assure strong network services all the times. Therefore, SME owners in Bangladesh would be thinking twice before they entirely rely on Cloud Computing to perform their daily tasks.

- **Risk of Security Breaches and Attacks:** According to Yang & Tate (2009), *"every single Cloud computing component is highly accessible from Internet server however, Internet connected services are not secure and sometimes IT teas have to suffer from hard security breaches and attacks"*. In Bangladesh, this risk is really high especially for Bangladeshi SME owners. This is because most of the Bangladeshi SME owners are not highly knowledgeable of computing therefore, they might not using Cloud Computing services accordingly. So for Bangladeshi SMEs it is a real challenge because computer hackers or third party users could easily get access of their data and information.

- **Migration Issues:** This is always challenging for anyone to migrate to Cloud Computing because the migration process is very tricky. Marston *et* al (2011) mentioned in their study that migration to Cloud is a real issue because there are many common experiments in this regard, which could be appropriate Cloud vendors identification, effectual management of Cloud possessions and obviously changeovers of IT infrastructures and investments. This is a common challenge for the Bangladeshi SMEs because they do not have right knowledge of Cloud Computing. So it would be difficult for them to choose the right Cloud providers. Because without knowing the facts of Cloud Computing they need to entirely depends on service providers by believing that they would be doing the right job for them. But however, there is possibility of dishonesty from the service providers as a result, migration could be negatively impacted or SME owners need to pay extra money, which will be highly impacting on their investments.

- **Continuous Developing:** Customers are very fascinating and their demand or requirements are keep changing therefore, Cloud Computing, networking, storage and requirements of interfaces are keep changing as well. According to Durkee (2010), these continuous evolving restrictions demonstrates that Cloud Computing needs to evolve over time cannot be static. This would be the real concern for the Bangladeshi SMEs because first of all they are not highly literate so every time some evolving happens into Cloud they might be thinking that why do I need to accept those changes. Therefore they might be stopping using Cloud Computing by thinking that using Cloud Computing is too much hassle.

Small & Medium Enterprises (SMEs): What are the Cloud Computing Structures in SMEs?

From the discussion above under the heading of cloud computing deployment model and services it has been clearly mentioned that cloud computing has many models and services. It has been also mentioned that all the models and services are different comparing others due to their own characteristics and business use. Therefore, it is now necessary for SMEs to clarify their IT necessities in order to make effectual decision about technical configuration in dissimilar cloud computing types (Peng *et* al., 2009). Cloud computing provides different services and these services could meet any IT necessities of SMEs with continuous provision of telecommunications and IT businesses (Khan, 2015). According to Khan (2015) the following four Cloud computing services categories are available for SMEs.

Software as a Service (SaaS): According to Peng *et* al. (2009), *"software as a service (SaaS) is basically a distribution model, where service providers or vendors host the applications and use Internet network to deliver these applications as a service to customers"*. SaaS is further referred as on-demand software because all the applications on SaaS are fully registered on payment basis (Khan, 2015). Khan (2015) also further added in his study that SaaS is one of the most valued computing facilities for the SMEs since SaaS is fully supported by the "plug and go" concepts. And under plug and go concept SMEs possibly could get IT possessions from "public cloud" or even from other facility providers and deliver those possessions to the customers (Lawton, 2008). IT organizations temporarily plays a vital role of IT service agent to supply fundamental cloud services to SMEs (Khan, 2015). SaaS provides an IT solution by using software, bandwidth and server and SMEs have choices to select the appropriate service suppliers who have prerequisite solutions according to the staffs need. Nevertheless, it is essential to ensure that the service provider guarantees the service admittance (Azodolmolky, Wieder & Yahyapour, 2013).

Infrastructure as a Service (IaaS): According to Khan (2015), *"the least disrupting cloud computing service adopted by SMEs is infrastructure as a service, known as IaaS"*. Peng *et* al. (2009) claimed that SMEs could get "virtualized computing services" via Internet by using IaaS. This is because, IT masses and servers are grounded on this provision, which allows software as a service and platform as a service (PaaS). Khan (2015) further added that in IaaS, third party is involved who functions as a host to provide different infrastructure components such as hardware, software, server and storage to the service users. IaaS further deals users' applications and provide holdup resolution, system care and resiliency enhancement (Weinhardt *et* al., 2009). According to Giessmann & Stanoevska-Slabeva (2012), IaaS offers extremely comprehensible resources for user request so IaaS is most appropriate for provisional investigational job, which could be altered suddenly. Based on the service level agreement (SLAs), price and performance IaaS cloud suppliers could be distinguished (Khan, 2015).

Platform as a Service (PaaS): According to Khan (2015), platform as a service provides a thought-provoking solution for IT associated SMEs who are involved in the enhancement of applications. Lawton (2008) claimed that in PaaS, a host environment could be offered and this host environment empowers the SMEs to progress online applications and also allow using web-based podium. Khan (2015) also found in his study

that PaaS offers the infrastructures such as improvement of hardware and software as well as operating system to serve users to support to improve new applications deprived of making substantial investments. Moreover, Giessmann & Stanoevska-Slabeva (2012) mentioned in their study that SMEs could lease PaaS facilities, which offers whole lifecycle of application enhancement. In 2010, Zhang *et* al. discovered in their study that over the Internet the combination of PaaS and IaaS could offer an operating system, which could possibly eradicate the requirements of downloading and mounting software to the end-user systems.

Communication as a Service (CaaS): According to Khan (2015), the process of SMEs leasing communication solutions from Cloud Computing service providers is called Communication as a Service (CaaS). CaaS empowers SMEs to apply Voice over IP services and Unified Communications, where SMEs do not invest for hardware and this is because in CaaS, Cloud providers manage the prerequisite hardware (Youseff *et* al., 2008). Moreover, CaaS could be used in SMEs for cumulating business communication efficiency as well as reducing telecommunications involvements (Conway *et* al., 2014). Although there are diverse ranges of Cloud Computing services are available for the SMEs to use but Rath *et* al (2012) clearly mentioned in their study that it is very important for the SMEs to scrutinise their required IT needs and capability before adopting any model of Cloud computing.

Appendix – F

Supporting Literatures of Digital Bangladesh

Digital Bangladesh – What are the major challenges in implementing CC that Bangladeshi Government could face under Digital Bangladesh context?

Unquestionably, it is now clear that the growth and use of Cloud computing is not only more than another platform shift but also transforming the information technology business (Wyld, 2009). Cloud Computing profoundly changes the working patterns of the people and business as well as in government. Moreover, Cloud Computing permits digital technology to enter every corner and cranny of the economy and of society (Wyld, 2009). While it is anticipated that Cloud Computing eventually could transmute using IT in the government but however, there are various apprehensions that needs to be looked at.

- **Scalability:** Scalability is becoming hallmark of fruitful approaches in the commercial world as well as in the administration. And IT resources now days need to be more flexible, agile and scalable for all the organization where, Cloud Computing is ready to provide unprecedented elasticity of resources. Under Cloud environment, organizations or administrations need dramatic use of computing power and increasing amount of computer utilization but at present Bangladesh government's Digital Bangladesh initiatives is at earlier stage therefore, implementing CC and ensuring scalability is really at immature stage (Wyld, 2009).

- **High Reliability:** One of the foremost concerns of Cloud Computing is ensuring reliability and availability (Wyld, 2009). Though this concerns are unfortunate because Cloud Computing can only offer service level agreement (SLA) with four-9s performance with guaranty of 99.99% uptime compared with in house IT. And for government, SLAs are particularly vacuous whenever data breach happens or regulation is broken (Wyld, 2009). Under Digital Bangladesh though BD government trying to use IT almost everywhere but however, still they are not in a position to ensure high reliability of their service. Moreover, the reality is in Bangladesh, law is keep changing by the ruling party therefore, there is no guaranty that strategies current government has taken in order to ensure reliability will be the same if government change, which will potentially put the whole initiatives and services under risks.

- **Securing Data in the Cloud:** Providing security is undoubtedly a very hard metric to quantify (Wyld, 2009). Keeping more data and applications on Internet through Cloud sometimes offering for criminal activity via identify burglary, hacking, stealing intelligent and other types of malevolent activities (Baily, 2009). Any organizations engaging with Cloud unquestionably depends on its necessity for security (North, 2009). Therefore, with sharp security concerns, for any government it would be one of the hardest tasks to make Cloud Computing secure because a darker Cloud of Internet security is vulnerable (Wyld, 2009). And in terms of Bangladesh government Digital Bangladesh initiatives they were given security is the first priority but reality is they are too far to implementing their initiatives due to absence of adequate policy of keeping data and information and how to manage theme to secure.

- **Open Standards and Interoperability:** *"one of the major concerns regarding Cloud Computing that government IT executives consistently express is a fear of being locked into vendors, due to the high switching costs – both in money and in time and effort, that would be incurred when switching between Cloud Computing Providers* (Hall, 2009). Government necessarily can support to foster total growth of Cloud Computing, which can support establishment of standards that will common architectures and portability of data and files (Wyld, 2009). Heyward (2009) mentioned that government should be an active participant in the standards-setting efforts like Open Cloud Project. But becoming an active participant is still questionable for the Bangladesh government due to not having adequate resources and understanding the importance of it.

- **Revise Procurement Practice:** Indeed, one of the challenges for the Bangladeshi government will have to be dealt with as switch to greater use of Cloud Computing in government occurs will be government's contracting processes (Wyld, 2009). This is because of constantly changing rules and regulations. Sometimes, it is difficult for the Bangladesh government to even use Cloud Computing in some instances due to new law and regulations. Therefore, Bangladesh government cannot be Cloud friendly in some instances and cannot encourage nations about the savings and efficiencies that can come from Cloud Computing.

- **Resolve Potential Legal Issues:** Handling stored data and information in Cloud Computing is customarily complicated. Dealing with government data, government storage database need to be retain for longer periods of time and need to be accessible 24/7. But however, there are some significant legal concerns accessing government data that potentially impact both public and private sectors. According to Corbin (2009), in Cloud Computing legal concerns are raised further. Under Digital Bangladesh initiatives, government needs to resolve those legal issues in order to ensure 24/7 access of their storage database. But in reality, it is somehow impossible for the Bangladesh government due to high risk of data being compromised therefore; it is difficult for them to resolve the legal issue relating to Cloud Computing.

- **Regulate "Cloud Market":** The first question everyone should ask where does the growth of Cloud Computing take us? The resources and power of Cloud Computing is leading us down dangerous paths as well as leading to huge monopoly (O'Reilly, 2008). And competition makes Cloud-based applications and data more attractive on a cost basis to potential enterprise customers. Therefore, government authorities must monitor this area to ensure competition and right choice among Cloud providers (Wyld, 2009). But problem with Bangladesh government is they do not have sufficient knowledgeable personnel to adequately regulate Cloud Market inside or outside Bangladesh. Moreover, there is possibility of misleading information due not having satisfactory knowledge in information technology arena.

- **Redefining Roles of the IT Workforce:** Truly, traditional IT personnel are most likely to be most resistant compared with those with experience with web development are likely to be supportive of Cloud efforts (Gruman, 2008). For Bangladesh government redefining the roles of IT personnel is one of the toughest tasks because of lack of understanding the new roles and functionalities of Cloud Computing.

- **Assessing Return on Investment (ROI) of Cloud Computing:** Bangladesh government need to proactively assess what, when and how will be the ROI of Cloud Computing may come up. Because Cloud Computing can offer cost savings by outsourcing IT operations nearly three to five times cheaper than in house data centres and hosted applications (Greenberg, 2009). But problem for Bangladesh

government is they still could not articulate the differences between in house technology and Cloud Computing in front of the nations especially those people living in the rural areas therefore, they are even not sure how they will get benefit from using Cloud Computing.

- **Government Cloud Coordination:** At present, Bangladesh government does not have proper plan to coordinate using and forecasting Cloud services to facilitate collaboration and to share cost.