



Faculty of Economic and Business

**Organizational Adaptation to Climate Change:
Three Case Studies from Bangladesh**

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Organizational Adaptation to Climate Change:
Three Case Studies from Bangladesh

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DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Malaysia Sarawak. Except where due acknowledgements have been made, the work is that of the author alone. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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ABSTRACT

Organizations deploy various approaches in managing impacts, undertaking adaptation and mitigation of climate change. Despite there has been a growing research in this area, yet the existing literature of organization studies and management is heavily dominated by empirical works using descriptive research approach and oriented towards quantitative research paradigm. There has been a serious lack of in-depth research that examines organizational adaptation towards climate change impacts in the context of developing countries from qualitative paradigm that can offer useful theoretical insights to advance the current understanding in this area. The objectives of this research are as follows. It investigates organizational adaptation to climate change in Bangladesh, and further examines factors that motivate or prevent organizations in undertaking effective climate change adaptation strategies, as well as the outcomes of organizational adaptation practices and responses. The study integrates open systems theory, organizational learning theory and Pettigrew's processual analysis in the conceptual framework to guide the research. It deploys a qualitative approach using case study method that involved three organizations in Bangladesh and uses variety of data collection techniques. Based on the research findings, this study found that there is no unique approach deployed by the organizations, and their adaptation responses to climate change could be considered as co-adaptation with other typical organizational changes to complement with new conditions. Most adaptation decisions were also found to be reactive and mainly focused on managing immediate business risks. The common adaptation strategies such as climate-proofing infrastructure, climate-proofing process, and communicating climate risks were engaged by these organizations. The findings further revealed internal and external factors such as low awareness, weak leadership, costly adaptation technology, lack of information and

difficulty to acquire adaptation finance, corruption, political instability and unsupportive regulatory environment as well as cultural factors could hamper initiatives to adopt effective business adaptation responses to climate change. Overall, this study makes three important research contributions. First, it extends the existing theoretical understanding about managing climate change impacts from the standpoint of an organization, by highlighting the dynamic interplays between internal and external factors, as well as cultural and institutional factors in the business environment, that are contributing towards reactive adaptation responses to climate change. Second, this study argues that in order to move beyond the typical reactive adaptation responses, initiatives such as development of good climate change governance framework, related policies and effective intervention programs by government are required to affect and sustain positive change in the business environment. Finally, the research has managerial and practical implications that can benefit Bangladesh business sectors particularly in telecommunication, real estate and garment manufacturing industries.

Keywords: Climate change management strategy, reactive adaptation response, climate change mitigation, Bangladesh, developing country

**Adaptasi Organisasi terhadap Perubahan Iklim:
Tiga Kajian Kes dari Bangladesh**

ABSTRAK

Pelbagai pendekatan digunakan oleh organisasi dalam melakukan adaptasi dan mitigasi, dan menguruskan impak dari perubahan iklim. Walaupun wujud peningkatan minat penyelidikan, namun, kajian empirikal menggunakan kaedah penyelidikan deskriptif dan berorientasi kepada paradigma penelitian kuantitatif mendominasi literatur dalam bidang penyelidikan organisasi dan pengurusan. Masih terlalu kurang penyelidikan yang dilaksanakan secara mendalam untuk mengkaji adaptasi organisasi dalam menangani impak perubahan iklim, dalam konteks negara-negara membangun, dari perspektif kualitatif untuk dapat menyumbang kepada perkembangan kajian berkaitan topik ini. Objektif-objektif kajian ini adalah seperti berikut. Kajian ini menyelidik adaptasi organisasi terhadap perubahan iklim di Bangladesh, dan seterusnya mengkaji faktor-faktor yang mendorong atau menghalang organisasi dalam melaksanakan strategi adaptasi perubahan iklim yang berkesan, serta kesan amalan adaptasi dan tindak balas organisasi. Kajian ini menggabungkan teori sistem terbuka, teori organisasi pembelajaran dan analisa proses dari Pettigrew dalam kerangka konseptual kajian. Pendekatan kualitatif dengan metod kajian kes yang melibatkan tiga organisasi dan pelbagai teknik kutipan data telah digunakan. Hasil dapatan kajian mendapati tiada pendekatan unik diaplikasikan oleh kesemua organisasi, dan pendekatan adaptasi organisasi terhadap perubahan iklim adalah berbentuk penyesuaian bersama dalam konteks perubahan biasa organisasi dalam membuat penyesuaian dengan persekitaran baru. Kebanyakan pembuatan keputusan adaptasi juga bersifat reaktif dan tertumpu kepada pengurusan risiko segera. Strategi adaptasi yang lazim seperti infrastruktur kalis iklim, proses kalis iklim, dan komunikasi

risiko iklim telah digunakan oleh organisasi-organisasi ini. Seterusnya, hasil kajian mendapati faktor-faktor dalaman dan luaran seperti tahap kesedaran yang rendah, kepimpinan yang lemah, adaptasi teknologi yang mahal, kekurangan maklumat dan kesukaran untuk memperolehi kewangan, rasuah, ketidakstabilan politik dan persekitaran kawal selia yang tidak menyokong serta faktor budaya boleh menghalang inisiatif untuk menggunakan kaedah adaptasi terhadap perubahan iklim yang berkesan. Secara keseluruhannya, kajian ini membuat tiga sumbangan penyelidikan. Pertama, kajian ini memperkembangkan pemahaman teori yang sedia ada mengenai pengurusan impak perubahan iklim dalam perspektif organisasi, dengan memberi fokus kepada interaksi dinamik di antara faktor-faktor dalaman dan luaran dengan faktor-faktor institusi dan budaya dalam persekitaran perniagaan yang menyumbang kepada tindakbalas adaptasi bersifat reaktif terhadap perubahan iklim. Kedua, kajian ini mengutarakan hujah yang untuk bergerak melangkaui tindak balas adaptasi bersifat reaktif, inisiatif-inisiatif seperti pembangunan rangka kerja tadbir urus perubahan iklim yang baik, dasar yang berkaitan dan program intervensi yang berkesan oleh kerajaan adalah diperlukan untuk mempengaruhi dan mengekalkan perubahan positif dalam persekitaran perniagaan. Akhir sekali, penyelidikan ini mempunyai implikasi pengurusan dan praktikal yang dapat memberi manfaat kepada sektor perniagaan Bangladesh, terutamanya dalam industri telekomunikasi, hartanah dan industri pembuatan pakaian.

Kata kunci: Strategi pengurusan perubahan iklim, adaptasi bersifat reaktif, mitigasi perubahan iklim, Bangladesh, negara sedang membangun

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
AR	Assessment Report
BCCSAP	Bangladesh Climate Change Strategy and Action Plan 2009
BGMEA	Bangladesh Garments Manufactures and Exporters Association
CDM	Clean Development Mechanism
CSR	Corporate Social Responsibility
COP	Conference of the Parties
FDI	Foreign Direct Investment
GHG	Green House Gas
IFC	International Finance Corporation
IPCC	Intergovernmental Panel on Climate Change
INDC	Intended Nationally Determined Contribution
MNC	Multi National Corporation
NAPA	National Adaptation Programme of Action
NGO	None Government Organization
OECD	Organization for Economic Co-operation and Development
REHAB	Real Estate and Housing Association of Bangladesh
SME	Small and Medium Industries
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WBCSD	World Business Council for Sustainable Development

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter introduces the research context and highlights the motivation, purpose and rationale of pursuing the research. The first part of the chapter covers the background of the study, problem statement and the importance of the study, as well as the formulated research objectives and questions to address the identified problems, based on the research gaps in the literature. The second part of the chapter presents briefly the conceptual framework that was developed to undertake the research, and the scope of the study in the context of Bangladesh. More details related to these subsections can be found in Chapter 2 and Chapter 3. The final part of the chapter describes the organization of this thesis and provides definitions of key terms relevant to the research.

1.2 Background of the Study

Climate change is one of the most complex problems affecting business and society (Bai et al., 2018; Porter, Kuhn & Nerlich, 2018). The understanding about the magnitude of the problem caused by climate change needs to extend beyond one discipline area or specific knowledge experts, in order to constructively develop sustainable and workable solutions to effectively manage risks and strategies for climate change mitigation and adaptation (Bai et al., 2018).

In many countries, climate change such as extreme weather has drastically affected cities, infrastructures and community's lifestyle, and is influencing the standpoints of policy makers, financial investors and business leaders to formulate solutions to address

climate change related problems and issues. It has been highlighted that climate change is impacting organizations in the following areas: heightening business risk because of extreme weather, disrupting resource supply and increasing costs in the supply chain, affecting demand for products, contributing to the tough working condition, affecting regulations imposed on business, and heightening public pressure for organizations to commit their business operations to be environmental friendly (Folk, 2018). Climate change is not only contributing to the obvious physical impacts such as infrastructure damage, supply chain disruptions, and business risk exposure (Lash & Wellington, 2007; Linnenluecke, Griffiths & Winn, 2012; Lowitt, 2014; Nyberg & Wright, 2015), but also placing organizations and industries to face pressures from international regulators and public bodies to abide on international standards, treaties, procedures and regulations (Lash & Wellington, 2007; Porter & Reinhardt, 2007; Wittneben & Kiyara, 2009; Pattberg, 2012; Biagini & Miller, 2013; Alves et al., 2017). For example, the Kyoto Protocol has been set up by the United Nations as an international agreement to commit its members to abide on emission reduction targets (UNFCCC, 2019a).

There is also the Intergovernmental Panel on Climate Change (IPCC) that was set up by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) in 1988 “to provide policymakers with regular scientific assessments on climate change, its implications and potential future risks, as well as to put forward adaptation and mitigation options” (IPCC, 2019). IPCC now is on 6th Assessment Cycle and in the midst of preparing “AR6 Synthesis Report: Climate Change 2022.” A recent study by Porter, Kuhn and Nerlich (2018) investigated some controversies related to perceived factual errors in the Fourth Assessment Report of the IPCC and how these controversies relate to the concept of authority in the context of an organization and

business decision makers. Using dialectical and communication theories, the study examined the context of Netherlands in relation to the responsible authority around climate change. The high-profiled errors discovered in the IPCC report had been debated in the Dutch Parliament earlier on. Climate change scientists, politicians, activists, media and other stakeholders raised concerns about who have greater authority and influence on scientific inquiry, policy and climate change related activism (Porter, Kuhn & Nerlich, 2018).

From the standpoint of organization studies and management, climate change now is viewed as a strategic issue rather than just a societal and ethical concerns (Daddi et al., 2018) and is treated as an organizational problem (Porter, Kuhn & Nerlich, 2018). However, whilst there has been an increasing interest among researchers from management and organization studies about climate change, yet the large research gaps have not been addressed well in the literature. Daddi et al. (2018) asserted that there is still a lack of serious research on the use of organization and management theories to understand how climate change is affecting organizations, business processes and operations. Winn et al. (2011) argued that in order to progress the literature, it is vital to examine research streams related to climate change emerging from the current literature to develop better theories that can offer explanatory power to explain the phenomenon. Winn et al. (2011) suggested the following broad research streams to be considered to systematically study about climate change impacts: sustainability management (Bansal & Gao, 2006), crisis management (Majchrjak et al., 2007), risk management (Amendola et al., 2007), adaptive organizational change (Berkhout, Hertin & Gann, 2006) and organizational resilience (Folke et al., 2006).

Further, at the organizational level, managing climate change impacts strategically necessitates good understanding about business environment in order to devise effective plans and strategies to adapt and mitigate risks as well as to take advantage of available business opportunity. In CDP Climate Change Report (2019), few emerging business trends were reported based on data obtained from 6937 organizations worldwide. The report highlighted substantial losses from business sectors due to extreme weather events and also from scenarios happening in the industry, particularly rapid technological shifts to move towards a low carbon economy. Financial investors and regulators were seen to be more focused to ensure private sector is prepared in handling climate change risks as well as taking advantage of emerging business opportunities (CDP Climate Change Report, 2019). Figure 1.1, excerpted from the report, presents the views from the respondents with regard to potential business opportunities emerging from climate change and having strategic impact towards their business operations.

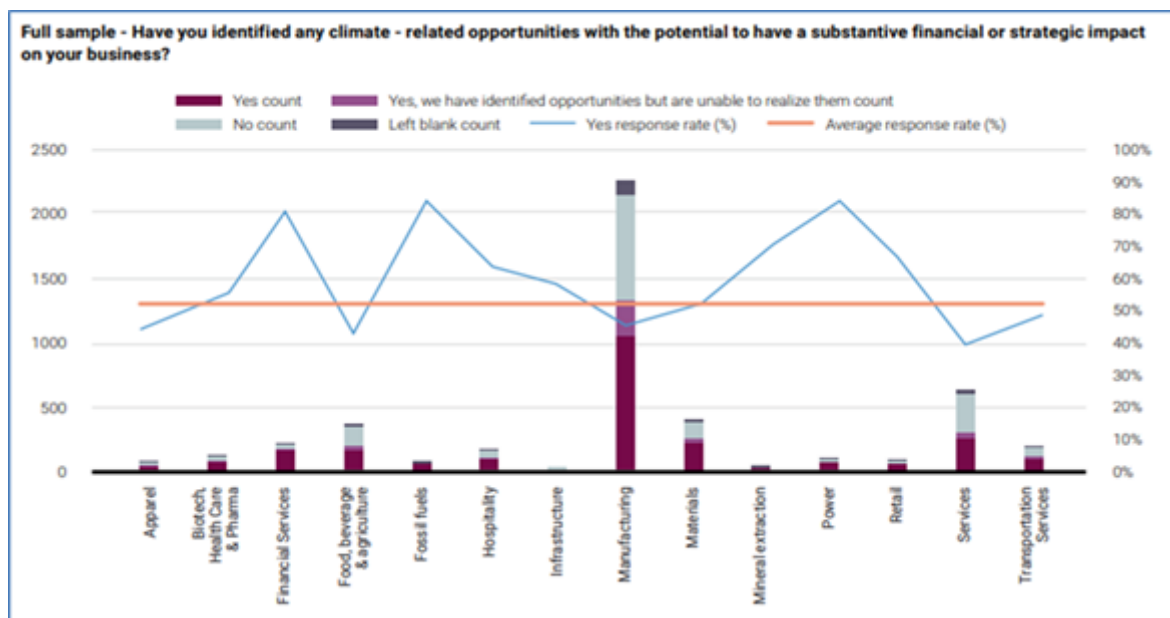


Figure 1.1: CDP 2019 Findings – Business Opportunity related to Climate Change
Source: CDP Climate Change Report (2019: 15)

Overall, as shown in the figure, the respondents operated in certain business sectors such as manufacturing, services, transportation services, food, beverage and agriculture reported having less substantive financial or strategic impact concerning climate related opportunities. A majority of the respondents in fossil fuels, financial services and power industries however reported gaining financial and strategic impact for their business.

It is also widely acknowledged in the literature that an organization is influenced by business environment and vice versa. CDP Protecting Our Capital (2014), using the data obtained from 207 cities and more than 4,500 large companies, reported perceptions of cities' administrators around the globe on the hardship facing by private sectors dealing with climate change issues. The report also presented some initiatives undertaken by a number of cities to create a resilient business environment for private business sectors. The report further revealed that, both cities and private business sectors recognized climate risks associated with increased temperatures and heat waves that having immediate impacts on public and private sectors. The report also noted, in Southeast Asia, the city of Bangkok was in agreement with two companies such as Hitachi and Lite-On Technology with regard to climate change risks from flooding. Both organizations (Hitachi and Lite-On Technology) reported a combined loss of nearly \$96 million in 2011 when they had to shut down their factories in Thailand for over a month when Bangkok flooded (CDP Protecting Our Capital, 2014).

Further, it is also widely acknowledged in the literature that cities of developing countries, despite experiencing climate change management challenges and resource constraints than cities of developed countries, they also can have different priorities in the agenda with regard to tackling climate change impacts (Bai et al., 2018; Jogerson et al.,

2018; CDP Protecting Our Capital, 2014). In this context, the interplays between power, social stratification and inequality that were argued by Jogerson et al. (2018) to contribute towards inequalities along global supply chains, can pose as adaptation barriers as highlighted by Adger et al. (2009) and can shape the governance of adaptation practices at various levels of decision making (Huitema et al., 2016). “Larger shares of value added, in comparison to shares of pollution, are generally prompted within more-developed countries, while less-developed countries experience more environmental destruction and associated health impacts per unit of value added for their contribution to global supply chains” (Jogerson et al., 2018:5). From the research standpoint, more empirical works that can examine business setting of business organizations operating in a developing country context with regard to managing climate change impacts, adaptation and risks are needed and must be supported to provide a balanced view in the literature.

Learning from the previous research studies and trends, this study aims to respond to the identified gaps in the literature, by investigating organizational adaptation to climate change in the context of a developing country, namely Bangladesh. The subsequent subsections present the details of the proposed research.

1.3 Problem Statement

It is acknowledged in the organization studies and management literature that climate change poses a great challenge for organizations and necessitates strategic approach in devising suitable adaptation strategies to resolve climate change problems to ensure business sustainability (Winn et al., 2011; Wright & Nyberg, 2017; Bai et al., 2018; Jogerson et al., 2018). In this context, business survivability depends on how well organizations adapt to climate change and prepare in advance on how to take advantage of

business opportunities arising from climate change impacts. IPCC (2001:365) defined adaptation as “adjustments in natural or human system in response to actual or expected climate stimuli or their effects, which moderate harm or exploit beneficial opportunities”. Organizational adaptation to climate change, whilst receiving an increased interest among scholars of the organization studies and management, is still an underdeveloped research area in the literature. This can be justified from three perspectives.

The first perspective is concerning about the various definitions and conceptualizations of organizational adaptation in the literature; and as a result, organization and management scholars are being diverted and constrained within the focus of academic debates according to their theoretical interpretations (Abetacola, 2012; Daddi et al., 2018). It was observed that there was a time lag in the initiatives of doing theory building based on serious research in the area. It is because climate change was earlier on viewed more as a practical problem, and hence a large number of studies were done using descriptive approach with no attention focusing on theorizing the phenomenon in the research (Abetacola, 2012). Previous researchers studying climate change also were less engaged in adopting influential theories from organization and management fields in their study, and hence this obstructed the progress of the present literature in providing good theoretical directions and explanations on the phenomenon of interest (Daddi et al., 2018).

Next, the second perspective is related to the heavy concentration of research studies orientating towards quantitative research in the literature in this focus area. This has resulted in the ongoing debates related to climate change impacts in the literature putting little emphasis on the layers of complexities pertinent to the organization context in adapting and mitigating risks from climate change, especially in the context of developing

countries. Complex research problem such as dealing with climate change impacts necessitates contributions from multidisciplinary research works and theoretical viewpoints, that can offer rich theoretical insights and advance understanding to properly theorize the phenomenon and making research impacts (Adger et al., 2009; Winn et al., 2011; Abetacola, 2012; Wright & Nyberg, 2017; Daddi et al., 2018; Jogerson et al., 2018; Porter, Kuhn & Nerlich, 2018). Bai et al. (2018:24) in elaborating about knowledge gaps related to mitigating and adapting to urban climate change asserted that “different approaches and models need to be compared, benchmarked and coupled with assessments of local social vulnerabilities and capabilities” to understand climate interactions. They also urged the researchers not to ignore narratives and local knowledge while processing the technical data. Hence, in this context, more systematic empirical works utilizing qualitative research approach can be constructive to complement the limitations of quantitative research paradigm with regards to the study of climate change impacts, adaptation and mitigation in the context of developing countries.

The last perspective is about the unsatisfactory progress in the organization studies and management literature with regard to empirical works researching in developing country context, and reporting related research evidences. Most studies were descriptive, lacking of theoretical grounds, or researching issues or problems from broad perspectives. Hence, these studies were not contributing critically to provide theoretical insights about organizational adaptations to climate change, from the standpoint of developing countries. Ford et al. (2014) based on their study on the status of climate change adaptation in 47 nations in Africa and Asia concluded that the literature progress on adaptation is an imbalance by region, country and sector with distinct groups of few leading nations contributing to the existing publication streams. They also found that a large number of

reported adaptation initiatives were being mainly driven at the national level. The study further highlighted even for the peer reviewed literature, most studies reported reactive practice instead of proactive (i.e., planned or anticipatory) in the adaptation approaches, and very little works were found to be associated directly with private sectors or gathering evidence from business organizations directly. A majority of adaptation projects reported in these studies were focusing on the adaptation at the individual, household, and community levels (Ford et al., 2014). This study, in an attempt to respond to the identified literature gaps, embraces the organizational viewpoint to research how organizations in developing countries adapt to climate change, and undertakes the research using a qualitative research paradigm.

1.4 Significance of the Study

The importance of this study can be justified from three aspects, as follows: (1) to respond to a serious lack of systematic research that uses organization and management theories to study climate change impacts from the perspective of business organizations of developing countries; (2) to provide new theoretical insights to advance understanding about organizational adaptation to climate change, by emphasizing on the context of business organizations from a developing country; and (3) to offer some practical and managerial contributions for business sectors and policy makers, learning from organizations in Bangladesh with regard to managing climate change impacts. The following elaborates these aspects further.

Firstly, this study argues that it is a worthy effort for the research to take the standpoint of organizations from a developing country and deploy suitable organization and management related theories to guide the research. Winn et al. (2011) contended that

there have been much bias and assumptions in the literature that are contributing to the slow progress of understanding about climate change impacts in the field of organizational studies. Daddi et al. (2018), using a systematic literature review method included 131 journal articles extracted from the ISI Web Science and Scopus in their review. They reported that many studies were found not having a clear theoretical contribution and having limited use of management theories. Also, because of the contextual nature of physical impacts of climate change (Smit et al., 2000; Winn et al., 2011; IPCC, 2014), hence reported empirical findings in the literature related to organizational adaptation were highly contextualized and difficult to generalize to different settings (Okereke, 2007; Pattberg, 2012). On top of this, the scarcity of research focusing on business organizations from developing country context has been further acknowledged as not constructive for the development of research in this area. This study aims to contribute to address some of these highlighted gaps in the literature.

Secondly, this study contends that by highlighting the context of business organizations operating in a developing country such as Bangladesh, there can be more new insights that can be constructive to advance the current understanding with regards to theorizing organizational adaptation to climate change. Organization and management scholars are still debating about how best to theorize organizational adaptation to climate change. In the past, climate change was viewed largely as a classic issue in public policy matters (Huiteima et al., 2016). To date, it is widely acknowledged that climate change is a strategic problem for organizations to manage strategically (Daddi et al., 2018; Porter, Kuhn & Nerlich, 2018). Also, as developing and poor countries “will bear the brunt of climate change” because these countries “rely heavily on climate-sensitive sectors, and high levels of poverty, low levels of education and limited human, institutional, economic,

technical and financial capacity” (OECD, 2010: 67), hence it is vital to have more research studies dedicated to investigate about how business organizations in developing countries manage climate change impacts, adapt and mitigate climate risks. This study can offer more new insights that can be beneficial to advance the current understanding with regards to theorizing organizational adaptation to climate change.

Finally, undertaking this research and using organizations in Bangladesh as case studies, the outcomes of this study can be beneficial not just for the academic community but also for business practitioners and policy makers. It is hopeful that the research outcomes can increase awareness among business owners, managers and policy makers about the importance of having adaptation strategies to deal with climate change impacts.

1.5 Research Objectives

The general objective of this research is to investigate how business organizations in Bangladesh adapt to climate change. The specific objectives of this research are as follows:

- i. To examine the existing organizational practices related to adaptation to climate change in the context of organizations in Bangladesh.
- ii. To identify barriers and enablers to climate change adaptation in the context of organizations in Bangladesh.
- iii. To examine how the identified barriers and enablers influence the organizational adaptation process in Bangladesh.
- iv. To study the outcomes of adaptation responses to climate change taken by organizations in Bangladesh.

1.6 Research Questions

The following are four (4) research questions formulated to achieve the stated research objectives.

(Q1) What are the existing organizational practices related to adaptation to climate change in the context of organizations in Bangladesh?

(Q2) What are the barriers and enablers to climate change adaptation in the context of organizations in Bangladesh?

(Q3) How the identified barriers and enablers influence the organizational adaptation process?

(Q4) What are the outcomes of adaptation responses to climate change taken by organizations in Bangladesh?

1.7 Research Conceptual Framework

This study is guided under open systems theory, organizational learning (OL) theory and Pettigrew's processual analysis, and embraces a qualitative paradigm to guide the research. Figure 1.2 depicts the conceptual framework developed for the research.

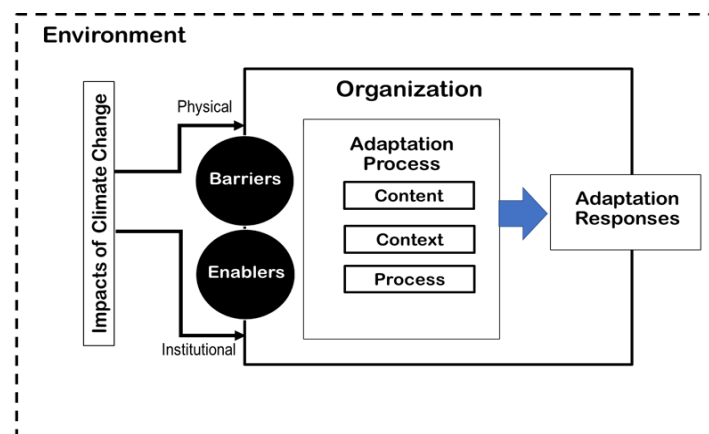


Figure 1.2: Conceptual Framework of the Study

As an organization is viewed as an open system, it is assumed that an organization consists of many subsystems and always interacts with its environment. In the context of managing the impacts of climate change, this study recognized two impacts that can exist and affect an organization, namely physical impacts and institutional impacts. An organization's adaptation process can be captured through its organizational activities, practices and business decision making processes and outcomes. To understand this, Pettigrew's processual analysis – content, context, process – is engaged to capture the adaptation processes, and also as a sense making tool to analyze the process of change happening within the context of an organization. In this study, it is also viewed that the adaptation process also is influenced by external context, in this case from various factors either serving as barriers or enablers towards effective adaptation process. As the adaptation process itself is also viewed as a learning activity for an organization to increase its competencies for adjusting to the new business conditions, hence adaptation is always an intense process-based activity, and will result in some observable patterns of responses. More details about the conceptual framework of this research can be obtained in Chapter 2 and Chapter 3.

1.8 Scope of the Study

This study is conducted in a developing country context, in this case Bangladesh. The country has been ranked at the 7th position among the countries most affected by climate change in the period 1998- 2017 (Eckstein, Hutfils & Winges, 2019). Bangladesh private sectors are continuously experiencing challenges from extreme weather events such as tropical cyclone and flooding. In 2004, it was ranked at 6th position as the most flood-prone country in the world and global hot spot for tropical cyclone (UNDP, 2004).

Table 1.1 presents the climate risks for Bangladesh as reported by the IPCC in AR 4 Climate Change Report in 2014. In the context of this study, Bangladesh is a suitable empirical setting to conduct the research. More elaborations about Bangladesh can be obtained in Chapter 2.

Table 1.1: Climate Risks for Bangladesh

Environmental Impacts	Industry
Changes in rainfall patterns	Water resources
Increased frequency and severity of:	Agriculture and forestry
Floods	Food security
Droughts	Human health
Storms	Infrastructure (e.g. Transport)
Heat waves	Settlements: displacement of
Changes in growing seasons and regions	inhabitants and loss of livelihood
Changes in water quality and quantity	Coastal management
Sea level rise	Industry and energy
Glacial melt	Disaster response & recovery plans

Source: IPCC AR 4 (excerpted from <http://www.icccad.net/wp-content/uploads/2015/01/IPCC-Briefing-for-Bangladesh.pdf>)

Further, using case study method, three organizations in Bangladesh were selected as case studies for the research. These organizations were chosen because of their business nature, which is within the climate sensitive business sector in Bangladesh. In addition, the researcher was granted access to these organizations because of the professional relationships and trusts established between the researcher and the business owners. The following table briefly describes these organizations. More details about these organizations can be obtained in Chapter 3.

Table 1.2: Brief descriptions of Case Studies

Case Study	Industry	Location	Employee Size	Years of Establishment
TelcoOrg	Telecommunication	Dhaka	3000	1996
RealEstateOrg	Real Estate	Dhaka	550	1994
GarmentOrg	Garments Manufacturing	Gazipur	2000	1985

1.9 Structure of the Thesis

Chapter 1 introduces the background of the research and further explains the focus and purposes of the study. It also provides an overview of the conceptual framework developed for the research, and describes the research empirical setting.

Chapter 2 presents the literature review related to this research. This chapter provides elaboration on conceptualizations of climate change impacts, adaptation and mitigation, and also elaborates related empirical works in the field of management and organization studies. It also provides a critical review of relevant theories, and justify why certain selected theories are being integrated into the research conceptual framework. At the end of the chapter, the summary of the literature gaps findings and details of the conceptual framework of this study are presented.

Chapter 3 presents the research design and methods to for this study. It also explains the data collection process and analysis. Aspects related to credibility and validity of data are also explained in this chapter.

Chapter 4 explains the research findings, obtained from the case studies. The explanation for each of the case studies is structured according to four parts. Part 1 presents the descriptive findings related to the organization. Part 2 elaborates the findings related to climate change impacts. Part 3 describes the findings related to barriers and enablers affecting adaptation process. Part 4 explains the findings related to the adaptation responses.

Chapter 5 further discusses the research findings, and engages relevant literature in the discussion. The findings across all the case studies are compared and further analyzed.

Chapter 6 presents the conclusion of the thesis. It highlights the research achievements and contributions, and also provides some recommendations for future consideration. At the end of the chapter, research limitations and conclusion are given.

1.10 Definitions of Key Terms

Climate change – This refers to long-term change of weather pattern and increase of global mean temperature because of the concentration of greenhouse gas in the atmosphere (IPCC, 2014).

Adaptation – This refers to adjustment to the climate change effects and impacts within our natural and social systems in responses to climate stimuli, which help us to moderate harm or exploit the potential benefits (IPCC, 2014).

Mitigation – This refers to any effort to reduce greenhouse gas emission or to absorb carbon dioxide from the atmosphere (IPCC, 2014).

Organizational Adaptation – This refers to any physical or non-physical changes or modifications of operational procedures of organization internally or externally in response to climate change related risks and opportunities (Smit et al., 2000; Abetacola, 2012).

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter presents the review of related literature, including empirical research works in the field of organization studies and management. The first part of the chapter provides a literature review related to organizational adaptation and mitigations of climate change impacts. The review also covers associated conceptualizations, applications, theories and models related to the adaptation process in the context of an organization. The second part of the chapter highlights some influential theoretical viewpoints and their applications relevant to the focus of this research. The third part of the chapter elaborates about Bangladesh and her ongoing challenges in dealing with climate change problems. The fourth part of this chapter explains about the research gaps found in the literature, and also justifies the adoption of selected theories and models to be integrated into the research conceptual framework. The conceptual framework for the research is elaborated in details in the final part of this chapter. This chapter ends with a concluding section.

2.2 Business Adaptation to Climate Change

2.2.1 Related Concepts for Climate Change Adaptation

2.2.1.1 Climate Change

The Climate change is one of the most highlighted global problems nowadays. In general, climate change refers to long-term change of weather pattern and increase of global mean temperature because of the concentration of greenhouse gas in the atmosphere (IPCC, 2014). IPCC (2014:5) defined climate change as “*a change in the state of the*

climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer.” From the standpoint of scientific community, a collective agreement was reached that there are a variety of greenhouse gases such as carbon dioxide, methane, ethane, and CFCs (chlorofluorocarbon) concentrated in the earth’s atmosphere due to past industrialization activities, and the ongoing carbon emission from energy consumption, contributing by rapid urbanization and economic activities (IPCC, 2001). Climate change is also human-induced (Porter, Kuhn & Nerlich, 2018), and this is particularly evident with regard to worldwide rapid urbanization problems (Bai et al., 2018). IPCC in 2014, cited from Bai et al. (2018), reported that urbanization of more than half of the population in the world contributing to cities consumed more energy and released 75% of all carbon dioxide from the energy use. Because of the increase concentration of the greenhouse gases, the earth’s mean temperature has increased. This has further resulted in the increased sea level, because of natural activities related to glacier melting and thermal expansion of sea water. The rising of global temperature further disrupts the hydrological (i.e., rainfall patterns) and ecological systems. Because of climate change, there has been frequency of extreme weather events such as floods, cyclones, droughts and heat waves (IPCC, 2001). Climate change has severely impacted societal well-being due to its impacts in aspects related to human livelihood and food security, health care, settlements, industrial process, transportation, energy supply and others (Stern, 2007; IPCC, 2014).

2.2.1.2 Mitigation of Climate Change

Mitigation from the scientific viewpoint, in general, refers to the reduction of greenhouse gas (GHG) emission or to absorb carbon dioxide from the atmosphere (IPCC, 2014). Recognizing the developed countries responsible for emitting GHG through

industrial activities over 150 years, the United Nations Framework Convention on Climate Change (UNFCCC) established *Kyoto Protocol* on 11 December in 1997 to control global carbon emission (UNFCCC, 2019a). Responding to the pressures from various stakeholders comprising of governments, international organizations, NGOs, customer groups, investors, media, environmental activists, and academia, UNFCCC put pressure on developing nations (Annex B parties to *Kyoto protocol*) by setting up emission reduction targets by 2012 (UNFCCC, 2019a). *Kyoto protocol*, effective in 2005 has undertaken three mechanisms: International Emission Trading, Clean Development Mechanism (CDM), and Joint Implementation (UNFCCC, 2019a). International emission trading means that countries (Annex B parties to *Kyoto protocol*) committed to reduce carbon emission can sell their spare amount of reduction (one tone of CO₂ as standard unit) to other countries that fails to fulfill their emission reduction target as per *Kyoto protocol* (UNFCCC, 2019b). Clean development mechanism means that a country (Annex B parties to *Kyoto protocol*) committed to reduce carbon emission can implement an emission reduction project in a developing country, which earn saleable certified emission reduction credits (one tone of CO₂ as standard unit) to meet the emission target set by *the Kyoto protocol* (UNFCCC, 2019c). Again, joint implementation means that a country (Annex B parties to *Kyoto protocol*) committed to reduce carbon emission can implement an emission reduction or emission removal project in another committed country (Annex B parties to *Kyoto protocol*), which is counted to meet the emission target set by *the Kyoto protocol* (UNFCCC, 2019d). Then in the European regions, there is European Union Emission Trading Scheme (EU ETS) that has missions to combat climate change in cost effective and economically efficient manner and cover 11000 power stations and industrial plants in 31 countries and some airports of participating countries (EU ETS, 2019). However in the

literature, it was noted as a failure concerning the commitment of international climate governance to meet the mitigation target, when the United States of America, Canada, and Russia did not ratify *Doha Amendment to Kyoto Protocol* (for the second term from 2013 to 2020) on 8th December 2012 (UN, 2019), and also when in June 2017 President of the United States of America declared withdrawal from *Paris Agreement* of 2015, that has a target to keep global temperature below 2 degree Celsius (Zhang et al. 2017).

From the organizational standpoint, mitigation concepts can be highly contextualized within the adaptation process, such as to refer to aspects related to enhance adaptive capacity or to increase resilience (Huiteima et al., 2016). Past studies in the organization and management literature, has a high concentration of studies focusing on organizations undertaking mitigation efforts such as reduce emission to promote environmental sustainability.

2.2.1.3 Adaptation to Climate Change

Adaptation, in general, can be viewed as adjustments to the climate change effects and impacts within our natural and social systems, and serving as responses to climate stimuli, which help us to moderate harm or exploit the potential benefits (IPCC, 2001; Huiteima et al., 2016). In this context, adaptation to climate change includes all types of adjustments whether from behavioral or economic activities, with the focus is always to reduce the vulnerability at all levels (Smit, McNabb & Smithers, 1996).

Smit et al. (2000) elaborated that adaptation also could refer to the act or process of adjusting to complement better with a new situation. The fundamental questions with regard to adaptation to climate change will concern with the following: “Adaptation to what? Who adapts? And How adaptation occurs?” (Smit et al., 2000).

The response to the first question regarding “adaptation to what” should refer to the consequences of climate change, which can be understood as two broad categories of impacts, as follows (Smit et al., 2000). Climatic impacts concern physical damages, such as consequences of extreme weather events like cyclones or floods; non-climatic impacts concern matters related to the establishment of new regulations, procedures or protocols, or business opportunities such as new market segment arising for climate proofing products (Smit et al., 2000). The second question regarding “who adapts” should refer to social actors at different levels of decision making – individuals, organizations, communities, countries, regions (Smit et al., 2000). Lastly, the third question about “how adaptation occurs” should always refer to the process and scope of adaptation (Smit et al., 2000).

It is also highlighted in the literature that any decision pertaining to adaptation strategies by social actors always involves some kinds of evaluation regarding adaptation options, and highly dependent on the decision makers’ frame of reference on the problems or issues that having relations with the concepts of exposure, sensitivity and adaptive capacity (Smit et al., 2000; IPCC, 2007). Exposure refers to the presence of any living entities (such as living species, community, and ecosystem) and physical assets (infrastructures) in a place that is subject to adversely affect by climate change (IPCC, 2014: 5). Sensitivity implies the degree of probability of a particular system to be affected by climate change; adaptive capacity refers to the ability of a system to cope with the negative consequences of climate change (IPCC, 2001). In the literature related to climate change adaptation, past studies also identified different types of adaptations available. For example, from a temporal perspective, adaptation can be either viewed as *reactive adaptation* or *anticipatory adaptation*. Reactive adaptation measures are taken after the fact (impacts of climate change), while anticipatory adaptation measures are taken in

advance, before the fact (Fankhauser et al., 1999). Anticipatory adaptation is a kind of deliberate decision in responses to expected impacts and requires advance planning and foresight (Fankhauser et al., 1999). Mendelsohn (2000) described the anticipatory and reactive adaptation as *ex-post* and *ex-ante*, respectively.

Fankhauser et al. (1999) also mentioned another two types of adaptation categories: *autonomous and planned* adaptation. Autonomous adaptations are spontaneous actions of individuals or systems due to changes in external natural or institutional systems, while planned adaptation triggered by the policy decision or conscious intervention (Fankhauser et al., 1999).

Beermann (2011) mentioned that *pro-active* adaptation could occur when both mitigation and adaptation are simultaneously considered. He argued that, pro-active adaptation is adopted because if mitigation is stopped, then climate change impacts will be more worsen, and then adaptation will not be successful. Unlike anticipatory adaptation, pro-active adaptation does not require switching to a new state; rather it attempts to retain original functions and structure while brings opportunities for innovative responses (Beermann, 2011).

Private adaptation measures are implemented by individuals, households, or business organizations. In this case, actors initiate adaptation actions for rational self-interests (Mendelsohn, 2006). Public adaptation, on the other hand, is more often is initiated and implemented by government at different levels and address the collective needs like imposing new land-use policy, building code and energy regulation (OECD, 2006).

2.2.2 Climate Change Impacts-Risks and Opportunities

2.2.2.1 Business Risks

Business risks are evident from the physical impacts of climate change such as from extreme weather events can severely damage infrastructures and disrupt supply chain, and operation. Organizations also have to consider risking their social legitimation and existence if they ignore to abide institutional or regulatory procedures. Wittneben and Kiyara (2009) argued that organizations should have considered in managing climate change impacts as responses towards political pressure, leverage on economic gain and increased public relation. Many researchers urged organizations to participate in climate change mitigation and adaptation to effectively handle regulatory risks, supply chain risks, product and technology risks, litigation risks, reputational risks, and physical risks (Lash & Wellington, 2007, Agrawala et al, 2011; Linnenluecke, Griffiths & Winn, 2012; Nyberg & Wright, 2015). Based on the report of Munich Re (2003) and Munich Re (2009), Winn et al. (2011) suggested that economic sectors related to agriculture, assembly, auto insurance, aviation, commerce, construction, event planning, manufacturing and transportation are susceptible by climate change risks (please see Table 2.1).

Table 2.1: Climate change impact anticipated by industry sector (Winn et al., 2011: 160).

Sector	Flood		Storms		Droughts		Extreme Winter	
	Short term	Long term	Short term	Long term	Short term	Long term	Short term	Long term
Agriculture	-	--	--	---	--	---	+	++
Assembly	-	--	--	---	-	--	+	++
Auto insurance	-	--	--	---	-	--	o	o
Aviation	-	-	-	--	-	--	+	++
Commerce	-	--	--	---	-	--	+	++
Construction	--	---	--	---	-	--	--	---
Event planning	--	---	--	---	-	--	+	++
Manufacturing	-	--	--	---	-	--	+	++
Private sector	-	--	--	---	-	--	+	++
Transportation	-	--	--	---	-	--	+	++

Key: - negative impact; + positive impact; -/+ low; --/++ moderate; ---/+++ strong; o zero impact;

2.2.2.2 Business Opportunities

Many researchers also argued that climate change impacts could be viewed as opportunities for organizations to increase their revenue, reduce cost and gain resource efficiency as well as improve public relations, and all these ultimately could be translated as gaining competitive advantages for the business (Porter & Reinhardt, 2007; WBCSD, 2008; Wittneben & Kiyara, 2009; Pattberg, 2012). In developing countries, for example, organizations can consider investing in different adaptation projects alone or in partnership with local government, NGOs and international organizations. These types of engagement with external bodies can strengthen business reputation and public relation (Biagini & Miller, 2013; Pauw, 2015). Table 2.2 shows examples of climate risks and opportunities by different business sectors, based on the literature findings.

Table 2.2: Examples of Business Risks and Opportunities due to Climate Change

Sector	Types	Business Risks	Business Opportunities
Goods Producing Sector	Manufacturers	Physical risk Supply Chain Risk	• Low-energy equipment • Low-water technology • Water purification plant • Waste management
	Agricultural	Physical risk Supply Chain risk Product Demand Risk Logistic Risk	• Increased yields due to temperature • Climate resilient crops • Irrigation/ water Management • Desalination plant
	Mining	Physical risk Supply Chain risk Demand Risk Logistic Risk	• Low-energy equipment • Low-water technology
Goods and Service Providing Sector	Retailers and Distributors	Physical Risks Supply Chain risk Reputational risk	• New climate proof products / Products for climate proofing
	Transportation	Physical risk Financial Risk	• New transportation route System • New transportation equipment
	Utilities	Physical Risks Demand Risk Regulatory Risk	• Off-grid/renewable energy like solar, wind, bio fuel, bio mass etc.

Table 2.2: continued

Sector	Types	Business Risks	Business Opportunities
Service Providing Sector	Financial	Financial Risk	• Micro finance for climate hazard • Financing Adaptation Project
	Insurance	Financial Risk	• Climate Index based insurance • Crop micro insurance
	Information and Telecom	Physical Risk	• Land-e Governance • Mobile based support for farmers • Mobile based health care
	Real estate	Physical Risk Regulatory Risk Financial Risk	• Affordable housing • Slum up gradation
	Health Care	Physical Risk Demand Risk	• Tele medicine • New medicine • Mobile clinic
	Tourism	Physical risk Demand Risk	• Shift of tourist destination to new location

Sources: Lash & Wellington (2007); WBCSD (2008); Agrawala et al. (2011); Pauw (2015)

2.2.3 How Organizations Adapt and Manage Climate Change Impacts

In a broader sense, management concerns with organizational functions related to planning, organizing, leading and controlling (Drucker, 1954). From the organizational standpoint, management is about how to effectively plan, organize, lead and control business activities and processes to achieve optimal use of resources, and be efficient in managing the business. Heimann and Scott (1974) argued that there could be three different conceptualizations of management: management as a noun (indicates a group of managers), management as a process (indicates different functions of a manager like planning, organizing, directing or controlling), and management as a discipline (indicates the subject of management). In management and organization studies, earlier works of influential scholars such as Drucker (1954), Taylor's work (1911) in his 'Scientific Management Theory' focusing on performance of tasks and Maslow's (1954) works focusing on motivation of employees have been referred and expanded.

In the organization and management literature, there are various streams of research focus with regard to how organizations adapt and mitigate climate risks, and manage the impacts of climate change. The following are some common streams of works related to how organizations deal with climate change problems: engaging corporate social responsibility approach (Sepúlveda & Mendizabal, 2011; Sodano & Hingley, 2013); practicing sustainable business practices (Kolk & Pinkse, 2007; Schoenherr, 2012); engaging with corporate environmentalism (Okereke & Küng, 2013).

Freeman's (1984) works have been influential and being referred in areas engaging corporate social responsibility (CSR) approach towards dealing with climatic impacts. It is common to observe that organizations participate in CSR activities to show to the public about their commitment towards protecting the environment and contributing to community sustainability. On the other hand, some organizations pledge about implementing sustainable business practices not just for economic gains, but also to be involved in environmental and social sustainability (Daly & Cobb, 1994; Kleindorfer et al., 2005).

Further, Porter & Reinhardt (2007) argued that to effectively manage climate impacts and risks, *Inside Out* and *Outside In* perspectives must be adopted by an organization. Inside out perspective concerns about how business activities such as production techniques, operation, transportation, logistics and marketing activities are impacting business environment and community, and playing roles in contributing to climate change effects (Porter & Reinhardt, 2007). Outside in perspective, on the other hand, concerns about how the outside changes - physical changes in climatic condition and social and regulatory changes - are affecting an organization and its environment (Porter &

Reinhardt, 2007). However, Winn et al. (2011) argued that to further prevent environmental degradation, institutional and regulatory institutions are being established to put pressure on organizations for participating in sustainability management and environmental risk management. In their context, they did not consider the *Outside In* perspective, that focuses on effective responses and adaptation measures to prevent ecological disasters like strong physical impacts of climate change on organization. With regard to crisis management related to climate change impacts, the literature is still at infancy stage and more works need to be done on how to facilitate organizations to deal with the unpredictable and long-term disruptions arising from climate change (Winn et al., 2011).

In the literature, Linnenluecke Griffiths and Winn (2013) argued that there are two dominant perspectives on firm and industry adaptations, namely: *strategic choice perspective* and *environmental determinism perspective*. Strategic choice perspective is based on managers and decision makers' perception and sense making in doing an assessment and developing business strategies (e.g., changing product, improving process, shifting location of operation) to respond to the changing conditions (Child, 1972; Miles & Snow, 1978). On the other hand, the environmental determinism perspective concerns with possible failures of organizations to adjust to external changing conditions continuously, and hence they will continue to modify and search for right forms to meet new conditions (Hannan & Freeman, 1977; Hannan & Freeman, 1984). From the standpoint of business strategies, these two dominant perspectives are being manifested by ways of how organizations adapt to climate change. Organizations dynamically adapt to external changes in the environment through a range of internal and external responses to improve performance (Meyer, 1982; Greenwood & Hinings, 1996).

Also, there have been various adaptation models and frameworks emerging from the practice (Linnenluecke & Griffiths, 2010; Winn et al., 2011) because of the increasing awareness and concerns by organizations worldwide considering the severity of climate change impacts (Smit et al., 2000; Lash & Wellington, 2007).

Mendelsohn (2000) for instance, theorized that private adaptation is mainly self-interest actions in dealing with climate risks, and focuses upon minimizing risks and obtaining potential benefits from any emerging situation. From the behavioral economic standpoint, he argued that adaptation will be automatically taken in climate sensitive business sectors (such as agriculture for its dependency on rainfall and temperature) when the cost of enacting adaptation strategies (investments) is lower than the net benefits gained from adaptation, and vice versa.

Bleda and Shackley (2008:517) defined business adaptation as “the change in the behavior of a business or organization aimed at coping with (or taking advantage of) the effects of any climate change related event occurring in the physical and institutional environment of the organization.”

Berkhout’s (2012) study was considered influential in this area of research. Berkhout (2012) proposed that organizational adaptation to climate change can be categorized into three distinct but overlapping approaches: *utility-maximizing approach*, *behavioral approach* and *institutional approach*. In utility-maximizing approach, it is assumed that an organization, for its self-interests, chooses from a range of adaptation options where cost and benefits are already known (Berkhout, 2012). In this case, he argued that the organization selects a particular adaptation strategy automatically when the cost of adaptation is less than the expected benefits. However, this approach can expose an

organization to risk of making poor judgment especially when responsible decision makers who are lacking of knowledge and have limited experience, and approach the problem reactively instead of strategically. In the behavioral approach, it is argued that an organization will follow rules of thumb and normative standard instead of optimum choices in its adaptation responses (Berkhout, 2012). In this case, its adaptation decisions mainly are influenced by organizational capabilities and decision makers' perceptions, and can be constrained by social, cultural, institutional, and financial conditions and other factors (Berkhout, 2012).

Institutional approach concerns with forced climate change mitigation and adaptation through policy, social norms and standard imposed by regulatory bodies or social institutions in the context of the business environment (Darmani, Arvidson & Hidalgo 2016; Damert & Baumgartner, 2018). Some scholars among institutional approach of adaptation also argued that social and institutional conditions sometimes act as barriers of adaptation and organizational adaptation to climate change can be accelerated through enabling policy and government intervention (Pauw & Pegels, 2013; Biagini & Millers, 2013; Matasci et al., 2014).

In the current literature, it was argued that adaptation was not given enough focus (Schipper, 2007, Pulver & Benney, 2013). More research studies can be found about business responses to mitigation efforts as compared to adaptation. There is a gap being noted about very little empirical works done in research to explore about business adaptation to climate change (Berkhout, 2012; Linnenluecke, Griffiths & Winn, 2013).

2.3 Adaptation to Climate Change: Evidence from the Literature

2.3.1 Overview

This study has reviewed past studies related to organizational adaptation to climate change. For the purpose of increasing understanding, these past studies are being categorized according to their theoretical orientations, as follows: contingency management perspective; institutional perspective; and behavioral perspective.

2.3.1.1 Related Studies in the Contingency Management Perspective

From the contingency management perspective, the impacts of climate change (different risks and opportunities) are viewed as highly uncertain and unpredictable in nature, and will cause severe effect in changing business environment. Taking the contingency approach, it is assumed that adaptation decisions can be both anticipatory and reactive in response, based on previous experiences and anticipation (Moser & Luers, 2008; Depoues, 2017; Alves et al., 2017). It is also acknowledged that there can be associated risks such as when decision makers' making poor prediction due to the high level of uncertainty related to climate change effects, as well as factors from socioeconomic and political influences. Table 2.3 presents a summary of the selected past empirical works that can be linked with this perspective.

Table 2.3: Selected Studies Categorized from the Contingency Perspective

Author	Impacts	Method	Key Concept	Findings and Implication
Gerlak et al. (2018)	Physical impacts of climate on infrastructures and demand of electricity.	Literature review	Outlining climate change impacts, assessment of risks & opportunities, stakeholder's engagement and cross-sectoral collaboration are fundamental issues for adaptation.	-The study identified that organizations paid less attention in risk assessment, stakeholder' engagement, and cross-sectoral collaboration. -There are also considerable variations among firms in terms of adaptation actions, measuring risks and engaging stakeholders.

Table 2.3 continued

Author	Impacts	Method	Key Concept	Findings and Implication
Depoues (2017) Railway Sector/ France (Empirical)	Physical& Institutional impacts of climate change.	Case -study (in depth, interview, document review)	Incremental reactive adjustment to physical and institutional contingencies related to climate change lead to adaptation.	- The study identified top-down and bottom-up approaches in adaptation based on climate impacts and vulnerability respectively. - It also criticizes the lack of consistent institutional framework, poor engagement with climate science, and not adapting the process & procedures as barriers.
Alves et al. (2017) Diverse sectors/ Brazil (Empirical)	Physical & Institutional impacts of climate change.	Case study (In-depth interviews)	Physical and institutional impacts of climate disrupt supply chain by four contingencies: resources scarcity, new regulations, technological advances, and extra cost.	-The study identifies four contingencies: (1) Resources scarcity, (2) New regulations, (3) Technological advances, (4) Extra cost. - Adaptation responses includes: (1) New products/services, (2) Improving process, (3) Improving logistics. -Adaptation benefits includes: (1) Sources of capital, (2) Reputation, (3) New market, (4) HR management, (5) Anticipation of regulation, (6) Improving risk management (7) Operational improvement
Pineda (2016) Automotive & Food supply sector/ USA (Empirical)	Physical & Institutional impacts of climate change.	Analysis of 10 K Annual Report submitted to United State Securities &Exchange Commission - 2013.	Resource disruption (due to physical impacts climate) and policy risks affect the supply chain (supply & demand domain). Business' perception of these risks determines adaptation responses	-To manage policy risks organizations, innovate (new technology, process) and share risks with other like customers and suppliers. -To manage resource risks businesses transfer risks by insurance and hedging.

Table 2.3 continued

Author	Impacts	Method	Key Concept	Findings and Implication
Nyberg & Wright (2015)	Physical & Institutional impacts of climate change.	Interviews analysis and document reviews.	Climate change poses physical, regulatory, financial, market & reputational risks. Organizations naturalize those risks through performative and political actions.	By the process of reiterating, codifying (valuing risks into monetary term), entangling the risks in market conventions (developing green product and internal process of reducing emission) and cementing (increasing inter-organizational collaboration), businesses organizations naturalize or adapted to the climate change impacts.
Bank, Energy, Insurance, Media / Australia				
Galbreath (2011)	Physical & Institutional impacts of climate change.	Literature review	Both Inside Out (consequence of firm's activities in outer environment) and Outside In (results of changes in external Env.) perspectives were used to analyze corporate responses to climate change.	-The study grouped responses into three categories: governance, mitigative & adaptive. -Governance activities not only increase employee awareness but also targets environmental performance. -New technologies and innovative process are used in value chain (growing, production & distribution). -Firm also adjusts/adapts with physical impacts (high temperature, less rainfall).
Wine Industry/ Australia				
(Empirical)				
Agrawala et al. (2011)	Physical & Institutional impacts of climate change.	Case study (Analysis of Data from CDP (Carbon Disclosure Project).	Business adaptation process occurs in three phases: risk awareness, risk assessment, and risk management.	-Findings show three broad motivational factors of adaptation: capacities, incentives, and perspectives. -Companies' perspectives or views on the adaptation need significantly determine its level of engagement. -Companies having prior bad experiences with climate extremes and having potentialities to grab opportunities tend to show more interests in adaptation. -Companies' capacity in terms resources and analytic ability also determine engagement in adaptation. However, in most cases, adaptation can be hampered due to lack incentives to the businesses.
Divers Sectors/ Developed countries				
(Empirical)				

Table 2.3 continued

Author	Impacts	Method	Key Concept	Findings and Implication
Hoffmann et al. (2009) Ski lift operator (Tourism) / Switzerland (Empirical)	Physical impacts of climate change on tourism resources.	Testing of hypothesis by econometric analysis of corporate data.	Characteristics of five corporate determinate (awareness, vulnerability, adaptive capacity, dependency on affected business & uncertainty) affect the adaptation responses.	-The study identified 26 adaptations measures that were broadly grouped into three strategic directions of adaptation: protect affected business, expand beyond affected business, and share risks of financial impacts. -Findings show that higher vulnerability to climate change does not give any guaranty that business will take more adaptation measures. However, higher vulnerability may lead business to share risks of financial impacts. -Higher dependency on affected business and higher adaptive capacity lead business to take more measures to protect affected business (e.g. artificial snowmaking) and expand beyond the affected business.
Moser & Luers (2008) Coastal management / USA (Empirical)	Physical impacts of climate change on coastal infrastructures and resources.	Analyzing survey data and interviews with coastal managers in California.	Manager's level of awareness and analytic capacity determines the extent of adaptation actions to manage climate risks.	-Findings show that to take adaptation actions only awareness is not sufficient. Managers must have a clear understanding of how the potential climate risks can affect organization. -Information must be organization specific, come from reliable sources and easily accessible. At the same time, decision makers must also have the capacity to convert the information into organizational strategies.

2.3.1.2 Related Studies from the Institutional Perspective

From the institutional perspective, it is assumed that adaptation approach is a result from conditioning process achieved via policy, social norms and standard by regulatory bodies or other social institutions influencing the business environment (Wright & Nyberg, 2017; Damert & Baumgartner, 2018). This process is always associated with normative approach, where climate change is viewed mainly as social policy and hence, emphasis is placed upon creating a business environment that can be effectively governed and regulated to comply with the targets such as to reduce greenhouse gas emission and to

increase community sustainability and resiliency to effectively adapt with climate change (Darmani, Arvidson & Hidalgo, 2016; Abreu, Freitas & Reboucas, 2017;). It is also noteworthy to highlight that, after the *Kyoto Protocol* (1997) had been established to control the global carbon emission, studies related to climate change mitigations were expanded (Pulver & Benney, 2013). Table 2.4 presents a summary of selected studies that are being categorized in this perspective.

Table 2.4: Selected Studies Categorized from the Institutional Perspective

Author	Impacts	Method	Key Concept	Findings and Implication
Damert & Baumgartner (2018)	Institutional pressures of climate change on business operation.	Analysis of supply chain position, regional affiliation, and financial performance reported in public and private database & documents.	Intra-sectoral corporate responses to climate change can vary based on institutional environment, supply chain position, firm size and financial performance.	The study finds eleven corporate adaptation strategies that have different foci of interactions (internal to external) and four strategic intents: (1) Governance a) GHG management & policy development b) Organizational involvement c) Risk Management (2) Innovation a) Process improvement b) Product improvement c) New market & product development (3) Compensation a) Supplier involvement b) Emission trading & Compensation (4) Legitimation a) Sector & stakeholder cooperation b) Corporate reporting, c) Political activities
Automotive industry/ global context				
(Empirical)				
Wright & Nyberg (2017)	Institutional pressures on organization due to climate change.	Case study (in-depth interview, public and private document review)	External critiques and regulatory pressure create tension with short-term profitability. Businesses translate this challenge into 'business as usual practice'.	The research shows that to translate climate change issue into normal business activities business managers follow three phases: (1) Framing a) Association, b) Disassociation (2) Localizing a) Incorporation, b) Commensuration, c) Proselytization (3) Normalizing a) Purification, b) Dilution
Electricity & gas, Banking, Manufac., Insurance, & Media sector/ Australia				
(Empirical)				

Table 2.4 continued

Author	Impacts	Method	Key Concept	Findings and Implication
Paul, Lang, & Baumgartner (2017) Generalized/ Global (Conceptual)	Institutional pressures of climate change on business operation.	Literature review	Climate change impacts are multi-level; and devising corporate responses requires interdisciplinary approaches.	To formulate corporate climate change strategies the study conceptualizes a frame work based on thirteen contextual factors under five levels: (1) Transnational level a) Geopolitical, b)Transnational stakeholders, (2) National level a)Socio-cultural, b)Economic, c)Regulatory and Judicial framework d)National stakeholder (3) Sectorial level a) Product –process-service, (4) Organizational level a) Organizational culture, structure & process b) Resource and Capabilities, c) Stakeholders (5) Individual level a)Disciplinary background & training, b)Norm and value
Abreu, Freitas, & Reboucas (2017) Energy sector/ Brazil (Empirical)	Institutional impacts of climate change.	Quantitative analysis (Structural equation model and cluster analysis)	Dynamic influence of climate change risks and stakeholder's pressures determine manager's carbon management practice and perception of performance.	-Companies undertake any one of the following types of strategies/ approaches: 1. Regulation shapers 2. Pressure manager 3. Greenhouse gas emission avoider
Backman, Verbek & Schulz (2017) Divers sectors/ North America, Europe (Empirical)	Institutional impacts of climate change.	Qualitative analysis of data from 552 firms as reported in Carbon Disclosure Project 2008	Investments in four firm-level resource domain like Governance, Information Management, Systems, and Technology develop capabilities in climate change mitigation.	Effective public policy to mitigate climate change should be based on the analysis of firm level strategies. To mitigate climate change European firms invest more in Governance, Information Management and systems than North American firms do. But, North American firms invest more in technology than European firms for climate change mitigation.

Table 2.4 continued

Author	Impacts	Method	Key Concept	Findings and Implication
Darmani, Arvidson & Hidalgo (2016) Energy Sector/ Europe (Empirical)	Institutional impacts of climate change.	Longitudinal Case study (in-depth interviews, documents) of Vattenfall (a Swedish MNC)& its subsidiaries	Divergent national institutional frameworks influence the strategic behavior of MNC's subsidiaries in different countries.	Findings shows – Though MNC follows their core global strategies, local institutions play more dominant role on subsidiaries to comply with local guidelines.
Leventon, Dyer & Alstine (2015) Copper Mining company/ Zambia (Empirical)	Physical and Institutional impacts of climate change.	Case study (key-informant interviews & site visit)	CSR (Corporate Social Responsibility) activities can be aligned with Govt.'s CCD (Climate Compatible Development) goal to reduce climate hazards on community.	CSR activities successfully fulfill the mitigation, adaptation, & development goal of CCD and shape the CCD norms. Low community awareness and lack engagement of local actors (govt., NGOs, civil society) and policy impeding the process.
Pauw (2015) Agriculture/ Zambia (Empirical)	Physical and Institutional impacts of climate change.	Case study (in-depth interview, document review)	Engagement of private sector in adaptation can reduce climate risks and create business opportunities for new product /investment.	Government can incentivize (by policy) the private sector to engage in adaptation by providing infrastructures, tax rebates, and information, or by building capacity and stimulating investment.
Matasci et al. (2014) Tourism/ Switzerland (Empirical)	Physical and Institutional impacts of climate change.	Case study (in-depth interview and online survey).	Climate adaptation process and responses are hindered by different social and institutional barriers.	Adaptation process is divided in to three major phases: (1) Understanding adaptation problems a) Perception of changes b) Recognition of impacts (2) Planning adaptation measures a) Decision to act b) Planning (3) Managing Adaptation actions a) Action, b) Outcome There are five families of barriers : (1) Social feasibility (2) Social acceptability (3) Institutional feasibility (4) Technological feasibility (5) Economic feasibility

Table 2.4 continued

Author	Impacts	Method	Key Concept	Findings and Implication
Biagini & Millers (2013) All private business/ Developing countries (Conceptual)	Physical and Institutional impacts of climate change.	Literature review	Climate change brings both business risks and opportunities. Engagement of private sector in adaptation will benefit business and reduce negative impacts on society in developing country	Private sector engagement in adaptation is being impeded by many social & economic barriers, which includes lack of awareness, information, supporting infrastructures, and economic incentives. -To overcome those barriers policy intervention by international bodies and local governments are necessary in addition to business collaboration.
Pauw & Pegels (2013) All business sector/Least Developed Countries (Empirical)	Physical and Institutional impacts of climate change.	Analyzing National Adaptation Plan of Actions of 38 Least Developed Countries.	Private sector engagement in public adaptation activities is beneficial for both business and society.	The study finds that in developing countries the government's role and policy are not enabling for private sector's engagement in adaptation.

2.3.1.3 Related Studies from the Behavioral Perspective

From the behavioral perspective, it is argued that organizations adapt to climate change according to their interpretation about risks and opportunities related to climate change effects. Different cognitive factors exist and impact on the adaptation process (Bleda & Shackley, 2008; Haney, 2017). Researchers in this stream of research works argued that decision makers such as managers may perceive climatic impacts through changes in external conditions, market or regulatory environment and experienced difficulties in organizational routines or working procedures (Arnell & Delaney, 2006; Berkhout, Hertin & Gann, 2006, Hertin et al., 2003). They will revise business practices and routines to with the emerging, new situations by based on internal capabilities and conditions, and this can be considered as reactive adaptation responses (Arnell & Delaney,

2006; Berkhout, Hertin & Gann, 2006, Hertin et al., 2003). In this context, decision makers' perceptions and ability to interpret climatic impacts are important preconditions and can serve as barriers also in taking effective adaptation process from an organizational standpoint (Arnell & Delaney, 2006). The following are examples of studies that relate different cognitive factors to analyze organizational adaptation to climate change: environmental attitude and climate change knowledge (Bremer & Linnenluecke, 2017); manager's ability to interpret environmental challenge as opportunities (Haney, 2017); awareness (Gasbarro & Pinkse, 2016); making sense of past weather related experience (Becken & Wilson, 2016); managerial perception and belief of climate change (Bleda & Shackley, 2008).

The organizational adaptation process is also viewed as organizational learning activity (Berkhout, Hertin & Gann, 2006; Orsato, Barakat & Campos, 2017). Berkhout, Hertin & Gann (2006) explained that organizational adaptation process of climate change will go through four phases: signaling and interpretation, experimentation and search, articulation & feedback, adaptation strategies. They proposed four factors that can shape adaptation strategies, in this case: core competencies, core business, dynamic capabilities, & organizational culture. From another angle, Orsato, Barakat & Campos (2017) described organizational adaptation process to climate change could be viewed as a sequence of four phases, namely: knowledge acquisition, information distribution, information interpretation, organizational memory. They further argued that, because of high uncertainty and unpredictability patterns associated with climatic impacts, hence standard organizational routines and practices may not work and for business survivability, organizations need to upgrade organizational knowledge. Table 2.5 presents a summary of selected empirical studies categorized from behavioral perspective.

Table 2.5: Studies Categorized from the Behavioral Perspective and Organizational Learning Theory

Author	Impacts	Method	Key Concept	Findings and Implication
Bremer & Linnenluecke (2017) Energy Industry/Australia (Empirical)	Physical and institutional impacts of climate change.	Econometric analysis of climate change response related data from selected company.	Environmental attitude and climate change knowledge determine the perception of organizational decision makers on climate change adaptation.	Findings show that both environmental attitude and climate change knowledge have significant positive impacts on the manager's perceived importance of climate change adaptation and this relation is mediated by perceived risks towards climate change acts. An organization needs to draw more attention of executives and business managers towards climate change knowledge for successful adaptation.
Haney (2017) Private water utility/England & Wales (Empirical)	Physical and institutional impacts of climate change.	Exploratory Case study (Cluster analysis)	Managers' ability to interpret the environmental challenge as an opportunity rather than threat increases the dynamic capabilities and influences them to take more proactive and innovative responses.	There is a link between threat interpretation and innovation in the context of climate change adaptation by the organization. Findings also show that the enlarged concept of responsibility to society and moral legitimacy positively mediate the relationship between threat interpretation and organizational innovation.
Orsato, Barakat & Campos (2017) Electric utility sector/Barzil (Empirical)	Physical impacts of climate change and institutional pressures on operation	Case study (in-depth interviews, public and private document review)	Recognizing climate impacts and taking anticipatory adaptation measures are embedded in organizational learning that involves the process of knowledge acquisition, information distribution, information interpretation, organizational memory.	Organizational learning for anticipatory adaptation to climate substantially differs from traditional organizational learning. Impacts of climate change do not follow any pattern and highly unpredictable, so standard routines based on the experience always, do not work, and organizations need rapidly changing knowledge. Knowledge within organizational boundary is insufficient due to complexity of interaction among internal and external factors. Learning from and interaction with other organizations is necessary to follow successful adaptation stories, but it can be restrictive due other constraints.

Table 2.5 continued

Author	Impacts	Method	Key Concept	Findings and Implication
Slawinski et al. (2017)	Institutional impacts of climate change.	Literature review.	Different antecedents of short termism and uncertainty avoidance operating at different levels (i.e., individual, organizational, institutional and across the levels) are mainly responsible for organizational inaction to climate change.	-Organizational inaction is grouped into three types based on intensity of actions to reduce greenhouse gas: (1) No reductions- ----No action: Climate change not on business agenda ----Action: Symbolic action to climate (2) Relative Reductions- ----No action: Reduction only due to regular efficiency improvement. ----Action: Insufficient conditions exist in case of growth. (3) Absolute reductions- ----No action: Reduction only due to organizational downsizing. ----Action: Sufficient conditions exist for effective action on climate change.
Gasbarro & Pinkse (2016)	Physical impacts of climate change on supply chain.	Analysis of corporate climate change disclosure data from Carbon Disclosure Project.	Corporation's ways of interpretation of climate events in terms of awareness & vulnerability determine the adaptation responses to climate change.	-Corporate adaptation behavior is grouped into four types: Pre-emptive, Reactive, Continuous, and Deferred.
Oil & Gas/EU, USA, Australia & NZ (Empirical)				-Subjective factors are responsible for variation of adaptation behavior to the same type of physical impacts of climate change in the same sectors.
Becken & Wilson (2016)	Physical impacts of extreme weather & climate variability	Case study (in-depth interview)	Making sense on past weather related experiences in tourism activities and resources, decision makers take diversified adaptation measures.	-Direct (e.g., rain, snow) and indirect physical effects (e.g., altered natural resources & infrastructures for tourism) can impact the operational capacity, cost, natural resource management, tourist destinations, and visitors' safety, comfort & satisfaction
Tourism industry/ New Zealand (Empirical)				-Knowledge of weather and climatic events, and business flexibility increase the capacity to adapt.
Bleda & Shackley (2008)	Physical and institutional impacts of climate change.	Economic analysis of climate change response related data from selected company.	Cognitive barriers like managerial perception & belief in direct and indirect impacts of climate change influence the adaptive responses & capacity of firms.	-Firm's adaptive capacity is dependent on 7 dimensions: range of adaptation options, availability of resources, institutional framework, stock of human capital, & social capital, ability to manage information, and degree of uncertainty in environment.
Divers sector/ Global Context (Empirical)				-More frequent experiences of climatic extremes and difficulties strengthen the managerial perception and belief in climate change, which leads an organization to increase adaptive capacity & actions.

Table 2.5 continued

Author	Impacts	Method	Key Concept	Findings and Implication
Arnell & Delaney (2006) Private water utility/ England & Wales (Empirical)	Physical and institutional impacts of climate change.	Case study	Adaptation occurs in three phases: awareness and concern, selection of options, and adaptation strategies. An organization needs to be aware of climate risks & opportunities; then be concerned about the impacts on performance.	-Three factors influence the adaptation process: susceptibility to change, resources, capabilities, regulatory and market context. -Adaptation strategies are tied to specific objectives. As for example, an organization may choose to discontinue an existing product or service, to continue existing service with different mode of production, to provide different products and services, or may ignore the climate change bearing the risks.
Berkhout, Hertin & Gann (2006) Building & water utility/ England (Empirical)	Physical and institutional impacts of climate change.	Case study (in-depth interview and document review)	Organizations learn to adapt to climate change by detecting changes in organizational routines and adjust routines continuously for better feedback.	-Adaptation occurs in four phases: signaling and interpretation, experimentation and search, articulation & feedback, adaptation strategies. -Four factors shape adaptation strategies: core competencies, core business, dynamic capabilities, & organizational culture. -Four alternative adaptation strategies: (1) Wait & see, (2) Risk assessment and options appraisal, (3) Bearing & managing risks, (4) Sharing & shifting risks.
Hertin et al. (2003) House building sector / England (Empirical)	Physical and institutional impacts of climate change.	Case study (in-depth interview)	Adaptation responses are determined by three things: awareness of climate change, analysis of potential climate impacts on business and available adaptation options based on organization's capacity.	-Both the physical effects (flood, rainfall, temperature, wind speed) and economic and institutional consequences of climate change (technical, commercial, and organizational challenges) put stresses on construction. -It shows three broad types of adaptation options available for building sectors: commercial, technological, and financial adaptation. -Adaptation process depends on internal capabilities of the firms, as well as external regulatory, market and climatic conditions.

2.3.2 An Overview of Bangladesh

2.3.2.1 Climate Change Impacts on Bangladesh

Bangladesh is located at South Asian region. Geographically, Bangladesh is surrounded by India, from the east, the west and also the north of Bangladesh. At the south of Bangladesh is the Ocean, Bay of Bengal; whilst in the north of the country, there is a popular Mount Himalaya. Bangladesh is also considered as the largest green delta in the world, having more than 200 rivers crisscrossing the land. Bangladesh population is recorded at 161,376,708 million in 2018 (<https://www.worldometers.info/world-population/bangladesh-population/>). In 2017, Bangladesh had a high population density of 1090 persons per square kilometer, from its land size of 148560 km² (BBS, 2017). Four largest city areas – Dhaka, Chittagong, Khulna and Rajshahi – together make up more than 56% of the total urban population of Bangladesh (Islam & Amstel, 2018).



Figure 2.1: Location of Bangladesh (Source: Google Image)

In the recent Global Climate Risk Index 2019 reported by Eckstein, Hutfils and Winges (2019), in 2017, Bangladesh was ranked in 9th place among the top 10 most affected

countries in the climate risk index, and in 7th place among the top 10 most affected countries in the long-term climate risk index. The country is noted as one of the most flood prone countries in the world (UNDP, 2004; Bai et al., 2018). In addition, the country also is recognized as hot spot for tropical cyclone (UNDP, 2004). Since 1954, Bangladesh recorded many severe flooding events, and the worst event was in 2017. In that year, the catastrophic flooding event hits several Southeast Asian cities including Dhaka in Bangladesh and Mumbai in India, and had claimed more than 1000 lives and forced displacement of 45 million people (Bai et al., 2018). In between 1887 and 1995, Bangladesh was recorded to have more than 154 cyclones that hit the coastal region; and among them most devastating one was cyclone ‘Sidr’ in 2007, that affected around 8.9 million people and caused a financial loss of 1.67 billion USD (World Bank, 2011). The country was highlighted to be at high risk due to climate change because about half of the total populations in Bangladesh live in low-elevation coastal zones (ADB, 2011).

Climate Change Cell (2006) projected that 88 cm sea-level rise will inundate most of the coastal areas and major riverside cities of Bangladesh by the year 2100. Because of the ongoing problems with climate change effects, Bangladesh also faces never ending challenges with regard to having sustainable sources of safe drinking water, and problems related to diseases such as the increase of vector borne diseases due to extra warm climate. Common diseases facing Bangladesh population living in the areas that prone to flooding and cyclone events are: diarrhea, hypertension, skin disease and acute respiratory (Khan et al., 2011). Women also are susceptible to premature birth complications, mental illness, aggressive behavior, depression and post-traumatic disorders (Khan et al., 2011). Table 2.6 depicts business sectors that experienced climate change impacts.

Table 2.6: Climate Change Impacts on Different Sectors in Bangladesh (MOEF, 2005).

Vulnerable Sector	Extreme temperature.	Drought	River flood	Flash flood	Cyclone & Storm surge	Coastal inundation	Salinity intrusion	Soil erosion
Crop	***	***	*	**	***	**	***	-
Agriculture	***	***	*	**	***	**	***	-
Fisheries	**	**	**	*	*	*	*	-
Livestock	**	-	-	**	***	**	***	-
Infrastructure	*	-	**	*	*	**	-	***
Industries	**	-	**	*	*	***	**	-
Biodiversity	**	-	**	-	*	***	***	-
Health	***	-	**	-	**	*	***	-
Human Settlement	-	-	-	-	***	-	-	***
Energy	**	-	*	-	*	*	-	-

Notes: “*” - Vulnerable, “**” - Moderately Vulnerable, “***” – Severely Vulnerable, “-” - Not Vulnerable.

In order to build capacity and resilience with regard to dealing with the impacts of climate change, the Government of Bangladesh formulated National Adaptation Programme of Action (NAPA) in 2005 in response to the decision of the Seventh Session of the Conference of the Parties (COP7) of UNFCCC (MOEF, 2005). The objectives of setting up NAPA are to provide strategic action plans based on climate change scenarios and for future climate variability and handling potential impacts for Bangladesh, as well as to identify key adaptation needs and priority activities (MOEF, 2005).

Also, another important national document is Bangladesh Climate Change Strategy and Action Plan-2009 (BCCSAP). This is a 10-year program (2009-2018) and focuses on 44 sub-programs under 6 (six) core areas: (1) Food Security, Social Protection, and Health; (2) Comprehensive Disaster Management; (3) Infrastructure; (4) Research & Knowledge Management; (5) Mitigation and Low Carbon Development; (6) Capacity Building & Institutional Strengthening (BCCSAP, 2009). The 6th Five Year Plan (2011-2015) for Bangladesh placed strong emphasis on adaptation and mitigation strategies for climate change (MOP, 2011). Both NAPA and BCCSAP documents give focuses on adaptation

measures in development planning processes for Bangladesh and also emphasizes the importance of climate change resilience and sustainable development.

Also, to strengthen the inter-ministerial co-operation and to coordinate climate change mitigation and adaptation related projects, the Ministry of Environment, Forest and Climate Change of Bangladesh passed Bangladesh Climate Change Act-2010 and opened Bangladesh Climate Change Trust in 2013, which formerly started operation as Climate Change Cell in 2006 (BCCT, 2019). Various stakeholders ranging from local governments, NGOs, and different civil society actors are engaged in the collaborations to work with climate change related agendas.

		Immediate Impacts		Result		Investment needed		
Global Warming	→	Cyclones-increased frequency & severity	→	-Higher storm surge -Higher wind speed	→	-Early warning Systems -Cyclone shelters	↔	Social protection for vulnerable/community based adaptation
	→	Heavier more erratic rainfall in GBM basin in the monsoon	→	-Higher river flows -Drainage congestion -Flooding in rural and urban areas	→	-Early warning Systems -Improved O & M of embankments -Upgrading of flood protection /embankments/drainage systems -Raising some roads and railways -Improved crops & cropping system	↔	
	→	Lower more erratic rainfall at other time	→	-Droughts and scarcity of drinking water	→	-Improved irrigation and water management systems -Provision of drinking water -Improved crops & cropping system	↔	
	→	Melting of Himalaya glaciers	→	-Higher river flows in short to medium term and then reduce flows and increased saline intrusion	→	-Exacerbates impacts 2 and 5	↔	
	→	Sea level rise	→	-Coastal embankments over topped -Saline intrusion into rivers and ground water	→	-Improved O & M upgrading of coastal embankments and Polders -Improved crops & cropping system -Provision of potable drinking water -Possible industrial relocation	↔	
	→	Warmer and more humid weather	→	-Increased prevalence of Diseases and diseases vectors	→	-Health education/awareness -Immunization -Other prevention program -Drinking water and sanitation	↔	

Figure 2.2: Impacts of Climate Change in Bangladesh (Source: BCCSAP, 2009: 26).

To implement the Bangladesh Climate Change Strategy and Action Plan-2009, the Government of Bangladesh allocated 385 Million USD out revenue budget to Bangladesh Climate Change Trust Fund (BCCTF) for seven years since its establishment in 2009 (USAID, 2017). BCCTF received 100 Million USD per year in the first three consecutive years and about 66% of the funds were available for climate projects (USAID, 2017). In 2010, Bangladesh Climate Change Resilient Fund (BCCRF) was established by the Government of Bangladesh in partnership with the World Bank (as trustee and secretariat) and other development partners (USAID, 2017). Until 2013 BCCRF received 130 Million USD from Denmark, Sweden, European Union, United Kingdom, Australia, Switzerland and United States of America (USAID, 2017).

In 2010, the Government of Bangladesh also has initiated policy and strategy for Public-Private Partnership (PPP) projects which includes vital infrastructures and services (PPPA, 2019). Green Climate Fund (GCF) under UNFCCC has approved 85 Million USD for Bangladesh and currently running three projects related climate change mitigation and adaptation (GCF, 2019a). Bangladesh being developing country, private sector or corporations and MSMEs (Micro, Small and Medium-sized Enterprises) in Bangladesh are also eligible to apply for funding from PSF (Private Sector Facility) of GCF to support them in implementing adaptation projects (GCF, 2019b).

2.3.2.2 Related Literature about Bangladesh and Climate Change

In the literature, there has been a growing interest that explores adaptation to climate change in Bangladesh, particularly in the public sector. For example, Adger et al. (2003) gave descriptions of climate risks and vulnerability of Bangladesh, and discussed the international policy responses on adaptation and building adaptive capacity. Ayers and

Huq (2008) argued that a lack of synergy between mitigation and adaptation could prevent the adaptation activities reaching sustainability goals in Bangladesh. Islam et al. (2011) examined how physical impacts of climate change (cyclones, sand bars) have negatively affected fishing community, and further identified barriers related to adaptation. They highlighted five types of barriers to climate adaptation, in this case: technologies such as lack of early warning system and poor quality boats; economic issues such as low income and lack of access to financing supports; social aspects particularly related to education and skills; and also institutional barriers. Table 2.7 presents related studies regarding private adaptation efforts in Bangladesh context.

Table 2.7: Literature Review on Private Adaptation in Bangladesh.

Author	Impacts	Method	Key Concept	Findings and Implication
Dey et al. (2017)	Institutional impacts of climate change.	Content analysis of annual report and websites of 88 sample companies listed in Dhaka Stock Exchange in 2014.	Corporations seek social legitimacy by producing corporate environmental and climate change disclosure.	-Climate change disclosure by Bangladeshi companies is very low and lacks in-depth details. Findings show that only 58% companies disclose at least one or more issues on climate change and 42% companies do not report anything about climate change. -The findings identified 12 climate change related issues disclosed by the sample companies. 29.55 % companies disclosed information about 'Energy saving & efficiency' issue, 15.91% about 'carbon emission' and 34.09 % about 'water management and pollution' issue.
Diverse business sectors/ Bangladesh				
(Empirical)				
Nurunnabi (2016)	Physical and Institutional impacts of climate change.	Mixed methods (Content analysis of annual reports of 71 companies listed in Dhaka Stock Exchange in 2011 and 32 semi-structured interviews).	Corporations seek social legitimacy by showing environmental and social responsibilities.	-Lack of regulation and a culture of low social accountability in Bangladesh on average 2.23% companies disclose climate change related information in annual reports. -Findings also show that large companies report more on climate change issues than small companies do. -Subsidiaries of multinational companies unexpectedly disclose very less on climate change issues.
Banking sector/ Bangladesh				
(Empirical)				

Table 2.7 continued

Author	Impacts	Method	Key Concept	Findings and Implication
Belal et al. (2015) Divers sectors/ Bangladesh (Empirical)	Physical and Institutional impacts of climate change.	Mixed methods (Analyzing data from public documents and 32 semi-structured interviews with stakeholders of businesses)	Corporate environmental responsibilities and accountabilitys can reduce negative consequences of environmental pollution and degradation due to global commercial production.	-Corporations in Bangladesh are reluctant about their social and environmental responsibilities due primarily to involved cost and lack of political will to make appropriate regulations to save vulnerable community from environmental hazards.
Ullah (2013) Banking sector/ Bangladesh (Empirical)	Institutional impacts of climate Change.	Literature review	By practicing 'Green Banking' system, banks play vital role in addressing climate change and other environmental problems.	-Bangladesh Bank (Central Bank) enacted GB (Green Banking) Policy in 2011, which includes many mandatory social and environmental activities for banks like in house environmental management, green finance, CSR reporting, and green products. -In spite of having many opportunities, only some PCBs (Public Commercial Bank) and FCBs (Foreign Commercial Bank) adopted Green Banking policy. Other SCBs (State-owned Commercial Bank) and SDBs(State-owned Specialized Development Bank) are still not following it.
Momin & Parker (2013) All Sector/ Bangladesh (Empirical)	Institutional impacts of climate change.	Case study (in depth, interview, document review)	Based on legitimacy and neo-institutional theories, the authors assume that internal (host country) and external institutional pressure influence the CSR reporting of MNC's subsidiaries in Bangladesh.	- The study shows that business organizations show more information on employee development issues and less concern for environment & community in CSR reporting. - Local (host country) culture and social norms are discouraging for CSR reporting. Informal norms and belief, very low expectation of CSR, less formal reporting regulation and low level of implementation of law are the main barriers for CSR reporting by MNC's subsidiaries in Bangladesh.

Table 2.7 continued

Author	Impacts	Method	Key Concept	Findings and Implication
Alauddin & Sarker (2013) Agriculture/ Bangladesh (Empirical)	Physical impacts of climate change. Increased temperature with decreased rainfall put stress on rice farming.	Economic analysis of surveyed data.	Considering drought and water-scarcity, rice farmers take several farm-level adaptation strategies that are controlled by perception, demographic characteristics, and institutional accessibility of farmers.	-Adaptation strategies vary with severity of drought, level of ground water depletion, educational level of farmers, farm size, ownership of livestock, and access to electricity and subsidy. -Crop diversification like planting short-duration crop, non-rice crops (wheat, maize, and mangoes) and extra irrigation are most adopted adaptation strategies.- Lack of information, inadequate irrigation facilities, limited knowledge of drought resistant crops, & lack of access to finance are major barriers.
Sovacool et al. (2012) Organizations/ Bangladesh, Bhutan, Cambodia, & Maldives (Empirical)	Physical and institutional impacts of climate change.	Qualitative Analysis of data from National Adaptation Programs of least developed countries.	Improving climate change adaptation needs all three dimension of adaptation: infrastructural, organizational, and social adaptation.	-Findings suggest that infrastructure (assets, technologies,/ hardware) needs to withstand climate change impact. As for example, climate proof roads and electricity network. -Organizational adaptation refers to the resiliency or endurance of any organization, institution, or set of institutions (having capacity to develop climate policy and planning) that cope with new stresses & changes and function as before. -Social adaptation means the cohesion of communities and their livelihoods that enable them to survive in climate related challenges.
Belal et al. (2010) Divers sectors/Bangladesh (Empirical)	Physical and institutional impacts of climate change.	Content analysis of annual report and websites of 100 sample companies listed in Dhaka Stock Exchange in 2008.	Improving climate change adaptation needs all three dimension of adaptation: infrastructural, organizational, and social adaptation.	Climate change disclosure by Bangladeshi companies is very low. Findings show that though 92% companies disclose at least one issue on climate change, most companies disclosed information about energy use that is mandatory requirement by local policy. No company discloses anything about greenhouse gas emission. Most of the disclosures are descriptive about the positive efforts of the companies and descriptive.

2.3.2.3 Bangladesh Business Sectors

As highlighted before, business sectors in Bangladesh have been experiencing challenges and suffer economic losses due to the negative impacts of climate change (Adger et al., 2003; BCCSP, 2009; World Bank, 2011; Sovacool, Linnér, & Klein, 2017). Few of the notable business sectors classified as climate sensitive sectors include agriculture, fisheries, infrastructure, industries, health and energy sectors (MOEF, 2005). Despite a large proportion (42.7% as estimate in 2016) of the total population of Bangladesh are working in the agricultural sector, yet the contribution of this sector to national GDP is accounted only 14.2% in 2017 (CIA, 2019). Meanwhile the contributions of industry that employed about 20.5% (as estimated in 2016) of the total population, and from the service sector that employed about 36.9 % (as estimated in 2016) of the total population to national GDP have accounted for 29.3% (as estimated in 2017) and 56.5% (as estimated in 2017) respectively (CIA, 2019). Similarly with the other countries, private business sector is important to the economic development of Bangladesh. ADB (2010) estimated that private sectors are responsible for 93% of GDP, 81% of total investment and 94% of consumption expenditure in Bangladesh in 2010.

Telecommunication, real estate, and garments manufacturing sectors are considered very important business sectors in Bangladesh in terms of their contribution to GDP and employment generation (BBS, 2018). These three business sectors are being affected by climate change and at the same time contributing to the climate change through emissions of greenhouse gas and disposing industrial waste as they are consuming huge amount of energy, fresh water and other natural resources for their operation and supply chain. Yin (2009) and Neuman (2014) posit that it is very important to understand the context in the

case study research. Therefore, a brief description for each business sector related to the chosen case study is elaborated below.

A. Telecommunication Sector in Bangladesh

Telecommunication technology improves the quality of life by providing information and communication services (e.g. Phone call, SMS, and internet), facilitates trade and commerce and also save lots of travel time and associated energy cost. So, the demand for telecommunication service is increasing day by day. But, telecommunication sector is responsible for consuming huge energy and greenhouse gas emission.

In Bangladesh, telecommunication sector is one of the rapidly growing business sectors. Currently, the country has more than 15 private telecommunication companies. Bangladesh Telegraph and Telephone Board (BTTB) is responsible in handling licensing for private organizations in this sector. At present, the Bangladesh Telecom Regulatory Commission (BTRC) has responsibilities to regulate and monitor the telecommunication sector. In Bangladesh, the most preferred choices of mobile phone services are Grameen Phone, ROBI, Airtel, City Cell, and Teletalk. Telecommunication sector is highly susceptible to climate change risks, and can experience losses of its physical assets (e.g., network towers and electrical equipment), disruptions of its supply chain and badly affected network signal in the case of extreme weather events like cyclones, floods, and heat waves.

B. Real Estate Sector in Bangladesh

The building sector is responsible for 32% of global energy use and 19% of GHG emission (IPCC, 2014). If no mitigation or adaptation action is taken the energy demand for building sector will increase by 50% by 2050 (IPCC, 2014). Real Estate sector also

carries embedded carbon emission while buying different building materials as manufacturers use energy and natural resource to produce them. Again, during project construction, workers utilize energy and resources; users of the buildings continuously use electricity, gas and water throughout the life of buildings.

In Bangladesh, according to the Real Estate and Housing Association of Bangladesh, it was estimated more than 1500 registered and unregistered private developers offering apartments of different sizes and qualities (REHAB, 2012). This is not surprising as Bangladesh has been noted as having increasing population and a high rate of rural-urban migration that have led to an increased demand for urban housing in the major cities of Bangladesh, especially in Dhaka. In general, the contribution of this sector was accounted around 7.2% of total GDP in 2009-2010 (REHAB, 2012). The sector also is important to stimulate related industries such as the productions of cement, brick, iron, ceramic, glass, paint, and other construction materials (REHAB, 2012).

C. Garments Manufacturing Sector in Bangladesh

The Bangladesh garment manufacturing sector is an important sector that is contributing significantly to government revenue generation. The export of ready-made garments alone contributed 25.49 Billion USD in 2014-2015 Fiscal Year, which is equivalent to 81% of total foreign earnings of the country and 10% of national GDP (BGMEA, 2018). This sector also employs more than 4.4 million people, and among them about 3.6 million are women (BGMEA, 2018).

The garments manufacturing sector is responsible for 8% global greenhouse gas emission (OECD, 2019). The garments manufacturing industry has created huge demand for energy and water usage. According to the report of the local newspaper - Daily Star -

published on 28th August 2019, garments sector is consuming 15000 million cubic meters of fresh water per year. In addition to greenhouse gas emission, the garment factories also discharge chemical waste during washing and ironing of manufactured clothes and hence negatively affect the environment.

2.4 Reviews of Related Theories and Models

Organizational adaptation in a broader sense is related to the behavior of an organization. Eldridge and Crombie (2013:17) mentioned that “if we want to focus on the organization itself and try to understand its behavior, then clearly we have to try to define, describe, and interpret the context in which it exists-the environment of the organization itself.”

In this study, five main theoretical viewpoints are considered such as System Theory, Institutional Theory, Contingency Theory, Organizational Learning Theory and Pettigrew’s Processual Analysis Framework. Most of the existing empirical studies on organizationa adaptation to climate change are somehow conceptually connected to any of these theories. The following elaborated in details about these theories.

2.4.1 System Theory

According to Bertalanffy’s (1969) work on ‘General System Theory (GST)’, a system is a combination of two or more elements, where the behavior of any element affects the behavior of the whole. The organization as a system, is composed of a number of interrelated subsystems (sub divisions of the organization) serving certain functions to achieve specified organizational goals. A fundamental assumption of system theory is that any system like a living organism is open to the environment and must interact with an environment for its survival (Bertalanffy, 1969). The open system approach focuses on

three major assumptions: An open system exists in an environment, an open system is comprised of interdependent subsystems, and the subsystems within every open system must act congruously or have alignment (Bertalanffy, 1969).

There are also concepts of *Homeostasis, Entropy, and Negative Entropy in System Theory* (Bertalanffy, 1969). Homeostasis refers to self-regulation and ability of a system to maintain a steady state based on negative feedback from the environment (Bertalanffy, 1969). Entropy indicates the tendency of a close system to be deteriorated or become vanished due to lack of interaction with the environment (Bertalanffy, 1969). Negative entropy signifies the tendency of an open system to sustain by interacting with the environment or by importing necessary energy to reduce entropy (Bertalanffy, 1969).

Boulding (1960) further classified systems into nine hierarchical levels based on the complexity of the system to understand their individual characteristics. Katz and Kahn (1960) described an organization as a collection of patterns of behavioral events that must be understood in terms of interactions with each other and with the external environment as well. Initially, they introduced the concept of *input-throughput-output*. According to Katz and Kahn (1960), every organization obtains input (raw materials, information, etc.) from the environment, and some of the inputs are modified in the internal process of throughput and finally transformed resources are exported to the environment as outputs (goods or services). The outputs are exchanged for new inputs and the cycle repeats. Open systems perspective urges for a closer linkage between an organization and its surrounding, and emphasizes that organizational survival depends on acknowledging and developing this connection.

In the study done by Emery and Trist (1965), they described the environment and their associated demands to improve the sensing and adjustment process of organization with the environment. According to them, understanding the organizational behavior of adaptation requires thorough insights into the following areas: the area of internal interdependency, the exchange between the organization and its environment (both way transactions) and the area of interdependencies that belong within the environment itself. They also noted that every organization's environment is itself composed of a collection of more or less interconnected organizations or forces-like customers, suppliers, competitors, regulatory authorities and others. Based on the degree of the complexities and dynamism, they proposed four types of basic environments for organizations: *placid random environment*, *placid clustered environment*, *distributed reactive environment*, and *turbulent field*. The fourth type of environment (turbulent field) surrounds most organizations after post-industrial civilization. This turbulent field is the most dynamic among other types and has a high level of uncertainty. Here, environmental forces are increasingly organized and interrelated. As in the current world, technological innovations, government regulations and demand shift can change the organizational environment overnight; the organization must remain flexible in the face of uncertainty and be smart to adapt to whatever conditions exist in the environment.

It should be noted that before Emery and Trist's (1965) classification of environments with respect to uncertainty, complexity and predictability, Rice (1963) already had divided organizational environment into two broad categories: *internal environment* (relationship and interaction among member inside the organization) and *external environment* (other individuals and organizations outside the organization).

Duncan (1972) further explained the work of Rice (1963) and provided comprehensive definitions of different factors and components of the internal and external environment. Duncan (1972:2) stated that, *“The internal environment consists of those relevant physical and social factors within the boundaries of the organization or specific decision unit that are taken directly into consideration in the decision-making behavior of individuals in that system. The external environment consists of those relevant physical and social factors outside the boundaries of the organization or specific decision unit that are taken directly into consideration.”* Duncan (1972) explained three components for internal environment (such as organizational personnel component, organizational functional and staff unit component, and organizational level component) and five components of external environment (such as customer component, supplier component, competitor component, socio-political component, and technological component). He also mentioned that these environmental components are only relevant to industrial organizations and may change for other types of organizations.

However, Kast and Rosenzweig (1973) identified four shortcomings of system approach. Firstly, they argued that making an analogy between living organisms and the organization is too superficial as an organization acts like a system but not necessarily as natural systems. Secondly, no organization is fully closed or fully opened, rather it can be considered partially close or partially open. Thirdly, the boundary between organization and environment is not always distinct and there can be numbers of boundaries based on context. Finally, the social organization is deliberately created by human rather than stimulated naturally. They also argued that organizations may have different goals and not follow the life cycle of birth-growth-maturity-death like living systems. Following this,

there is more development of theories expanded from GST like Contingency Theory, Organizational Learning, and Population Ecology Theory.

2.4.2 Contingency Theory

Contingency theory is based on two main contentions: (a) there is no universal or fixed rule to manage an organization; and (b) organization must fit better with the external environment by changing structures or functions of the internal subsystems (Morgan, 1986). Previously, Burns & Stalkers (1961) differentiated between ‘mechanistic’ and ‘organic’ approaches of management in their research conducted in Scotland in 1950. They divided organizations into two major categories: *Mechanistic Organizations* and *Organic Organizations*. In their study, a mechanistic organization is viewed as having rigid structure and procedures, and prominent hierarchy levels, whilst an organic organization is more flexible, has less specialization of functions, and can react quickly to environment. According to them, organizations in uncertain and changing environment need more organic and flexible management system in order to be successful.

Subsequently, in aligning with Burns and Stalkers (1961), Lawrence and Lorsch (1967) mentioned that different types of organizations are necessary for different types technological and market conditions. They further added that organizations in uncertain and changing conditions need more internal change than organizations functioning in a relatively stable environment. Tosi and Slocum (1984) argued that optimal performance is contingent (depending) on a number of external or internal factors or constraints of organizational environments. They further added that the relationship between the uncertainty regarding task environment and organizational structure is the primary focus of

contingency approach. Everything outside the organizational boundary belongs to the task environment (Aldrich & Marsden, 1988).

Dess and Beard (1984) identified *munificence*, *dynamism*, and *complexity*- the three important dimensions of the task environment, which must be understood first to explain organizational behavior. According to them, munificence refers to organizational efforts to looking out of task environment for growth and stability, while dynamism indicates the unpredictability and uncertainty of environmental change. Complexity refers to the diversity of activities within the organization (Dess & Beard, 1984).

Professor Gareth Morgan first summarized the concept of contingency view of organization in his book '*Images of organization*' (first published in 1986). According to him, there is no single way to manage organization and different types of management are necessary for different environment. He argued that the right form of management strategy depends on the task or emerged situation. Hence, the manager's primary role is to ensure alignment among all activities, as different types of tasks are necessary at different levels within the same organization (Morgan, 1986).

2.4.3 Institutional Theory

Institutional theory puts emphasis on organizational stability and similarity by the influences of external social and cultural environment, rather than on functional and technical aspects. DiMaggio and Powell (1983), probed deeper the proposed concepts by Meyer and Rowan (1977) that the organization gets legitimacy, stability, and resources by conforming to the social expectations.

According to institutional theory, institutional regulations, social norms, culture, values, and expectations influence the organizational behavior or actions (DiMaggio & Powell, 1983; Scott, 2005; Colwell & Joshi, 2013). DiMaggio and Powell (1983) classified the institutional pressures into three major categories: *Normative*, *Coercive*, and *Mimetic*. However, Scott (2005) renames *Coercive* pressure as *Regulatory* pressure. Normative pressures come to the organization as collective expectations, values, norms, and culture of different social bodies like consumer groups, professional associations, suppliers, accrediting agencies, and social activists; and coercive pressures stem from political decision and implemented by government agencies as laws and regulations (DiMaggio & Powell, 1983). In both cases, organizations get guidance from those strong stakeholders through their standard rules, incentives, or punishment. Mimetic pressures are seen when a particular organization directly copies or adopts successful and widely acceptable actions, system, or structure of another competitor organization in the event of uncertainty and ambiguity in the environment. Therefore, there are similarities of organizational structure and responses in the same institutional environment, which is called *institutional isomorphism* (DiMaggio & Powell, 1983). Nonetheless, the adoption of isomorphic pressures by organizations can vary within a same institutional environment due to many endogenous factors (Zeitz, Mittal & McAulay, 1999).

2.4.4 Organizational Learning Theory

Organizational learning theory focuses on how an organization continuously gains knowledge from direct experience, and how it retains or transfers the acquired knowledge. In their book '*A Behavioral Theory of Firm*', Cyert and March (1963) mentioned organizational learning as adaptive behavior and means of organizational development over time. Their model is called '*learning cycle*'. According to them, every organization

follows routines or some specific operating procedures (e.g., rules, conventions, strategies) that are repetitive. As new experiences gained or disturbance occurred, organization changes routines to adapt new situations or to improve performance (Cyert & March, 1963). After Cyert and March's (1963) study, a considerable amount of literatures has been dedicated to expanding organizational learning theory and its applications.

March and Olsen (1975) criticized the learning cycle with the concept of *ambiguity*. They argued that experienced knowledge could be misleading if goals are ambiguous or there are conflicts between routines and goals. They identified four problematic situations in organizational learning: (1). *Role-constrained learning*, (2). *Superstitious learning*, (3). *Audience-learning*, and (4). *Learning under ambiguity*. In role-constrained learning, rigid or bureaucratic roles (task specialization) prevent individual behavioral change, which ultimately leads to organizational inertia (March & Olsen, 1975). If the connection between organizational actions and environmental responses are unhealthy, then superstitious learning occurs (March & Olsen, 1975). In this situation, the organization learns from apparent environment, which is not actual knowledge. In audience learning, there exists a visible conflict between the individual actions and organizational actions (March & Olsen, 1975). In this case, an employee can develop an innovative approach, but cultural inertia of organization prevents it to be implemented in practice. Finally, learning under ambiguity occurs when both individuals are not sure of what is happening and why is it happening (March & Olsen, 1975). In this situation, the individual tries to conclude, based on personal beliefs, myth, or ideology (March & Olsen, 1975).

Argyris and Schön (1978) introduced the concepts of *single-loop learning* and *double-loop learning*. In an organization, every individual acts in a certain manner to

achieve a certain goal or objective. Single-loop learning occurred when an individual, after failure or getting negative feedback, corrects mistakes and continues actions to achieve the same goal (Argyris & Schön, 1978). On the other hand, double-loop learning occurs when individual, after failure, readjusts the current goal or moves towards a new goal (Argyris & Schön, 1978).

Later, Levitt and March (1988) describe in detail how organization gains knowledge from direct experiences and the experiences of others, how interpret experience, and how retain the knowledge as *organizational memory* for future distribution. According to Levitt and March (1988), organizational learning from direct experience occurs by two mechanisms: *trial-error experimentation* and *organizational search*. The organization does experiment with new routines or set of procedure. If the new routines bring success or fulfill a desired goal, they are adopted; and, if the new routines fail, then they are abandoned or alternative routines are sought (Levitt & March (1988). In the second mechanism, organization searches solutions for a given problem from a large pool of alternative options and implement the best ones based on their success history (Levitt & March (1988). Levitt and March added that the organization also learns from the experience of other organizations through the transfer of encoded knowledge in the form of technology, procedures, or similar routines, which they termed as *diffusion*. According to Levitt and March (1988), diffusion can occur in three distinct mechanisms. The experience can be broadcasted by a single individual of one organization to the whole population of a different organization, by the contact between two individuals from separate organization, and by the single individual to a group in different organization and group disperse it to whole population (Levitt & March (1988).

To describe the experience interpretation process of organization, Levitt and March (1988) put emphasis on some behavioral attributes of human being. They argue that during learning there are always systematic errors. As, for example, due to the complexity of changing environment, only a limited number of observations are considered to derive a lesson from a past event (experience); and, only problems with big impacts or problems that are easily discernible to learners are decoded. While searching for a solution, organization members may over estimate an impact, and use a general sense of legitimacy instead of accurate calculation. Regarding *organizational memory*, Levitt and March (1988) mentioned that organization retains experienced knowledge for two purposes: *conservation* and *retrieval*. Due to employee turnover or replacement of old routines with new ones, organization experienced are lost. Moreover, the organization may need to reuse past knowledge at any time. So, learned experiences are always recorded as documents, accounts, standard procedures, organizational culture or shared perceptions among employees within the organization.

Huber (1991) argued that traditional organizational learning theories emphasized only learning from experiences, but other ways of organizational learning had been less explored. Criticizing and summarizing previous literatures, Huber (1991) proposed organizational learning related four key constructs: *knowledge acquisition*, *information distribution*, *information interpretation*, and *organizational memory*. He also described a number of sub processes under every key construct. As, for example, knowledge can be acquired in five sub processes: *congenital learning* (shared knowledge by new entrepreneur of new organization), *experiential learning* (knowledge gained through experimentation), *vicarious learning* (second-hand knowledge gained from the practices of other organizations), *grafting* (knowledge grafted from new employees), and *searching*

and noticing (knowledge gained from environmental scanning, focused searching and performance monitoring).

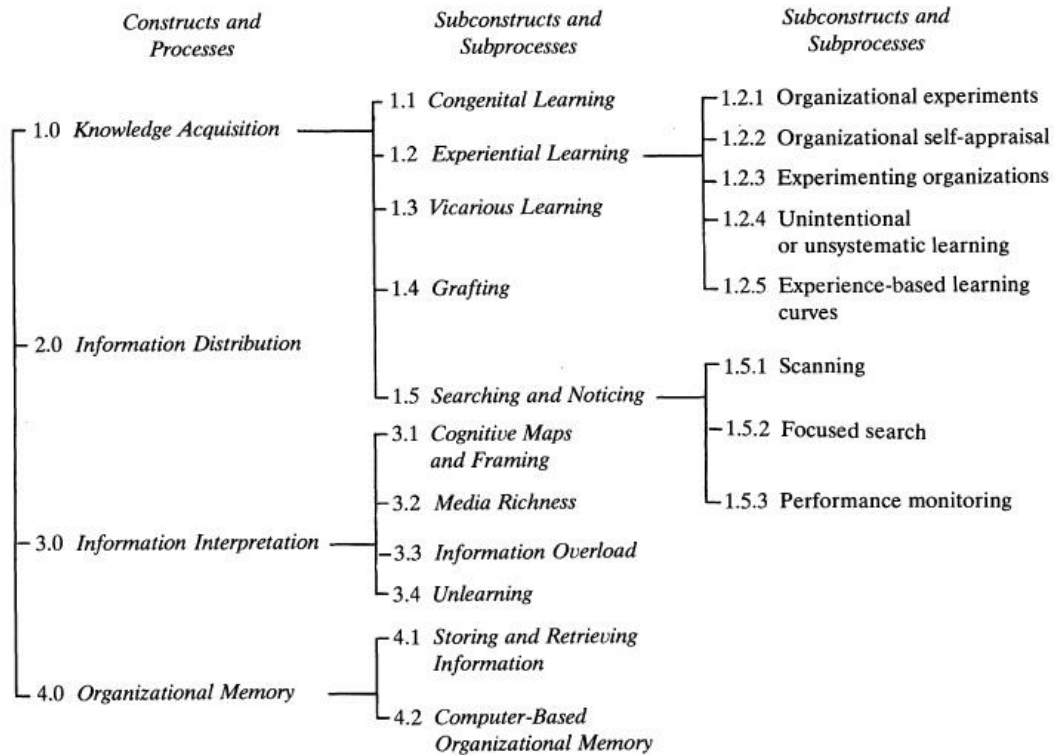


Figure 2.3: Constructs and Processes Associated with Organizational Learning (Source: Huber, 1991:90)

According to Huber (1991), information interpretation depends on four sub processes: cognitive map and framing (belief structure), media richness (variety of information and rapidity of feedback), information overload (according to processing capacity) and unlearning.

Daft and Weick (1984) described organization as an interpretation system and differentiate four organizational interpretation modes (*undirected viewing*, *conditioned viewing*, *enacting* and *discovering*) based on the criteria whether assumption about the

environment is analyzable or organization is willing to look outside. Later, Weick (1995) introduced the theory of sense making in organizations, which is constructed as a feedback loop of scanning (data collection), interpreting (giving meaning to data) and learning (taking action).

Senge (1996) described learning as the continuous process through which human develops abilities over the time. He also added that organizational learning is achieved through five ways: personal mastery, mental models, shared visions, team-learning, and systems thinking.

2.4.5 Pettigrew's Processual Analysis Framework

Pettigrew's (1987) concept of processual analysis argued that strategic change or organizational transformation not only refers to the process of change but also is interlinked with historical, political and cultural context of organization. Earlier on, Pettigrew (1985) criticized the notions of organizational change referring either single event or the sum of discrete events that are separated from immediate or more distant influencing factors and conditions. Single or sum of discrete events fails to provide actual information in the mechanism or process through which change comes out. So, Pettigrew (1987) introduced his model of processual analysis that emphasizes on continuous interactions of content of change with the context of change and the process of change. His model traces its roots back to the Burn and Stalker's (1961) open system perspective that considers *organic organization* as a flexible entity continuously accommodating changes in internal process and structure through dynamic interaction with the external environment, and Child's (1972) concept of strategic choice focusing dynamics of change and continuity.

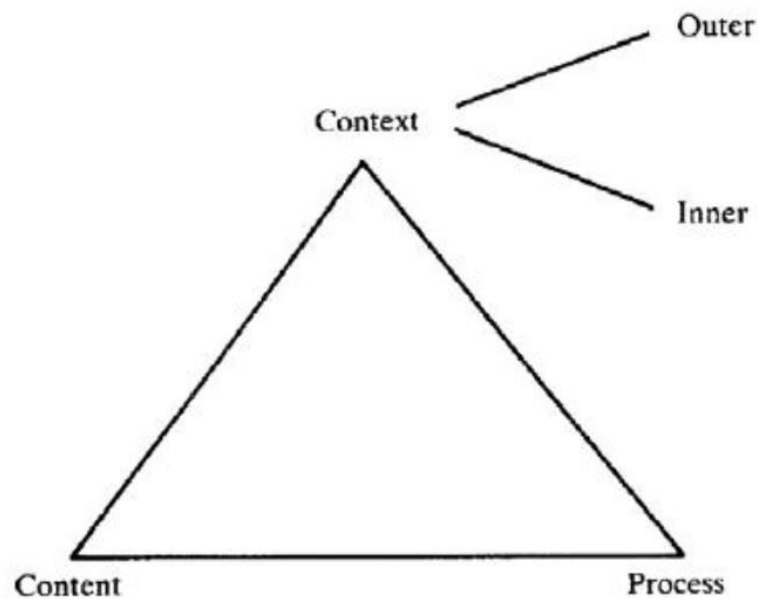


Figure 2.4: Pettigrew's Processual Analysis (Source: Pettigrew, 1987: 657)

Pettigrew's (1987) model answers to the three radical questions: what to change (content), why or when to change (context), and how to change (process)? The core thinking of their model is that the formulation of content for any new strategy essentially depends on managing context and process. Content defines what changes are necessary in which areas of organization for transformation, as such, the production techniques, geographical positioning and setting criteria to evaluate the quality of raw materials received from suppliers (Pettigrew, 1987). And, context refers to the reasons why change is necessary or to the situation when change is triggered (Pettigrew, 1987). He divided context into two sub-groups: outer context and inner context. Outer context refers to prevailing external condition of the organization, as such, economic condition, the power of media, regulatory environment in which the organization is operating, while inner context refers to internal conditions like firm's capacities and resources, organizational structure and corporate culture (Pettigrew, 1987). Process refers to the ways of actions, reactions and interaction of

different stakeholders or interested groups of the organization to move an organization from present to future state of change (Pettigrew, 1987).

Pettigrew (1987) also argued that contextual analysis of process considers both vertical and horizontal levels of analysis and interconnections between those levels over a certain period. Vertical level analysis concerns with the interdependencies between higher or lower levels, such as, impacts of economic recession on the stakeholders of business. Horizontal level of analysis concerns with the sequential interconnectedness of phenomena in past, present and future.

Subsequently, to strengthen the proposed concepts, Pettigrew (1997: 337) further defined process as a *'sequence of individual or collective events, actions, and activities unfolding over time in context.'* From this definition of process, he further explained - what is the processual analysis and what the purpose of the processual analysis is. According to Pettigrew (1997), process is dynamic and its main purpose is to identify what, why and how some sequences of actions are taken by individual or collective agency. He also argued that actions are embedded in context which itself can limit the influence of actions.

Highlighting the dual quality of agents and context, Pettigrew (1997) posited that context is shaping and shaped and similarly actors is producer and produced. As this interchange between agent (actor) and context develops over time, time and history are the center of any processual analysis.

For processual analysis, Pettigrew (1997) suggested five guiding principles as follows. First is to search for pattern and compare the shape, character and incidence of these patterns. The second principle is to seek the underlying mechanism which shapes any pattern in the process. Third is balancing the act of induction and deduction. The fourth

principle is to ensure the natural connectedness of the first three principles. Finally, fifth one is to link the analysis process to outcome.

It is already mentioned that all the theories discussed above are somehow connected with different empirical studies in existing literature mentioned in section 2.3.1. Among those discussed theories, Pettigrew's processual analysis is the grand theory of this study. System theory and Organizational learning theories have been combined with Pettigrew's processual analysis to develop the conceptual framework of this study. Pettigrew's processual analysis is most relevant as the three main components of this theory-content, context and process- are suitable to clearly explain the phenomenon of business adaptation to climate change.

Every business organization is situated in context which comprises physical environment (e.g., location, geography, climatic condition) and institutional environment (e.g., market, regulator, social institutions). Some contextual elements are internal like production process, resources, employees and management; and some contextual elements are external like changes in climatic condition or physical environment, market forces, regulation and so on. By the influences of different contextual factors due to climate change, business organization brings changes in contents that refer to the adaptation responses in terms of changes in business practices, working procedures or other strategies. And, process refers to how the organizational changes come over time through the sequences of actions taken by business itself and by other stakeholders as well. Again, during the adaptation process some contextual factors, both from inner and outer context, act as barrier or enabler. In section 2.6 more elaboration has been provided while discussing conceptual framework.

2.5 Research Gaps in the Literature

Reviewing the present literature, this study found the following research gaps that can justify this research effort.

Firstly, existing literature offered various conceptualizations about organizational adaptation to climate change. However, this study found that a substantial number of studies lack proper theoretical grounds (e.g., Hoffmann et al., 2009; Becken & Wilson, 2016). Hence, though the reported findings from these studies are significant for practical use, these studies are not contributing towards building good theories to explain the phenomenon.

Secondly, some studies explored the organizational adaptation to climate from restricted perspectives, where they ignored the dynamic interplays between internal and external factors, which can affect the environment and influence organizational adaptation process. Some researches present more descriptive findings with limited efforts to recognize that organizational survivability depends on the recognition of both risks and opportunities due to climate change. As, for example, empirical studies based on the contingency approach (Pineda, 2016; Alves et al., 2017) consider climate change related risks as external contingencies in a task environment of business. However, climate change not only brings risks, but also brings different business opportunities. Therefore, opportunities due to climate change should be integrated into climate management strategies. Moreover, detail of the adaptation process and behavioral issues like risks interpreting process, assessment methods of risks and proposed strategies, and other subjective biases in decision making are absent in these studies.

Again, a stream of works based on the institutional approach, like Wright and Nayberg (2017) and Damert and Baumgartner (2018), consider climate change as institutional pressures on businesses and assume that businesses need to get legitimacy by abiding the regulation or fulfilling social expectation.

Another stream of literature on the institutional approach like Matasci et al. (2014) and Pauw and Pegels (2013) are more concern on the governance of climate change adaptation and removing different barriers through institutional intervention. But, the literature on the institutional approach of climate management show less interest to investigate physical impacts of climate change, such as damage of infrastructure and supply chain by extreme weather, shortage of raw materials and so on.

Empirical studies which consider different cognitive factors as antecedent conditions for adaptation, as, for example, environmental attitude and climate change knowledge of manager (Bremer & Linnenluecke, 2017), managers' ability to interpret the environmental challenge as an opportunity (Haney, 2017), awareness and vulnerability (Gasbarro & Pinkse, 2016), managerial perception and belief in climate change (Bleda & Shackley, 2008), provide a partial view of actual phenomena. Those studies omit the process of adaptation and other contextual factors shaping the adaptation.

Thirdly, the current literature also has a higher concentration of research works deploying either descriptive or quantitative research approach. Other influential factors were not considered in these studies because their approach is deterministic. Institutional and cultural factors, for example, are being ignored by most of these studies as affecting the adaptation process.

Finally, climate change adaptation is highly contextual because related physical impacts of climate change vary geographically and institutional environment changes with social and economic structure of the location (Smit & Wandel, 2006; Winn et al., 2011); hence, it is not appropriate to generalize findings from developed nation with the context of developing countries. Also, there has been a limited number of systematic empirical works available in the organization and management literature that investigates organizational adaptation in the context of developing countries.

In the context of Bangladesh, very limited studies systematically research about Bangladesh climate change adaptation from the organization perspective. Studies such Ullah (2013), Belal et al. (2015), Nurunnabi (2016) and Dey et al. (2017) research about climate change adaptation in the context of Bangladesh, but mainly focusing on public adaptation context and agricultural sector. To date, Bangladesh private organizations have received very minimal attention in the literature.

2.6 Research Conceptual Framework

In this study, open systems theory, organizational learning theory and Pettigrew's processual analysis are integrated into the research conceptual framework. This study adopts the organization centric view and considers the research as a process-based research. The proposed theoretical viewpoints embedded in the conceptual framework to complement the nature of this research. Figure 2.5 provides a visual for the conceptual framework of this study.

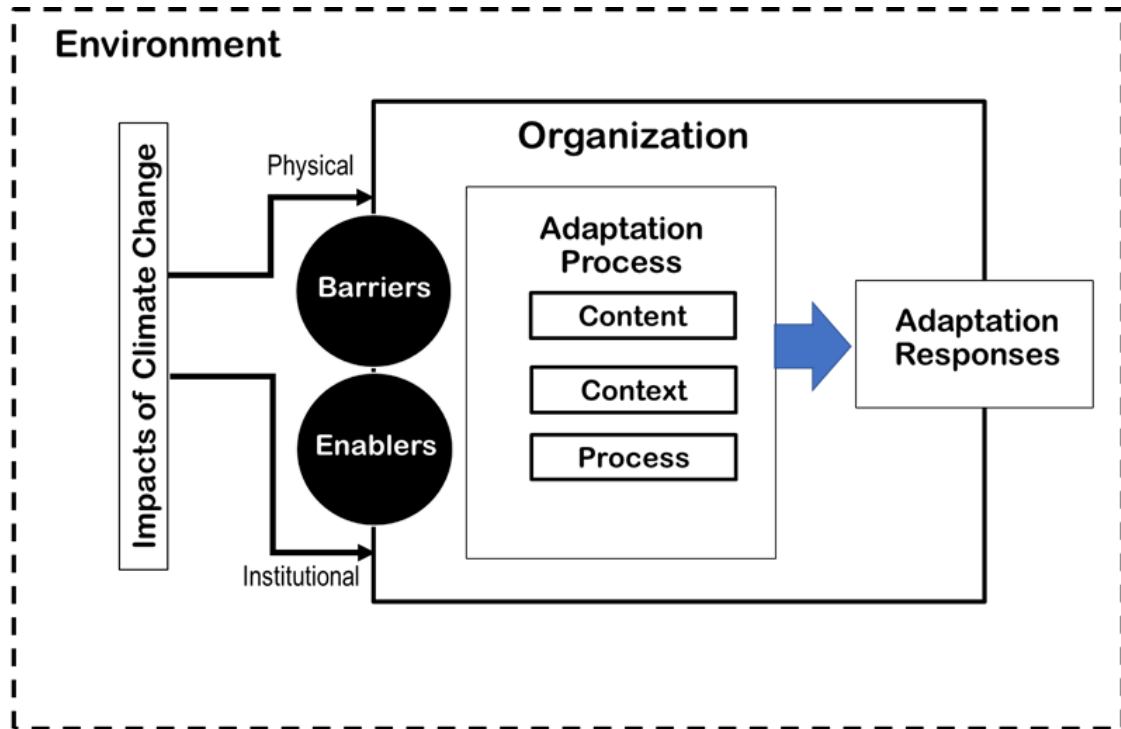


Figure 2.5: Conceptual Framework of the Study

In the above figure, the following conceptualization applies:

- *Physical impacts*- Physical impacts refer to direct impacts on the organization caused by climate change related bio-physical changes like extreme weather (e.g., cyclones, floods, altered precipitation), high temperature, sea-level rise, water scarcity, and ecosystem damage (Lash & Wellington, 2007; Winn et al., 2011; Linnenluecke, Griffiths & Winn, 2012).
- *Institutional impacts* - Institutional impacts refer to impacts on organizations from climate change related regulatory change, pressure from customer groups, environmental activists, investors and other stakeholders (Arnell & Delaney, 2006; Berkhout et al., 2006; Porter & Reinhardt, 2007; Nyberg & Wright, 2015).

- *Adaptation responses:* Adaptation responses refer to all sorts of physical (e.g., substituting old equipment) and non-physical activities or new business practices (e.g., changing production process, providing training to employees) taken by organizations to manage climate change related risks and opportunities.
- *Enablers-* Enablers refer to the factors that belong to the external or the internal context of the organization and help organization to adapt to climate change.
- *Barriers-* Barriers refer to the factors that belong to the external or the internal context of the organization and prevent the organization to adapt to climate change.

The following further explains related principles and assumptions derived from these theories and include in the conceptual framework to guide the research.

An Organization as An Open System

In this study, an organization is defined as a system that is composed of many subsystems that have functions to support specified organizational goals and missions, continuously interacts with its environment, and also influences and are being influenced by its environment (Katz & Kahn, 1960; Emery & Trist, 1965; Bertalanffy, 1969). An organization is viewed in this study as having social structures and consisting of certain patterns of behaviors and organizational practices (Katz & Kahn, 1960). With regard to an organization's interactions with its environment, these interactions are assumed to be always dynamic, ongoing and contain layers of complexities depending on the organizational attributes that are manifested through several dimensions such as size,

nature of business, employee characteristics, market, technology, resources and others. Organizations also perform continuous adjustments or adaptations to its environment in order to increase its business survivability (Emery & Trist, 1965). In this context, an organization adapting to its changing environment can be captured from its organizational activities, practices and business decision making processes and outcomes.

Organizational Learning and Organizational Adaptation

In this study, following the assumptions and viewpoints of open systems theory, organizational adaptation is viewed as dynamic organizational processes and practices where an organization interacts with its business environment to increase its adaptive capacity and to build resilience to deal with the harmful effects of climate change and to take advantage of any emerging opportunity from the situation. Organization adapts and increases its business survivability and competencies through learning (Berkhout, Hertin and Gann, 2006; Orsato, Barakat & Campos, 2017). In this study, following Huitema et al. (2016), it is assumed that an organization having effective learning mechanisms or practices is more innovative and will be more climate resilient and able to adapt well with climate change strategically because of its competencies, available resources including knowledge and information. In this context, enablers and barriers are exist, and can be perceived differently by organization, depending on the characteristics and competencies of decision makers of the organization.

Pettigrew's Processual Analysis

Pettigrew (1987, 1997) proposed three elements– content, context, process – to understand change processes happening in an organization. “Content” refers to what aspects or elements related to change; whilst “context” concerns about responding to the

questions of why and when to change (Pettigrew, 1987). He differentiated two contexts that can exist for an organization, namely: outer context and inner context. In undertaking processual analysis, he defined process as a ‘*sequence of individual or collective events, actions, and activities unfolding over time in context*’ (Pettigrew, 1997:337). This study integrates Pettigrew’s processual analysis as the research embraces a qualitative research paradigm and is a process-based research. This study will be benefited from undertaking processual analysis to process and interpret data systematically and to make sense from the data to understand the phenomenon of interest.

2.7 Conclusion

This chapter has presented pertinent literature review and analysis related to the study. Through the details review of the literature, this study found research gaps that can justify the contributions of the research. Further, a details review of certain theoretical viewpoints gives more insights on the strength and weaknesses of these theories, and provides justifications also on why theoretical viewpoints from system theory, organizational learning theory and Pettigrew’s processual analysis are deemed suitable for this study to be integrated in the research conceptual framework. In addition, the elaboration of empirical setting for the research, in this case Bangladesh is also given to strengthen the understanding regarding the context and scope of the research. The subsequent chapter will elaborate details about research design, methods and analysis.

CHAPTER 3

METHODOLOGY

3.1 Introduction

In This chapter elaborates the research philosophical approach adopted to guide the research and explains in details about the research design including data analysis for this study. In general, this study is guided under interpretivism research paradigm using qualitative research approach, which is justified according to the objectives of the research. In this chapter, explanations about the data collection methods using case study method, interviews, observations and use of secondary documents as well as process to select the three organizations as case studies are given. At the end of the chapter, important considerations related to the research design especially with regard to validity and reliability of the research are explained. This chapter ends with a conclusion subsection.

3.2 Research Paradigm

A research paradigm refers to a set of beliefs, values, and assumptions adopted by a researcher to guide their way of doing research, in this case undertaking systematic research enquiry to provide answers to the problems or issues of interest (Kuhn, 1962; Kuhn, 1977). Neumann (2000:65) defined a scientific paradigm as “a whole system of thinking ... includes basic assumptions the important questions to be answered or puzzles to be solved, the research techniques to be used, and examples of what good scientific research looks like.” In this context, a researcher’s decision to embrace a certain research paradigm can only be reached, when he or she is able to articulate their works from the philosophical standpoint of ontological and epistemological, as well methodological (Guba & Lincoln, 1994). Ontology refers to the form and nature of knowledge; epistemology

seeks to understand the relationship between knower (researcher) and knowledge (what can be known) (Guba & Lincoln, 1994). Methodology, in the other hand, describes how the knower goes to find about knowledge (Guba & Lincoln, 1994). In the literature, three major research paradigms exist, namely: positivism, interpretivism and critical theory (Guba & Lincoln, 1994; Gephart, 1999; Neuman, 2000).

Table 3.1, excerpted from Gephart (2004: 456), presents these three dominant research paradigms.

Table 3.1: Research Traditions (Source: Gephart, 2004: 456)

Tradition	Positivism and Post positivism	Interpretive Research	Critical Postmodernism
Assumptions about reality	Realism: Objective reality that can be understood by mirror of science: definitive/probabilistic	Relativism: Local inter-subjective realities composed from subjective and objective meanings, represented with concepts of actors.	Historical realism: Material /symbolic reality shaped by values and crystallized over time.
Goal	Discover truth	Describe meanings, understanding	Uncover hidden interest and construction: critique, transformation, and emancipation
Task	Undertake explanation and control of variables: discern verified hypotheses or non-falsified hypothesis	Produce description of member's meanings and definitions of situations: understand reality construction	Develop structural or historical insights that reveal contradictions and allow emancipation, spaces for silence voices.
Unit of analysis	Variable	Verbal or nonverbal action	Contradictions, critical incidents, sign and symbols
Methods focus	Uncover facts, compare these to hypotheses or propositions	Recover and understand situated meanings, systematic divergences in meaning	Understand historical evolution of meanings, material practices, contradictions, inequalities

The following subsections provide an overview of each of this research paradigm.

3.2.1 Positivism

Positivism paradigm is rooted in the natural science field. From the philosophical standpoint, positivism paradigm views “social science as an organized method for combining deductive logic with precise empirical observations of individual behavior in order to discover and confirm a set of probabilistic causal laws that can be used to predict general patterns of human activity” (Neumann, 2000: 66). A positivist focuses on using quantitative techniques to measure objectively research data. From the epistemological stance of positivism, to be objective, there must be separation of knowledge from social construction to enable a researcher from any subjective bias (Guba & Lincoln, 1994). Positivists deploy a quantitative research approach, formulate and test research hypotheses and use deductive logic to reach to conclusions (Neuman, 2000).

3.2.2 Interpretivism

From the ontological stance of interpretivism, knowledge is created through social process and relies on subjective interpretations (Gephart, 1999; Neuman, 2000). Interpretivists believe that epistemologically there exist relationship between the knower (researcher) and the object to be known and social reality is embedded in the perception of the participants and can be shaped by aims and personal beliefs of the researcher also (Walsham, 1993; Merriman, 1998). Interpretive researchers according to Neumann (2000) are interested on studying meaningful social action, in particular how people construct meaning in their natural settings, as well as to social behavior. In the interpretivism approach, phenomenology and hermeneutics are the two dominants approaches of this paradigm (Boland, 1985). *Hermeneutics* is an interpretivist approach focusing on interpretation through the study of written text and also to understand how people acquire meaning associated with it (Neumann, 2000). In other words, whenever someone tries to

interpret a text or speech, one has to understand the language and the mind of the author as well (Bowie, 1998). *Phenomenology* deals with how phenomenon appears in our experience or the ways we experience the phenomenon and ascribe meanings to it (Husserl, 1982). Though the term *phenomenology* was used in the '*Critique of Pure Reason*' by Emmanuel Kant and in the '*Phenomenology of Spirit*' by Hegel, Edmund Husserl (1889-1976) is considered the 'Father of Phenomenology'. Later, Martin Heidegger, Husserl's student, developed it further. The basic assumption of phenomenology is that reality consists of objects and events (phenomena) as understood by human consciousness (Husserl, 1982).

In sum, interpretivists aim to acquire deeper understanding of a particular social phenomenon. Hence, their aim through their research is not about generalizability of their findings, instead they deploy inductive logic to offer explanations of the phenomenon (Neuman, 2000).

3.2.3 Critical Theory

Most Critical theory sees social science as "a critical process of inquiry that goes beyond surface illusions to uncover the real structures in the material world in order to help people change conditions and build a better world for themselves" (Neumann, 2000: 76). Critical thinkers argued that positivism approach ignores social context and anti-humanist; interpretivism approach in the other hand is too subjective and relative (Neumann, 2000). Critical thinkers, in responding to their views on the weaknesses of positivism and interpretivism paradigms, aim to highlight the problematic social structures or values and to develop self-consciousness concerning people's behavior (Kincheloe & MacLaren, 1994). They attempt to dismantle or bring change in existing relationship of power and

domination in society and to show ways for marginalized people to get opportunity to flourish (Gaphart, 1999). Though critical thinkers also believe in socially constructed meanings, they however disagree with the interpretivists emphasizing on micro-level interpersonal interactions and place the meanings in larger macro-level historical context (Neumann, 2000). According to Neuman (2000), to transform the social relations and to change the world, critical researchers put emphasis on history and *praxis (theories on practice)*. Praxis acknowledges that any explanation is valued only when people really understand the world through it and involved in actions to change it (Neumann, 2000).

3.2.4 Justification in Adopting the Interpretivist Research Paradigm

This study sets to investigate how organizations adapt to climate change in their natural setting. It examines in details with regard to organizational practices, business activities and routines, and also actors' decision-making aspects and approaches in developing adaptation strategies for business. In this context, the research is an interpretivist type of research because its focus on climate change impact is a phenomenon happening in natural setting. This phenomenon affects people and their ways of living. In the context of business organization, climate change affects work procedures, operational processes and employee behaviors. In the context of researching organizational adaptation to climate change, this behavior is social in nature and is highly contextualized depending on circumstances of an organization in dealing with problems associated with climate change. Adaptation responses of business organizations in Bangladesh for example will be influenced by how devastating is the impacts of climate change towards the organization, and the kind of perceptions and beliefs held by key decision makers of the organizations, as well as other stakeholders such as customers, NGOs, state governments and others. From this standpoint alone, positivism paradigm is not supporting the nature of the

research. Interpretivism paradigm, by deploying qualitative research approach, hence is justified as main theoretical orientation to guide the research process to achieve all the research objectives.

3.3 Qualitative Research Approach

To undertake the research, this study deploys a qualitative research approach. This research approach is justified because by using the approach, the researcher is able to gain deeper understanding with regard to social interactions and behavior of the affected organizations suffering from climate change impacts. Qualitative research approach aims to understand and interpret social phenomena through the understanding of how people attach meaning with social actions in natural setting (Denzin & Lincoln, 2000). In undertaking a qualitative research, qualitative data in the forms of texts, conversations, photographs, and observation of events and behaviors can permit a qualitative assessment of a phenomenon in their natural setting to be done. The subjective interpretation about the meaning of social actions is also influenced by the research participants and the researcher. Some important features of qualitative research approach as emphasized by others are as follows:

Naturalistic: Qualitative research explores phenomena in natural setting and assumed human behavior is influenced by the context significantly (Bogdan & Biklen, 2007).

Inter-subjectivity: Qualitative researcher needs to consider subjective variations of meanings from participants and researcher himself while interpreting and reflecting on data (Morrison, 2000).

Inductive: Qualitative research is inductive in nature as researcher may construct theory or hypothesis based on participant's view or observation of researcher. Theory usually emerged from bottom up and from a number of interconnected pieces of evidences (Bogdan & Biklen, 2007). In contrast to the quantitative research that begins with a prior hypothesis, the qualitative research can start with a conceptual framework (Miles & Huberman, 1994).

Descriptive: In qualitative research, everything is important and considered a link towards investigation (Bogdan & Biklen, 2007). Therefore, data as a form of words or pictures generated from qualitative research provides detail description of phenomenaList of Figures

3.3.1 Research Design and Methods to Obtain Data

This Research design is considered as architectural blue print or master plan of a research to undertake the research and obtain data. It shows all the procedures sequentially carried down from beginning till the end of the research. Yin (2003) stated that *“a research design is an action plan for getting from here to there, where ‘here’ may be defined as the initial set of questions to be answered and ‘there’ is some set of answers (conclusion)”*.

This study deployed case study method and utilized a variety of data collection techniques such as semi structured interviews, observations and relevant documents from various secondary data resources. The following explains about these methods to obtain the qualitative data for the research.

In this study, firstly, a desktop research was carried out by reviewing relevant literatures from wide number of sources like journals, reports of international organizations

(like United Nations, World Bank, Asian Development Bank, International Finance Corporation), textbooks, company websites, and newspapers. Then, a conceptual framework was developed to guide the case organizations.

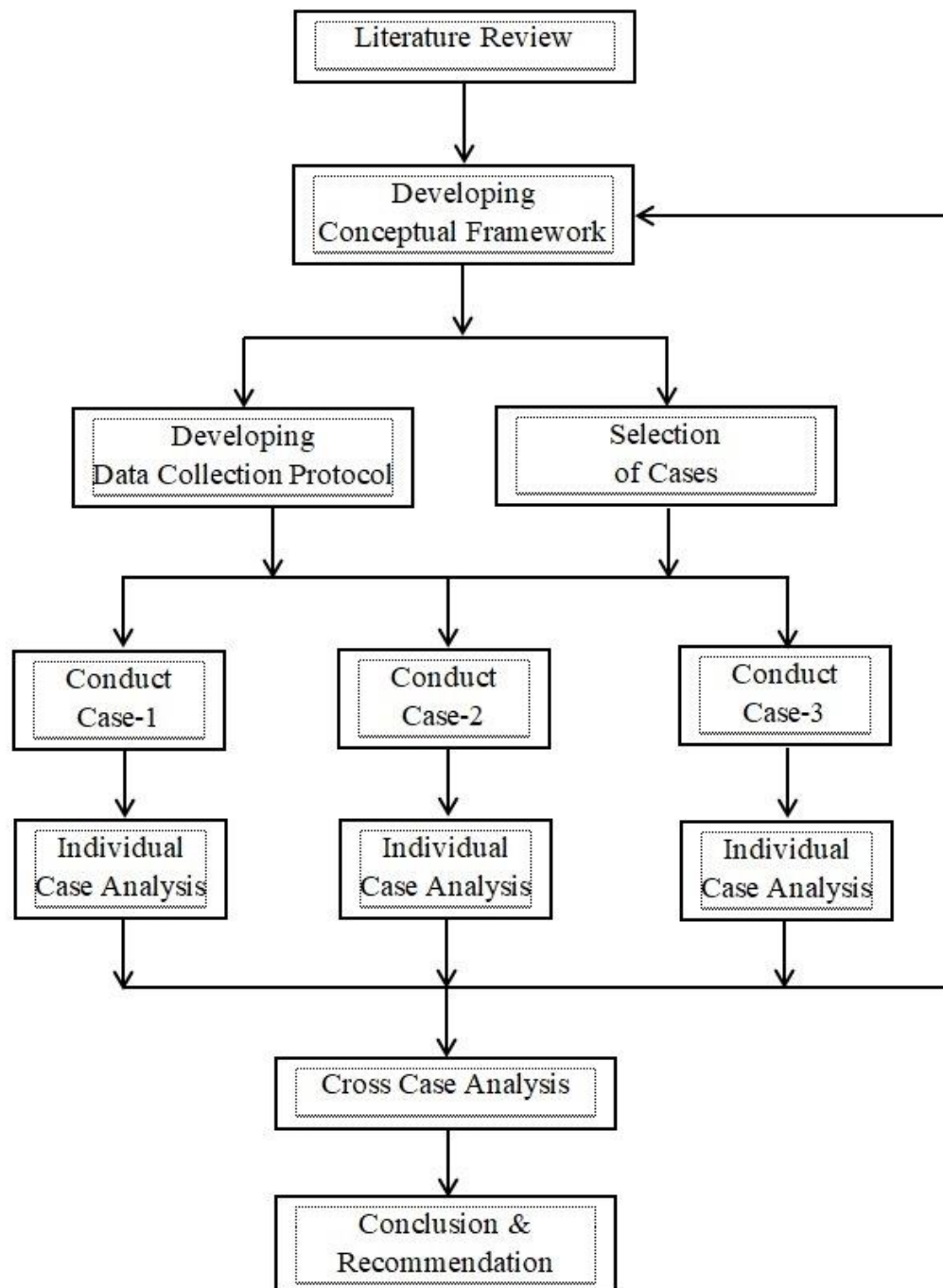


Figure 3.1: Research Design and Procedures

Figure 3.1 depicts the design and procedures relevant for the research to guide the overall research works to obtain and analyze data, provide interpretation and draw conclusions for the research. Details about the research methods use to collect data, selection of case studies and techniques use to analyze data are explained in the subsequent sections.

3.3.2 A Case Study Method

Appendix A case (unit of investigation) can be a person, a group, or an organization (Neumann, 2000; Gerring, 2004). Yin (2009:18) defined this method as “an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident and in which multiple sources of evidence are used.” According to Gall et al. (2007), case study method can have three characteristics as such study of particular instances, in-depth study of the case; and a study of phenomenon in its real-life context. In the current literature, few studies have used case study method in their research about how organizations adapt to climate change. For example, studies by Depouse (2017), Becken and Wilson (2016), Leventon et al. (2015), Matasci et al. (2014), and Berkhout, Hertin and Gann (2006) used case study method to investigate organizational adaptation to climate change.

Case study method is justified to be used in this research, as the focus of the study is on organizational adaptation and hence the unit of analysis is an organization and also groups that are associated with the organization. An organization as a unit of analysis permit deeper investigation to be done with regard to physical and institutional impacts of climate change on the business, and also to understand the interplays between the organization and the environment. Organizational activities, practices and routines and factors deriving from both internal and external environment will influence the adaptation

process happening in the organization. Relevant groups (i.g., owner, employee, customer, supplier, regulator, other stakeholders) as unit of analysis are important to be included because their behaviors and social actions provide the micro-level focus and serve as data. In the research framework, this unit of analysis is closely related to content and context that shapes the adaptation process, following the principles within Pettigrew's Processual Analysis. Organization as unit of analysis is important for this research because the study focusing also on private business organizations. Organizational behaviors of private organization are different than public organization or community. In this study, these business entities represent the macro-level of focus, and serve as secondary data source for the study.

This study also argues that using more than one case study can offer benefits and overcome research biases. One case runs the high risk of being considered as subjective or non-scientific (Burns, 2000; Yin, 2009). Multiple cases from different settings or contexts give opportunity for comparison (Stake, 1995; Drake et al., 1998). In addition, comparison across cases can provide difference and similarities of data, which is necessary to draw conclusions from the data and theorize and explain the phenomenon (Glaser & Strauss, 1967). Moreover, if findings from multiple cases converge, the qualitative research findings are more convincing and valuable (Yin, 2003). Therefore, three organizations were considered and selected as case studies for the research.

3.3.3 Process in Selecting Case Studies

In multiple case studies, selection of cases needs to be concerned with two issues: appropriateness and adequacy (Kuzel, 1999). Appropriateness of case is related to displaying a fit to both the objectives of research and phenomenon to be investigated,

while adequacy is concerned with how many cases is sufficient (Kuzel, 1999; Miles & Huberman, 1994; Patton, 1990).

This study used purposive sampling method (Creswell, 2007; Patton, 1990) to select the suitable business organizations. In this case, one organization from each climate sensitive business sector - telecommunication, real estate, and garments manufacturing – is being considered as ideal for case studies. The selected business sectors are very important in the context of Bangladesh in terms of their contribution to GDP and employment generation. Therefore, considering the issue of appropriateness, the selected three business cases from telecommunication, real estate and garments manufacturing sectors are justified. The selected organizations also have to be private business organization and employ more than 500 employees. See Table 3.2 that depicts general criteria in selecting organizations for this research.

Again, unlike statistical generalization where result from a sample population in any experiment or survey is generalized for whole universe, case studies relies on analytical generalization which is generalization of “a particular set of results to some broader theory” (Yin, 2009: 43). Generalizability of findings, sometimes called external validity, is established through the replication logic of multiple case study design (Yin, 2009). And, replication logic in multiple case designs can be achieved by two approaches: literal replication and theoretical replication (Yin, 2009). Literal replication approach is used when selected cases have similar contexts and we expect similar result; and theoretical replication approach is used when selected cases have different contexts and we expect different results (Yin, 2009). Regarding the sufficiency of the number of cases in multiple case design, Yin (2009: 54) suggested to select six to eight cases for theoretical

replication and three to four cases for literal replication. As the three selected cases organizations of this study situated in similar geographical and institutional context of Bangladesh, their number is justified for literal replication logic.

Initial searching of case organizations started in early 2016 by visiting the websites of different organizations in Bangladesh. After returning back to Bangladesh from Malaysia in May 2016, the researcher started contacting different organizations through the help of friends, relative and colleagues. Through the existing social networking, the researcher managed to get initial contacts of five organizations. In the beginning in June 2016, only a Garment manufacturing organization gave initial respond but other four still hesitated to participate in the research. Being uncertain about their final approval, the researcher sent emails to twenty organizations seeking their cooperation for possible access to conduct the research using their organization. These organizations are: Building Technology and Ideas Ltd., Sheltech Private Ltd., Labaid Properties Ltd., Orion Group, Ibnsina Trust, Hammem Group, Standard Group, Pran Group, Kazi Farm Group, Akij Group, Nasir Group, BSRM, KSRM, Beximco, Shah Cement, Bengal Glass, Prime Bank, Eastern Bank, Agrani Insurance and Meghna Insurance. Unfortunately, none of these organizations replied to the request.

Then, in July 2016, the researcher was able to get final consent of three case organizations from the second attempt, by personally meeting several business managers within his professional networks. It should be noted that as the researcher came back to Bangladesh from Malaysia three times for data collection purpose, most of the interviews and site visits occurred in three phases: Phase-1 (May 2016 to August 2016), Phase-2 (November 2106- January 2017) and Phase-3 (May 2017 to August 2017). To protect the

identity of these organizations, the following naming system is used in this thesis, as follows: (1) TelcoOrg is an organization belongs to the telecommunication sector; (2) RealEstateOrg is an organization belongs to Real Estate sector; and (3) GarmentOrg is an organization belongs to Garments Manufacturing Sector. The following table presents some descriptive criteria associated with the organizations chosen for the study.

Table 3.2: General Criteria in Selecting Case Studies

Case Study	Industry	Business Importance	Employee Size	Years of Establishment
TelcoOrg	Telecommunication	Operation throughout the country	>500	15 to 20 years
RealEstateOrg	Real Estate	More than 50 construction projects	>500	15 to 20 years
GarmentOrg	Garments Manufacturing	Own factory and good reputation	>500	15 to 20 years

3.4 Data Collection Technique

The main In addition to case study method, this study also deployed semi structured interviews, non-participant observations and secondary data sources, mainly from company documents and online sources.

3.4.1. Interview Method

In using case study method, it is common to deploy interview method which is a guided conversation as primary qualitative data sources (Yin, 2009). Depending on the nature of questions posed by an interviewer, there can be three types of interview method, namely: structured, semi-structured, and unstructured interview methods. In the structured interview method, questions are pre-determined by the researcher and limited responses are

coded according to some pre-established criteria (Miles & Huberman, 1994). On the other hand, being highly flexible, unstructured interview method provides open –ended questions and does not impose pre-established answers for the interviewees (Fontana & Frey, 1994).

Semi-structured interview method however is viewed more flexible and permit a researcher to have better focus in framing interview questions to suit the purpose of the research, and taking into account the interview participants' perspectives and circumstances (Daymon & Holloway, 2002). In doing field research, Neuman (2014) suggested an in-depth interview method is more suitable. Neuman (2014: 461) argued that:

"The field interview is a joint production of a researcher and one or more members. Members are active participants whose insights, feelings, and cooperation are essential parts of a discussion process that reveals subjective meanings."

The researcher carried out in-depth interviews with a total of 26 participants, ranging from top-level managers, mid-level managers, lower-level employees, suppliers, customers, and regulators of related organizations. Top-level managers included in the interview are: the chairman (RealEstateOrg and GarmentOrg) and Director (GarmentOrg), General Manager (TelcoOrg) and General Manager (RealEstateOrg), middle –level managers include Deputy General Manger (TelcoOrg), Manager-Electronic (TelcoOrg), Deputy General Manager (RealEstateOrg), Architect (RealEstateOrg), Maintenance Engineer (GarmentOrg), and lower level employees refer to Executive-Legal & Infrastructure (TelcoOrg), Executive-Customer Care (TelcoOrg), Executive (RealEstate), Construction Supervisor (RealEstae), Accounts Officer (GarmentOrg), Techincal Staff (GarmentOrg) who work as frontline employee. The interviews were conducted in the natural settings preferred by the

interviewed participants. Each interview process used a set of open-ended questions to guide the interview.

As interviewees are chosen from different tiers of management levels of the case organization as well as from outside stakeholders like customers, suppliers and regulators, it is expected to have different answers on same issue from different people due to variation of their backgrounds and roles in the case organization. As the objective of the study is to explore the existing business practice and barriers or enablers in climate change adaptation, the researcher considered those variations in both collecting and analyzing data. For this reason, interview questions were not pretested and interview questions were tailor made based on organizational contexts and categories of respondents. See Appendix-C for samples of guiding questions used in some of the interviews.

In choosing the interviewed participants from the case studies, the researcher reached out directly to the key decision makers or business owners and requested their permission to interview their staff. Then the researcher approached the identified list of participants to arrange for an interview. First introductory interview was conducted with top manager, then he referred to another manager from mid –management level, then mid-manger referred another participant from lower level-employees. Other participants like customer, suppliers, and regulators were selected by the researcher based on the business sector.

In the interview session, following initial agreement with the business owner and abiding the company policy of not using any electronic device or video camera to record the interview, the researcher relied on note-taking method. The researcher had taken various measures such as cross-check the notes with the interviewed participants to ensure

the quality of obtained data. The researcher also noted on the non-verbal communications like tone of speaking, facial expression, and other body language and following Guba and Lincoln (1991) immediately recorded them separately as ‘nonverbal cues’ in the note books for future interpretation. The interviews were done in Bengali language, and the note taking was also in Bengali language. Later, all the written data using note-taking method were translated into English. The content from these interviews were analyzed as sources of primary data for the research.

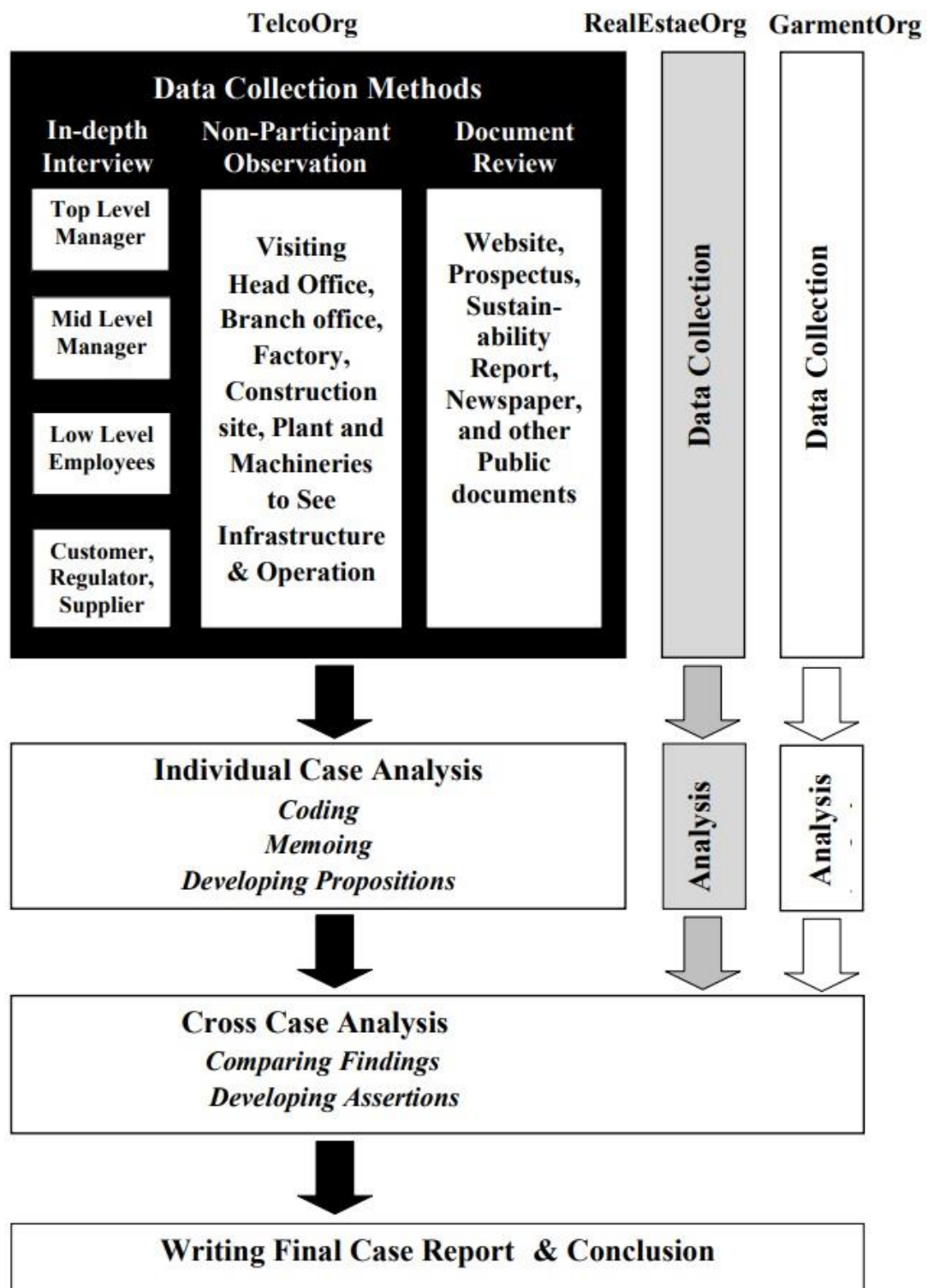


Figure 3.2: Data Collection and Analysis Methods

Table 3.2 included the list of interview participants, with the information regarding their work position, age, sex, academic background and time and place of interviews.

Table 3.3: List of Interviewees

No.	Name of Interviewees	Sex	Age	Academic background	Timeline	Dur- ation	Place
1.	TelcoOrg-General Manager	M	38	BSc (Electrical), MBA	Aug 2016 Dec 2016	2 hrs	Bashundhora
2.	TelcoOrg-Deputy General Manager, Finance	M	35	BBA, MBA	Aug 2016	2 hrs	Gulashan
3.	TelcoOrg-Manager (Electronic)	M	34	BSc(Computer), MBA	Dec 2017	1 hrs	Banani
4.	TelcoOrg-Executive, (Legal & Infrastructure)	M	42	LLB	Nov 2016 Jun 2017	2 hrs	Kafrul
5.	TelcoOrg -Customer Care Executive	M	30	B Com.	Jul 2017	1 hrs	Farmegate
6.	TelcoOrg -Supplier (Electronic service)	M	35	BSc(Computer), MBA	Jul 2016	1 hrs	Dhanmondi
7.	TelcoOrg -Customer (Businessman)	M	40	B.Sc	Jan 2017	30 mins	Farmegate
8.	TelcoOrg -Regulator (Government Officer)	M	50	B.Sc, M.Sc	Dec 2016	2 hrs	Agargaon
9.	RealEstate-Chairman	M	60	B.Arch	Jul 2016 Nov 2016	2 hrs	Panthapath
10.	RealEstate -General Manger	M	50	B.Sc (Civil Engg.)	Nov 2016	2 hrs	Panthapath
11.	RealEstate -Deputy General Manager	M	45	B.Sc (Civil Engg.)	Nov 2016	2 hrs	Panthapath
12.	RealEstate -Executive	M	35	B. Arch	Dec 2017	1 hrs	Mirpur
13.	RealEstate -Construction Supervisor	M	30	Diploma (Civil Engg.)	Aug 2017	1 hrs	Motijheel
14.	RealEstate -Suppliers (Building Material)	M	40	B.Sc	Jan 2017	1 hrs	Farmegate
15.	RealEstate -Architect	M	35	B. Arch	Nov 2017	1 hrs	Segun Bagicha
16.	RealEstate -Customer	M	35	B. Com	Dec 2017	30 mins	Dhanmondi
17.	RealEstate -Regulator	M	50	B.Sc	Jul 2016 Jan 2017	2 hrs	Hatirpul
18.	GarmentOrg-Chairman	M	60	B.Com	Jun 2016 Jan 2017	2 hrs	Tejgaon
19.	GarmentOrg -Director	M	60	B.Com (Management)	July 2016 Dec 2016	2 hrs	Gazipur Tejgaon
20.	GarmentOrg -Maintenance Engineer	M	50	Diploma (Civil Engg.)	Aug 2016 Jan 2017	2 hrs	Tejgaon
21.	GarmentOrg -Accounts Officer	M	35	B.Com	July 2016 Jan 2017	1 hrs	Gazipur Tejgaon
22.	GarmentOrg -Technical Staff	M	30	Diploma (Electrical)	Jun 2017	2 hrs	Tejgaon
23.	GarmentOrg-Financer (Bank Manager)	M	45	B.Com, M.Com	Jul 2016	2 hrs	Gulshan
24.	GarmentOrg -Supplier (Accessories)	M	50	Bsc.	Jan 2017	2 hrs	Kafrul
25.	GarmentOrg -Customer (Businessman)	M	45	B.Sc	May 2017	30 mins	Baridhara
26.	GarmentOrg -Regulator	M	50	B.Sc, M.Sc	Aug 2017	1 hrs	Banani

3.4.2 Observation Technique

This study also deployed observation technique to collect data for the research. This method is useful to be used as for data verification and to compare findings using data from other research methods (Gall et al., 2007). According to Coleman and Briggs (2007), observation can be categorized as ‘semi-participant observation’ and ‘non-participant observation’. In a semi-participant observation, a researcher also participates while observing the social event. In a non-participant observation, a researcher observes the social event or phenomena from a distance and records own interpretations on the event.

This study deployed non-participant observation, and used note-taking to record business practices, operational procedures, quality of infrastructure and equipment during a number of site visits that were carried out in three phases: Phase-1 (May 2016 to August 2016), Phase-2 (November 2106- January 2017) and Phase-3 (May 2017 to August 2017).

As the research objective was to explore the existing business practices of case organization and top managers were informed about the intention of the researcher, unobtrusive observation of regular business routines like operation of machineries in factories and construction sites, product delivery process, waste management etc. did not hamper the behavior of employees significantly.

For TelcoOrg, the researcher visited office building at Dhaka, several network tower and base transceiver stations located at Dhaka Cantonment, Kawran Bazar, Mirpur and sites at rural areas, as well as several service centers and sales outlets located at Farmagate, Mirpur, Banani and Dhanmondi.

For RealEstateOrg, the researcher visited head office at Panthapath, few construction sites located at Mirpur, Motijheel and Uttara, and completed projects located at Kakarail, Banani and Dhanmondi.

And, in the case of GarmentOrg, the researcher visited head office at Tejgaon, factory building and effluent treatment plant at Gazipur, cold storage at Rangpur, a residential house of garment customer at Baridhara in Dhaka.

3.4.3 Secondary Data Sources

This study also used various secondary data sources to obtain data. Documents and archival records belong to an organization is important sources for case study research and hence must be included as a source of data (Yin, 2003). This study obtained secondary data from various sources that include the organizations' prospectuses, sustainability reports, billboards and posters for advertisement, websites, and reports in newspapers.

3.5 Data Analysis

In the qualitative research study, data analysis concerns with systematically process data and undertake data interpretations (Bogdan & Biklen, 2007; Neumann, 2000). Doing data analysis in the qualitative research was noted as a tedious process. In this study, the note-taking data were transcribed using Microsoft words. Data that were processed also include those obtained from note taking from doing non-participant observation, and analyzing company documents and other secondary data sources.

Content was analyzed of transcribed texts from in-depth interview. In qualitative content analysis the researcher not only considers the characteristic of language or words but also interprets their contextual meanings (Tesch, 1990). Content analysis of interview texts

went beyond counting similar words in order to classify them in categories with similar meanings (Weber, 1990).

This study used Miles, Huberman and Saldana (2014) in doing data analysis; in this case these data were analyzed in three stages: coding, analytic memoing, and making assertion and proposition. Techniques proposed by Miles, Huberman and Saldana (2014) have been widely referenced in the literature and extensively being used by the qualitative researchers. Hence, it is justified for this study to adopt techniques to process qualitative data for this study.

3.5.1 Coding Technique

A coding is a short label or tag assigned to a descriptive or inferential data chunk while organizing and compiling data in a research work (Miles, Huberman & Saldana, 2014). A coding indicates some underlying meanings of the respective data set for the researcher. The purposes of doing coding are to categorize the similar data and to facilitate a researcher in reducing volume, displaying, and referring back for comparison.

According to Miles, Huberman and Saldana (2014), coding can be done in two stages: *first cycle coding and second cycle coding*. Strauss and Corbin (1998) termed them as *open coding* and *axial coding* respectively. In first cycle coding (open coding), researcher can assign a single word or sentence to a data set for broadly identifying theme in particular group based on the objective or conceptual framework. Second cycle coding (axial coding or pattern coding) is done to give specific meaning and to find sub categories. In this stage, researcher looks for similar pattern among data and may tag a data set with long explanatory sentences or paragraphs (Strauss & Corbin, 1998; Miles, Huberman &

Saldana, 2014). Different stages of data analysis with their purposes have been shown in Table 3.4.

Table 3.4: Stages of Data Analysis

Analysis Strategies Neuman (2014)	Analysis Strategies Miles, Huberman & Saldana (2014)	Purpose
Open coding	First cycle coding	Describe generalized theme
Axial coding	Pattern coding	Explanatory or inferential codes to create more meaningful analysis
Analytic memo writing	Analytic memoing	Reflective thinking to synthesize data
Outcroppings	Making assertions and propositions	Formalize and systemize into a coherent set of explanation.

In this research, firstly, individual interview transcripts and other data from non-participant observation and document review were written down. Then data were coded. In first cycle coding or open coding, sentences were categorized around broad general themes like physical impacts of climate change, barriers of adaptation and so on. If any sentences contain more than single theme, then it was divided into small parts. In second cycling coding (axial coding), deeper meanings were sought and many specific categories of themes were developed, such as, physical impacts of climate change on infrastructures, physical impacts of climate change on supply chain.

3.5.2 Analytic Memoing Technique

An analytic memo is used to expand meaning and explanation for a data set, beyond just doing coding. It is a piece of narrative that describes the researcher's self-reflection and thinking process on a particular data group. An analytic memo goes beyond simple summarizing and attempts to synthesize information in a much abstract level

(Miles, Huberman & Saldana, 2014). The main objective of analytic memoing is integrating different pieces of data from different data sources.

According to Neuman (2014), analytic memo is actually the discussion of concept based on the reflection of a researcher and serving as a platform from which concrete data is linked with abstract idea or theoretical thinking. In this research, detail description or explanation was written for every specific theme and sub- theme. Every coded theme or sub-theme was explained by individual memo based on integrated information collected from interview responses, non-participant observation and document review.

3.5.3 Making Assertions and Propositions

Data or empirical evidences gathered from social interactions (visible surfaces) are always tied as hidden relationship or structure. The main objective of data analysis is to bring out that unseen structure of social reality as theory. Neuman (2014) called this process as '*outcroppings*' which refers to a recognition or representation of social events or aspects as deeper structural relations. Miles, Huberman and Saldana (2014) described this form of analysis technique as making assertions and propositions. According to them, assertion is a declarative statement supported by evidences from data. Assertion can be revised or modified when discrepancies arise. On the other hand, propositions are conditional statements. Both assertions and propositions are considered as the summary or synthesis of individual observation.

In this research, some propositions were made reviewing the analytic memos of different themes and sub-themes found from axial coding and preliminary individual case report was written down. Then cross case analysis, mainly comparing findings from individual cases, was carried out to identify patterns, similarities, and dissimilarities among

cases. Finally, different propositions held from individual case were again compared with each other for generalization and some assertions were made to write final case reports. Then findings were summarized and compared with research questions for conclusion.

3.6 Research Validity & Reliability

To evaluate the trustworthiness of qualitative research, Lincoln and Guba (1985) mentioned following four criteria that needs to be justified: credibility, transferability, confirmability, and dependability. Credibility refers to in what extent the data and analysis is believable, while transferability denotes the applicability of findings in different context (Lincon & Guba, 1985). Confirmability refers to the degree of neutrality of the research and dependability measures in what extent the findings will be consistent if the research is repeated by others (Lincon & Guba, 1985).

Agreeing with the concepts of Lincoln and Guba (1985) to check the research validity and reliability, Miles & Huberman (1994) and Creswell (2007) proposed different techniques as such triangulation, prolonged observation, peer review, clarifying researcher bias, member checking, providing thick and rich description and negative case analysis and external audit. Creswell (2007: 209) also argued that for any qualitative research the researcher should engage at least any two of the above discussed techniques. In this study, to increase the research credibility, the researcher had taken the following measures in data collection techniques and analysis.

Triangulation in this study simply refers to cross checking of information by different data sources. In this research, the researcher collected data from three different sources such as in-depth interviews, non-participant observation and document reviews. As a result, some information collected from interviewee responses are often confirmed by the

company website, sustainability report or observation of researchers or other interview respondents. Again, the data collection procedures of this research were completed in three phases in between early 2016 to late 2017, which is a considerable amount of time to conduct case study. During the data collection phase, written interview transcripts and initial case report were checked by the interviewees and the top managers of each case organization, which to ensure the credibility of findings and the quality of interpretation could be attained. The researcher also gave detail descriptions of the context and data collection and analyzing techniques of this study which may help these selected participants to determine whether the findings are applicable to other context or settings (transferability).

3.7 Research Ethics

To conduct any qualitative research Miles and Huberman (1994) put emphasis on the terms ‘Harm and Risk’ associated with research participants. By this they imply that individual, group, institution or even any physical objects should not be negatively affected during the research or after sharing the research outcome. As research participants or organization can be jeopardized by disclosing their views, identities, and deviation from standard, researcher must not take advantages of those facts (Miles and Huberman, 1994; Creswell, 2007). So, to avoid harm and risks researchers need to take informed consent of research participants and to ensure their privacy, confidentiality and anonymity in the research output (Miles and Huberman, 1994; Creswell, 2007). Tracy (2010) called this approach as ‘procedural ethics’. Moreover, research integrity in collecting, analyzing and presenting data is another ethical issue in good research (Miles & Huberman, 1994).

This research has been carried out following the above mentioned ethical standard and abiding by the Universiti Malaysia Sarawak Research Policy, 2011 (Version.8) published in the website of Research & Innovation Management Centre (RIMC). While conducting this research, the researcher took formal consent from interviewees and from top managers to go for site visits with in the organizational premises. The researcher also built trustful relationship with interviewees and did not disclose company names, participant's identity, photographs or any negative interpretation in this research paper to ensure their privacy, confidentiality and anonymity. In addition, the researcher did not present any unauthentic information to damage the reputation or public image of any participant or organization.

3.8 Conclusion

This chapter has explained the research paradigm embraced by this study and elaborated details related to research design, data collection methods and data analysis. The important aspects related to validity and reliability of the research are also explained. The subsequent chapter will present the research findings based on the data analysis process and interpretation.

CHAPTER 4

FINDINGS

4.1 Introduction

This chapter presents the research findings that have been structured in three parts. The first part of this chapter describes descriptive findings related to the three organizations of Bangladesh. The research outcomes related to the organizational adaptation process to climate change, manifested via the existing organizational practices and business activities are being presented in the second part of the chapter. The identified barriers and enablers to climate change adaptation in the context of these organizations are also presented here. Subsequently, in the third part of this chapter, the findings related to the outcomes of adaptation responses to climate change taken by these organizations are described. In this part, the emphasis is given on describing the research outcomes related to the dynamic interplays between these organizations and the environment, and how the identified barriers and enablers can shape these interactions. This chapter ends with a conclusion section.

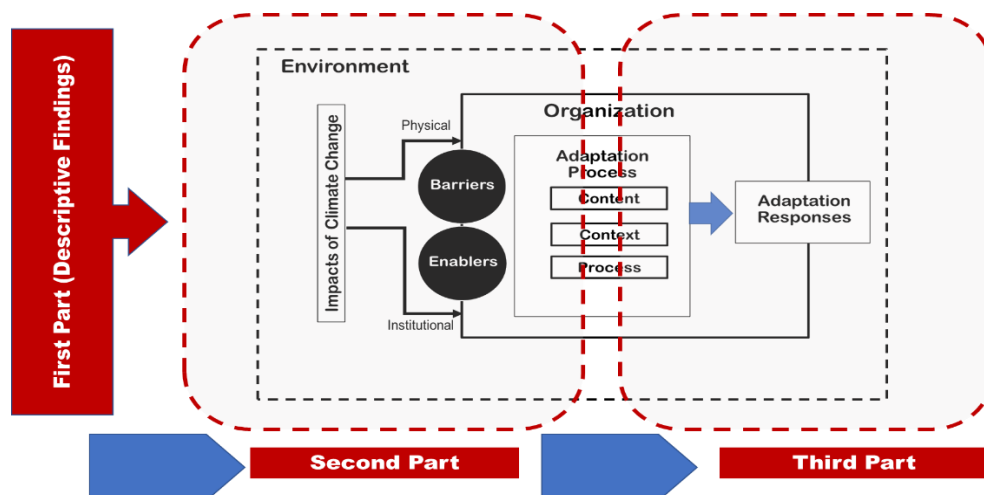


Figure 4.1: Visualization of the Structure of this Chapter to Present Findings

4.2 Citation in Text

In this section, the empirical profiles of each organization – TelcoOrg, RealEstateOrg and GarmentOrg – are presented as below.

TelcoOrg is one of the largest private telecommunication service providers in Bangladesh. The organization was established in 1996, comprising of local and foreign shareholders as business owners. As of 2017, the organization employed around 3000 people (full time and part-time employees). To date, it has around 1600 base transceiver stations and 94 service centers. Its corporate office is located at Dhaka, the Capital of Bangladesh. TelcoOrg is viewed as having good corporate reputation with regard to the organization's commitment in taking initiatives promoting environmental awareness and sustainability.

According to a local newspaper that was published on 16 January, 2011, the Corporate office of TelcoOrg is one of the prestigious green buildings or sustainable architecture in Bangladesh, which emits less carbon, consumes less energy and utilizes maximum natural light and airflow for the comfort of inhabitants. It was mentioned in the organization website that TelcoOrg also received international prize in 2004 for improving poor people's lives, and CSR Leadership award in 2018. Previously the TelcoOrg also received CSR awards in 2014, as reported in local newspaper published on May 29, 2014. TelcoOrg took endeavor to become a 'Green Company' in 2007 and initiated 'Climate Change Program' in 2008 to gain environmental sustainability and help community people (as per Annual Report 2102).

RealEstateOrg is a real estate organization in Bangladesh that builds and sells residential and commercial buildings. The organization was established in 1994. The

headquarter office of this organization is located in Dhaka, the capital of Bangladesh. Due to its many successful business ventures, the business has been diversified in six different areas including architectural consultancy, real estate development, importing and installing high-tech building materials, furniture manufacturing and magazine publishing. As of 2017, the organization has employed more than 550 full-time employees. There has been a successful track record for the organization in developing landmark residential and commercial buildings within the agreed project timeframe. Such good track record is highly attributed to the effective leadership of the business owner who is an architect, and the Managing Director who is a civil engineer. RealEstateOrg has a solid business reputation in the real estate business sector in Bangladesh.

GarmentOrg was established in 1985 and is considered as one of the biggest industry players in the garment business sector. The organization manufactures clothing and readymade garments for export. To date, its clients include several international clothing retailers such as GAP, Walmart and Zara. The organization has a garment factory located at Gazipur industrial area and a head office at Tejagaon in Dhaka. The factory building is a 10-story modern industrial building of 300000 square feet floor area. As of 2017, the organization employs more than 2000 employees (both part-time and full-time). GarmentOrg has diversified its business in other areas such as cloth washing, real estate development, and cold storage business.

4.3 Climate Change Impacts – Organizational Viewpoints

In the context of findings related to climate change impacts, two major codings are used to categorize the qualitative data related to this area, namely physical impacts and institutional impacts. Physical impacts refer to direct impacts on organization caused by

climate change related bio-physical changes like extreme weather (e.g., cyclones, floods, altered precipitation), high temperature, sea-level rise, water scarcity, and ecosystem damage (Lash & Wellington, 2007; Winn et al., 2011; Linnenluecke, Griffiths & Winn, 2012). Institutional impacts refer to impacts on organizations from climate change related regulatory change, pressure from customer groups, environmental activists, investors and other stakeholders (Arnell & Delaney, 2006; Berkhout et al., 2006; Porter & Reinhardt, 2007; Nyberg & Wright, 2015). The following presents the related findings for TelcoOrg, RealEstateOrg and GarmentOrg.

4.3.1 Related Findings from TelcoOrg

4.3.1.1 Physical Impacts of Climate Change

Based on the interview data, this study found that the key decision makers of TelcoOrg viewed the associated business risks related to climate change in the following areas: physical risks, financial risks and regulatory risks. TelcoOrg has continuously faced great challenges in managing these risks and the ongoing effects of climate change on their business operations. Since several years of its operation, the extreme weather events such as flooding and tropical cyclones happening in Bangladesh have greatly impacted their business. Based on past experience, the organization has suffered accumulated business losses substantially, and these have contributed to the decline of business revenue throughout the years of its operation. In the scenario of extreme weather events, their telecommunication infrastructures like network towers and related electrical devices and equipment that belong to 13,000 of their base stations, located in remote areas of Bangladesh, are always exposed to physical damage. Heat waves due to increase temperature also has contributed to poor network signals, electronic equipment

malfunctioned, as well as increased energy consumption for higher cooling load to cool the machines and equipment.

In addition, the Executive (Legal and Infrastructure) participated in the interview also described about the ongoing floods and cyclonic events in Bangladesh that have created logistic difficulties in sending supplies (e.g., fuel for generator, parts of equipment) and undertaking repair and maintenance of the damaged base transceiver stations. The time delay in repairing the infrastructure damage has led to major service disruptions affecting communication coverage networks and internet service connections.

In the context of post disaster crisis, TelcoOrg also has to deal with the problem in declining telecommunication service subscribers. The General Manager of TelcoOrg described the challenges to manage the declining number of their customers due to natural disaster. According to him, the post disaster crisis phase typically brings problems and issues in the areas related to socio-economic conditions and healthcare status of the affected communities. When people lose their homes due to flooding or cyclones, they face poverty challenge and economic hardship, and these also greatly affect their health status including mental health. There is more works to be done for telecommunication sector in the areas related to early warning system and post disaster crisis management.

4.3.1.2 Institutional Impacts of Climate Change

At the institutional level, based on past experiences, the Deputy General Manager of TelcoOrg also mentioned that the climate change impacts facing Bangladesh will continue to bring challenges to the organization to deal with. These challenges are mostly related to the increase of operational costs due to an increase prices for fuel and electricity, which is beyond the control of the organization. Also, when the energy crisis happening

such as electricity disruptions for a longer period of time, the organization has to spend more to obtain fossil fuel which is very expensive and harmful for the environment,

Further, according to the Executive (Legal and Infrastructure) of TelcoOrg, the telecommunication business has to face constraints in doing business expansion and planning because of the changes of land value and tougher regulations from local administrators in procuring desired land to setup base transceiver stations. Moreover, while choosing land, expected extreme weather events like cyclone and flood add extra consideration. The future plan to expand the network coverage will be affected because of these factors. Also, according to the General Manager, TelcoOrg is facing financial difficulties to acquire resilient construction materials and climate friendly (efficient) electrical/electronic equipment because of the high cost, and high tax imposed on these products. In addition to these ongoing challenges, TelcoOrg also has to deal with societal pressures and criticism regarding the public perceptions about their role affecting environment and doing not enough to reduce carbon emission and help the affected communities.

Nevertheless, the Deputy General Manager of the TelcoOrg confidently assured that managing climate change impacts will always become their priority.

“We are afraid of future energy crisis, destruction of our remote infrastructure and supply network by extreme weather, sustaining our customers in vulnerable areas and new government regulations...Our company also takes climate change as a business opportunity to produce new climate proofing products and to be engaged with government and community to show our corporate social responsibility.”

(The Deputy General Manager of TelcoOrg)

4.3.2 Related Findings from RealEstateOrg

4.3.2.1 Physical Impacts of Climate Change

In the context of RealEstateOrg, the General Manager of the organization in the interview mentioned that: “...floods, cyclones, and heavy rainfall most often disturb construction works, supply chain, and decrease life span of building. Floods free land is also a concern for future investment.”

Due to climate change impacts, the organization has experienced many disruptions in the past especially in their logistic business operations to deliver building construction materials to the project sites, and the construction activities to complete the project in due time. According to the General Manager of RealEstateOrg, in order to effectively manage these challenges, the organization has to be really good in project management and scheduling construction works, in this case the first phase of building construction will always focus on completing outdoor construction activities. Activities related to digging earth for foundation, casting concrete roof, laying bricks, and plastering of exterior wall have to be carried within a very tight schedule during winter and dry seasons. Bangladesh is known to experience heavy rainfall during the tropical monsoon seasons. Because of the extreme weather variations (heat waves and severe rainfalls), the organization is always in the situation to anticipate an increase operating costs, especially in the maintenance of their new and existing buildings.

The Deputy General Manager of RealEstateOrg explained that in the real estate business sector in Bangladesh, a long period of dry and hot weather seasons would lead to a shortage of underground water sources and increase consumptions of electricity because of the needs for heavy cooling load. A large portion of population in Dhaka city is already

facing the crisis of fresh water for domestic use. Alam (2017) reported in The Daily Star (a newspaper published on June 1, 2017) that load shedding (absence of electricity), ground water depletion, and malfunction of deep tube wells are the main reasons of water crisis all around Dhaka. Sarkar (2019) in another daily newspaper, Financial Express (published on February 11, 2019) reports: *‘Like in every year, the scourge of water crisis has already begun hitting Dhaka city this year, too.’*

The Deputy General Manager of RealEstateOrg also added that the extreme hot temperature and heavy rainfall increase the cost to maintain and repair damaged building, such as exterior and interior finish materials of a building to solve issues related to dampness and decay. In addition, salinity in river bed also increases the portion of salt in sand particles, which is essential construction material in Bangladesh. These sands, being low quality, will affect the overall quality of a completed building. Moreover, Construction Supervisor of RealEstateOrg also complained that due to extreme heat and breakout of different diseases in construction sites, many of the daily labors often become sick and hampered regular construction work in summer.

4.3.2.2 Institutional Impacts of Climate Change

With regard to the institutional impacts of climate change, RealEstateOrg faces challenges in finding suitable lands for their construction projects. According to the Chairman of RealEstateOrg, suitable project sites in urban areas and city centers in Bangladesh are difficult to get due to high population density and high land value. Because of this issue, to remain competitive in the sector, most real estate organizations have to search for suitable lands outside cities having certain criteria such as being flood free, accessible by roads and having supportive utility connections like electricity, gas and

water. In the context of Bangladesh, the Chairman of RealEstateOrg mentioned that it is really difficult to find such lands because of poor urban planning policy and implementations.

The Chairman of RealEstateOrg further explained that, regulations relevant to building code and urban planning are becoming tougher. This is because additional information are required to furnish in applying for building approval. It should be noted here that Dhaka Building Construction Act-1996 has already become obsolete and the New Building Construction Act-2008 has been imposed by Ministry of Housing and Public Works, Bangladesh since May 2008. According to the new rules, more environmental factors are needed to be considered in architectural and engineering design; as a consequence of this issue, the project design team will require more time to comply with the rules. On top of that, project cost is also susceptible to risks of exceeding the targeted budgeted and extension of project completion time. This is due to the long process of obtaining building permit and completing the necessary building construction process following required standard and specifications as expected by the related government agencies.

According to the General Manger of RealEstateOrg, the Government of Bangladesh stopped to entertain any new application for gas utility connection for any residential and industrial usage since April 2015. Because of this, real estate companies are facing various clients' complaints and dissatisfaction. Moreover, because of the strict environmental regulations, traditional fossil-fuel based brick-kilns have been decreasing and some of the brick-kilns and suppliers of sand and stones already moved away from the city. The situation had caused the company to deal with higher transportation cost to bring

those construction materials from their suppliers located far away from the city or project sites.

The Chairman of the RealEstateOrg also observed that there has been a growing public awareness about climate change impacts that is creating more demand for energy efficient and green building for residential or commercial purposes. However, the real estate business sector in Bangladesh is facing unresolved problems related to delayed certification process, costly raw materials, and unavailable and less affordable technologies to construct green buildings.

4.3.3 Related Findings from GarmentOrg

4.3.3.1 Physical Impacts of Climate Change

The Director of GarmentOrg informed that from their organizational viewpoint, there can be four major business risks that he perceived due to climate change impacts, namely: physical risk, financial risk, regulatory risk, and market risk. He mentioned in an interview that *“...we are worried about our supply chain, energy and water crisis, diseases of employees, confidence of our foreign buyers and future government regulation.”*

The Director of GarmentOrg further stated that the physical impacts of climate change for the company can be associated with all risks arising from extreme weather events such as floods and cyclones that can disrupt business supply chain and damage infrastructures particularly their factory buildings and warehouses, and also transportation routes. From his viewpoints, the company will be in financial risks due to logistic difficulties in carrying raw materials from seaports and sending finished goods to the seaports for cargo shipment to overseas. The Technical Staff of GarmentOrg further mentioned that during dry season, there will be shortage of fresh water supply, which is

necessary for washing plants. He also informed that during the hot summer season, the increased cooling load will cause longer use of generator (run by fossil fuel), and many workers tend to get sick due to exposure on working under high temperature.

In the agreement with the Technical Staff, the Account officer of GarmentOrg mentioned that during flood seasons, there will be more workers not coming from work due to water logging and certain water borne diseases. Due to these highlighted challenges, productivity will go down and the company will face the risks not meeting the shipment deadline.

4.3.3.2 Institutional Impacts of Climate Change

With regard to the institutional impacts of climate change, the Director of GarmentOrg informed that the organization will continue to experience challenges in managing their operating costs, particularly in dealing with increasing energy cost for electricity and fuel. There has been also an increased pressure by the regulators for the garment manufacturing business to be more environmental-friendly in running their manufacturing operations, by acquiring climate resilient and suitable equipment and adopting required standards. However, he claimed that the effort to transform their manufacturing process to be more sustainable and environmentally friendly is just too expensive to consider. Without grant funding or financial assistance from the Bangladesh Government or via some affordable financing mechanisms, GarmentOrg will not be able to transform their business operations and acquire better technologies for climate adaptation.

Apart from these challenges, the sector also faces tough regulations in the areas of occupational safety and labor standards. These standards are not only being imposed by the local authorities (such as the Ministry of Environment, Ministry of Industry), but also by

the international bodies and foreign customers. The industry players are urged to comply with recommended criteria for exporting their products to reach international clients along the global supply chain. According to the Chairman of GarmentOrg, the organization is also concerned if they do not comply with the tough regulation and restrictions, then their international clients might shift to other countries like India, Vietnam, China and other Asian countries. The Chairman of GarmentOrg stated that he is not optimistic enough to find any opportunity that can emerge from climate change impacts. He said: “...*till now, we cannot see any business opportunity due to climate change.*”

4.4 Organizational Adaptation Process to Climate Change

In this subsection, a summary of findings related to physical and institutional impacts are presented first. Then, the findings related to how each organization adapts and what enablers and barriers shaped the adaptation process and responses are given. Engaging Pettigrew’s processual approach, these barriers and enablers are viewed to be embedded in the outer context as well as internal context. More specifically, these are factors, internal and external to these organizations, which shape the dynamic interactions between these organizations and their environment.

4.4.1 A Summary of Findings related to Physical and Institutional Impacts

The following Table 4.1, Table 4.2 and Table 4.3 present the details findings related the perceived physical and institutional impacts for TelcoOrg, RealEstateOrg and GarmentOrg, respectively. These qualitative findings are being further organized according to the related business processes. The findings about the organizational practices and activities for each organization in their adaptation process are being further analyzed to determine the outcomes of their adaptation responses.

Table 4.1: Physical and Institutional Impacts of Climate Change - TelcoOrg

Business process		Climate Impact	Adaptation Responses
Procuring Land for Infrastructure	Physical Impacts	Floods and land sliding due to heavy rain damage network towers & equipment at base stations.	Company avoids buying floods prone land.
	Institutional Impacts	- Higher land value in flood free areas - Urban planning regulation prohibits buying land in restricted areas.	Company avoids installing network tower/base stations in environmentally restricted areas.
Construction of telecommunication Infrastructure	Physical Impacts	- Higher cost is being incurred for designing & building of towers and base stations to withstand cyclones & floods. - Installation work & delivery of materials to site are affected in extreme weather events.	- Try to finish outdoor installation works during dry seasons. - Invest more money to finish installation in shorter time.
	Institutional Impacts	High cost for resilient construction materials & technology.	Lobby with government.
Transmission Process & other operation	Physical Impacts	- Tower may be uprooted by cyclone. - Network failed during cyclones. - Weak signal & malfunctioning of equipment in high temperature - Equipment is damaged while base stations are flooded. - Higher cooling load for hot summer	- Installing more wind resistant network towers - High temperature resistant electronic equipment
	Institutional Impacts	- Climate friendly electrical equipment is expensive due to high tax on imported technology. - Severe electricity crisis causes longer use of generator - High price of fossil fuels.	- Old equipment/machineries are substituted by more energy efficient (low emission) machineries (Nano Project). - Use of DC Ventilation system - CNG vehicle for petrol.

Table 4.1 continued

Business process		Climate Impact	Adaptation Responses
Selling and Marketing Plan	Physical Impacts	▪ Reduced revenue in cyclone and flood affected community.	▪ Invest more money in climate adaptation projects targeted for climate vulnerable community in partnership by Govt./NGOs.e.g. Community information Service, Online Schooling.
	Institutional Impacts	▪ Demand for different climate proofing products and services. ▪ Criticism from social bodies for polluting environmental & showing less social concern.	▪ Provides different climate proofing products like SMS based early warning system, Mobi-cash, Health line. ▪ Emission reduction target. ▪ Water & waste recycling. ▪ Process improvement.
Maintenance	Physical Impacts	▪ Gradual damage of infrastructures by climate variability causes higher maintenance cost. ▪ Maintenance staff with supplies fail to reach remote climate affected towers and base stations.	▪ Use of more durable outdoor materials and finishes. ▪ Maintenance automation (detecting faults and doing repairing work at remote station automatically from head office).
	Institutional impacts	▪ High price of fossil fuels incurs financial loss due to extended use of generators.	

Table 4.2: Physical and Institutional Impacts of Climate Change – RealEstateOrg

Business process		Climate Impact	Adaptation Responses
Procuring Land for Infrastructure	Physical Impacts	▪ Floods and water logging due to heavy rain damage regular activities of apartment owners.	▪ Company avoids buying floods prone land.
	Institutional Impacts	▪ Higher land value in flood free areas. ▪ Urban planning regulation prohibits buying land in restricted areas. ▪ Restriction on building permits in flood & cyclone prone areas. ▪ Customers are not interested to buy flats in flood & cyclone prone areas.	▪ Company avoids construction of apartment/housing in environmentally restricted areas.

Table 4.2 continued

Business process	Climate Impact	Adaptation Responses
	Physical Impacts	Floods and water logging due to heavy rain damage regular activities of apartment owners.
Procuring Land for Infrastructure	Institutional Impacts - Higher land value in flood free areas. - Urban planning regulation prohibits buying land in restricted areas. - Restriction on building permits in flood & cyclone prone areas. - Customers are not interested to buy flats in flood & cyclone prone areas.	- Company avoids buying floods prone land. - Company avoids construction of apartment/housing in environmentally restricted areas.
Designing & building permit	Physical Impacts Both design cost & time have been increased as more environmental design parameters are being considered to reduce negative climatic impacts on building.	- Provides training to employees. - Uses more advanced software in design to simulate or forecast impacts of climate.
	Institutional Impacts - High cost for resilient construction materials & technology. - Longer time to get building permit & utility connections.	- Lobbies with government through (REHAB) Real Estate & Housing Association. - Communicates by media.
Selling and marketing plan	Institutional Impacts - Reduced price of apartments in flood and cyclone prone areas. - Customer's preference has increased for environment friendly buildings. - Longer time to get building permit & utility connection. - Imported green materials are costly for high taxation. - Severe electricity crisis causes longer use of generator. - High price of fossil based fuels.	Bearing risks

Table 4.2 continued

Business process		Climate Impact	Adaptation Responses
Construction Execution	Physical Impacts	▪ Extreme weather events hamper outdoor construction works and increase project cost and time.	▪ Quicker schedule for outdoor construction work to be done in dry season or winter. ▪ Provide more training to construction workers.
	Institutional Impacts	▪ Criticism from social bodies for polluting environment & showing less concern for society. ▪ Adaptation technologies like water & waste recycling, renewable energy plant are costly.	▪ Bearing risks
Maintenance	Physical Impacts	▪ Gradual damage of infrastructures by climate variability causes higher maintenance cost. ▪ More cooling load in hot summer.	▪ Use of more durable outdoor materials and finishes like tiles, stone instead of paint.
	Institutional Impacts	▪ Customer's dissatisfaction for long use of generator due to energy crisis ▪ Pressures on public utilities.	▪ Bearing risks

Table 4.3: Physical and Institutional Impacts of Climate Change - GarmentOrg

Business process		Climate Impact	Adaptation Responses
Procuring Land for Infrastructure	Physical Impacts	▪ Floods and water logging due to heavy rainfall cause damage to machineries and supply chain, and severely affects employee health. ▪ Increased absence of employees at work place decreases productivity.	▪ Company avoids buying floods prone land for setting any factory.
	Institutional Impacts	▪ Higher land value in flood free areas ▪ Urban planning regulation prohibits buying land in restricted areas.	▪ Factories are moving outside the city center.

Table 4.3 continued

Business process	Climate Impact	Adaptation Responses
Designing factory & getting building permit	Physical Impacts	Both design cost & time have been increased as more environment related design parameters are being considered.
	Institutional Impacts	- Invest more money to hire expert consultant to finish design in shorter time. - Lobby with government through BGMEA (Bangladesh Garments Manufacturers & Exporter Association) and BKMEA (Bangladesh Knitwear Manufacturers & Exporters Association) to change regulations. - Foreign customer's preference has increased for environment friendly factories. - Land use policy & building code are becoming harder day-by-day. - Media & social activists have become strong for occupational safety, health, and environment.
Production & other operation	Physical Impacts	- Extreme weather events hamper operation, and manufacturer fails to meet shipment deadline. - Heat stress & diseases reduce employee productivity & delay shipment. - Difficulty in getting raw materials in factory & delivering finished products for shipment at sea port. - Higher cooling load in hot summer. - Water scarcity - Build infrastructures/factories that are more wind resistant. - Use of natural light & ventilation inside factory. - Energy efficient machineries and production process are used. - Recycle Water & sell waste. - Own deep tube-well for continuous water supply.
	Institutional Impacts	- Foreign customers have imposed more environmental regulations. - Climate friendly electrical equipment is expensive due to high tax on imported technology. - Labor union and media occasionally create labor unrest for increasing wages and employee benefits. - Severe electricity crisis causes longer use of generator. - High price of fossil-based fuels. - Use ETP (Effluent Treatment Plant). - Condensed Natural gas based vehicles (instead of Petrol). - Recycle Water & waste recycling. - Train Employees.

Table 4.3 continued

Business process	Climate Impact	Adaptation Responses
	Institutional Impacts ▪ Loss of foreign buyers' & investor's confidence. ▪ Criticism from social bodies and media for polluting environment & showing less concern for employees & society.	▪ Invest more money in employee welfare and external CSR activities. ▪ Target less carbon emission.
Maintenance	Physical Impacts ▪ Higher maintenance cost for gradual damage of infrastructures.	▪ Use more durable exterior materials.

4.4.2 TelcoOrg– Barriers and Enablers to Climate Change Adaptation

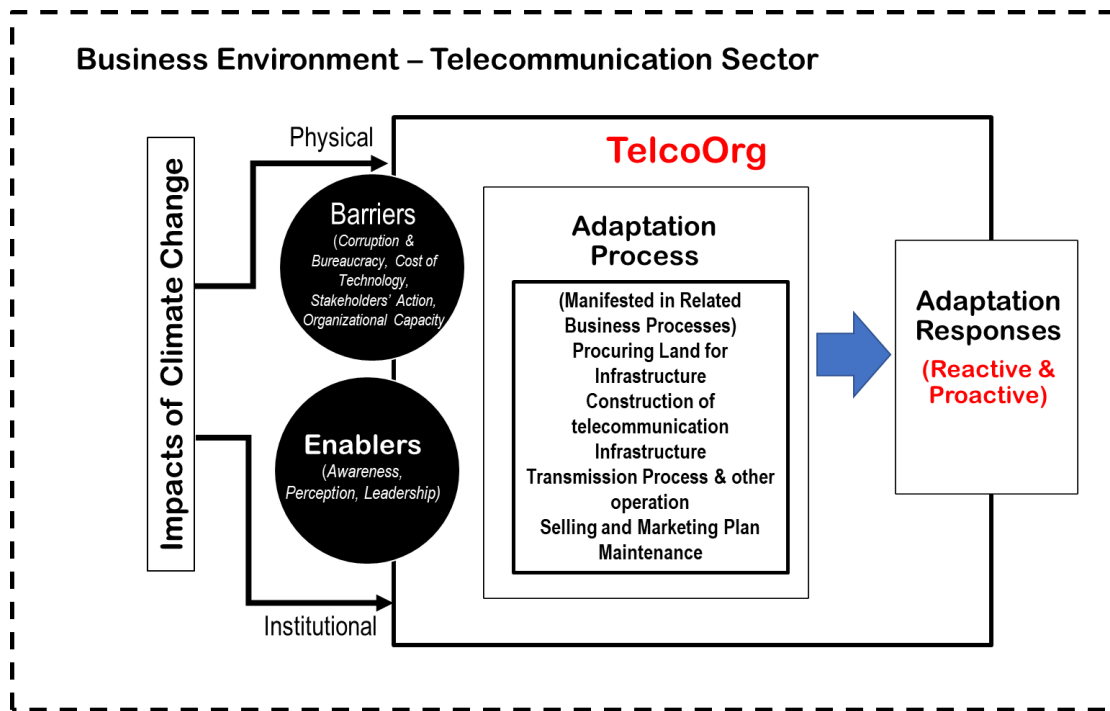


Figure 4.2: A Summary of Related Findings -TelcoOrg

Figure 4.2 depicts a summary of the related findings including barriers and enablers that have been identified in the research for TelcoOrg. The following describes the findings.

4.4.2.1 Enablers to Climate Change Adaptation

This study identified three enablers that are positively affecting TelcoOrg's adaptation to climate change. These enablers are: leadership, perception, and awareness. All these enablers are situated within the internal context and are embedded in the organizational adaptation process which being manifested through related business processes and activities, as presented in Figure 4.2.

Leadership-Inner Context

Based on the research outcomes, this study found that leadership is a vital enabler that contributes to strong corporate environmental awareness, positive perception and organizational capacity towards devising and implementing various initiatives and strategies related to climate change adaptation for TelcoOrg. Strong corporate leadership at TelcoOrg was cited by most of the employees who participated in the interview sessions. One of the Executives of TelcoOrg mentioned that: “...it is our top manager or CEO who decides every strategy. We get everything from our top manager.”

Top management of TelcoOrg comprising CEO and other Senior Managers were found to be quite knowledgeable and demonstrated good experience and technical knowledge in dealing with organizational problems related to climate change. This study found that since its inception the organization has been led by several visionary leaders who have carried leadership brand of “Green Champion”. TelcoOrg leaders defined adaptation strategies for the business, and communicated these strategies directly to their employees. They have been perceived by most of the employees involved in the interview as very proactive and highly engaged in many corporate initiatives related to climate change such as setting target for emission reduction, establishing rainwater harvesting

system and in-house wastewater treatment plan and devising dedicated and strong communication platforms to raise awareness about climate change impacts.

Perception-Inner Context

Based on the interview data, this study found TelcoOrg has been successful in building strong and positive perceptions among its senior management with regard to the organizational commitment to manage climate change impacts. For example, in the interview sessions both technical and non-technical manager was able to recognize and explain climate risks as well as opportunities for business. The General Manager who is Electrical engineers appeared to be more aware about how extreme weather events have been affecting the business operations and processes. Again, Deputy General Manager who is working in Finance Division of the company also mentioned different climate proofing efforts of the company and gave different examples of projects where the company is engaged with community development as business opportunity due to climate change. Due to having this strong perception, they also tend to be proactive in addition to reactive in the adaptation responses with regard to climate change.

Awareness-Inner Context

This study found that TelcoOrg has successfully established strong organization awareness regarding climate change impacts among its employees. The Deputy General Manager of TelcoOrg commented the following:

“Though we heard about climate change from newspapers, television, public seminar, and university, it is our management who teach us most about climate change adaptation. Our Company is continuously thriving for new business strategies for climate proofing their own operation and increasing the resiliency

of climate vulnerable community of Bangladesh. Our 'Click Green' initiative is to build employee awareness about environment and climate change as well."

This study found that initiatives related to organizational learning about climate change are being implemented in the organization such as using corporate website, sustainability report and internal training to continuously upgrade staff knowledge. As a result, from this strong organizational awareness, various related activities are being planned and carried out annually as corporate activities and commitment towards protecting environment. For example, a competition "Click Green" launched on 5th June 2007 has become an official corporate activity associated with 5th of June, World Environmental Day.

The organization established a dedicated Department of Business Continuity and Crisis Management, which stated Corporate Climate Initiatives since 2008. The department has been active in implementing various activities related to environmental awareness, setting emission target and transforming the corporation be known as "Green" organization. Through the role of this department, various corporate social responsibility activities with a focus on climate change impacts such as increasing use of renewable energy, developing awareness about climate risks and campaigns involving communities and other stakeholders, have been carried out systematically throughout the country to boost the corporate reputation.

Based on the feedback obtained from the interviews, TelcoOrg was found to be motivated to emulate efforts done by other large multinational corporations such as HSBC and Nestle that have been successfully in attaining international standards related to adaptation to climate change. The General Manager of TelcoOrg commented that:

“We are still not facing any strong pressure from competitors, suppliers, customer groups, media, and environmental activists on climate change adaptation issue. Yet, they are not so strong enough to oblige us to engage in adaption. Whatever we are doing is done by our self-concern.”

4.4.2.2 Barriers to Climate Change Adaptation

This study identified four barriers that are affecting TelcoOrg’s adaptation to climate change. These barriers are: corruption and bureaucracy, technology, stakeholders’ actions and organizational capacity. The three barriers - corruption and bureaucracy, technology, stakeholders’ actions - are situated within the external context; organizational capacity is situated in the internal context. All of these barriers however are affecting the organizational adaptation process at certain extent.

Corruption and Bureaucracy- Outer Context

Based on the findings from the interview responses of top managers and regulators, this study inferred that unfriendly regulation, bureaucracy in government agencies and corruption in some extents both in internal and external environment of business are the main factors contributing to slow progress of the telecommunication business to be more proactive and engaged in taking effective mitigation and adaptation strategies for climate change. For example, Deputy General Manager of TelcoOrg said that they have money to expand and diversify the existing business but unable due to regulatory restrictions. In this regard, a local newspaper The Daily Star (2010, June 30) reported that the proposed Bangladesh Telecommunication (Amendment) Act-2010 was unfriendly and against the vision for Digital Bangladesh. According to that news report, the new telecommunication laws included 21 sections giving regulatory body the power to fine any telecommunication

operator without chance for appeal, which is repressive. Government also most often complained about illegal VOIP (Voice over Internet Protocol) calling which deprived government from huge revenue. According to a newspaper The Daily Star (2018, November 12), from October 14 to November 1, 2018 Bangladesh Telecommunication Regulatory Commission (BTRC) confiscated 42150 mobile SIMs which were using in illegal international calling. The report also stated that earlier in September 2018 BTRC also seized 10947 Sims and through their continuous action government till now saved up to 8670 Million BDT. In TelcoOrg, the General Manager stated that: *“Our management is committed to show zero tolerance for any kind of corruption.”*

Cost of Technology - Outer Context

Telecommunication sector in Bangladesh is considered as a climate sensitive business sector. Despite continuous efforts being taken by TelcoOrg to upgrade their electrical equipment and infrastructures to be more climate resilience, yet the progress is slow because of the high cost related to acquire and maintain the efficient technology. Due to high tax on telecommunication operator, most company cannot afford the upgrading the technologies. According to the newspaper report of Abdullah (2019) in Dhaka Tribune (published on June 18, 2019), the Association of Mobile Telecommunication Operators of Bangladesh (AMTOB) criticized the government budget of 2019-2020 fiscal for increasing supplementary duty on talk time (5% to 10%), imposing fresh tax on retain earning of listed companies and adding 10%-20% import duty on smartphone, which would bring negative impacts on telecommunication companies. The report stated that: *“The rise in minimum tax threatened to make 4G expansion and the required investment for upcoming 5G in Bangladesh is uncertain.”*

Organizational Capacity –Inner Context

Reflecting on the other identified barriers, it is not surprising for this study to find out that there is a lack of organizational capacity in adapting to climate change. The General Manager of TelcoOrg commented that:

“Based on whatever we experienced till now, we have adaptive capacity towards certain extent, but we are unable to predict what will happen in future? Some effects of climate change are directly visible and some effects are indirect and very slow. We have just started. And, we are still learning.”

Because of the uncertain and unpredictable nature of climate change effects, TelcoOrg still has no solid understanding about what types of climate change related incidents will affect their business in future, and to what degree of intensity the impact will be.

According to the General Manager of TelcoOrg, the organization also is not clear about what types of resources they need in order to have clear understanding whether they are prepared for the future impacts of climate change. Although the international shareholders of TelcoOrg provide some strategic directions and technological supports, the lack of skills among their employees as well as financing matter are contributing to their slow progress in climate adaptation. However, the organization has continued to invest resources for training and R&D to enable the organization to continue to learn to formulate and implement better adaptation strategies for business sustainability.

4.4.3 RealEstateOrg– Barriers and Enablers to Climate Change Adaptation

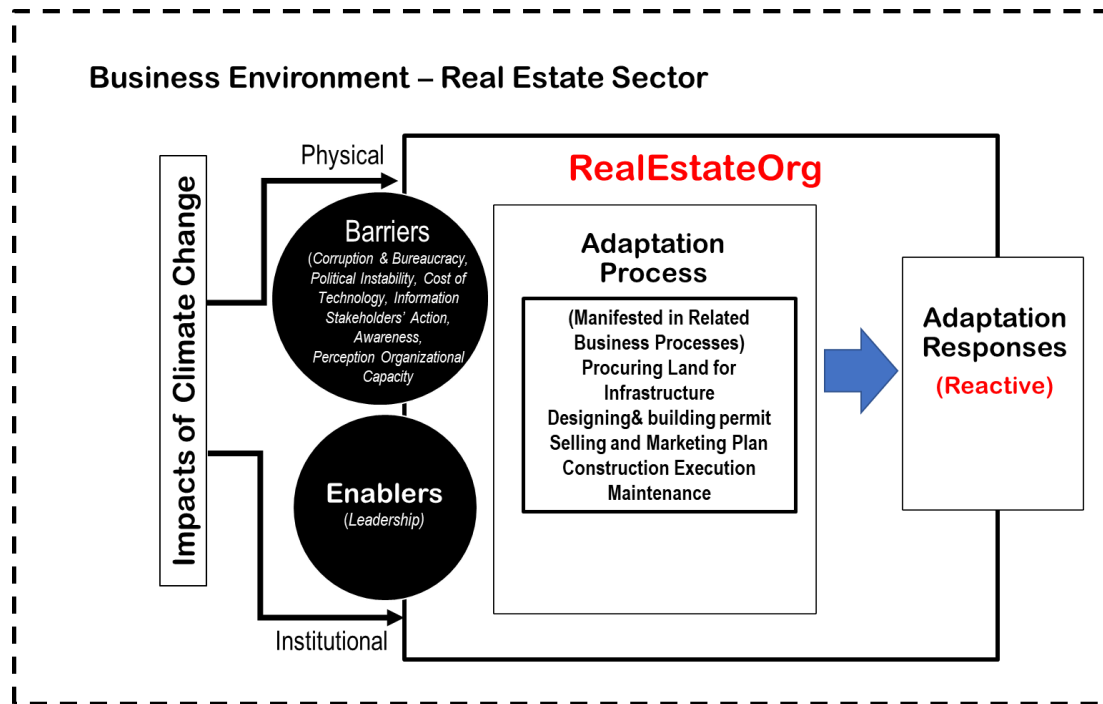


Figure 4.3: A Summary of Related Findings - RealEstateOrg

Figure 4.3 presents a summary of the related findings including barriers and enablers that have been identified in the research for RealEstateOrg. The following describes the research findings in details.

4.4.3.1 Enablers to Climate Change Adaptation

Only one enabler that has been identified in this study is positively affecting RealEstateOrg with regard to some initiatives related to adaptation towards climate change, namely leadership. Leadership is an enabler that is situated in the inner context of the organization.

Leadership-Inner Context

For RealEstateOrg, the research outcomes revealed that leadership is a major enabler that has been pushing certain organizational initiatives related to climate change adaptation.

According to General Manager of RealEstateOrg, through the initiatives championed by the Chairman of the RealEstateOrg, the organization has started to be more innovative in finding and using better construction techniques and materials that can increase building resilience to climate change. The leader also has steered the business directions strategically to minimize dependency on existing suppliers through diversification. For example, to decrease the dependency on external suppliers, the organization established their own factory in Ashulia to meet the internal demand for the following materials: metal work (grill and railing), aluminum work for glass fitting and wood work for interior furnishing of the buildings. Moreover, while traveling in foreign countries, the Chairman always brings different and latest building materials and construction manuals with him, and then at the organization, he will share the knowledge and new information with the design team and the construction managers to apply in the context of RealEstateOrg.

4.4.3.2 Barriers to Climate Change Adaptation

This study has identified the following barriers that exist in the inner as well as the outer contexts and are contributing to the slow progress of RealEstateOrg's adaptation to climate change. In the inner context, barriers that were found in the form of awareness, perception and organizational capacity are serving as bottlenecks that have made the organization not as much proactive as necessary in pursuing its mission to develop and implement climate change adaptation strategies for business sustainability. In the outer context, the following barriers were highlighted based on the analysis of interview data, namely: corruption and bureaucracy, political instability, technology, access to information, and stakeholders' actions.

Awareness – Inner Context

This study found that the organizational awareness about climate risks and opportunities was rather low for RealEstateOrg. Despite most of the top managers who participated in the interview stated that they are aware about what is going on with the climate change problem and its impacts towards the business, yet it was evident from the data that most of the employees did not have clear understanding or awareness about initiatives related to mitigation and adaptation to climate change. For example, the Construction Supervisor of RealEstateOrg commented that:

“We are not worried about climate; we just need to finish the project in time.”

There is also no clear evidence of organizational effort to increase the knowledge of the managers and other employees about climate change impacts, adaptation and risks.

Perception – Inner Context

For RealEstateOrg, based on the findings, there are certain misconceptions regarding the severity of climate change impacts, which could bring a sense of urgency to strategically plan, respond and solve whatever organizational problems related to climate change for business survivability. For example, the Chairman of the organization viewed that:

“Building is not a mere structure; it has to interact with human being. Climate change is human induced problem and will affect the human civilization most; the building industry must address it.”

However, most senior managers reported that there is no urgency for them to view climate change impacts as business priority at the moment, as compared to other agendas in their list. The organization in general has been engaged in ‘wait-and-see’ approach, and will

only respond when there are external pressures or forces such as market demand or regulations. Hence, whilst in general, they have acquired certain awareness about the global pressures coming from the industry such as green movement and the highlight of sustainability issue in the field of architecture and urban planning, yet they did not take any proactive measure to adapt to climate change. As for example, the General Manager said:

“We heard about rainwater harvesting to ease up water crisis, but yet we did not make any rainwater harvesting plant in roof-top of any buildings.”

Capacity – Inner Context

The Chairman of RealEstateOrg mentioned that “...We are a fully capable organization but the problem is funding. We do not know whether climate funds will be available for real-estate industry in the future...”.

Agreeing with the Chairman, senior managers in the interview also mentioned about the lack of climate funding opportunities that is contributing to the slow progress in developing organizational capacity pertinent to climate change adaptation and mitigations. For example, General Manager said:

“Due to lack adequate bank loan we have already slowed down many ongoing construction projects. Construction of green building is out of thinking now.”

At present, according to most of the managers interviewed, the organization has manpower capacity and skills in advancing certain innovative approaches towards climate-friendly building constructions. However, without sufficient climate funds and adequate policy and supports from the government, RealEstateOrg as well the other industry players in the real

estate sector of Bangladesh are unable to acquire appropriate resources towards developing organizational capacity in dealing with climate change impacts.

Chairman of RealEstateOrg mentioned that a heavy business investment is necessary to acquire advanced machineries and equipment that can realize the vision of designing and constructing climate friendly building that produces less greenhouse gas, consumes less energy and resources to minimize climate change impacts in the context of Bangladesh. RealEstateOrg's Deputy General Manager stated that:

“There is strong competition among real-estate companies to retain market share. We are always in pressure to minimize production cost. But, making green building always adds extra cost.”

Corruption and Bureaucracy-Outer Context

The real estate business sector in Bangladesh is experiencing various ethical and legal issues closely associated with the problems of corruption and bureaucracy. Molen and Tuladhar (2007:4) reported his findings in a report “Household Survey Bangladesh” prepared by Transparency International Bangladesh in 2005:

“...under 3000 households shows that 97% households that bought land had to pay bribes for land registration, 85% of the households who mutated their land ownership had to pay bribes for land mutation, 85% households who collected land related documents had to pay bribes, 83% households had to pay bribes for land survey, and 40% households who received land had to pay bribes...”

The Chairman of the RealEstateOrg complained that bureaucracy and corruption in plan pass and flat registration process is one of the major obstacles to flourish the real estate

sector and climate adaptation as well. According to the Chairman, the real estate business owners have to wait longer and pay high amount of bribes to get building permit from the city development authority RAJUK (Rajdhani Unnayon Kortepokhsho), which significantly increases project duration and cost. According to a report named ‘*Corruption in Plan Permission Process in RAJUK: A study of Violations and Proposal*’ by Transparency International Bangladesh, there are huge corruption in RAJUK in land use clearance, plan approval process and construction monitoring to control deviation from planning rules and construction act (TIB, 2007).

Regarding financial corruption TIB (2007: 7) stated:

“In a very conservative estimation, in a year only for planning permission 20 to 25 crore money is transacted as bribe.”

Another editorial report by The Independent (2017, June 29) mentioned:

“In addition to irregularities in plan permission there are corrupt practices in land use clearance, building permission and other process, which are obstructing the planned development of the city.”

Corruption practices in the form of bribery have led to increasing business resources being used to condone illegal and immoral practices in Bangladesh. Without serious reform undertaken by the government to ease the bureaucracy problems and corruption issues at all levels in their agency, the business sector will suffer. As a result, in the long term, there can be no serious efforts undertaken by the industry players to dedicate organizational resources and investment related to effective climate change strategies and mitigations, and also to build community resilience in Bangladesh.

Political Instability- Outer Context

In Bangladesh context, political instability for the past 10 years has really affected the industry. According to the General Manager of RealEstateOrg, due to political instability, any real estate organization like them will become risk averse and not willing to dedicate large investment related to implementing climate change adaptation strategies for their business. Political instability will lead to social unrest and abrupt change of regulations, policies and governance framework. All these will create economic challenges for the players in the real sector in Bangladesh. In March 8, 2015, The Daily Star, a local newspaper, published an article titled ‘Economic Implications of Political Instability’, in which Khatun (2015) predicted lower GDP growth, less foreign investment, less revenue collection and higher unemployment in Bangladesh due to recent past in term of political instability through infrastructure damage and violence.

Cost of Technology- Outer Context

At present, the real estate sector of Bangladesh is still heavily relying on traditional approaches in constructing buildings. For RealEstateOrg, the Chairman stated that the organization is aware about the advanced practices such as using Building Information Modeling in design and implementing environment friendly construction process, materials and technologies. However, due to high tax and less incentive given by the government, there has been no serious effort to acquire these important technologies to modernize the industry practices.

Information- Outer Context

Despite the real estate business sector is viewed as climate change sensitive industry, yet there has been poor information and knowledge sharing practices. Industry benchmarking

related to effective implementation of adaptation strategies to climate change is difficult to establish among the industry players because of this lack of information.

Stakeholder's Actions-Outer Context

The General Manager of RealEstateOrg mentioned that: *“Current policy is the only barrier to grow the real-estate business.”* Based on the data, this study found that there has been no visible effort by the government to engage the industry players of the sector to formulate climate change mitigation and adaptation strategies that can benefit the business sector. The government is also facing various criticisms with regard to their commitment to develop community resilience and good living environment for Bangladesh citizens. Despite various attempts undertaken by RealEstateOrg, the Chairman expressed his frustration as follows:

“We sit with the government agency several times, to give us land and subsidies so that we can produce low cost housing for vulnerable population both in rural and urban areas. But no negotiation has been successful.”

The Chairman of RealEstateOrg also mentioned that at present the government does not have a responsible agency that can carry a role to certify “Green Building” and to study the needs of the industry for providing a clear roadmap for the industry to progress in tackling climate change impacts.

A recent newspaper article published in The Daily Star (2019, May 26) in response to the government budget for fiscal year 2019-2020 claimed that construction sector in Bangladesh is against any Tax and VAT (Value added Tax) hike. According to the report, the BSMA (Bangladesh Steel Manufacturer Association) requested NBR (National Board of Revenue) not to increase duty and tax imports of sponge iron and President of REHAB

(Real Estate and Housing Association of Bangladesh) also requested government to keep the scope to legalize untaxed money in the housing sector. The news report also added:

“The REHAB has proposed the government introduce a long term `refinancing scheme that carries single-digit interest rate and form a TK 20, 0000 crore fund to help the sector make a turnaround.”

4.4.4 GarmentOrg– Barriers and Enablers to Climate Change Adaptation

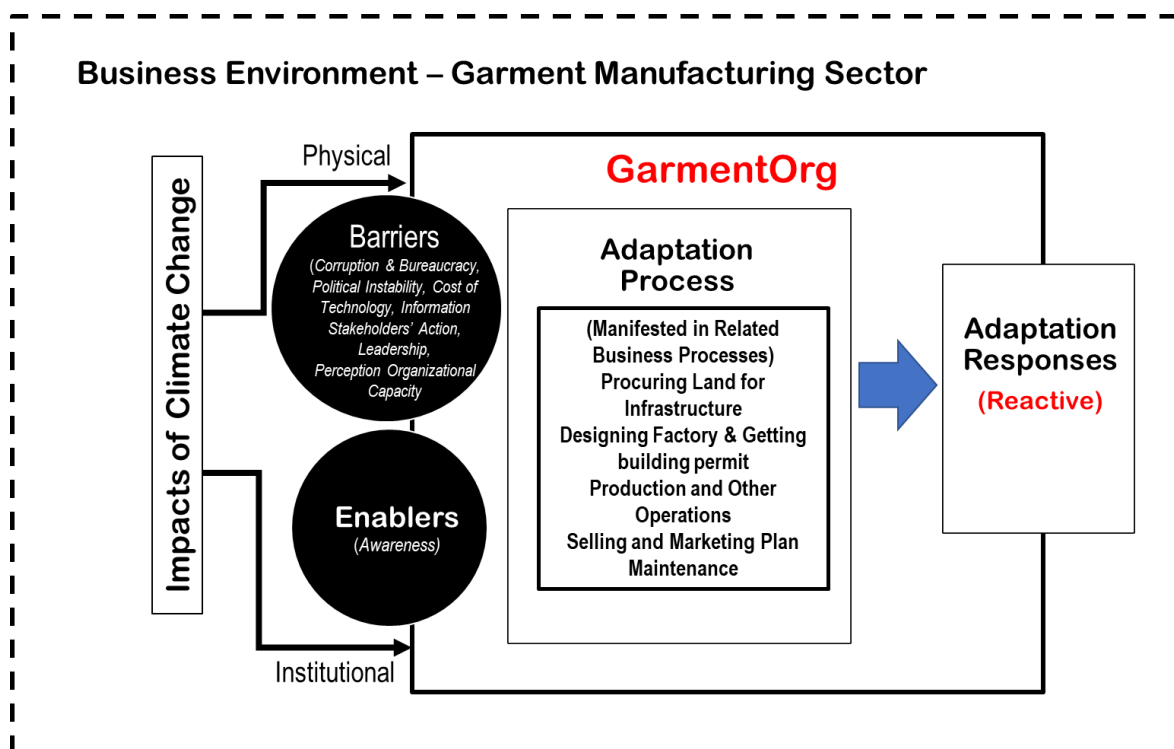


Figure 4.4: A Summary of Related Findings – GarmentOrg

Figure 4.4 presents a summary of the related findings including barriers and enablers for GarmentOrg in adaptation to climate change. The following describes the research findings in details.

4.4.4.1 Enablers to Climate Change Adaptation

In the context of GarmentOrg, this study identified only one enabler, which is organizational awareness that has been found to positively influence the organization with regard to efforts related to adaptation to climate change.

Awareness-Inner Context

For GarmentOrg, this study found that the awareness about climate change impacts has been triggered through its relationships with international clients, mainly via existing regulations and compliance standards imposed by responsible international agencies for import and export business activities in the industry. In this context, the organization must agree and abide when accepting orders from these international clients. For example, environmental pollution and energy efficiency issues were mentioned by both the Chairman and Director of GarmentOrg. According to them, without setting ETP (Effluent Treatment Plant) of required capacity and getting a clearance certificate from the Ministry of Environment, Forest and Climate Change, no owner can start their business operation, i.e., operating the factory. Also, the researcher was informed by them that the representatives from few foreign buyers were often visited their factory and put forward a request related to reducing environmental pollution through cleaner production process.

4.4.4.2 Barriers to Climate Change Adaptation

In the context of GarmentOrg, the identified barriers to climate change adaptation situated in the inner context are as follows: perception; capacity and resources; and leadership. For the outer context, similarly like the other two organizations, barriers in the form of corruption and bureaucracy, political instability, technology, access to information,

and stakeholders' actions were found to create obstacles for the industry to take efforts and strategies for climate change adaptation.

Capacity and Resources-Inner context

Based on the data, this study found that GarmentOrg at present has been experiencing challenges in obtaining climate funds and not enough human resources with adequate skills and knowledge that can facilitate the organization on climate change adaptation strategies. According to the Director of GarmentOrg:

“...The company does not have any professional or a skillful manager who can assess the climate risks for the organization and propose appropriate risk management or adaptation strategies.”

He also added that as there is no direct incentive or assistance from the government, it is very costly for the organization to implement adaptation strategies that include initiatives towards Green Building, use of renewable energy and undertaking waste recycling efforts. However, there are some efforts being undertaken at the organization such as using water recycling plant, effluent treatment plant, and using energy efficient lights and machineries to reduce energy cost and to ensure less carbon emission by the organization.

During the interview session, the Maintenance Engineer of GarmentOrg commented that:

“We are always hearing about climate change through television, newspaper, public conference ... but we really do not know how to deal with it or adapt.”

He further informed that the organization has not established any dedicated unit to manage climate change impacts. Most of the adaptation related decisions are taken by the Compliance Manager under the advice of other managers such as department heads.

Perception-Inner Context

It was also apparent that there is a low concern and understanding about the relationship between climate change impacts and business profitability. This somehow has shaped the perception of most managers and employees who participated in the interview session. When asked about whether they could identify any business opportunity related to climate change, none of them could respond to the question. The managers also mentioned that, whilst they acknowledged climate change can negatively impact business profitability, however they did not have the sense of urgency to develop adaptation measures that can benefit the organization and adjacent communities as well. For the organization, abiding on the regulations and standards imposed by their foreign clients and international agencies are treated as business priorities. The Director of GarmentOrg said:

“Garments sector still have different other operation related problems like workers movement, unavailability of new electricity and gas connection, regular fire hazard etc. So, climate change adaptation is an extra problem for us.”

Leadership-Inner Context

At present, GarmentOrg does not have any visionary leader in the organization. Despite the influential standing of its Managing Director and the Chairman, the organization is not proactive yet towards handling climate change impacts. The Maintenance Engineer said:

“It is always the leader or top management who decides everything in private organization. We, the employees, understand that climate change may change our business or we need to help our community. But... what to do and how to do ... is not our business.”

Due to the lack of support and direction by the top management of the GarmentOrg, hence it is not surprising to learn that GarmentOrg has weak organizational capacity and poor resources invested in undertaking climate change adaptation, as well as has low concern about climate change impacts towards business and community.

Corruption and Bureaucracy-Outer Context

Similar like the other two organizations, GarmentOrg also operates in the business sector having major problems related to corruption and bureaucracy. Although the industry established Bangladesh Garment Manufacturers and Exporters Association (BGMEA), their role and activities of industrial inspectors could not prevent past incidents claimed to take lives of many workers due to corruptions. Occasional fire hazards and few building collapse incidents provide clear evidence of poor governance and corruption in garments manufacturing sectors in Bangladesh. In 2013, Iftekharuzaman, Executive Director of Transparency International Bangladesh commented the following:

“The bottom line is that worker safety laws are hardly enforced. The key lesson from the tragedy is about the importance of the rule of law, and controlling collusive corruption in a manner that a strong message is out that corruption is indeed a punishable offence as provided by the law (TIB, 2013).”

Based on the interview data, the situation has not change much since the incidents of Dhaka Garment Factory collapsed at Rana Plaza, which claimed the loss of life of 1,135 factory workers, as reported by The Guardian (2016). There were five garment factories having global clients involved in this incident. According to the report conducted by Bangladesh Fire Service and Civil Defense, 414 workers were killed in 213 factories in Bangladesh due to fire hazard from the duration between 2006 and 2009 (BFSCD, 2010).

In 2012, the New York Times (2012) also reported criminal charges against the owner of the garment's factory called Tajreen Fashion where 112 workers died due to fire hazard on November 14, 2012. These past incidents also served as proofs of the negligence of garments factory owners in Bangladesh in respect of providing basic amenities and worker's safety apart from environmental sustainability and climate change.

Political Instability-Outer Context

The industry players in the garment manufacturing business sector also suffer whenever there is political unrest and labor movement initiatives that typically leads to infrastructure damage and financial loss. Though worker unrest in garments manufacturing sector is regular phenomena in Bangladesh, during the political turmoil or changing of government it gets worse. Historically, most severe garments worker movement happened in 2006 (Mridha, 2012). After that worker unrest again happened in December 2010, September 2011, March 2012, May 2012 and in June 2012 for wages increase and improving working conditions (BDRC, 2013). According to news report of Mridha (2018) published in local newspaper The Newage, recent labor unrest forced closure of 70 garments factories in Ashulia, Savar in December 2018, just before the National Parliamentary Election in Bangladesh. These incidents contributed to risk aversion attitude among business owners to consider investing resources for dealing with climate change impacts.

Cost of Technology-Outer Context

The high cost of importing climate friendly technologies is also a barrier for the climate adaptation of garments manufacturing organization. The Accounts Officer of GarmentOrg commented:

“We always need to import improved technology from foreign markets. We are developing country and produce nothing. So, it incurs a high cost in term of tax and requires skilled manpower to operate.”

Information-Outer Context

GarmentOrg similar like all other players in the sector requires access to up-to-date information related to good business practices and guidelines that can promote strong awareness in protecting environment and helping improve community resilience in Bangladesh. It is matter of regret that though there are two important associations - BGMEA (Bangladesh Garments Manufacturer Association) and BKMEA (Bangladesh Knitwear Manufacturer Association) representing the industry, yet not much efforts has been taken in this matter. Guidelines that produced by these associations are oriented solely towards effective business operations and fulfilling the compliance standards of foreign customer, but none so far about adaptation strategies in dealing with climate change impacts.

Stakeholder's Actions- Outer Context

In the garment manufacturing business sector, despite industry associations such as BGMEA (Bangladesh Garments Manufacturer Association) and BKMEA (Bangladesh Knitwear Manufacturer Association) represent the voices of the industry players, but they are not doing much to facilitate GarmentOrg to solve some of their problems. The Chairman of GarmentOrg commented that:

“We are always pressured by media, foreign buyers, and local government for compliance issues in term of environment and labor right. Sometimes, foreign

governments like European Union, USA ... impose restrictions on exporting our products to their countries... nobody help us to solve our problems.”

The Director of GarmentOrg further commented that:

“Most of the independent manufacturers are efficient in their operation. But small manufacturers which work as sub-contractors of big manufacturers need to improve their financial and organizational capacity to adapt successfully. We need close collaboration among our sub-contractors to improve their operation and infrastructures.”

Based on the interview data, both Chairman and Director collectively viewed the need for the industry associations to systematically organize efforts to develop organizational capacity and shared resources to move industry forward in dealing with climate change impacts.

Further, the role of government in encouraging and supporting efforts by the organizations to devise and implement adaptation strategies is still weak. There are weaknesses of implementation of some core areas mentioned in Bangladesh Climate Change Strategy and Action Plan-2009 (BCCSAP-2009), which needs to be revamped and tailor made for the garments manufacturing sector. As for example, BCCSAP-2009 puts emphasis on engaging private sectors in Research & Knowledge Management, Mitigation and Low Carbon Development, and Capacity Building & Institutional Strengthening. But, any practical action yet has not been taken to engage garments manufacturing sector to reach those objectives.

Despite the Bangladesh government offers 20% tax rebate for business owners to encourage them to set up their garment factory in remote areas or under developed zone,

yet such incentive is just not attractive enough to attract them to consider. It is because of poor implementation planning with lacking basic infrastructure support such as utility connections.

Also, the Director of GarmentOrg stating from his standpoint mentioned that, at present there is no incentive or tax rebate that can encourage business investment in undertaking adaptation projects. There is also no mandatory rule to oblige the industry players to initiate climate-proofing activities.

4.5 Organizational Adaptation and Responses to Climate Change Impacts

4.5.1 Overview of the Research Findings

Overall, the research outcomes revealed that most adaptation related decisions and responses that were discovered in all the organizations – TelcoOrg, RealEstateOrg and GarmentOrg - to be reactive. TelcoOrg however, because of the establishment of Department of Business Continuity and Crisis Management, has shown a proactive tendency in responding to certain business situations. Specifically, the Department of Business Continuity and Crisis Management has a systematic way to respond to certain business scenarios, and hence this led to a proactive approach in decision making and activities related to handling climate change impacts. This study further organized the qualitative findings related to organizational adaptation to climate change on four categories of processes, namely: reducing risks, seizing opportunities, bearing risks and transferring risks. The following defines these processes:

- 1. Reducing risks** refers to activities taken by organization, which will help them to minimize the impacts or financial loss by future climate hazards. In the context of reducing risks, three common adaptation strategies - climate-proofing

infrastructure, climate-proofing process, and communicating climate risks – are typically engaged at certain extent regardless of whether the adaptation decisions are reactive or proactive in nature.

2. **Seizing opportunities** refers to activities taken by organization to get benefit or advantages of any situations aroused due to climate change.
3. **Bearing risks** refers to organization's not taking any action in response of any climatic impacts.
4. **Transferring risks** refer to activities by which organization transfer the climate risks to other areas of business.

The subsequent subsections present the findings for each organization.

4.5.2 Adaptation and Responses to Climate Change- TelcoOrg

This study, as mentioned before, found that TelcoOrg practiced a mixed of reactive and proactive approach in their adaptation responses. The Department of Business Continuity and Crisis Management has played its role well in coordinating matters concerning climate change problems and issues affecting the organization. The General Manager of TelcoOrg explained that:

“Telephone call, of course, is not the basic human need. People have to survive first. They need food, safe drinking water, shelter, health facility and secured livelihood and then communication. So, our company takes both long term and short-term adaptation strategies to climate proof our business.”

According to him, TelcoOrg has established both long term and short-term strategies related climate change adaptation and mitigation. Long term strategies involve the focus in

the following initiatives: (1) Emission Reduction; (2) Resource Efficiency; and (3) Developing community by providing information, education & health. The short-term strategies in the other hand are the organized efforts related to the following: (1) Handling energy crisis; (2) handling river erosion; and (3) ensuring smooth business supply chain during extreme weather.

In TelcoOrg, there is a prestigious post ‘Green Champion’; and a person who is appointed as Green champion is the best performer among the employees and help the organization to achieve climate change objectives. In general, immediate business risks that are short-term in nature are typically dealt with, using reactive adaptation measures. For example, in the case of managing flood prone areas, automated maintenance of base stations is being activated. The following describes these activities based on the data.

4.5.2.1 Reducing Risks

In the process of reducing risks related to climate change effects, TelcoOrg was found to deploy various initiatives in supporting climate-proofing infrastructure, climate-proofing process, and communicating climate risks. Table 4.4 described some of the initiatives related to reducing climate risks at TelcoOrg. The Deputy General Manager of TelcoOrg explained that:

“Our company is already combating with climate hazards and has taken a number of advanced precautionary measures to cope with future climate change. We are proud of our green corporate office building. Adaptation to climate change is not our only concern. Our management regularly communicates and gives efforts to lower carbon emission and ensures resource efficiency through our operation and supply chain.”

Table 4.4: Initiatives in Reducing Climate Risks – TelcoOrg

A. Climate proofing infrastructures

(1). Green Building

- The organization's corporate office is one of the well-known 'Green Buildings' in Bangladesh. The use of a system – CoGen – has resulted in 60% energy saving as compared the traditional energy system.
-

B. Climate proofing process

(1) Water Management

- Efficient in-house waste water treatment plant has resulted in 31% saving in water usage at the corporate building. The current rainwater harvesting system has the capacity to supply water for 93000 toilet flashes annually.

(2) Recycling and waste management

- The organization adopts ISO 14001:2004 standard for Environmental Management System. The organizational practices related to this include: use of e-waste management system; regular audit for energy conservation; and practices safe disposal of environmentally harmful materials such as batteries, used lubricants, scrape waste and electrical materials. A number of local and foreign vendors are engaged in the recycling of old telecommunication equipment and device.

(3) Emission reduction

The mitigation target sets by the organization is 40% reduction of CO2 emission by 2015; it also aims to decrease carbon footprint. To reach this target, few organizational initiatives have been implemented such as:

- a paperless system
 - modernization of telecommunication network infrastructures to reduce energy consumption from 90% to 50%
 - closing all unused and obsolete equipment
 - execute 'NANO Project' that aims to consolidate and optimize core locations throughout Bangladesh, for the purpose of reducing energy consumption and increase work efficiency. As a result, it recorded the saving of 650 MWhr electricity and 10500 Liters fuel that is reducing 420 tons of CO2 emission.
 - install DC Ventilation System (DVS) to replace traditional air conditioning system, and this led to a reduction of 40%-60% energy cost at a base station. The DVS system that reduces operating hour of air conditioning is a sustainable solution to reduce electricity cost. Until 2014, the company introduced DVS system at 7500 sites and has recorded saving of 77 Giga Watt hours electricity annually.
-

Table 4.4 continued

B. Climate proofing process

(4) Maintenance automation

- Using automation and remote maintenance system through a central monitoring station located at the corporate office has led the organization to saving in labor cost and traveling costs, and sustainable practices in dealing with extreme weather situations.

(5) Renewable energy

- It uses solar panel as a source of renewable energy, between 6%-7% of its total energy use. Starting from 2 solar sites at Sylhet in 2007, currently it has more than 656 solar sites across the nation. This has led to saving of 3.2 billion liter of fuel, reducing 6880 tons of CO2 emission annually.

(6) Green transport

- The organization adopts green transportation, and hence it deploys activities such as optimized route for shortest travel, pooling, converting vehicle engines to use CNG (Converted Natural Gas) instead of petrol, as well as other transportation related activities that can lead to resource efficiency.

C. Communicating Climate Risks

(1) Training

- Training and raising awareness about climate change and renewable energy use among targeted audiences such as suppliers, customers, school children and public in the form of sponsored programs such as ICDRET-2012 and Earth Hour 2012, as well as using social media applications.
- Conduct “Supplier Awareness Program” for its suppliers, partners, in-house contractors, and external stakeholders (e.g., International Finance Corporation, Transparency International Bangladesh) as well. The number of participants increased from 250 in 2103 to 400 in 2015.

(2) Sustainability reporting

- Despite there is no obligation to produce sustainability report, yet the organization takes initiatives to publish its sustainability report annually, and also to comply as a member of New York Stock Exchange. Information related to climate change issues are also shared with the suppliers, which can be accessed through their website and sustainability report.

Sources: Annual Report of the Company (2014)

4.5.2.2 Seizing Opportunities

A. Providing Climate Proofing Product/Services

With regard to explore business opportunities, the General Manager of TelcoOrg commented the following:

“Our company is not sure whether we are fully capable or not to adapt to climate change and sustain revenue in changing market in Bangladesh. We already started to supply different climate proofing products in market and continuously doing research to develop more products and service in future.”

TelcoOrg, in 2006, launched *Health Line* - a 24/7 medical call center - to provide healthcare consultancy operated by licensed physicians. The service is provided in two modes of operations. The first mode is a subscription-based call center, where subscribers can call anytime to get primary medical advice from doctors on duty. The second mode is a mobile SMS-based health tips, ranging from general healthcare to childcare and nutrition advice. This service has been particularly helpful for climate-affected communities in remote areas of Bangladesh to get emergency medical care during natural disasters like floods and cyclones. Until now, TelcoOrg recorded about millions of subscribers have accessed to these services. *Health Line* service also was made available through *Community Information Centers* and *Village Phone* program around the rural areas to ensure the poor who do not have access to mobile phone can also use the facilities.

TelcoOrg also has worked closely with Bangladesh Institute of ICT in Development (BIID) and the Department of Agricultural Extension (DAE) to explore innovative ways of using mobile technologies to help local farmers in the agricultural sector especially in the rural areas of Bangladesh. *Smart Farmer Smart Future* initiative

has been established through this collaboration. The local farmers located at remote areas can obtain up-to-date market price for agricultural products, and also can have access to information and professional advice from experts in their districts.

Further, TelcoOrg introduced *Mobi-Cash* service that could assist easy money transfer to rural areas using mobile phone subscription service. This service also has greatly facilitated rural communities to pay their utility bills. Without the need to travel and can save cost, Mobi Cash is an example of TelcoOrg's innovative service that supports low-carbon economy.

B. Engaging with External Bodies

Based on the data, TelcoOrg has shown strong commitment to develop surrounding community resilient towards climate change impacts through its various CSR initiatives and activities that on-goingly engage targeted stakeholders and recipients. TelcoOrg has been actively collaborating with local governments, NGOs, and international organizations in various CSR activities to reach vulnerable and affected communities. The Deputy General Manager explained that:

“Our organization believes in socially responsible business. So, improving the living condition of surrounding community where we operate not only ensure our legitimacy to do business but also help the local government for developing resilience community that can cope with negative impacts of climate change. In addition to regular CSR activities our company works in partnership with different government agencies, NGOs, and international development organizations.”

TelcoOrg has initiated MDEEP (Mobile Data, Environmental Extremes and Population Movement) in partnership with X Group, UNU-ECH (United Nation University Institute for Environment and Human Security) and ICCCAD (International Center for Climate Change and Development) to further understand climate change impacts through mapping population flow, before and after an extreme weather event occurred. MDEEP is viewed as an innovative technology based on mobile call data, which records population movement after disasters such as cyclones and floods. The data then can be used with the local governments, NGOs, as well other international organizations and stakeholders for the purpose of doing need assessment and disaster preparation.

Further, TelcoOrg also has been very active in engaging stakeholders in education sector. The ‘online school’ program was established by TelcoOrg in collaboration with other two partners to provide access of primary education throughout the country using video conferencing technologies. Partner 1 is responsible for setting up the teaching delivery and course content, and partner 2 is responsible for providing free internet access and doing maintenance service. TelcoOrg now has funded about 10 online schools that cater for poor children living urban slum and remote areas of Bangladesh. On top of that, an online book-reading program was also launched by TelcoOrg with Bishwo Shahityo Kendro in 2004. This program has served more than 1 million students from 8500 educational institution all over Bangladesh. In addition to provide 2.1 million free Internet hours for students, the organization also has implemented various initiatives at school to promote ICT knowledge and related activities.

In 2012, TelcoOrg also introduced *tele-medicine* service as a pilot project to cater for four Community Information Centers to provide skin disease consultation to

underprivileged communities. Then, together with partners such as Ayesha Memorial Specialized Hospital, Dusthya Shasthya Kendro and Concern Worldwide, the organization further established 20 rural sites and 20 service delivery points to provide maternal and child health care advice over the internet. In 2013, in collaboration with the Bangladesh ICT Ministry, the telemedicine service has been integrated in 15 local Union Information Service Centers (UISC) to help the poor and rural communities to obtain online medical diagnosis advice.

TelcoOrg also has been very active in reaching out women with a focus towards empowering them to generate various sources of income to improve their livelihoods in Bangladesh. Together with established partners such as CARE International and Danone Communities, the organization supports JITA, which is a network of women entrepreneurs and female sales persons. Currently, more than 7650 women are attached with JITA program across 48 districts in Bangladesh. These women purchase mobile phone credit refilled cards and sell these cards door to door to rural consumers. In this refilled card, the buyer can use it to get daily household products.

C. Lobbying with Policy Makers

The organization is also actively involved in lobbying government agencies and policy makers through the Association of Mobile Telecom Operators in Bangladesh (AMTOB) to influence related policies especially related to taxation, energy regulation or financial services.

4.5.2.3 Bearing Risks

With regard to bearing risks, TelcoOrg also has been risk averse in pursuing other important initiatives important to support carbon free economy such as green transportation. In this context, TelcoOrg is protecting itself via the traditional mechanism such as subscribing to insurance coverage.

4.5.2.4 Transferring risks

In the context of diversifying business risks, TelcoOrg undertook certain decisions to diversify its business such as in providing information technology solution, establishing village phone services and Community Information Centers around rural areas of Bangladesh.

4.5.3 Adaptation and Responses to Climate Change - RealEstateOrg

Based on the findings, RealEstateOrg has not established yet any dedicated unit or department to undertake a systematic assessment related to climate risks and opportunities. Hence, its decision-making process related to adaptation to climate change has always being reactive. Based on the feedback given from the interview done with the employees, it was clear that in most cases the organization always put a priority to tackle problems related to climate change effects, using past experiences for quick decision making and reaching for immediate solutions. In the typical scenarios dealing with extreme weather events, the Chairman and the Managing Director instruct the General Manager handling the project site to evaluate possible adaptation measures according to available resource and capacity of the organization. In this context, the reactive adaptation measures are deployed. As precautionary adaptation is not being considered, RealEstateOrg is highly

depending upon the experience of its managers and employees for learning and making decisions related adaptation to climate change.

4.5.3.1 Reducing Risks

A. Climate Proofing Infrastructures

According to the manager handling construction projects, RealEstateOrg always put a high priority on acquiring flood free lands for their construction sites. The organization, despite not yet committed in having complete green building construction, took certain initiatives that are already being implemented to increase climate resilience of their building. For examples, the buildings are being designed to have adequate natural light and ventilation to reduce the electricity consumption for lighting and cooling. There is also an investment being done to develop resistant building structures that can stand extreme weather events such cyclone or earthquake. The General Manager commented that:

“...although our company is currently not involved in construction of 100% green building, but the management follows appropriate processes to reduce energy consumption throughout the whole life-cycle of every building.”

B. Climate Proofing Process

RealEstateOrg also has placed highest consideration on implementing approaches towards resource efficiency and climate proofing, in all aspects of building constructions and completions such as design, material procurement, construction execution, and maintenance. The long-term strategy mentioned by the Deputy General Manager is

concerning resource efficiency. The short-term strategies are related to the following aspects: flood and cyclone free buildings; handling energy crisis; approaches in building design & construction methods. He commented that: “...as *adaptation strategies we are adopting new construction techniques. We also stopped using many traditional building materials and tried newer building materials to minimize construction cost and to gain sustainability.*”

Over the last few years, the organization uses tiles, long span glasses, and different prefabricated partition materials substantially in their construction projects. Traditional cast-in situ mosaic flooring has been replaced by floor tiles. Brick partition walls are avoided whenever possible. Melamine board, wooden particleboard and plastic board are used to divide interior spaces.

With regard to water consumption, the organization has responded to the existing regulations by installing on site deep-tube well for building with certain number of occupants. RealEstateOrg relies heavily on the local water utility company for source of water. The organization till now perceived that installing rainwater harvesting system and waste water recycling plant are an expensive investment to consider. RealEstateOrg has not established yet any recycling system. Their wastage materials are usually sold to vendors directly.

The General Manager of RealEstateOrg stated that: “...*We are still growing. We are not interested to invest money to mitigate greenhouse gas.*” In this context, the organization till now does not have any emission reduction target. The organization however has put certain considerations with regard renewable energy sources. Following

the regulation standards, RealEstateOrg has installed solar panel on the rooftop of constructed buildings.

As for supporting green supply chain, the organization has invested substantially in converting their transport vehicles into CNG (Converted Natural Gas) based engines. The petrol saving is particularly attractive for the organization.

C. Communicating Climate Risks

RealEstateOrg provides on-going training to the employees - managers, engineers, construction workers – as well as their contractors, and suppliers about resource efficiency and environmental hazards. However, personalized training about climate change mitigation and adaptation has not been considered yet.

4.5.3.2 Seizing Opportunities

A. Providing Climate-Proofing Products

RealEstateOrg, due to high cost and investment and lack of demand, has not considered yet about constructing green buildings. One of their customers commented that: *“We want to buy green building, but it is expensive.”* Investing on projects targeted for low income people for low-cost housing is also not attracted to the organization to consider due to higher costs of the land as well as bureaucracy issues especially in obtaining building permit. The Chairman of the organization stated that:

“Until now our social activists and customers are not strong enough. When our people will be conscious about environment and their right, demand for green buildings will be created automatically.”

B. Engaging with External Bodies

RealEstateOrg also involved in adaptation projects funded by two international organizations: *Fael Khair* and *US Army-Alaska District*. To date, the researcher was informed that the organization has completed the construction of 22 cyclone shelters in coastal climate affected districts of Bangladesh. RealEstateOrg also has a dedicated magazine - '*Sthapatya o Nirman*' - that is published annually in the areas related to art and architecture to raise awareness among general people and practitioners with regard to environmental problems, building technologies, urban planning, photography, art and culture.

C. Lobbying with Policy Makers

The REHAB (Real Estate and Housing Association of Bangladesh) is the platform that RealEstateOrg has leveraged to pursue its agenda in lobbying the government agencies and policy makers with regard to policy related to building code, urban planning, taxation, energy, and utility regulation. Arranging occasional fair, seminar and discussion meeting with different government agencies regarding urban planning, energy crisis, utility services, taxation and housing loan are regular works of the REHAB.

4.5.3.3 Bearing Risks

Despite being aware about certain climate change risks, RealEstateOrg is still bearing many risks and adopts wait and see approach. For example, the frequent energy and water crisis occurring in Dhaka city of Bangladesh has not triggered major concerns, and hence not leading towards a commitment by the organization to explore renewable energy sources. The rainwater harvesting system also is not being prioritized despite the water shortage issue is a real problem in Bangladesh.

4.5.3.4 Transferring Risks

Over the last ten years, RealEstateOrg has diversified their business in other building technology fields such as architectural consultancy service, aluminum and metal workshop, furniture manufacturing, importing and installing high-tech building materials and paint manufacturing as part of transferring risks to other business.

4.5.4 Adaptation and Responses to Climate Change - GarmentOrg

GarmentOrg, similarly like the previous organization, did not have a dedicated unit to manage climate change effects systematically. Hence, the organization practices reactive approach in doing decision about climate change problems. As for the decision-making process, most decisions are being done by the senior managers of each business unit. In certain scenarios especially where their business receives direct impacts from extreme weather events from the past, the adaptation options are evaluated carefully. For example, the organization will opt for flood free land having well connected road towards seaport, in an effort to minimize any disruption on their supply chain due to climate change effects. GarmentOrg's adaptation responses are reactive in nature; the organization adjusts accordingly depending on the available resources and past experiences to solve problems.

4.5.4.1 Reducing risks

A. Climate Proofing Infrastructures

GarmentOrg has chosen to have their corporate office, factory and warehouse to be located at flood free land areas that have good road connectivity. Their current factory is easily accessible for local suppliers and employees, and is also well connected with the road to reach Chittagong sea-port for exporting shipments. The Maintenance Engineer commented that:

“We are always caring about many environmental consideration and resource efficiency while setting up a factory building. Buying flood free land, confirming possibility of gas connection, installing deep tube-well for water supply, appropriate sewerage connection and effluent treatment plant for industrial waste disposal, housing facility in closest neighborhood, transportation network etc. are some major considerations. But we cannot really separate them from adaptation to climate change.”

B. Climate Proofing Process

The organization, based on the findings, has undertaken efforts in several climate-proofing activities. Most of these efforts have been triggered by external factors such as regulations and standards, as well as for the overall expenditure reduction and risk management purposes. For example, although GarmentOrg did not set any emission reduction target, the organization has certain initiatives to reduce energy consumptions by improving their production process and by using energy efficient machineries and equipment.

GarmentOrg, since past few years, has been facing with water shortage problem. Their factory used fresh water from a deep-tube well from 1000 feet below the ground level at Tejgaon in Dhaka before the factory was relocated to a new location in Gazipur. In this new location, the factory is currently getting water from 500 feet below the ground level. However, it faces a risk if the water level goes beyond 1000 feet. In this case, the organization has to shut down its operation if it cannot find alternative water source. Despite this challenge, GarmentOrg has not considered to recycle wastewater from toilet,

kitchen, and washing machines because the investment required to set up a system in their factory is very high.

GarmentOrg also has not seriously considered about renewable energy sources. However, with regard to recycling waste, the organization has a big effluent treatment plant (ETP) that separates toxic materials from industrial wastes. Treated wastewater is channeled to local sewerage line; extracted solid waste from ETP is sold to vendors who will use these materials for brick burning. Jute-waste (mainly fabric waste) is also sold outside as raw materials of cotton. Because, GarmentOrg has several international buyers, hence, most raw materials used to produce their garments are obtained from these buyers. The recommended vendors are being engaged to obtain quality accessories. The international regulations and standard have led the organization to put certain efforts to make their supply chain environmentally friendly. The organization also has changed its transport vehicle engines from petrol/diesel engines to Converted Natural Gas (CNG) based engines.

C. Communicating Climate Risks

GarmentOrg uses training to educate its employees and manager on matters related to environmental management. The organization also published its mission towards “*Sustainable Execution of Production with Aspiring Leadership*” in their website, and communicated also some guidelines related to quality and their commitment towards social and environmental responsibility.

D. Lobbying with Policy Makers

Bangladesh Garments Manufacturers and Exporters Association (BGMEA) is the platform utilized by the organization and other business players in the garments industry to

reach to the government and policy makers. BGMEA, on behalf of the government, monitors and provides guidance to the association with regard to the environmental compliance and standards such as green building, sustainable consumption of natural resources and cleaner production (BGMEA, 2020a).

Just recently, in order to support the government's ongoing climate adaptation initiatives and activities, BGMEA joined the 'Fashion Industry Charter for Climate Action' convened by the UN Climate Change. By joining this initiative, BGMEA pledged for a target to 30 percent reduction of green house gas emission by 2030 and to fulfill the goal of 'Paris Agreement 2015' (BGMEA, 2020b). GarmentOrg is a member of BGMEA.

4.5.4.2 Bearing Risks

GarmentOrg bears many risks despite the industry is highly climate sensitive. It does not consider investing serious efforts in developing effective adaptive measures that are proactive instead of reactive.

4.5.4.3 Transferring Risks

In the last five years, GarmentOrg invested substantial amount of money to diversify their business in other related areas. At present, the organization has established four garment factories, laundry services, a cold storage business for potatoes, as well as real estate development. These efforts can be viewed as an attempt to transfer climate change related business risks to other business.

4.6 Conclusion

This chapter has presented the research findings for the three organizations from Bangladesh using a qualitative research approach and deploying multiple data collection techniques. For each organization, it described the findings related to physical and institutional impacts related to climate change impacts, barriers and enablers, as well as the organizational adaptation process and responses. In general, this study found that only one organization – TelcoOrg - has adopted proactive adaptive measures only in certain areas. The remaining two organizations were found to practice the typical reactive response in adaptation to climate change, according to available resources, support and learning from past experiences. The subsequent chapter will discuss the findings further.

CHAPTER 5

DISCUSSION

5.1 Introduction

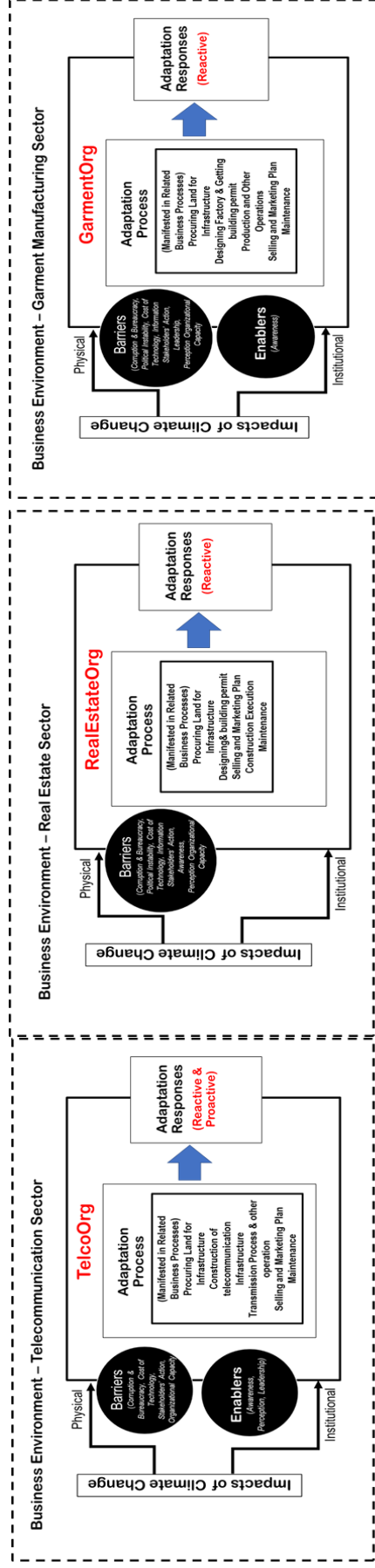
This chapter discusses further the research findings. The discussion is structured in two main parts. The first part of the discussion focuses on explaining how the identified barriers and enablers are shaping the organizational adaptation processes and practices, based on the outcomes of the research. This study engages the viewpoints from theories such as open systems theory, organizational learning (OL) theory and Pettigrew's processual analysis that are being integrated in the theoretical framework of the research to explain the phenomenon of interest. The second part of the discussion focuses on the outcomes of adaptation responses, in which about why most of decisions related to organizational adaptation to climate change in the context of TelcoOrg, RealEstateOrg and GarmentOrg are reactive by nature, instead of proactive. This study puts forward an argument that because of the dynamic interplays between internal and external factors situated in the inner and outer contexts of an organization, these interplays shape and influences the adaptation process and practices in an organization. An organization adapts according to available resources and market forces. In this context, an organization that recognizes not just climate risks but also potential business opportunities and can manage climate change impacts effectively and strategically is in a better position with regard to ensuring its business sustainability. A conclusion section is given at the end of the chapter.thesis guideline has been prepared as guidance to all graduate students at UNIMAS in the preparation of their thesis for evaluation and final endorsement by the university Senate.

5.2 Organizational Adaptation to Climate Change – What, Why and How

Figure 5.1 on the next page presents how this study articulates the phenomenon and attempts to provide an explanation based on the research findings.

Chapter 4 has presented related findings for all the case studies – TelcoOrg, RealEstateOrg and GarmentOrg – that are used in this research. The 3 sub-diagrams embedded in Figure 5.1 contain a summary of some key findings for each of these organizations.

In articulating about the phenomenon, this study argues that physical and institutional impacts of climate change experiencing by these organizations in the past are important component of organizational learning to adapt to climate change effects. Further, the identified barriers and enablers that were found in the research, have roles in affecting organizational practices and processes in dealing with change initiatives. The research outcomes further revealed that the decision makers of these organizations have approached their decision-making process from either reactive or proactive standpoints, and their viewpoints as a decision maker are really depended upon the dynamic interplays of the various factors that affecting the organization and its business environment in Bangladesh context. This study further argues that organizational adaptation responses and strategies hence are being influenced by various factors situated in the outer context as well as the inner context of an organization. The organizational adaptation responses and strategies are also being determined to certain extents by the available resources that an organization acquires for business survivability in dealing with climate change impacts, and the presence market forces and conditions. The following subsections discuss further about these articulations and the related research findings.



Organizational Adaptation to Climate Change



Figure 5.1: Framing Organizational Adaptation to Climate Change

5.2.1 Climate Change Impacts and Learning to Adapt

An organization as a system is always on the search mode behavior that is manifested through its various organizational activities that aim for growth and stability (Dess & Beard, 1984). In the context of managing climate change impacts, Wright and Nyberg (2017) asserted that complex environmental issues and challenges will continue to shape and affect organizations as change agent in making a difference to deal with climate change, which is viewed as the grandest of challenges facing humankind. In the context of adaptation to climate change, organizations learn to increase its survivability (Berkhout, Hertin & Gann, 2006). An organization is always learning through its interactions with its business environment, and past experiences dealing with climate change effects will serve as a frame of reference in the organizational practices of making business decisions.

The findings of the research revealed physical and institutional impacts occurred in the business processes of TelcoOrg, RealEstateOrg and GarmentOrg. The physical impacts that were documented in this research appeared to be tailored according to the distinct organizational environment, more specifically the inner context of these organizations in which climate change effects affecting their business operations and processes. The institutional impacts however, according to the research findings, contained many similarities among these organizations that triggered largely from the outer context, in this case the business environment in Bangladesh setting. These organizations hence learn through their interactions with this environment.

In the literature, DiMaggio and Powell (1983) proposed a process called institutional isomorphism that can exist at the macro environment that will affect an organization. Isomorphism from the context of institutional theory refers to the process of

homogenization of organizations operating in a business field that having similarities with regard to their supply chain, regulatory bodies and industry players producing similar kinds of services and products (DiMaggio & Powell, 1983). Institutional isomorphism is triggered by institutional factors that are affecting and influencing organizations and their business activities and practices (DiMaggio & Powell, 1983).

In the context of Bangladesh business environment, the extreme weathers in the form of devastating floods and cyclones that are continuously affecting the nation, have severely disrupted supply chains and led to shortage of raw materials that substantially affecting the business operations and productions of TelcoOrg, RealEstateOrg and GarmentOrg.

The following Table 5.1, excerpted from Eckstein, Hutfils and Winges (2018:6), ranked Bangladesh at 9th place in the Germanwatch Climate Risk Index 2019 - 14th edition.

Table 5.1: The Climate Risk Index for 2017- The Ten Most Affected Countries

Ranking 2017 (2016)	Country	CRI score	Death toll	Deaths per 100000 inhabitants	Absolute losses (in million USD PPP)	Losses per unit GDP in %	Human Development Index 2017 ¹⁰
1 (105)	Puerto Rico	1.50	2978	90.242	82315.240	63.328	-
2 (4)	Sri Lanka	9.00	246	1.147	3129.351	1.135	76
3 (120)	Dominica	9.33	31	43.662	1686.894	215.440	103
4 (14)	Nepal	10.50	164	0.559	1909.982	2.412	149
5 (39)	Peru	10.67	147	0.462	6240.625	1.450	89
6 (5)	Vietnam	13.50	298	0.318	4052.312	0.625	116
7 (58)	Madagascar	15.00	89	0.347	693.043	1.739	161
8 (120)	Sierra Leone	15.67	500	6.749	99.102	0.858	184
9 (13)	Bangladesh	16.00	407	0.249	2826.678	0.410	136
10 (20)	Thailand	16.33	176	0.255	4371.160	0.354	83

PPP = Purchasing Power Parities, GDP= Gross Domestic Products.

Source: Eckstein, Hutfils and Winges (2018:6)

All these organizations have been experiencing institutional isomorphism such as change of regulations and procedures, energy crisis, shortage of water and disruptions of productions to certain extents in their business environment. Hence, it is not surprising in this study to find out that most reactive decisions being formulated in the past, focused on short-term, immediate problem solving and decision-making process in dealing with organizational problems related to climate change effects. These organizations also, as described in the previous chapters, have leveraged on certain established platforms to reach out to the regulatory agencies to push forward their agenda. For example, TelcoOrg through its leaders, has played an active role in the Association of Mobile Telecom Operators in Bangladesh (AMTOB). Similarly, RealEstateOrg uses the Real Estate and Housing Association of Bangladesh (REHAB) as a platform to pursue their interests with the government agencies to deal with bureaucracies and tedious business procedures. As for GarmentOrg, the Bangladesh Garments Manufacturers and Exporters Association (BGMEA) is a platform that is being leveraged by the industry players in the garment manufacturing sector to reach out to the relevant government agencies and other important stakeholders.

Also, based on the findings, this study also found similar attitudinal responses for RealEstateOrg and GarmentOrg as described by Nurunnabi (2014) study. His study in particular reported that a majority of Bangladesh's organizations (29 out of 32 organizations) in the research viewed that because of a lack of regulation and unavailable best practice guidelines from responsible state regulators, these organizations are not concerned about disclosing climate change reporting. Hence, reflecting on the present gaps related to industry benchmarking standards and vital information about effective management of climate change impacts happening at the industry level, this inarguably is

contributing to the level of understanding and learning that taking place among Bangladesh organizations. From the standpoint of organizational learning theory such as argued by Weick (1995), such behaviors observed in the study can be argued to produce many blind spots in the crisis context. This refers to a scenario “once a person becomes committed to an action, and then builds an explanation that justifies that action, the explanation tends to persist and become transformed into an assumption that is taken for granted” (Weick, 1995:310). From the organization standpoint, hence it is not surprising to learn that, despite the on-going challenges facing climate change effects in Bangladesh, the organizations such as RealEstateOrg and GarmentOrg are found not to be bothered about having formal and systematic evaluation procedures to assess climate risks, opportunities and adaptation options. The wide extent of ad hoc decision-making process and practices dealing with crises related to climate change effects, that was found in these organizations are making these organizations susceptible to future risks related to business sustainability. More specifically, without clear adaptation process and strategies, these organizations will experience more difficulties in the future due to the uncertain pattern of climate change effects faced by Bangladesh.

5.2.2 Barriers and Enablers Affecting Organizational Adaptation

In the literature, it has been widely noted that to formulate enabling policies towards effective climate change adaptations, the existence of barriers and enablers that either motivate an organization to be proactive in doing adaptation to climate change or serving as obstacles must be acknowledged (Biagini & Millers, 2013; Pauw, 2015; Backman, Verbeke & Schulz, 2017; Gasbarro, Iraldo & Daddi, 2017). This study engaged Pettigrew’s processual analysis and identified barriers and enablers situated in inner and outer contexts that were found in the research affecting TelcoOrg, RealEstateOrg and

GarmentOrg and their organizational adaptation processes and practices. For example, in these organizations, a lack of access to high quality of information related to climate change impacts as well as the unavailability of industry benchmarking standards are found to affect the managers in making effective and strategic adaptation decisions to deal with problems or issues triggered by climate change effects. In the outer context, lacking of access to these important resources will lead to poor business ecosystem and perception of lack of good regulatory environment and governance framework, and this in turn will influence the organization adaptive capacity to deal with climate change effects effectively (Berkhout, 2012; Linnenluecke, Griffiths & Winn, 2013). Table 5.2 depicts the barriers and enablers that were found in this study that affecting organizational adaptation to climate change to certain extents in Bangladesh context.

Table 5.2: Barriers and Enablers Affecting Organizational Adaptation

	Outer Context	Inner Context	Identified Enablers and Barriers
Climatic		Experience	Experience of physical impacts (Cyclone, flood, rise of temperature) on infrastructures and supply chain affects organizational adaptation.
	Uncertainty		Unpredictable nature of climate variables contributing to unclear organizational understanding.
Social		Awareness & Perception	Low awareness among employees about climate change lead to poor adaptation implementation.
	Stakeholder's Actions		Pressures from customers, business partners, investors, media & social activists have less influenced on adaptation decisions.
	Political stability		Political instability made managers risk averse in deciding on investment related to adaptation.
	Corruptions & Bureaucracy		Corruptions and bureaucracies affecting the business ecosystem discourage organizations to be committed on undertaking effective and strategic adaptation decisions and strategies.
		Leadership	Strong support from business leaders and top management is required to promote serious climate change related agenda in business decision making.
		Corporate Social Responsibility	In certain business scenarios, CSR efforts are not directed at adaptation needs of climate vulnerable society.

Table 5.2: Continued

	Outer Context	Inner Context	Identified Enablers and Barriers
Technological	Information		Due to lack of information & R&D, organizations fail to understand the extent of climate change impacts and risks on their business.
	Cost of Technology		Higher initial cost of adaptation technology and lack of skill manpower have negatively affected organizational efforts in doing strategic adaptation for climate change.
	Regulation		Poor implementations of regulations & not up-to-date policies and incentives as well as weak governance framework are barriers facing the private sector to seriously engage in doing strategic adaptation initiatives.
Economical	Market force		Opportunity to invest in climate proofing products/ infrastructures
		Capacity& Resource	Lack of expertise to asses climate risks/opportunities in business context. Lack of easy access to adaptation finance.
		Size of Organization	Because of the availability of resources, large organizations demonstrate proactive initiatives.
		Business Security	Organizations do not want to disclose climate change related business strategies due to confidentiality matters and no obligation to do so by the regulators.

5.2.2.1 Access to Information and Technology

In the literature, factors such as accessibility to information and technology are vital for organizations in formulating effective adaptation strategies. Past studies such as done by Agrawala et al. (2011) and IFC (2013) demonstrated that early warning system and accessibility to public information (such as future pattern of climate variability, climate resilient business model, and climate-proofing products) could help business to better forecast future risks and doing adaptation decisions. A report published by UNEP (2014) mentioned that lacking of adaptation technology is one of the major barriers of adaptation in developing countries like Bangladesh. This study found that all the organizations' decision makers involved in the research commented that they were unable

to visualize and project future risks or opportunities because of lack of high-quality information that could inform them and progress their understanding about climate change impacts in the context of Bangladesh setting. The unavailability of easy to acquire low cost technologies also serving as barriers to commit for planning and implementation of long term and strategic adaptation decisions.

5.2.2.2 Poor Regulatory Framework, Incentives and Political Instability

As reported in the previous chapter, this study found corruption practices, extensive bureaucracies, weak regulations and political instability are major barriers that have existed in the business environment of Bangladesh and could obstruct business organizations including TelcoOrg, RealEstateOrg and GarmentOrg to prioritize the business agenda for planning and implementing effective adaptation strategies and risk mitigations related to climate change impacts. In these organizations, energy crises such as gas and electricity were mentioned as typical problems that they are experiencing in association with climate change effects. Almost all the interviewed participants of these organizations expressed their concerns about the association of bureaucracy practices among the local government agencies with bribery activities, including in matters concerning energy consumption. Debnath and Mourshed (2018) reported a significant correlation between corruption practices and the increased cost of power plants in Bangladesh, especially the public power plants. In Bangladesh, more power plants are needed to cater for high demand for electricity. They argued that if there is no serious effort to curb the corruption practices, this can impose additional burden to Bangladesh that relies on long term borrowing from international agencies to finance such public projects. Despite the Bangladesh Government aims to generate 10% of the total electricity from renewable resources by 2021 (Debnath &

Mourshed, 2018), yet not many private organizations have taken interest to participate to increase the use of renewable energy sources.

In the interview done with the Director, Climate Change Cell, Department of Environment, Ministry of Environment and Forestry of Bangladesh, the researcher was informed that unethical and illegal practices induced by the widespread of bribery activities that happening in the energy and utility sectors of Bangladesh contributed to the low acceptance of renewable energy as an alternative source of energy that could increase business sustainability to face future challenges. According to the Director, despite potential opportunities with funding like international projects such as the Clean Development Mechanism (CDM) funded by the United Nations Framework Convention on Climate Change (UNFCCC) and the Joint Credit Mechanism offered by the Government of Japan for low-carbon related initiatives, very few organizations have taken advantage from these programs. The on-going political instability in Bangladesh is also another barrier that is making the business organizations tend to be risk averse in considering to invest in technologies for renewable energy sources for their own consumption.

Poor regulatory framework and governance system, as well as lack of business incentives have been highlighted in the literature, which can significantly influence adaptation behaviors in the context of developing countries (Sadat, 2011; Biagini and Millers, 2013; and Pauw and Pegels, 2013). It is clear in this study that weak involvement and lack of serious efforts by the government and other responsible local agencies are contributing to the low adaptive capacity to adapt to climate change impacts for RealEstateOrg and GarmentOrg. These organizations also were not aware about the

availability of adaptation finance system and Green Climate Funds that could assist them with regard to strengthening their adaptive capacity to adapt to climate change impacts.

Also, a recent study about sustainable waste management policy pointed out that until now Bangladesh does not have waste management policy that includes any type of waste including food waste and energy, as well as explanation regarding recycling and reuse targets (Shams et al., 2017). In this study, as presented in Chapter 4, only TelcoOrg was found to be committed and has established a recycling system.

5.2.2.3 Stakeholders' Engagement and Market Forces

In the context of Bangladesh, despite there has been a growing awareness about the devastating effects of climate change, yet the pressures from the affected stakeholders are not strong enough to exert external influence that can trigger positive change among business organizations to be proactive in devising and implementing adapting strategies and contributing to build community resilience. The recent work published by Sovacool (2018) claimed that in Bangladesh context, there has been a national scale of practices that exclude forms of planning and implementation of climate change adaptation responding to the needs of poor and vulnerable communities. The impacts of this practice have led to unattainable objectives towards equitable development, poverty reduction and human security (Sovacool, 2018).

Based on the research, the three organizations in this study have not engaged in visible and sustainable practices of adaptation within the local business supply chains that could respond to the needs for the vulnerable and poor communities, due to no felt pressure from the external stakeholders. GarmentOrg only concerned about a commitment towards making selected business operations to support certain aspects of supply chain to be

“green” because of the pressure and regulations being imposed by their international clients, mainly from the European region and the United States. Based on the research findings, this study also concluded that apart from a number of international NGOs and established institutions such as the World Bank and the Asian Development Bank that have implemented various adaptation projects in Bangladesh, their roles however were not strong enough to attract interests and increase awareness among business organizations about devising strategies for climate change adaptation. With regard to market forces, only TelcoOrg has been proactive in leveraging mobile technologies and services to contribute towards increasing community resilience through their various innovative programs.

5.2.2.4 Barriers and Enablers in the Organization Context

Studies such as Arnell and Delaney (2006), Moser and Luers (2008), Hoffman et al. (2009) and Agrawala et al. (2011) argued that organizations must have clear understanding and awareness about risks associated with climate change impacts before they can formulate and implement effective adaptation measures. In this study, TelcoOrg has been successful in raising awareness about climate change risks among its managers and employees. RealEstateOrg and GarmentOrg however did not place much emphasis with regard to climate change risks among its employees. This study found that GarmentOrg in particular, despite having certain resources, has not dedicated much effort to increase awareness among its managers that can lead to initiatives to formulate adaptation strategies to prepare for future. Without systematic and consistent efforts to increase awareness about climate change impacts, this undoubtedly can contribute towards weak perception about the importance of to be proactive instead of reactive in responding on risks and opportunities associated with climate change impacts.

Further, Moser and Luers (2008) and Agrawala et al., (2011) also highlighted that many organizations do not implement long term adaptation measures due to lack of resources and adaptation capacity. In this context, TelcoOrg is in a better position as compared to the other organizations with regard to their adaptive capacity and resources in managing climate change impacts. The senior management of GarmentOrg and RealEstateOrg consistently cited lack of resources such as funding as serving a major obstacle for them to strategically plan and implement effective strategies to deal with the frequent energy crises and water shortage.

In the research, the findings further revealed that TelcoOrg having climate change champions and strong leadership has been consistent and committed in executing various adaptation activities. Berkhout (2012) and Adam et al. (2011) highlighted the importance of business leaders who acquire a different mindset to effectively strategize and manage climate change impacts. Leadership roles are crucial for developing climate resilient business models, instilling strong awareness among employees and strengthening organizational adaptive capacity to tackle challenges related to climate change effects (WBCSD, 2015). Based on this research, TelcoOrg has proved to be successful in this line of thinking.

5.3 Organizational Adaptation Responses and Strategies to Climate Change

From the perspective of systems theory and Pettigrew's processual based framework, an organization is made up of employees and their behaviors through social interactions in an environment (outer context and inner context), give forms to the dynamic social structures of the organization (Emery & Trist, 1965; Daft & Weick, 1984; Pettigrew, 1987). With regard to organizational adaptation, Goddard et al., (2016) argued that when

adaptation is conceptualized as change process, one has to understand the process from the viewpoints of decision making and decision context of a larger set of social actors beyond those decision makers who are being authorized to participate in formal decision-making process. They contended that the dynamic interactions between values, rules and knowledge will shape and influence the decision context and decision-making process. Pettigrew (1987) further proposed that with regard to content, context and process related to change happening in the organization, the influence of political and cultural elements could not be ignored. According to him, these elements shape and affect the processes and mechanisms of the organization through its change journey.

In the context of this study, applying the viewpoints of Berkhout, Hertin and Gann (2006), it is seen that the three organizations - TelcoOrg, RealEstateOrg and GarmentOrg - that operate and interact in their environments, enact certain sets of organizational routines and practices conditioned by internal resources and external influences. Their adaptation practices can be viewed and understood from past decision contexts and decision-making processes.

Table 5.3 presents the summary of organizational adaptation practices as of these organizations, being categorized further according to the objectives of doing the adaptation. The findings from the research revealed that there could be four types of general objectives, in which the adaptation practices were aimed to attain such as reducing risks, seizing opportunities, bearing risks, and transferring risks. Past studies such as by Arnell and Delaney (2006) and Hoffmann et al., (2009) also reported these common objectives associated with organizational adaptation practices. Because of the distinct decision contexts and decision-making processes that occur in the organizational context,

hence the nature of adaptation that either reactive or proactive in the adaptation strategies of these organizations have generated adaptation responses that inarguably are serving certain purposes and leading to certain business outcomes.

Table 5.3: Organizational Adaptation Practices – Research Findings

Objectives	Adaptation Practices		TelcoOrg	RealEstate Org	Garment Org
Reducing risks	Climate proofing infrastructures	Buying flood free land	✓	✓	✓
		Cyclone proof & green infrastructures	✓	Partial	partial
		Emission reduction	✓	✓	✓
	Climate proofing processes	Green supply chain	✓	x	x
		Green transportation	x	x	x
		Sources of renewable energy	✓	Partial	Partial
		Water management	✓	x	✓
		Recycling of waste	✓	x	✓
	Communicating climate risks	Training to employees & suppliers	✓	Partial	Partial
		Advertisement, website, CSR reporting	✓	Partial	Partial
Siezing opportunities	Providing climate proofing products	Climate proofing products	✓	x	x
		Climate proofing services	✓	x	x
	Engaging with external bodies	Networking with others	✓	x	x
		With local governments	✓	x	x
		With NGOs/ Communities	✓	✓	✓
		With international bodies	✓	x	x
	Lobbying with policy makers	With business association	✓	✓	✓
		With local government	✓	✓	✓
Bearing risks	No adaptation	Energy and water crisis	x	✓	✓
		Green supply chain	x	✓	✓
		Waste management	x	✓	✓
Transferring risks	No adaptation	Business diversification	x	✓	✓
		Purchasing insurance	✓	✓	✓

In this case, TelcoOrg has practiced both reactive and proactive adaptation strategies, and appeared to be more focused in their adaptation actions and practices to attain certain business outcomes. TelcoOrg has dedicated resources for reducing climate change risks and exploring potential business benefits that can emerge from the situations. From organizational learning perspectives, the on-going interactions between the top management and the international shareholders and business partners have played vital role in molding TelcoOrg to be strategic in managing climate change impacts to ensure its business sustainability.

In contrast, RealEstateOrg and GarmentOrg despite facing the continuous disruptions in supply of electricity and water affecting their business operations, yet there have been no visible strategic adaptation strategies being implemented. These organizations have committed their resources with a focus just to bear the risks and not placing any emphasis on strategically mitigating the climate changes risks. In the literature, studies done by Smit et al. (2000), Hertin et al. (2003), Berkhout, Hertin and Gann (2006) and Gasbarro and Pinkse (2016) have explored these adaptation strategies in the context of climate change impacts.

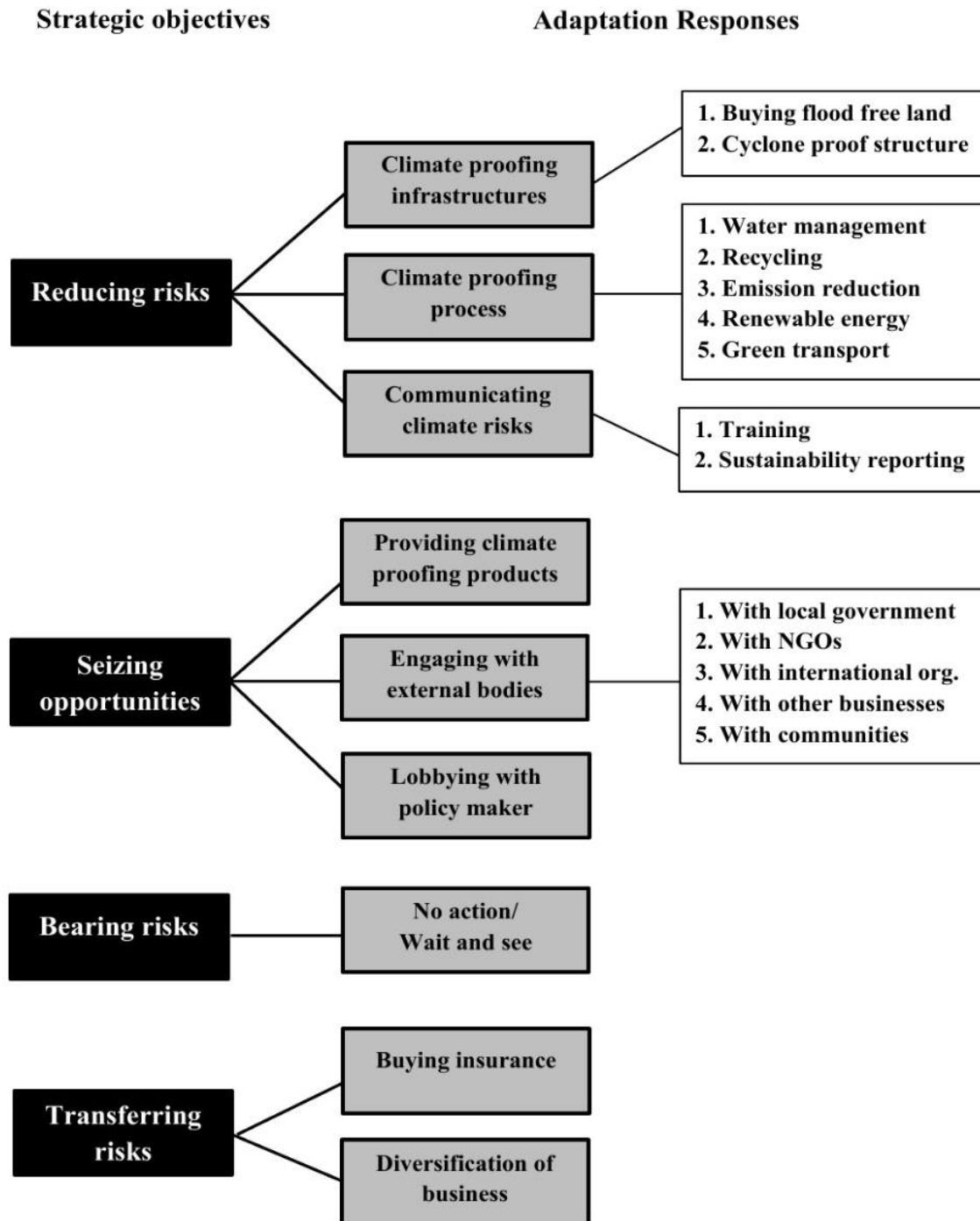


Figure 5.2: Adaptation Responses with Strategic Objectives

Further to assess the success of adaptation measures, Adger, Arnell and Tompkins (2005) described four criteria, namely: *effectiveness*, *efficiency*, *equity*, and *legitimacy*. Based on the overall findings, the adaptation process of these organizations is no doubt evolving. Embracing the processual based framework of thinking proposed by Pettigrew (1987), these organizations are in the searching mode and learning process to determine adaptation measures that are effective and resource efficient. TelcoOrg has appeared to acquire certain social legitimacy through its proactive actions demonstrated through various successful efforts involving not just NGOs as their partners, but also government agencies and business partners to take advantage of climate change impacts for business opportunities in offering best solutions that can meet the demand of the affected and vulnerable communities. Figure 5.2 presents the overview of the linkage between organizational objectives, adaptation practices and adaptation responses.

5.4 Conclusion

This chapter has further elaborated the research findings. The detail explanations on the phenomenon of interest using the theoretical viewpoints embraced in this study are given. This study in particular has articulated various important contexts such as decision-making process and decision makers, past organization experiences, aspect of learning as well as dynamic interplays of factors serving as barriers or enablers and playing important roles in influencing the adaptation actions and practices, which further lead to certain outcomes. The subsequent chapter provides a conclusion for this research and highlights the achievement of this study.

CHAPTER 6

CONCLUSION

6.1 Introduction

This chapter serves as a conclusion chapter that elaborates the achievement of this study in attaining all the research objectives, and provides answers to all the research questions formulated for the research. It also provides a summary of the research findings as presented and discussed in Chapter 4 and Chapter 5. At the end of the chapter, the contributions of this study, the limitation of the research and suggestions for future research are given.

6.2 Summary of the Research

This study sets out to examine how organizations in Bangladesh adapt to climate change. The research specifically investigated organizational practices, barriers and enablers, and how the identified barriers and enablers influence the organizational adaptation process as well as the outcomes of adaptation responses related climate change in the context of business organizations in Bangladesh. The research was guided under the qualitative research paradigm, and embraced open systems theory, organizational learning theory and Pettigrew's processual analysis framework in the conceptual framework to undertake this study.

In general, this research has empirically demonstrated that in the context of Bangladesh business organizations, there was no unique approach deployed by the three organizations that were used as case studies with regard to their adaptation practices, strategies and measures to deal with climate change impacts. Only one organization –

TelcoOrg- was found to have a combination of proactive and reactive approach in its adaptation responses and measures. The other two organizations – RealEstateOrg and GarmentOrg – were found to be reactive in its adaptation related decisions. These organizations appeared not to be bothered to strategically climate proofing extensively their business processes and infrastructures despite the frequent problems and issues including supply chain disruption, energy crisis and water shortage triggered by extreme weather events, such as floods and cyclones.

This study also identified barriers and enablers situated at the outer context of these organizations affecting the business ecosystem of Bangladesh. The identified barriers and enablers are as follows: poor access to information and industry benchmarking standards and low-cost technology, weak regulatory framework and governance, lack of incentives, political instability, corruptions and inefficient governing system, and stakeholders' engagement and market forces.

In the inner context of an organization, elements such as leadership, awareness and perception, adaptive capacity of an organization were found to serve as enablers or barriers for these organizations, which could encourage or obstruct strategic initiatives related to formulating and implementing adaptation strategies to manage climate change impacts strategically.

Overall, there are three research contributions gained from this study. The first and second contributions are in the theoretical and research aspects. The third contribution is in the practical and managerial aspects, where the research findings have provided valuable insights for business leaders, managers and policy makers, which can benefit

telecommunication, real estate and garment manufacturing industries in the context of Bangladesh.

6.3 Summary of the Research Achievement and the Findings

There are four (4) research questions formulated for this study, which have been successfully answered, as follows.

Q1) What are the existing organizational practices related to adaptation to climate change in the context of organizations in Bangladesh?

It was found that climate change effects have affected the business processes of all the organizations. Using two categories of impacts - the physical impacts and the institutional impacts, this study reported the organizational practices and activities of TelcoOrg, RealEstateOrg and GarmentOrg, which are related to adaptation to climate change. In Bangladesh context, past organizational experiences in dealing with the extreme weather events such as cyclones, heat waves and floods faced by Bangladesh served as a frame of reference for these organizations to learn, adjust and adapt. Further to manage the climate change impacts and risks, these organizations engaged in using three types of adaptation strategies, as follows: climate-proofing infrastructures; climate-proofing process; and communicating climate risks.

For example, from the viewpoints of key decision makers at TelcoOrg, climate change challenges have exposed the organization to face physical, financial and regulatory risks. In the context of handling business operations, TelcoOrg has to absorb higher operating costs due to damage network towers and base station equipments whenever cyclone and flooding disasters happening in Bangladesh. Ongoing efforts that have been

undertaken by the organization include decisions to develop cyclone resistant network towers and leverage automation for doing maintenance. TelcoOrg also placed strong emphasis in communicating climate risks and worked closely with various important stakeholders in the various CSR programmes to help communities. RealEstateOrg, on the other hand, has experienced great challenges in the aspect of finding and securing suitable lands for their development projects due to the ongoing, uncertain patterns of climate change affecting Bangladesh. The organization also has to face ongoing pressures to comply with regulations and standards for their construction projects to be aligned with the directives and focus of the government agenda to effectively manage climate change impacts in Bangladesh. Apart from physical, financial and regulatory risks, GarmentOrg also has to face market risks when interruptions occur along the global supply chain and logistics due to extreme weather events such as floods and cyclones. In the context of this organization, their business operations and organizational practices are also being continuously influenced by the ongoing pressures from the international clients and several established international and local regulatory standards that require the industry players including GarmentOrg to comply. More details can be read in Chapter 4.

(Q2) What are the barriers and enablers to climate change adaptation in the context of organizations in Bangladesh?

The research outcomes revealed that the barriers and enablers existed in both outer and inner context of an organization. The identified enablers such as leadership, awareness and perception in the context of TelcoOrg for instance, have embedded in the organizational adaptation process, that are being manifested through business practices and activities contributing to the strong corporate image of TelcoOrg as climate champion in

Bangladesh. In contrast, organizational capacity was found to exist as barriers in the organizational context of all these organizations.

This study also found that most barriers existed in the outer context, have substantially influenced the business ecosystem of Bangladesh and affected the decision context and organizational decision-making process concerning climate change adaptation and risk mitigations. Barriers in the form of corruption and bureaucracy, political instability, cost of technology and stakeholders' action have affected TelcoOrg, RealEstateOrg and GarmentOrg to certain extents. As a result, these organizations were risk averse when coming to decision making to allocate resources to invest for future, and to extensively climate proofing their products and services, and business processes and infrastructures.

(Q3) How the identified barriers and enablers influence the organizational adaptation process?

Deploying Pettigrew's processual based framework supporting with other theories and viewpoints, this study found that the identified enablers and barriers situated at the outer context have played roles influencing the ecosystem of the business sector. Institutional isomorphism as described by DiMaggio and Powell (1983), in the forms of change in regulations and procedures and uncertainties that are triggered from climate change effects and leading to energy crisis, shortage of water source and disruptions of supply chains and business operations, have been experiencing by these organization in the business environment of Bangladesh.

The identified barriers and enablers that situated in the business environment such as lacking of quality information and industry benchmarking standards, access to low-cost

technology, poor regulatory framework and governance system have affected the organizations' adaptive capacity to manage climate change impacts effectively. RealEstateOrg and GarmentOrg for example were found having no awareness about some attractive adaptation financing systems such as availability of Green Climate Funds that could be used to increase their adaptive capacity to adapt to climate change.

(Q4) What are the outcomes of adaptation responses to climate change taken by organizations in Bangladesh?

This study found that the outcomes of adaptation responses undertaken by the organizations supported some of these objectives, namely: reducing risks, seizing opportunities, bearing risks, and transferring risks. It was found that most adaptation decisions and responses were reactive by nature. Only TelcoOrg was found to demonstrate proactive responses in certain areas.

The organizational adaptation responses and strategies as revealed in the research findings were also influenced by the available resources as well as the learning context based on past experience dealing with climate change effects. Framing from this perspective, this study found that RealEstateOrg and GarmentOrg, despite facing on-going problems and sometimes crises related to climate change effects, yet these organizations have failed to fully understand and recognize climate risks. TelcoOrg on the other hand, was found to be in a better position for risk mitigations and had already been successful in taking advantage of opportunities related to climate change. The outcomes of adaptation responses to climate change in the context of these organizations have been reported in the previous chapter.

6.4 Theoretical Contributions

This study has made two contributions in the domain of theoretical and academic research. From the theoretical standpoint, this study extends the current understanding about how organizations adapt and manage climate change effects and impacts from the organization context. More explicitly, the research offers some useful theoretical insights that can better theorize this phenomenon of interest, through the use of processual analysis based framework, open systems theory and organizational learning theory, as an explanatory tool to explain why and how reactive or proactive adaptation responses serving as outcomes from the organizational learning process, and in which such learning process are gained from the interactions of social actors and decision makers with the internal and external environments.

The findings of this research are supporting the claims put forward by Berkhout, Hertin and Gann (2006) at certain extent, that there are many similarities in the way organizations adapt and respond to climate change with the conventional adaptation related to market, regulatory and technological changes. Embracing organization centric view and emphasizing the Bangladesh business environment in the research, this study further extends the works by Berkhout, Hertin and Gann (2006) by contending that the dynamic interplays of barriers and enablers situated in the inner and outer context of an organization can substantially affect decision context and decision making process occurring within the organizational environment in handling climate change impacts. In the case of business organizations in Bangladesh, barriers and enablers situated at the external context in particular can substantially affect the adaptation decisions either to be reactive or proactive, and the way the organization managing the climate change effects either strategically or always on ad-hoc basis. Hence, this study argues that it is not just four

factors influencing organization's adaptation strategy - core competencies, core business, dynamic capabilities and organization culture - as suggested by Berkhout, Hertin and Gann (2006).

Institutional influences exist as barriers or enablers that exist in the business environment also play crucial role in shaping organization's adaptation approach and strategy. Business organizations in Bangladesh show considerable variations in their adaptation responses based on distinct characteristics of organizations such as types of products delivered, level of awareness, managerial perceptions, internal capacity and resources. On the other hand, their adaptation responses have shared many similarities in approaches (climate-proofing infrastructures, climate-proofing process, lobbying with policy makers) and objectives (reducing risks, seizing opportunities, bearing risks and transferring risks) because these organizations facing similar institutional influences in the environment. In this context, the isomorphism process inarguably is taking place and influences the organizational adaptation to climate change.

From the standpoint of academic research, using three business organizations of Bangladesh as case studies, this study has addressed the limitations of the literature with regard to the scarcity of empirical research from developing countries that are being recognized as high climate risks country. This is important to provide a more balanced view and to further stimulate the progress of the literature. The research directly responds to the urgent calls made by past researchers such as Wright and Nyberg (2017), Ford et al. (2014) and Abetacola (2012). This study has systematically reported empirical evidence based on a systematic research guided under a research framework supported by management theories, and used multiple case studies as research instruments. The research

has enriched the current academic literature with new insights obtained from these organizations from Bangladesh.

6.5 Managerial Contributions

From the managerial standpoint, the research findings have offered rich insights for business leaders and managers to understand the implications of factors identified as barriers and enablers that situated at the inner and outer context of an organization and how they can affect and influence organizational adaptation practices and strategies. The following are recommendations that put forward based on the research outcomes to benefit business leaders and managers with regard to strategically planning and effectively implement climate change adaptation strategies.

Firstly, business leaders and top management must create effective and strategic enablers within the organization context to increase awareness and understanding among managers and other employees about climate change risks and impacts, as well as to equip them with important skills to ensure they can effectively adapt.

Secondly, organizations must consider devising a governance system that commits to respond strategically in managing climate change impacts for their business sustainability. Organizational activities and programs related to CSR should have clear focus and prioritize in building community resilient among the vulnerable and affected communities.

Thirdly, business leaders and managers must actively collaborate with the local government agencies, international stakeholders and institutions, NGOs and other stakeholders including community leaders, which are closely related with the adaptation

projects. Forming a strong business coalition such as an industry association is a strategic platform that can be leveraged to lobby and negotiate with the government and responsible agencies with regard to matters concerning climate change adaptations.

Finally, it is important for organizations to have access to industry benchmarking standards and up-to-date information with regard to climate change. Access to this important information can improve organizational understanding and also adaptive capacity to deal with the uncertain nature of climate change effects and patterns. Organizations also must commit to invest resources to train not just their employees but also related players in their supply chain about climate change impacts. Organizations should actively communicate their commitments in managing climate change impacts strategically and those commitments should be made visible in the organization's website, annual report, social media, newspapers and other channels.

6.6 Practical Contributions

From the practical standpoints, the research outcomes can benefit policy makers of Bangladesh, which are as follows:

Firstly, it is important than ever for the Government of Bangladesh and responsible agencies to remove barriers and create enabling environment by enacting new policy or changing existing policy or regulations (such as building code, urban planning, energy regulations, taxation and business incentives, fiscal policy, innovative financing systems and others) to engage private businesses in adaptation to climate change strategically. Past studies such as Biagini & Miller (2013), Mendelsohn (2000), Mendelsohn (2006), Pauw & Pegels (2013), Weinhofer & Busch (2013) reported that systematic interventions by government to remove barriers and create enablers can positively sustain business

ecosystem supporting innovative implementation of adaptation strategies to manage climate change impacts.

Secondly, the local government and responsible institutions and regulators should arrange for sharing sessions in the form of seminar and training, as well as through a systematic campaign using mass media including social media to raise awareness about climate change impacts and risks, as well as opportunities for organizations.

Finally, the Government of Bangladesh should encourage collaborations and partnership with all important stakeholders in the innovation ecosystem of Bangladesh to work closely with private organizations to encourage and support their commitment in implementing adaptation strategies proactively.

6.7 Limitation and Opportunities for Future Research

The focus of this research is to examine Bangladesh business organizations in adapting to climate change. This study specifically conducted the research to include only private organizations as case studies to uncover organizational practices, barriers and enablers, and to further understand how the identified barriers and enablers shaping the adaptation process, and the outcomes of adaptation responses related to climate change. Whilst this study has achieved all the targeted research objectives, yet the application and generalization of the research findings are rather restricted.

Firstly, this study only used organizations in Bangladesh setting and specifically selected private business organizations. The research findings hence cannot be generalized in the context of small business enterprises or subsidiary of multinational corporations, as well as businesses operating outside Bangladesh setting. Secondly, due to budget and time

constraints as well as difficulties to obtain access to more choices of case studies for selection for the research, data were obtained only from three organizations where the researcher was able to obtain clearance agreement from the business owners. These organizations also are from three different business sectors. In this context, the applicability of the research findings is also not generalizable to be treated as a sample from industry context. This is because there is no cross comparison within industry can be done.

Finally, despite all the important measures being taken care of, yet the restrictions of using audio and video recording for the research purpose during the interview sessions, and also the challenges to transcribe from the local language into English language inarguably can affect on the quality of data obtained for the research. The researcher also has to acknowledge that biases can occur during the sense making process and analyzing data to draw conclusions to serve as research findings. However, the conceptual framework that was developed and guided under open systems theory, organizational learning theory and Pettigrew's processual analysis framework serving to ensure the interpretation can be done the best possible way, based on the data obtained from these organizations.

Future studies can replicate the research design and use the conceptual framework to carry out a similar kind of research in different contexts. Researchers can apply the conceptual framework to examine different type of business organizations in Bangladesh or in other developing countries in Asia or Africa. Future research also should aim on doing theory building in this area, in which the findings of this research can contribute to strengthen the researchers understanding who share similar interest. The findings of this research also can offer opportunities for the researchers who are interested to use a

quantitative research approach to construct related variables and to propose hypotheses to be tested and confirmed. Concepts and factors that were derived from the data such as identified barriers and enablers that shaping organizational practices and processes can be examined further to be used as variables in any future research using a quantitative research approach.

REFERENCES

- Abreu, M. C., Freitas, A. R., & Rebouças, S. M. D. (2017). Conceptual model for corporate climate change strategy development: Empirical evidence from the energy sector. *Journal of Cleaner Production*, 165, 382-392. doi.org/10.1016/j.jclepro.2017.07.133
- Abdullah, M. (2019, June 18). Budget affects telecom sector, says AMTOB. *Dhaka Tribune*. Retrieved from <https://www.dhakatribune.com/business/economy/2019/06/18/budget-affects-telecom-sector-says-amtob>
- Abatecola, G. (2012). Organizational adaptation: an update. *International Journal of Organizational Analysis*, 20(3), 274-293.
- Adams, C. A., Heijltjes, M.G., Jack, G., Marjoribanks, T., & Powell, M. (2011). The development of leaders able to respond to climate change and sustainability challenges: The role of business schools. *Sustainability Accounting, Management and Policy Journal*, 2(1), 165-171. <https://doi.org/10.1108/20408021111162191>
- ADB. (2010). Bangladesh Private Sector Assessment. Asian Development Bank.
- ADB. (2011). Climate Change and Migration in Asia and the Pacific. Asian Development Bank.
- Adger, W. N., Huq, S., Brown, K., Declan, C., & Hulme, M. (2003). Adaptation to climate change in the developing world. *Progress in Development Studies*, 3(3), 179–195.
- Adger, W. N., Arnell, N. W. & Tompkins, E. L. (2005). Successful adaptation to climate change across scales. *Global Environmental Change*, 15(2), 77-86.
- Adger, W. N., Dessai, S., Goulden, M., Hulme, M., Lorenzoni, I., Nelson, D. R., Naes, O. L., Wolf, J., & Reford, A. (2009). Are there social limits to adaptation to climate change? *Climatic Change*, 93(3-4), 335-354.

- Agrawal, A., Perrin, N., Benson, C. S., & Kononen, M. (2012). Climate Policy Process, Local Institution, and Adaptation Actions: Mechanisms of Transition and Influence. *Wiley Interdisciplinary Review, Climate Change*, 3(6), 656-579.
- Agrawala, S., Carraro, M., Kingsmill, N., Lanzi, E., Mullan, M., Prudent-Richard, G. (2011). Private Sector Engagement in Adaptation to Climate Change: Approaches to Managing Climate Risks. OECD Publication.
- Ahmad, R. (2018, December 14). Labour unrest forces closure of 70 RMG factories. New Age. Retrieved from <http://www.newagebd.net/article/58881/labour-unrest-forces-closure-of-70-rmg-factories>
- Ahmed, N. (2013). Linking prawn and shrimp farming towards a green economy in Bangladesh: Confronting climate change. *Ocean & Coastal Management*, 75, 33-42.
- Alam, H. (2017, June 1). Water crisis all around Dhaka: Load shedding, ground water depletion, malfunction of deep tube wells main reasons. *The Daily Star*. Retrieved from <https://www.thedailystar.net/city/water-crisis-all-around-1413664>
- Alauddin, M., & Sarker, M. A. R. (2014). Climate change and farm- level adaptation decisions and strategies in drought-prone and groundwater-depleted areas of Bangladesh: an empirical investigation. *Ecological Economics*, 106, 204–213.
- Aldrich, H. E., & Marsden, P.V. (1988). Environments and organizations, In Handbook of Sociology. Smelser N. (Ed.). Newbury Park, CA: Sage.
- Alves, M.W. F. M., Jabbour, A. B. L. S., Kannan, D., & Jabbour, C. J. C (2017). Contingency theory, climate change, and low-carbon operations management. *Supply Chain Management: An International Journal*, 22(3), 223-236.
- Amendola, A., Linnerooth-Bayer, J., Okada, N., Shi, P. (2007). Towards integrated disaster risk management: case studies and trends from Asia. *Natural Hazards*, 44(2), 163–168.
- Argyris, C., & Schön, D. A. (1978). Organizational Learning. A Theory of Action Perspective. Reading, MA: Addison-Wesley.

- Arnell, N. W., & Delaney, E. (2006). Adapting to climate change: Public water supply in England and Wales. *Climatic Change*, 78(2), 227-255.
- Averchenkova, A., Crick, F., Kocornik-Mina, A., Leck, H., & Surminiski, S. (2016). Multinational and large national corporations and climate change adaption: are we asking the right questions? A review of current Knowledge and a new research perspective. *Wiley Interdisciplinary Reviews: Climate Change*, 7(4), 517-536. <https://doi.org/10.1002/wcc.402>
- Ayers, J. M., & Huq, S. (2008). The Value of Linking Mitigation and Adaptation: A Case Study of Bangladesh. *Environmental Management*, 43(5), 753-764.
- Bai, X., Dawson, R. J., Ürge-Vorsatz, D., Delgado, G. C., Barau, A. S., Dhakal, S., Dodman, D., Leonardsen, L., Masson-Delmotte, V., Roberts, D. C. & Schultz, S. (2018, March). Six Research Priorities for Cities and Climate Change. *Nature*, 55, 23-25.
- Bansal, P., & Gao, J. (2006). Building the future by looking to the past: examining research published on organizations and environment. *Organization and Environment*, 19(4), 458–478.
- BBS. (2017). Vital Information of Bangladesh, Bangladesh Bureau of Statistics.
- BBS. (2018). Monthly Statistical Bulletin Bangladesh, October 2018, Bangladesh Bureau of Statistics.
- BCCSAP. (2009). Bangladesh Climate Change Strategy and Action Plan-2009, Department of Environment, Ministry of Environment and Forestry, Bangladesh.
- BCCT. (2019). Bangladesh Climate Change Trust. <http://www.bcct.gov.bd/>
- Backman, C., Verbeke, A., & Schulz, R. (2107). The Drivers of Corporate Climate Change Strategies and Public Policy: A New Resource-Based View Perspective, *Business and Society*, 56(4), 545-575.
- Becken, S., & Wilson, J. (2016). Are tourism businesses' responses to weather variability a suitable precursor to climate change adaptation? *Worldwide Hospitality and Tourism Themes*, 8(5), 578-592. <https://doi.org/10.1108/WHATT-06-2016-0033>

- Begum, R. A., & Pereira, J. J. (2013). The awareness, perception and motivational analysis of climate change and business perspectives in Malaysia. *Mitigation and Adaptation Strategies for Global Change*, 20(3), 361–370. doi:10.1007/s11027-013-9495-6.
- Belal, A. R., Kabir, M. R., Cooper, S., Dey, P., Khan, N. A., Rahman, T., & Ali, M. (2010). Corporate environmental and climate change disclosures: empirical evidence from Bangladesh. *Research in Accounting in Emerging Economies*, 10, 145-167.
- Belal, A. R, Cooper, S., & Khan, N. A. (2015). Corporate environmental responsibility and accountability: What chance in vulnerable Bangladesh? *Critical Perspectives on Accounting*, (Article in Press). <http://dx.doi.org/10.1016/j.cpa.2015.01.005>
- Beermann, M. (2011). Linking corporate climate adaptation strategies with resilience thinking. *Journal of Cleaner Production*, 19, 836-842.
- BGMEA. (2018). Made in Bangladesh with Pride. RMG Success Story. Bangladesh Garments Manufacturers and Exporters Association. <http://www.bgmea.com.bd/blog/story/877>
- BGMEA. (2020a). BGMEA's Activities. Bangladesh Garments Manufacturers and Exporters Association. <https://www.bgmea.com.bd/home/about/BGMEASACTIVITIES>
- BGMEA. (2020b). BGMEA Joins UN Climate Charter. Bangladesh Garments Manufacturer and Exporter Association. http://www.bgmea.com.bd/home/activity/BGMEA_joins_UN_Climate_Charter
- Berkhout, F., Hertin, J., & Gann, A. (2006). Learning to adapt: Organizational adaptation to climate change impacts. *Climatic Change*, 78(1), 135-156.
- Berkhout, F. (2012). Adaptation to climate change by organizations. *WIREs Clim Change*, 3(1), 91–106. doi: 10.1002/wcc.154
- Bertalanffy, L. V. (1969). General System Theory: Foundations, Development, Applications. New York: Braziller.
- BDRC. (2013). Reasonable Wages for Workers to Eliminate Unrest in Bangladesh's Ready-made Garments (RMG) Sector. Bangladesh Development Research Center.
- BFSCD. (2010). Annual Report, Bangladesh Fire Service and Civil Defense.

- Biagini, B., & Miller, A. (2013). Engaging the Private Sector in Adaptation to Climate Change in Developing Countries: Importance, Status, Challenges. *Climate and Development*, 5(3), 242-252.
- Bleda, M., & Shackley, S. (2008). The dynamics of belief of climate change and its risks in business organization. *Ecological Economics*, 66, 517-532.
- Bogdan, R., & Biklen, S. K. (2007). Qualitative Research for Education: An introduction to theory and method (5th ed.). Boston: Pearson/Allyn and Bacon.
- Boland, R. (1985). Phenomenology: A Preferred Approach to Research in Information Systems, In Research Methods in Information Systems, E. Mumford, R. Hirschheim, G. Fitzgerald, and T. Wood (Eds.), pp. 193-201. North Holland, Amsterdam: Harper.
- Boulding, K. E. (1956). General Systems Theory: The Skeleton of Science. *Management Science*, 2(3), 197-208.
- Bremer, J., & Linnenluecke, M. (2017). Determinants of the perceived importance of organisational adaptation to climate change in the Australian energy industry. *Australian Journal of Management*, 42(3), 502-521.doi.org/10.1177/0312896216672273
- BTRC. (2016). Report-2016, Bangladesh Telecommunication Regulatory Commission.
- Burns, T., & Stalker, G. M. (1961). The Management of innovation. London: Tavistock.
- Burns, R. (2000). Introduction to Research Methods (4th ed.). French's Forest: Pearson.
- Busch, T. (2011). Organizational adaptation to disruptions in the natural environment: the case of climate change. *Scandinavian Journal of Management*, 27, 389–404.
- Climate Change Cell. (2006). Component 4B of Comprehensive Disaster Management Programme, CDMP, Dhaka, Bangladesh.
- Caring for Climate. (2012). Business and Climate Change Adaptation: Toward resilient companies and communities, United Nation Global Compact & United Nation Environment Program.

- Carina, E., Keskitalo, H., Vulturius, G., & Scholten, P. (2014). Adaptation to climate change in the insurance sector: examples from the UK, Germany and the Netherlands. *Natural Hazards*, 71, 315–334. doi: 10.1007/s11069-013-0912-7
- CDP Carbon Disclosure Project. (2014). Protecting our Capital – How climate adaptation in cities creates a resilient place for business. Retrieved from <https://www.c40.org/researches/protecting-our-capital>
- CDP Climate Change Report. (2019). World’s biggest companies face \$1 trillion in climate change risks. Retrieved from <https://www.cdp.net/en/articles/media/worlds-biggest-companies-face-1-trillion-in-climate-change-risks>.
- Child, J. (1972). Organization structure, environment and performance: the role of strategic choice. *Sociology*, 6, 1-22.
- Coleman, M., & Briggs, A. R. J. (2007). Research methods in educational leadership and management, (2nd ed.). London: Sage Publication.
- Creswell, J. W. (2007). Qualitative Inquiry and Research Design; Choosing Among Five Traditions (2nd ed.). Thousand Oaks, CA: Sage Publication.
- Colwell, S. R., & Joshi, A. W. (2013). Corporate ecological responsiveness: antecedent effects of institutional pressure and top management commitment and their impact on organizational performance. *Business Strategy and the Environment*, 22(2), 73–91.
- CIA. (2019). The world fact book 2019, Central Intelligence Agency. Retrieved from https://www.cia.gov/librarY/publications/the-world-factbook/geos/print_bg.html
- Cyert, R. M., & March, J. G. (1963/1992). A Behavioral Theory of the Firm, (2nd Ed.). New Jersey: Prentice Hall.
- Daddi, T., Todaro, N. M., Giacomo, M. R. D., & Frey, M. (2018). A Systematic Review of the Use of Organization and Management Theories in Climate Change Studies. *Business Strategy and the Environment*, 27(4), 456-474.
- Daft, R. L., Weick, K. E. (1984). Toward a Model of Organizations as Interpretation Systems. *Academy of Management Review*, 9(2), 284-295.

- Daly, H. E., & Cobb, Jr. J. B. (1994). *For the Common Good: Redirecting the Economy toward Community, the Environment, and a Sustainable Future*. Boston: Beacon Press.
- Damert, M., & Baumgartner, R. J. (2018). Intra-Sectoral Differences in Climate Change Strategies: Evidence from the Global Automotive Industry. *Business Strategy and the Environment*, 27, 265–281. doi: 10.1002/bse.1968
- Damert, M., Paul, A., & Baumgartner, R. J. (2017). Exploring the determinants and long-term performance outcomes of corporate carbon strategies. *Journal of Cleaner Production*, 160, 123-128. <https://doi.org/10.1016/j.jclepro.2017.03.206>
- Darmani, A., Arvidsson, N., & Hidalgo, A. (2016). Do the strategic decisions of multinational energy companies differ in divergent market contexts? An exploratory study. *Energy Research and Social Science*, 11, 9-18. <https://doi.org/10.1016/j.erss.2015.08.009>
- Debnath, K. B., & Mourshed, M. (2018). Forecasting methods in energy planning models. *Renewable and Sustainable Energy Reviews*, 88, 297–325.
- Dépoues, V. (2017). Organisational uptake of scientific information about climate change by infrastructure managers: the case of adaptation of the French railway company. *Climatic Change*, 143, 473–486. doi: 10.1007/s10584-017-2016-y
- Denzin, N. K., & Lincoln, Y. S. (2000). Introduction: The Discipline and Practice of Qualitative Research, In N.K. Denzin & Y.S. Lincoln (Eds.), *Handbook of Qualitative Research*, (2nd ed.), pp: 1-28. Thousand Oak, CA: Sage.
- Dess, G. G., & Beard, D. W. (1984). Dimensions of Organizational Task Environments. *Administrative Science Quarterly*, 29(1), 52–73.
- DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, 48, 147-160.
- Drake, P., Shanks, G., & Broadbent, M. (1998). Successfully completing case study research combining rigour, relevance & pragmatism. *Information Systems Journal*, 8(4), 273-289.

- Drucker, P. F. (1954). *The Practice of Management*, (1st ed.). New York: Harper & Row.
- Duncan, R. B. (1972). Characteristics of Organizational Environments and Perceived Environmental Uncertainty. *Administrative Science Quarterly*, 17(3), 313-327.
- Daymon, C., & Holloway, I. (2002). Interviews, In: *Qualitative research methods in public relations and marketing communications*, pp: 166-185. New York: Routledge.
- Eagleton, T. (1983). *Literary theory: An introduction*. Oxford: Basil-Blackwell.
- Eckstein, D., Hutfils, M., & Wings, M. (2019). Global Climate Risk Index, Germanwatch. https://germanwatch.org/sites/germanwatch.org/files/Global%20Climate%20Risk%20Index%202019_2.pdf
- Eldridge, J. E. T., & Crombie, A. D. (2013). *A Sociology of Organizations* (13th ed.). New York: Routledge.
- Emery, F. E., Trist, E. (1965). The Causal Texture of Organizational Environments. *Human Relations*, 18, 21–32.
- Eisenack, K., Stecker, R., Reckien, D., & Hoffmann, E. (2012). Adaptation to climate change in the transport sector: a review of actions and actors. *Mitigation and Adaptation Strategies for Global Change*, 17, 451–469. doi: 10.1007/s11027-011-9336-4
- EU ETS. (2015). *EU ETS Handbook*, European Commission.
- Fankhauser, S., Smith, J., & Tol, R. (1999). Weathering Climate Change: Some Simple Rules to Guide Adaptation Decisions. *Ecological Economics*, 30, 67–78.
- Flyvberg, B. (2006). Five Misunderstandings about Case-Study Research. *Qualitative Inquiry*, 12(2), 219-245.
- Folke, C. (2006). Resilience: the emergence of a perspective for social–ecological systems analyses. *Global Environmental Change*, 16, 253–267.
- Folk, E. (2018). How Climate Change Will Affect Businesses. *Renewable Energy Magazine*. Retrieved from <https://www.renewableenergymagazine.com/emily-folk/how-climate-change-will-affect-businesses-20181109>

- Fontana, A., & Frey, J. H. (1994). Interviewing: The Art of Science. In: Denzin, N. K. and Lincoln, Y. S. (Eds.), *Handbook of Qualitative Research*. Thousand Oaks, CA: Sage.
- Freeman, R. E. (1984). *Strategic Management: A Stakeholder Approach*. Boston, MA: Pitman.
- Gadamer, H. G. (1998). *Truth and Method*, translated by Joel Weinhammer and Donald G. Marshall, New York: Continuum.
- Galbreath, J. (2014). Climate change response: Evidence from the Margaret River wine region of Australia. *Business Strategy and the Environment*, 23, 89-104. doi:10.1002/bse.176
- Galbreath, J. (2011). To What Extent is Business Responding to Climate Change? Evidence from a Global Wine Producer. *Journal of Business Ethics*, 104, 421-432.
- Gall, M. D., Gall, J. P., & Borg, W. R. (2007). *Educational Research: An Introduction*, (8th ed.). Berkshire: Allyn and Bacon.
- Gasbarro, F., Iraldo, F., & Daddi, T. (2017). The drivers of multinational enterprises' climate change strategies: A quantitative study on climate-related risks and opportunities. *Journal of Cleaner Production*, 160, 8-26. <https://doi.org/10.1016/j.jclepro.2017.03.018>
- Gasbarro, F., & Pinkse, J. (2016). Corporate adaptation behaviour to deal with climate change: The firm-specific interpretations of physical climate impacts. *Corporate Social Responsibility and Environmental Management*, 23, 179-192.
- Gasbarro, F., Rizzi, F., & Frey, M. (2016). Adaptation measures of energy utility companies to cope with water scarcity induced by climate change. *Business Strategy and the Environment*, 25, 54-72.
- GCF. (2019a). Country Profile, Bangladesh, Green Climate Fund. Retrieved from <https://www.greenclimate.fund/countries/bangladesh>
- GCF. (2019b). Private Sector Facility, Green Climate Fund. Retrieved from <https://www.greenclimate.fund/what-we-do/private-sector-facility>
- Gerlak, A. K., Weston, J., McMahan, B., Murray, R. L., & Mills-Novoa, M. (2018). Climate risk management and the electricity sector. *Climate Risk Management*, 19, 12-22. <https://doi.org/10.1016/j.crm.2017.12.003>

- Gephart, R. P. (1999). Paradigms and Research Methods. Research Methods Division forum. www.4.aom.pace.edu/rmd/1999_RMD_Forum_Paradigms_and_Research_Methods.htm.
- Gephart, R. P. (2004). From the Editors: Qualitative Research and Academy of Management Journal. *Academy of Management Journal*, 47(4), 454-462.
- Gerring, J. (2004). What is a Case Study & What is it Good for? *American Political Science Review*, 98(2), 343-354.
- Glaser, B., & Strauss, A. L. (1976). The discovery of Grounded Theory: Strategies for Qualitative Research. Chicago: Aldine Publishing Company.
- Greenwood, R., Hinings, C. R. (1996). Understanding radical organizational change: bringing together the old and the new institutionalism. *Academy of Management Review*, 21, 1022–1054.
- Guba, E. G. & Lincoln, Y. S. (1991). Evective evaluation: Improving the usefulness of evaluation results through responsive and natuaralistic approaches. San Fransisco, CA: Jossey-Bass Publishers.
- Guba, E. G. & Lincoln, Y. S. (1994). Competing Paradigm in Qualitative Research, In N.K. Denzin & Y. S. Lincoln (Eds), *Handbook of qualitative Research*, pp: 105-111. Thousand Oaks, CA: Sage Publication.
- Haigh, N., & Griffiths, A. (2012). Surprise as a Catalyst for Including Climatic Change in the Strategic Environment. *Business & Society*, 51, 89-120.
- Hannan, M. T., & Freeman, J. (1977). The population ecology of organizations. *American Journal of Sociology*, 82, 929–964.
- Hannan, M. T., & Freeman, J. (1984). Structural inertia and organizational change. *American Sociological Review*, 49, 149–164.
- Haney, A. (2017). Threat Interpretation and Innovation in the Context of Climate Change: An Ethical Perspective. *Journal of Business Ethics*, 143(2), 261–276.

- Herrmann, J., & Guenther, E. (2017). Exploring a scale of organizational barriers for enterprises' climate change adaptation strategies. *Journal of Cleaner Production*, 160, 38-49. <https://doi.org/10.1016/j.jclepro.2017.03.009>
- Hertin, J., Berkhout, F., Gann, D. M., & Barlow, J. (2003). Climate change and the UK house building sector: Perceptions, impacts and adaptive capacity. *Building Research & Information*, 31(3-4), 278-290.
- Heimann, T., & Scott, W. G. (1974). *Management in the modern organization* (2nd Edition), Boston: Houghton Mifflin.
- Hoffmann, V. H., Sprengel, D.C., Ziegler, A., Kolb, M., & Abegg, B. (2009). Determinants of corporate adaptation to climate change in winter tourism: an econometric analysis. *Global Environmental Change*, 19, 256–264.
- Husserl, E. (1982). *Logical investigations*. Vol. II. Translated by J. N. Findlay, London: Routledge and Kegan Paul.
- Huber, G. P. (1991). Organizational Learning: The Contributing Process and the Literatures. *Organization Science*, 2(1), 88-115.
- Huitema, D., Adger, W. N., Berkhout, F., Massey, E., Mazmanian, D., Munaretto, S., Plummer, R. & Termeer. C. C. J. A. M. (2016). The governance of adaptation: choices, reasons, and effects. Introduction to the Special Feature. *Ecology and Society* 21(3), 37.
- IFC. (2013). *Enabling environment for private sector adaptation: An index assessment framework*. International Finance Corporation.
- IPCC. (2019). *Intergovernmental Panel on Climate Change*. <https://www.ipcc.ch/>
- IPCC. (2014). *Fifth Assessment Report*. Intergovernmental Panel on Climate Change, Cambridge: Cambridge University Press.
- IPCC. (2007). *Fourth Assessment Report*. Intergovernmental Panel on Climate Change, Cambridge: Cambridge University Press.
- IPCC. (2001). *Third Assessment Report*, Intergovernmental Panel on Climate Change, Cambridge: Cambridge University Press.

- Intellectcap. (2010). Opportunities for private sector engagement in urban climate change resilience building. Hyderabad: Author.
- Islam, M. M., Sallu, S., Hubacek, K., & Paavola, J. (2014). Limits and barriers to adaptation to climate variability and change in Bangladeshi coastal fishing communities. *Marine Policy*, 43, 208–216.
- Islam, M. N. & Amstel, A. V. (2018). Bangladesh I: Climate Change Impacts, Mitigation and Adaptation in Developing Countries, Springer Climate.
- Joarder, M. A. M., & Miller, P. W. (2013). Factors affecting whether environmental migration is temporary or permanent: Evidence from Bangladesh. *Global Environmental Change*, 23, 1511–1524.
- Jorgenson, A. K., Fiske, S., Hubacek, K., Li, J., McGovern, T., Rick, T., Schor, J. B., Solecki, W., York, R., & Zycherman, A. (2018). Social science perspectives on drivers of and responses to global climate change. *Wiley Interdisciplinary Reviews: Climate Change*, 10(1), e554.
- Katz, D., & Kahn, R. L. (1966). *The Social Psychology of Organizations*, NY: Wiley.
- Kast, F. E., Rosenzweig, J. E. (1973). General System Theory: Application for Organization and Management, *Academy of Management Journal*, 15(4), 447-465.
www.jstor.org/stable/255141
- Kandiklar, M. & Risbey, J. (2000). Agricultural impacts of climate change: if adaptation is the answer, what is the question? *Climatic Change*, 45(3-4), 529-539.
- Khan, A. E., Xun, W. W., Ahsan, H., & Vineis, P. (2011). Climate Change, Sea-Level Rise, & Health Impacts in Bangladesh. *Environment Magazine*, 53(5), 18-33.
- Khatun, F. (2015, March 8). Economic implications of political instability. The Daily Star. Retrieved from <https://www.thedailystar.net/economic-implications-of-political-instability-7499>
- Khun, T. (1962). *The Structure of Scientific Revolutions*. Chicago: University of Chicago Press.

- Khun, T. (1977). *The Essential Tension. Selected Studies in Scientific Tradition and Change*. Chicago: University of Chicago Press.
- Kincheloe, J. L., & McLaren, P. L. (1994). Rethinking critical theory and qualitative research. In Denzin N. K., Lincoln Y. S. (Eds.), *Handbook of qualitative research*, pp.138- 157. Thousand Oaks, CA: Sage.
- Kleindorfer, P. R., Singhal, K., & Wassenhove, L. V. (2005). Sustainable operations management, *Production and Operations Management*, 14(4), 482–492.
- Kolk, A., & Pinkse, J. (2007). Towards strategic stakeholder management? Integrating perspectives on sustainability challenges such as corporate responses to climate change. *Corporate Governance: The international Journal of Business in Society*, 7(4), 370-378. <http://dx.doi.org/10.1108/14720700710820452>
- Kreft, S., & Eckstein, D. (2013). Global Climate Risk Index 2014, German Watch.
- Kulatunga, U., Gayan, W., Amaratunga, D., & Haigh, R. (2014). Evaluation of vulnerability factors for cyclones: The case of Patuakhali, Bangladesh. *International Journal of Disaster Risk Reduction*, 9, 204–211.
- Kuzel, A. J. (1999). Sampling in Qualitative Inquiry, In *Doing Qualitative Research*, B. F. Crabtree and W. L. Miller (Eds.), pp: 33-45. Thousand Oaks, CA: Sage Publication.
- Lash, J., & Wellington, F. (2007). Competitive Advantage on a Warming Planet, *Harvard Business Review*, 85(3), 94–106.
- Lawrence, P. R., & Lorsch, J. W. (1967). *Organization and Environment*. Cambridge, MA: Harvard University Press.
- Levitt, B., & March, J. G. (1998). Organizational Learning. *Annual Review of Sociology*, 14(1), 319-338.
- Leventon, J., Dyer, J. C., & Alstine, J. D. V. (2015). The private sector in climate governance: opportunities for climate compatible development through multilevel industry-government engagement. *Journal of Cleaner Production*, 102, 316-323. <http://dx.doi.org/10.1016/j.jclepro.2015.04.125>

- Lincoln, Y. S. & Guba, E. G. (1985). *Naturalistic Inquiry*. Beverly Hills, CA: Sage Publication.
- Linnenluecke, M. K., Griffiths, A., & Mumby, P. J. (2015). Executives' engagement with climate science and perceived need for business adaptation to climate change. *Climatic Change*, 131, 321–333. doi: 10.1007/s10584-015-1387-1
- Linnenluecke, M. K., Griffiths, A., & Winn, M. (2013). Firm and industry adaptation to climate change: a review of climate adaptation studies in the business and management field. *WIREs Climate Change*, 4(5), 397–416, doi: 10.1002/wcc.214
- Linnenluecke, M. K., Griffiths, A., & Winn, M. (2012). Extreme weather events and the critical importance of anticipatory adaptation and organizational resilience in responding to impacts. *Business Strategy & Environment*, 21, 17–32.
- Linnenluecke, M. K., & Griffiths, A. (2010). Beyond Adaptation: Resilience for Business in Light of Climate Change and Weather Extremes. *Business and Society*, 49(3), 477–511.
- Lowitt, E. (2014). How to survive climate change and still run a thriving business. *Harvard Business Review*, 92(4), 86-92.
- March, J. G., & Olsen, J. P. (1975). The Uncertainty of the Past: Organizational Learning under Ambiguity. *European Journal of Political Research*, 3(2), 147–171.
- Maslow, A. (1954). *Motivation and personality*. New York, NY: Harper.
- Majchrzak, A., Jarvenpaa, S. L., Hollingshead, A. B. (2007). Coordinating expertise among emergent groups responding to disaster. *Organization Science*, 18, 147–161.
- Matasci, C., Kruse, S., Barawid, N., & Thalmann, P. (2014). Exploring barriers to climate change adaptation in the Swiss tourism sector. *Mitigation and Adaptation Strategies for Global Change*, 19, 1239–1254, doi: 10.1007/s11027-013-9471-1
- Mendelsohn, R. (2006). The role of markets and governments in helping society adapt to a changing climate. *Climatic Change*, 78, 203–215. doi:10.1007/s10584-006-9088-4
- Mendelsohn, R. (2000). Efficient Adaptation to Climate Change. *Climatic Change*, 45(3–4), 583–600.

- Merriam, S. (1998). *Qualitative Research and Case Study Application in Education*. San Francisco: Jossey-Bass Publication.
- Meyer, A. D. (1982). Adapting to environmental jolts. *Administrative Science Quarterly*, 27, 515-537.
- Meyer, J., & Rowan, B. (1977). Institutional organizations: Formal structure as myth and ceremony. *American Journal of Sociology*, 83, 340–363.
- Miles, R. E., & Snow, C. C. (1978). *Organizational Strategy, Structure, and Process*. New York: McGraw-Hill.
- Miles, M. B., Huberman, A. M., & Saldana, J. (2014). *Qualitative Data Analysis: A Methods Source Book* (3rd ed.). Thousand Oaks: Sage Publication.
- Miles, M. B. & Huberman, A. M. (1994). *Qualitative Data Analysis: An Expanded Source Book* (2nd ed.). Thousand Oaks, CA: Sage Publication.
- Molen, P. V. D., & Tuladhar, A. M. (2007, March). Corruption and Land Administration. International Federation of Surveyors. Retrieved from https://www.fig.net/resources/monthly_articles/2007/march_2007/march_2007_vander_molen_tuladhar.pdf
- Momin, M. A., & Parker, L. D. (2013). Motivations for corporate social responsibility reporting by MNC subsidiaries in an emerging country: The case of Bangladesh. *The British Accounting Review*, 45, 215–228.
- Moser, S. C., & Luers, A. L. (2008). Managing Climate Risks in California: the need to engage resource managers for successful adaptation to climate change. *Climatic Change*, 8, 309-322.
- Morrison, M. (2000). What do you mean by educational research? In M. Coleman and A.R.J. Briggs, (Eds.). *Research Method in Educational Leadership and Management*, pp: 3-27. London: Paul Chapman.
- Morgan, G. (1986). *Image of Organization*. Thousand Oaks, CA: Sage Publication.

- Morse, J. M. (1994). Emerging from the data: the cognitive process of analysis in qualitative inquiry, In Morse J. M. (Ed.), *Critical issues in qualitative research method*. Thousand Oak, CA: Sage Publication.
- Mourshed, M. (2011). The impact of the projected changes in temperature on heating and cooling requirements in buildings in Dhaka, Bangladesh. *Applied Energy*, 88, 3737–3746.
- Mridha, R. U. (2012). Causes of RMG Unrest. A monthly publication of The Daily Star. *Forum*, 6(8). Retrieved from <https://archive.thedailystar.net/forum/2102/August/rmg.htm>
- Munich Re. (2003). Topic Geo, Munich Re: Munich.
- Neuman, W. L. (2014). *Social research methods: Quantitative and qualitative approaches*, (7th ed.). England: Pearson Publication.
- Neuman, W. L. (2000). *Social research methods: Quantitative and qualitative approaches*, (5th ed.). California: Allyn and Bacon.
- New York Times. (2012, December 17). Bangladesh Finds Gross Negligence in Factory Fire. Retrieved from <https://www.nytimes.com/2012/12/18/world/asia/bangladeshfactory-fire-caused-by-gross-negligence.html>
- Nurunnabi, M. (2016). Who cares about climate change reporting in developing countries? The market response to, and corporate accountability for climate change in Bangladesh. *Environment Development and Sustainability*, 18, 157-186.
- Nyberg, D., & Wright, C. (2015). Performative and Political: Corporate Constructions of Climate Change Risk. *Organization*, 23(5), 617-638.
- OECD. (2006). *Adaptation to Climate Change: Key Terms*. Organisation for Economic Co-operation and Development.
- OECD. (2010). Chapter 5 - Climate Change: Helping Poor Countries to Adapt. *Development Co-operation Report 2010*. Available at <https://www.oecd-ilibrary.org/>
- OECD. (2015). *Climate finance in 2013-14 and the USD 100 billion goal, a report by the Organisation for Economic Co-operation and Development (OECD) in collaboration*

- with Climate Policy Initiative (CPI). Retrieved from:
<http://www.oecd.org/environment/cc/OECD-CPI-Climate-Finance-Report.phtml>
- OECD. (2019). Addressing Climate Change in the Fashion Sector: A Collaborative Approach. Organisation for Economic Co-operation and Development.
- Okereke, C. (2007). An exploration of motivations, drivers and barriers to carbon management: the UK FTSE 100. *European Management Journal*, 25(6), 475-486.
- Okereke, C., Wittneben, B., & Bowen, F. (2012). Climate Change: Challenging Business, Transforming Politics. *Business & Society*, 51(1), 7–30.
- Okereke, C., & Küng, K. (2013). Climate policy and business climate strategies. *Management of Environmental Quality: An International Journal*, 24(3), 286-310.
- Orsato, R. J., Barakat, S. R., & Campos, J. G. (2017). Organizational adaptation to climate change: learning to anticipate energy disruptions. *International Journal of Climate Change Strategies and Management*, 9(5), 645-665.
- Pattberg, P. (2012). How climate change became a business risk: analyzing non state agency in global climate politics. *Environment and Planning C: Government and Policy*, 30, 613–626. doi:10.1068/c1179
- Patton, M. Q. (1990). Qualitative Evaluation and Research Methods. Newbury Park, California: Sage Publications.
- Paul, A., Lang, J. W. B., & Baumgartner, R. J. (2017). A multilevel approach for assessing business strategies on climate change. *Journal of Cleaner Production*, 160, 50-70, <http://dx.doi.org/10.1016/j.jclepro.2017.04.030>
- Pauw, W. P., Klein, R. J. T., Vellinga, P., & Biermann, F. (2016). Private finance for adaptation: do private realities meet public ambitions? *Climatic Change*, 134, 489- 503. doi: 10.1007/s10584-015-1539-3
- Pauw, W. P. (2015). Not a panacea: private-sector engagement in adaptation and adaptation finance in developing countries. *Climate Policy*, 15(5), 583-603. doi:10.1080/14693062.2014.953906

- Pauw, P. & Pegels, A. (2013). Private Sector Engagement in Climate Change Adaptation in Least Developed Countries: An Exploration. *Climate and Development*, 5(4), 257-267.
- Pettigrew, A. M. (1985). *The Awakening Giant: Continuity and Change in ICI*. Oxford: Basil Blackwell.
- Pettigrew, A. M. (1987). Context and Action in the Transformation of the Firm, *Journal of Management Studies*, 24(6), 649-670.
- Pettigrew, A. M. (1997). What is a Processual Analysis? *Scandinavian Journal of Management*, 13(4), 337-348.
- Pineda, R. (2016). Making the climate change issue real for managers. *Journal of Global Responsibility*, 7(1), 84-97. <https://doi.org/10.1108/JGR-12-2015-0022>
- Porter, M. E., & Reinhardt, F. L. (2007). A strategic approach to climate. *Harvard Business Review*, 85(10), 22-26.
- Porter, A. J., Kuhn, T.R. & Nerlich, B. (2018). Organizing Authority in the Climate Change Debate: IPCC Controversies and the Management of Dialectical Tensions. *Organization Studies*, 39(7), 873-898.
- PPPA. (2019). Public Private Partnership Authority, Prime Minister's Office, Government of People's Republic of Bangladesh. <http://www.pppo.gov.bd/>
- Pulver, S., & Benney, T. (2013). Private-Sector's Response to Climate Change in the Global South. *WIRE's Climate Change*, 4(6), 479-496. doi: 10.1002/wcc.240
- REHAB. (2012). A comprehensive study on the real estate sector of Bangladesh, Real Estate and Housing Association of Bangladesh.
- Rice, A. K. (1963). *The Enterprise and its Environment: A system theory of management of organization*. London: Routledge.
- Sadat, A. (2011). Green Climate Fund: Unanswered Question. *Economic and Political Weekly*, 46(15), 22-25. <http://www.jstor.org/stable/i40051091>
- Sarkar, S. (2019, April 11). Coping with Dhaka's water crisis. *The Financial Express*. <https://thefinancialexpress.com.bd/views/coping-with-dhakas-water-crisis-1554997838>

- Sarker, M. A. R., Alam, K., & Gow, J. (2013). Assessing the determinants of rice farmers' adaptation strategies to climate change in Bangladesh. *International Journal of Climate Change Strategies and Management*, 5(4), 382-403.
- Scott, D., McBoyle, G., & Minogue, A. (2007). Climate change and Quebec's ski industry. *Global Environmental Change*, 17(2), 181-190.
- Scott, R. W. (2005). Institutional theory: contributing to a theoretical research program. In Great Minds in Management: the Process of Theory Development, Smith K. G., Hitt, M. A. (Eds), pp: 460-485. Oxford: Oxford University Press.
- Scott, W. R. (2003). Organization: Rational, Natural and Open Systems, (5th ed.). Prentice Hall.
- Schipper, E. L. F. (2007). Climate Change Adaptation and Development: Exploring the Linkages; Tyndall Centre for Climate Change Research, Working Paper -107.
- Schoenherr, T. (2012). The role of environmental management in sustainable business development: A multi-country investigation, *Int. Production Economics*, 140, 116-128.
- Senge, P. (1996): There is no such thing as a learning organization. An interview with Peter Senge in the summer of 1995. In: Senge, Peter (1996): The fifth discipline. Art and practice of the learning organization, pp: 493-529. Stuttgart: Klett.
- Sepúlveda, J., & Mendizabal, M. (2011). Business in climate or climate in business? *Management of Environmental Quality: An International Journal*, 22(5), 632-651.
- Slawinski, N., Pinkse J., Busch, T., Banerjee, S. (2017). The Role of Short-Termism and Uncertainty Avoidance in Organizational Inaction on Climate Change: A Multi-Level Framework. *Business and Society*, 56(2), 253-282.doi.org/10.1177/0007650315576136
- Smit, B., & Wandel, J. (2006). Adaptation, adaptive capacity & vulnerability. *Global Environmental Change*, 16, 282-292.
- Smit, B., Burton, I, Klein, R. J. T., & Wandel, J. (2000). An anatomy of adaptation to climate change and variability. *Climatic Change*, 45, 223-251.
- Smit, B., McNabb, D., & Smithers, J. (1996). Agricultural adaptation to climatic variation. *Climatic Change*, 33(1), 7-29.

- Sovacool, B. K., Anthony, L., D'Agostino, A. L., Meenawat, H., & Rawlani, A. (2012). Expert views of climate change adaptation in least developed Asia. *Journal of Environmental Management* 97, 78-88. doi:10.1016/j.jenvman.2011.11.005
- Sovacool, B. K., Linnér, B., Klein, R. J. T. (2017). Climate Change Adaptation and the Least Developed Countries Fund (LDCF): Qualitative insights from policy implementation in the Asia-Pacific. *Climatic Change*, 140, 209–226. doi:10.1007/s10584-016-1839-2
- Sodano, V., & Hingley, M. (2013). The food system, climate change and CSR: from business to government case. *British Food Journal*, 115(1), 75-91. doi:10.1108/00070701311289885
- Stake, R. E. (1995). *The Art of Case Study Research*. California: Sage Publication.
- Stern, N. (2007). *The Economics of Climate Change: The Stern Review*. Cambridge: Cambridge University Press.
- Strauss, A., & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (2nd ed.). Thousand Oaks, CA: Sage Publication.
- Surminski, S. (2013). Private Sector Adaptation to Climate Risk. *Nature Climate Change*, 3, 943-945.
- Taylor, F. W. (1911). *The Principles of Scientific Management*. New York: Harper & Brothers.
- The Guardian. (2016, July 18). Rana Plaza Collapse: 38 charged with murder over garment factory disaster. Available at <https://www.theguardian.com/world/2016/jul/18/rana-plaza-collapse-murder-charges-garment-factory>
- The Daily Star. (2019, May 26). Construction sector against any tax, VAT hike. Retrieved from <https://www.thedailystar.net/star-infrastructure/news/construction-sector-against-any-tax-vat-hike-1749085>
- The Daily Star. (2018, November 12). Mobile operators to face legal action: BTRC. Retrieved from <https://www.thedailystar.net/business/telecom/illegal-voip-business-in-bangladesh-btrc-seizes-42150-sim-cards-1659019>
- The Daily Star. (2010, June 30). New telecom law a conspiracy against digital Bangladesh. Retrieved from <https://www.thedailystar.net/news-detail-144690>

- The Independent. (2017, June 29). RAJUK anomalies. Editorial Report. Retrieved from <https://www.theindependentbd.com/arcprint/details/101242/2017-06-29>
- TIB. (2007). Corruption in Plan Permission Process in RAJUK: A Study of Violations and Proposals. Transparency International Bangladesh.
- TIB. (2013). In Bangladesh, Corruption Kills Hundreds. Transparency International Bangladesh. Available at https://www.transparency.org/news/feature/in_bangladesh_corruption_kills_hundreds
- Tosi, H. L., & Slocum, J. W. (1984). Contingency Theory -Some Suggested Directions. *Journal of Management*, 10(1): 9–26.
- Trapp, N. L. (2012). Corporation as climate ambassador: Transcending business sector boundaries in a Swedish CSR campaign. *Public Relations Review*, 38, 458-465.
- Ulin, P. R., Robinson, E. T., & Tolley, E. E. (2004). Qualitative Methods in Public Health: A Field Guide for Applied Research. San Francisco: Jossey-Bass.
- Ullah, M. M. (2013). Green Banking in Bangladesh- A Comparative Analysis, *World Review of Business Research*, 3(4), 74 – 83.
- UNEP. (2014). The Adaptation Gap Report 2014. United Nations Environment Programme, Nairobi. <http://www.unep.org/climatechange/adaptation/gapreport2014/>
- UNFCCC. (2019a). Kyoto Protocol, United Nation Framework Convention on Climate Change. https://unfccc.int/kyoto_protocol
- UNFCCC. (2019b). Emission Trading, United Nation Framework Convention on Climate Change. <https://unfccc.int/process/the-kyoto-protocol/mechanisms/emissions-trading>
- UNFCCC. (2019c). Clean Development Mechanism, United Nation Framework Convention on Climate Change. <https://unfccc.int/process-and-meetings/the-kyotoprotocol/mechanisms-under-thekyoto-protocol/the-clean-development-mechanism>
- UNFCCC. (2019d). Joint Implementation, United Nation Framework Convention on Climate Change. <https://unfccc.int/process/the-kyoto-protocol/mechanisms/joint-implementation>

- UN. (2019). Treaty Collection, Status of Doha Amendment to Kyoto Protocol, United Nations.
https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-c&chapter=27&clang=_en
- USAID. (2017). Climate Finance in Bangladesh: Situation Analysis.
- Wagner, J. A., & Hollenbeck, J. R. (2010). Organizational Behavior: Securing Competitive Advantage. NY: Routledge.
- Walsham, G. (1993). Interpreting information systems in organizations. Chichester, NY: Wiley.
- WBCSD. (2008). Adaptation: an issue brief for business. World Business Council for Sustainable Development.
- WBCSD. (2015). Climate Resilience: A guide for CEO. World Business Council for Sustainable Development.
- Weick, K. E. (1995). Sense Making in Organizations. Foundations for Organizational Science. London: Sage.
- Weinhofer, G., & Busch T. (2013). Corporate strategies for managing climate risks. *Business Strategy and the Environment*, 22(2), 121–144.
- Winn, M. I., Kirchgeorg, M., Griffiths, A., Linnenluecke, M. K., & Günther, E. (2011). Impacts from Climate Change on Organizations: A Conceptual Foundation. *Business Strategy and the Environment*, 20(3), 157–173.
- Wittneben, B. B. F., & Kiyara, D. (2009). Climate change basics for Managers. *Management Decision*, 47(7), 1122-1132. doi: 10.1108/00251740910978331
- World Bank (2011). The Cost of Adapting to Extreme Weather Events in a Changing Climate.
- Wright, C., Nyberg, D. (2017). An inconvenient truth: how organizations translate climate change into business as usual. *Academy of Management Journal*, 60(5), 1633–1661.
- Yin, R. K. (2003). Case Study Research: design and methods (3rd ed.). California: Sage.
- Yin, R. K. (2009). Case Study Research: design and methods (4th ed.). California: Sage.

- Zhang, Y. X., Chao, Q. C., Zheng, Q. H., & Huang, L. (2017). The Withdrawal of the U.S from Paris Agreement and its impact on Global Climate Governance. *Advances in Climate Change Research*, 8(4), 213-219.
- Zeitz, G., Mittal, V., & McAulay, B. (1999). Distinguishing adoption and entrenchment of management practices: a framework for analysis. *Organization Studies*, 20(5), 741-776.

APPENDICES

Appendix A

Search engines & searched words for literature review

1. Search Engines/database:

Google Search, Google Scholar, UNIMAS Library, KTH library, Sage, Routledge, Elsevier, Wiley, Taylor and Francis, Springer, Research Gate, Scopus, ERA, UNFCC database, UNEP, UNDP, World Bank, Asian Development Bank.

2. Key Words:

Adaptation to climate change

Business adaptation to climate

Business adaptation to climate change

Business adaptation in developing countries

Business and Environment

Business risks due to climate change

Business opportunities due to climate change

Business strategies and environment

Business strategies and climate

Business risk management

Climate and Business

Climate change adaptation

Climate change adaptation and business

Climate adaptation and developing countries

Conducive policy for private sector in adaptation

Enabling environment for private sector adaptation

Private sector adaptation

Private sector engagement to climate change adaptation

Multinational and climate change

Appendix B

Sample letter to seek permission to do case study

Fakulti Ekonomi dan Perniagaan
Faculty of Economics and Business
Dekan / Dean



www.unimas.my

1st April 2016

TO WHOM IT MAY CONCERN

LETTER OF CONFIRMATION REGARDING PHD DATA COLLECTION, BY PHD CANDIDATE MEHEDI ISLAM (D.OB: 3rd February 1982)

This is to certify that Mr. Mehedi Islam (Matric Number: 15010077) is the doctoral candidate under my supervision at the Faculty of Economics and Business, Universiti Malaysia Sarawak (UNIMAS), Malaysia.

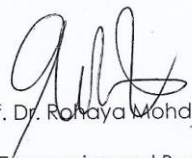
Mehedi Islam is currently undertaking his PhD project in the area of Management research. His research is focusing on climate change adaptation from the organizational perspective in the context of Bangladesh. The proposed title of his PhD Thesis is "Private Sector Engagement in Adaptation to Climate Change in Developing Countries (Bangladesh)".

He is currently working on his data collection to complete his PhD study. Your kind consideration to allow him to do interviews and doing field visits at your organization will assist him greatly in completing his data collection phase. The data that collected are purely for his research purpose. If you have any inquiry, please do not hesitate to email me at mnrohaya@unimas.my.

I am really grateful for your kind assistance to help Mehedi Islam in completing his study.

Thank you.

Yours Sincerely,


Assoc. Prof. Dr. Rohaya Mohd Nor
Dean
Faculty of Economics and Business
Universiti Malaysia Sarawak, Malaysia





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Appendix C

Sample questions for semi-structured interviews with managers/employees.

Themes/RQ	Illustrative Questions
Awareness & perception (RQ-2)	1. What do you know about climate change? 2. Where from you learn about climate change? 3. Do you think the climate change has any influence on your business? If yes, please explain.
Adaptation practices (RQ-1)	4. Does your company take or plan to take any business strategy to tackle climate change? 5. Does your company communicate climate change issue to other stakeholders? If yes, how do you communicate? 6. Does your company donate/invest in any climate change adaptation related projects in partnership with govt./NGO/international bodies? 7. Does your organization have any person or unit dedicated to deal with climate change issue? 8. How you evaluate adaptation decisions?
Drivers or barriers of adaptation (RQ-2) (RQ-3)	9. What external factors motivate your organization to adapt? 10. What internal factors motivate your organization to adapt? 11. What are the main barriers that prevent your business to adapt? 12. Do you think current laws or regulations are sufficient to engage private sector in climate change mitigation and adaptation? 13. Does your organization have necessary access to information, finance, work force, or technology for adaptation? 14. Do you think climate proofing/adaptation technology are available? 15. What are the major constraints involved in adaptation technology? 16. Do you think other people or organizations like competitor, customer group; suppliers or social activists influence your business to engage in adaptation to climate change? How they influence?
Feedback (RQ-2) (RQ-4)	17. How do you evaluate the effectiveness of adaptation initiatives to fulfill organizational goals? 18. How your business can be more engaged in adaptation to climate?

Sample open-ended questions for semi-structured interviews with customers

Themes/RQ	Illustrative Questions
Awareness & perception (RQ-2) (RQ-3)	1. What do you know about climate change? 2. Where from you learn about climate change? 3. Do you think that your' purchasing decision contribute to the climate change? If yes, please explain. 4. Do you think the climate change has any influence on your purchasing decision? If yes, please explain. 5. Do you want the organization to produce the products or services in climate friendly ways?
Adaptation practices (RQ-1)	6. Does your company sell any product/service that helps mitigate or adapt to climate change? 7. Does your company communicate climate change issue to you as stakeholder? If yes, how do they you communicate? 8. Does your company (from where you buy product) participate in any climate change adaptation related projects in partnership with govt./NGO/national or international bodies? 9. In what extent the does the organization address the environmental and social responsibility of business?
Drivers or barriers of adaptation (RQ-2) (RQ-3)	10. What factors motivate the organization to adapt to climate change? 11. What are the main barriers that prevent the business to adapt? 12. Do you think current laws or regulations are sufficient to engage private sector in climate change mitigation and adaptation in Bangladesh?
Feedback (RQ-2) (RQ-4)	13. Do you think the organization's ongoing business activities have any positive impacts on climate change adaptation in Bangladesh? 14. How your business can be more engaged in adaptation to climate?

Sample open-ended questions for semi-structured interviews with supplier

Themes/RQ	Illustrative Questions
Awareness & perception (RQ-2) (RQ-3)	1. What do you know about climate change? 2. Where from you learn about climate change? 3. Do you think that your supplying decision contribute to the climate change? If yes, please explain. 4. Do you think the climate change has any influence on your supplying decision? If yes, please explain. 5. Do you want the organization to produce the products or services in climate friendly ways?
Adaptation practices (RQ-1)	6. Does your company sell any product/service that helps mitigate or adapt to climate change? 7. Does your company communicate climate change issue to you as a stakeholder? If yes, how do they you communicate? 8. Does your company (to whom you supply raw materials) participate in any climate change adaptation related projects in partnership with govt./NGO/national or international bodies? 9. In what extent the does the organization address the environmental and social responsibility of business?
Drivers or barriers of adaptation (RQ-2) (RQ-3)	10. What factors motivate the organization to adapt to climate change? 11. What are the main barriers that prevent the business to adapt? 12. Do you think current laws or regulations are sufficient to engage private sector in climate change mitigation and adaptation in Bangladesh?
Feedback (RQ-2) (RQ-4)	13. Do you think the organization's ongoing business activities have any positive impacts on climate change adaptation in Bangladesh? 14. How your business can be more engaged in adaptation to climate?

Sample open-ended questions for semi-structured interviews with regulator

Themes/RQ	Illustrative Questions
Awareness & perception (RQ-2) (RQ-3)	1. What do you know about business adaptation to climate change?
	2. Where from you learn about climate adaptation?
	3. Do you think that your policy decision contribute to the climate change? If yes, please explain.
	4. Do you think the climate change has any influence on policy making in Bangladesh? If yes, please explain.
Adaptation practices (RQ-1)	5. In what extent the does the organization address the environmental and social responsibility of business?
	6. Do you want the business organizations in Bangladesh to produce the products or services in climate friendly ways?
Drivers or barriers of adaptation (RQ-2) (RQ-3)	7. What factors motivate the organization to adapt to climate change?
	8. What are the main barriers that prevent the business to adapt?
	9. Do you think current laws or regulations are sufficient to engage private sector in climate change mitigation and adaptation in Bangladesh?
Feedback (RQ-2) (RQ-4)	10. Do you think the organization's ongoing business activities have any positive impacts on climate change adaptation in Bangladesh?
	11. How business can be more engaged in adaptation to climate?

Appendix D

Transcript of Interview with General Manager TelcoOrg (first phase)

Researcher: *What do you know about climate change?*

Interviewee: Our earth is warming; ices at polar region are melting, we are getting too much rain, too much sunshine, very cool winter, very hot summer, frequent cyclones etc. are the effects of climate change. But, it is matter of regret that earth is warming due to our actions: carbon emission and our negligence.

Researcher: *Where from you learn about climate change?*

Interviewee: Everywhere we are hearing about climate change- newspapers, television, seminar, conference.

Researcher: *Do you think the climate change has any influence on your business? If yes, please explain.*

Interviewee: Of course, Why not? Climate change is affecting not only specific population or natural system but also global economic activities.

Due to cyclones and floods, our physical infrastructures like network towers and electrical equipment at 1600 base stations located in remote areas are at high risks. Sometimes they are damaged and we cannot reach or supply accessories to repair them immediately for bad weather or disrupted road network. Higher temperature during summer also increase cooling load and disturb transmission process. To make climate resilient infrastructures, to buy efficient machineries, to meet extra energy cost and to keep pollution free operation our company has to invest extra money that reduce profit margin.

Moreover, revenue from phone call drops in poverty afflicted community during any natural disaster.

We are facing new regulation controlling our land and resource acquisition, operating procedures. As for example, regulation regarding energy and water utilities, urban planning, and environmental pollution are always changing.

However, climate change creates demand for different telecommunication services. We already provide SMS base early warning, information for farmers, medical advice for disease affected community, mobile base money transfer facilities for remote population.

Researcher: *Does your company take or plan to take any business strategy to tackle climate change?*

Interviewee: Telephone call, of course, is not the basic human need. People have to survive first. They need food, safe drinking water, shelter, health facility and secured livelihood and then communication. So, our company takes both long term and short term adaptation strategies to climate proof our business.

Long term strategies include:

1. Emission reduction
2. Resource efficiency
3. Developing community by providing information, education & health care.

Short term strategies include:

1. Tackle power or energy crisis
2. Tackle river erosion
3. Ensure continuous service and supply chain during climate extremes.

Our corporate building is fully green building ensuring natural light, wind, and minimum energy and resource consumption. Following ISO: 14001-2004, we recycle water and waste regularly to reduce pollution and gain water efficiency.

We use special type of DC ventilation system to cool our interior and electronic devices located at corporate office and 1600 base stations.

To reduce carbon emission we also substitute our old electrical machineries with new energy efficient machineries on regular basis. As remote rural area lack of continuous electricity supply from National Grid, we set up solar power base electricity supply system in every base station.

Not only that. We also started automated maintenance system for our remote base station and network towers during emergency.

Our office management work is run by fully e-filing system to cut the use of papers made of trees.

You can get more specific data about the above mentioned strategies form our website, sustainability report or technical manager.

Researcher: *Does your company communicate climate change issue to other stakeholders? If yes, how do you communicate?*

Interviewee: Yes. We regularly train our employees and suppliers. Also take different initiatives to make customers conscious about environmental responsibilities.

We have been arranging photography competition every year on 5th June on the occasion World Environment Day since 2007.

We have green supply chain management policy published in our website to procure climate friendly materials for our operation.

To make outside people aware about climate and environment we also arrange many seminar and rally, as such Earth Hour 2012.

Researcher: *Does your company donate/invest in any climate change adaptation related projects in partnership with govt./NGO/international bodies?*

Interviewee: I am not sure about it. Our manager from finance section can give accurate information. As far as I know, our company invests lot of money to improve the quality of community life. As for example, for poor children we run online school and online book reading programs for poor children and tele-medicine service for rural people in co-operation with other external organizations.

Researcher: *Does your organization have any person or unit dedicated to deal with climate change issue?*

Interviewee: Yes. We established 'Business Continuity and Crisis Management' department to deal with climate change mitigation and adaptation issue. However, every departmental head report climate related problems individually to them while working with individual subunit.

Researcher: *How you evaluate adaptation decisions?*

Interviewee: There are always meeting with CEO about compiled climate change related risks and opportunities. Then individual department propose relevant solution or adaptation options. Finally, Business Continuity and Climate Management department assesses feasibility of those adaptation options based on external and internal factors or circumstances. Then top management decides on right strategies and policy documents are made to disperse among internal subunits for execution. After executing adaptation strategy, feedbacks from internal and external sources are assessed to make correction or revision.

Researcher: *What external factors motivate your organization to adapt?*

Interviewee: We always give top priority to government regulation, concern of our media and business partners while applying any adaptation strategies. Among other factors -business specific information about climate impacts, frequent bad experience with climatic change and availability of climate proofing technology are important,

Researcher: *What internal factors motivate your organization to adapt?*

Interviewee: Capacity and resources like money, skill people to execute the adaptation strategy. Climate adaptation requires lot of money and human efforts to bring change in organization. And, of course, appropriate leadership. Top manager's vision and mission must be aligned with environmental goal of organization. If leader decides, lower level employees must comply.

Researcher: *What are the main barriers that prevent your business to adapt?*

Interviewee: Again I want to say that regulation and policy environment are important.

Another barrier is awareness. Our employees, customers and business partners and policy makers must be aware of climate change impacts.

Moreover, political stability is important not only climate adaptation but also running smooth business operation, because it is related to new regulation. There are also corruption and bureaucracy in our country that hamper business activities and climate adaptation as well. Our management is committed to show zero tolerance for any kind of corruption.

Researcher: *Do you think current laws or regulations are sufficient to engage private sector in climate change mitigation and adaptation?*

Interviewee: I cannot directly say that our policy is not good. But, it must be changed and integrated with national and international climate adaptation agenda. Business as profit making entity will do nothing automatically. Government must give incentive or support our business and adaptation efforts.

Researcher: *Does your organization have necessary access to information, finance, work force, or technology for adaptation?*

Interviewee: Our Company is not sure that whether we are fully capable or not to adapt to climate change and sustain revenue in changing market in Bangladesh. We already started to supply different climate proofing products in market and continuously doing research to develop more products and service in future. We need finance, bank loan, more supporting infrastructures and more energy.

Researcher: *Do you think climate proofing/adaptation technology are available?*

Interviewee: Yes, but expensive. They are not locally made, so importing cost is high due to transportation cost and taxes.

Researcher: *What are the major constraints involved in adaptation technology?*

Interviewee: We need local production for quick delivery and lower cost.

Researcher: *Do you think other people or organizations like competitor, customer group; suppliers or social activists influence your business to engage in adaptation to climate change? How they influence?*

Interviewee: We are still not facing any strong pressure from competitors, suppliers, customer groups, media, and environmental activists on climate change adaptation issue. Yet, they are not strong enough to oblige us to engage in adaption. Whatever we are doing is done by our self-concern.

Researcher: *How do you evaluate the effectiveness of adaptation initiatives to fulfill organizational goals?*

Interviewee: It is very difficult to assess the effectiveness of adaptation responses immediately. Whenever we take any initiative relating climate adaptation, we observe it as trial basis. If it is not fruitful we change. By climate proofing our process we are saving our money and getting competitive advantage over competitors. By engaging with external local and internal organization, we are also increasing our public relation and corporate reputation.

Researcher: *How your business can be more engaged in adaptation to climate?*

Interviewee: If there is good policy, business will be more engaged in adaptation. For this we need to lobby with government agencies. We also need to train our stakeholders, as such, employees, suppliers and customers.

Transcript of Interview with Chairman-RealEstateOrg (first phase)

Researcher: *What do you know about climate change?*

Interviewee: Due to greenhouse gas emission, average temperature of earth rises dramatically. As a result, hydrological system has been changed and we are experiencing frequent cyclones and floods that are causing loss of ecosystems, fresh water, destruction human settlements and infrastructures in different parts of the world.

Researcher: *Where from you learn about climate change?*

Interviewee: I read in newspapers and magazines about climate change. Sometimes, I also watch television program about it.

Researcher: *Do you think the climate change has any influence on your business? If yes, please explain.*

Interviewee: Building is not a mere structure; it has to interact with human being. Climate change is human induced problem and will affect the human civilization most; the building industry must address it. We are more affected by regulators than physical impacts of climate change.

We always chose flood free land for apartment. But lands in city center are scarce. If we found flood free land in remote area, there are no road for better accessibility and no gas and water connection due to poor urban planning?

Considering cyclones, floods, earth quack risks, we always pay extra money for structural strength of buildings.

During heavy rainfall outdoor construction works are highly interrupted and customer dissatisfaction grows for delayed construction work.

River salinity causes salt deposit in sand particles. For this reason, brickwork and outside plaster gets moisture easily. Many essential building materials like sand, stone, wood has become very scarce.

Due to higher cooling load in hot summer, use of generator is prolonged, which adds extra fuel cost.

Frequent rain and extreme heat decay the outdoor finish materials and company gets burden of extra maintenance cost.

Water level is going downwards day by day and dwellers of apartment are facing crisis of fresh water for domestic use.

Building permit authority changes National Building Code and Town Planning principle several times over the last few years. So, we always need long time to get building design considering many environmental parameters and to get approval from building permit authority.

With higher environmental consciousness, customer's demand for green building or sustainable architecture is growing. Moreover, concentration of climate migrants in city areas requires low-cost housing.

Researcher: *Does your company take or plan to take any business strategy to tackle climate change?*

Interviewee: Yes. We are always working to cope with physical and regulatory shifts due to climate change. From land procurement to construction execution, in every phase we take different strategies to adapt to climate.

Researcher: *Would you please explain in details?*

When our design team prepares a construction drawing of a building we consider different environmental parameters strictly to conform to the national building code and ensure enough natural light and airflow inside the buildings.

We also use heat proof glass, energy efficient light and electric equipment to save electricity.

We use durable construction materials to control maintenance cost. And, we also gradually decreased use of environmentally harmful building materials like traditional bricks burnt in fossil fuel.

We prepare tight schedule in dry seasons to finish important outdoor construction works like laying brick and concrete to avoid storm and rain.

To save fuel cost, our company converted all the car engines to use CNG.

Researcher: *Does your company communicate climate change issue to other stakeholders? If yes, how do you communicate?*

Interviewee: Yes. Our construction managers regularly train site supervisor and workers about occupational safety and climate friendly construction.

To increase environmental awareness among customers and building professionals we regularly publish a magazine called ‘Sthahpattya o Nirman’ that includes up-to-date information about new design theories, construction techniques, and building materials.

Researcher: *Does your company donate/invest in any climate change adaptation related projects in partnership with govt./NGO/international bodies?*

Interviewee: Currently we are engaged with two International organizations namely Fael Khair and US Army-Alaska District to build cyclones shelter in coastal areas of Bangladesh. Till today, we have built more than 22 cyclones shelter for cyclone and flood affected community. We have also future plan to build low cost housing for urban poor and climate victims.

Researcher: *Does your organization have any person or unit dedicated to deal with climate change issue?*

Interviewee: No. usually our construction site supervisors and manager from every internal sub-unit report the climate change related difficulties to us.

Researcher: *How you evaluate adaptation decisions?*

Interviewee: After getting report from head of any department, I decide on any adaptation decision in consultation with our Managing Director and General Manager. During decision making, I also ask individual department to propose solutions of associate climate change problems and opportunities. Finally, I assess feasibility of those adaptation options based on our capacity and resources and other external circumstances. Later, I select and plan appropriate adaptation strategy. While selecting any strategy for execution we consider whether it needs huge investment or not. If required finance is not ready, we bear risks. As for example, we have water crisis in Dhaka city. However, we are not taking any effort to recycle waste water or to harvest rain water in our building.

Researcher: *What external factors motivate your organization to adapt?*

Interviewee: Generally, when we experience any climatic problem and relevant management strategy matches with our internal resources like money and skill we execute it. But, we always check it with external regulation and interests of our external stakeholders like customer, community and business partners. However, availability of appropriate information, possibility of getting finance, technology, and healthy economic condition are helpful for climate adaptation.

Researcher: *What internal factors motivate your organization to adapt?*

Interviewee: First of all need money, because climate proofing requires huge investment. Secondly, capacity of our employees is also important. We need skill people to detect and predict climatic problems and any new opportunities. We also expect that possible solutions come from them. But, problem is that a huge portion of our staff, mainly day labors our in construction sites are illiterate or half educated. So, we have to improve the awareness of our employees.

Researcher: *What are the main barriers that prevent your business to adapt?*

Interviewee: I said earlier that no regulation is supportive to real estate business. Due to bureaucracy and corruption, it always takes very long time to get building permit. We build lot of apartments but cannot handover to our customer as there is no new gas connection for domestic use. Our supply of electricity and water is not sufficient. We have mandatory requirement to install solar panel on roof top to get electricity connection, but those solar panel is not sufficient enough to provide electricity for whole building.

Cost of building materials is very high. So our customers cannot afford them. But, interest on bank loan is also high. As result we cannot sell our ready flats.

Researcher: *Do you think current laws or regulations are sufficient to engage private sector in climate change mitigation and adaptation?*

Interviewee: I already explained. Our regulations need to be changed.

We sit with government agency several times to give us land and subsidies so that we can produce low cost housing for vulnerable population both in rural and urban areas. But, no negotiation was successful. We lobby with policy maker through the REHAB to improve the conditions but many of our demands are not met or efforts are not fruitful.

Researcher: *Does your organization have necessary access to information, finance, work force, or technology for adaptation?*

Interviewee: We are aware and capable, also. But we need finance.

Researcher: *Do you think climate proofing/adaptation technology are available?*

Interviewee: No, every high quality and climate friendly building materials are foreign made. We are always dependent on our neighbor countries like India, China, Thailand, Malaysia, and Japan.

Researcher: *What are the major constraints involved in adaptation technology?*

Interviewee: Taxes, transportation cost and time. We do not have proper research to manufacture them locally.

Researcher: *Do you think other people or organizations like competitor, customer group; suppliers or social activists influence your business to engage in adaptation to climate change? How they influence?*

Interviewee: Still now our social activists and customers are not strong enough. When our people will be conscious about environment and their right, demand for green buildings will be created automatically.

Researcher: *How do you evaluate the effectiveness of adaptation initiatives to fulfill organizational goals?*

Interviewee: We always monitor the outcome of taken adaptation actions. If not working occasionally we change it. We are managing climatic problem to continue our services. As a Chairman I am personally feelings risks to continue real estate business in the future. So, I invest money in different businesses like furniture making, aluminum fabrication.

Researcher: *How your business can be more engaged in adaptation to climate?*

Interviewee: Both business and government have responsibility. Business leader need to be more visionary to predict future climate risks and opportunities. On other hand, government agencies need to be more supportive. Our stakeholders also need to be more conscious.

Transcript of Interview with Director-GarmentOrg (First phase)

Researcher: *What do you know about climate change?*

Interviewee: I can see too much hot weather, too much rainfall. Occasional cyclones and floods damage houses, crops and domestic animals, people are affected by different diseases. Lot of people is coming to city leaving rural areas to look for work and shelters.

Researcher: *Where from you learn about climate change?*

Interviewee: Television and newspaper.

Researcher: *Do you think the climate change has any influence on your business? If yes, please explain.*

Interviewee: We are worried about our supply chain, energy and water crisis, diseases of employees, confidence of our foreign buyers and future government regulation.

Researcher: *Would you please give me some example?*

During summer many of our female workers get sick for extreme heat in production area. Electricity supply is not continuous. We have to run high power generator to cover the cooling load and run continuous production.

When there is heavy rain fall many workers come late at office, because nearby roads go under water.

We have extreme water crisis to wash our manufactured clothes. We sift our factory from Dhaka to Gazipur for this reason. Water level is growing downwards every day.

When there are cyclones in the coastal area, our shipment at Chittagong port for imported accessories and finished readymade garments is delayed.

During flood our cargo sometimes did not reach at port for damaged road network.

Building permit authority and Ministry of Environment set lot of criteria to approve new plan or future extension of factory buildings.

Media and foreign customers become very strict about environmental pollution.

Researcher: *Does your company take or plan to take any business strategy to tackle climate change?*

Interviewee: We are taking many actions not only for environmental hazards but also cut our production cost and meet the regulatory standard of government and foreign buyers of clothes. For example,

We are using LED lights, energy efficient fans, sewing machines, washing machine to save energy cost.

Our company recycles waste water to reuse in cloth washing and ironing.

We have ETP (Effluent Treatment Plant) to reduce harmful chemical substances from our industrial waste.

We provide free healthcare facilities for our workers in factory.

We converted all the car engines to use CNG to reduce pollution and fuel cost. Our factory has own deep tube well to get continuous water supply.

Researcher: *You are only telling about climate risks or problems. Do you think climate change can bring any opportunity?*

Interviewee: No. Yet, I cannot see any opportunity rather I am afraid that if the present condition persists our foreign customers might shift to other countries like Vietnam, India or China.

Researcher: *Does your company communicate climate change issue to other stakeholders? If yes, how do you communicate?*

Interviewee: We regularly train our workers about fire hazard, occupational health and safety, and save energy and natural resources. Yet, we don't take any actions to train our suppliers or business partners.

Researcher: *Does your company donate/invest in any climate change adaptation related projects in partnership with govt./NGO/international bodies?*

Interviewee: Very often we give money, food and medicine to flood and cyclone affected people. We also donate money to our employees for the education of their children. Our Accounts officer can give actual information regarding donation, CSR or other external investments.

Researcher: *Does your organization have any person or unit dedicated to deal with climate change issue?*

Interviewee: No. Everything is decided by top management.

Researcher: *How you evaluate adaptation decisions?*

Interviewee: Usually our factory manager and supervisors tell us if any problem arises. Sometimes, they also advise us about new efficient machineries and

production process. Then Director and Production Managers assess different solutions and send recommendation to Chairman and Managing Directors. They finally take necessary action to cope with the problematic situation. We always follow the other competitor organizations.

Researcher: *What external factors motivate your organization to adapt?*

Interviewee: As a 100% export oriented company, we are more afraid of our foreign buyers that are mostly Multinational Companies in Europe and America. They most often imposed many regulations about product quality, employee facility standard and environmental issue.

Moreover, our government poses many restrictions through the Ministry of Industry, Ministry of Environment, Ministry of Electricity, Fuel and Mineral Resources. Media are also very much concern about the working condition of garments industry. Besides, climate change impacts are unpredictable. We cannot take measure in advance.

Researcher: *What internal factors motivate your organization to adapt?*

Interviewee: Money and employee awareness. Among 4.4 million workers in garments industry majority are female and illiterate. They even don't know how to work efficiently.

Researcher: *What are the main barriers that prevent your business to adapt?*

Interviewee: The Company does not have any professional or skill manager who can assess the climate risks for the organization and propose appropriate risk management or adaptation strategies. We also need bank loan to finance our production efficiency and environmental concern.

Political stability is very vital for our business. Most often worker movement occurs to increase salary during political power shift. Many of our workers die due to fire hazard every year. So, media are always against us. We are always busy with fulfilling government regulation.

Researcher: *Do you think current laws or regulations are sufficient to engage private sector in climate change mitigation and adaptation?*

Interviewee: No. We need more business friendly laws and regulation; we need sufficient energy supply to run our business. Government gives incentives to shift garments manufacturing industry to rural area to reduce housing and energy demands in city. But, in rural area there is not sufficient electricity and gas. Road network outside the city area is not good to ensure smooth supply chain.

Researcher: *Does your organization have necessary access to information, finance, work force, or technology for adaptation?*

Interviewee: We are always hearing about climate change but we don't fully understand how they might impact our future operation. So, we need business sector specific information to manage climate change. We have lot of cheap workers but they are unskilled.

Researcher: *Do you think climate proofing/adaptation technology are available?*

Interviewee: No, efficient machineries related to garments industries are expensive. We import them from foreign countries. We need renewable energy sources like solar power plant, but we do not have sufficient land.

Researcher: *What are the major constraints involved in adaptation technology?*

Interviewee: Our taxation policy, high price, transportation cost and time.

Researcher: *Do you think other people or organizations like competitor, customer group; suppliers or social activists influence your business to engage in adaptation to climate change? How they influence?*

Interviewee: We always follow example of other garments manufactures. Our foreign customer also put stresses on us for environmental responsibility.

Researcher: *How do you evaluate the effectiveness of adaptation initiatives to fulfill organizational goals?*

Interviewee: Till now whatever we invested to improve our internal process, we are happy with that. We can cut our production cost and still retain our foreign customer with competitive price. In our factory there is less labour movement in comparison to other factories.

Researcher: *How your business can be more engaged in adaptation to climate?*

Interviewee: Most of the independent manufacturers are efficient in their operation. But, small manufacturers which work as sub-contractors of big manufacturers need to improve their financial and organizational capacity to adapt successfully. We need close collaboration among our sub-contractors to improve their operation and infrastructures.

Transcript of Interview with Regulator

(Director of Climate Change Cell, Ministry of Environment, Government of Bangladesh)

Climate Change Cell is the key initiative of Bangladesh government to fight against climate change. The cell was established in the Department of Environment under the Ministry of Environment and Forests in 2004 under Comprehensive Disaster Management Program. The main objective of the project is to enhance the technical capacity of the Department of Environment in supporting government to develop climate change related policy.

With a number of foreign development partners (like UK AID, Australian AID, EU, Norwegian Embassy, Sweden, UNDP etc.) the cell jointly celebrate with Department of Environment and Ministry of Disaster Management and Relief. Till now the key works of the cell included preparing technical papers to support international climate negotiation, documentary on climate change vulnerable sectors of Bangladesh, doing research, publishing quarterly online news letters, formulating climate change main streaming guidelines and developing sectoral training modules. The Cell is headed by a Director, a high rank Government official, who takes the key decisions. Currently, Mr. X is the Director of the Climate Change Cell. He was interviewed by the researcher regarding business adaption to climate change in Bangladesh. His responses to survey questions are mentioned below:

Researcher: *What do you know about business adaptation to climate change?*

Interviewee: There are growing policy debates that private sector can supplement public adaptation efforts. We, of course, want private sector to be engaged in

adaptation to climate change as we are in shortage of financial and technical resources. But, it is the corporate perception or awareness level that will determine their level of engagement in adaptation.

Researcher: *Where from you learn about climate adaptation?*

Interviewee: Mainly from national and international policy documents and conferences. Moreover, it is my job to make climate policy in Bangladesh.

Researcher: *Do you think that your policy decision contributes to the climate change?*

Interviewee: Of course. If our policy is not up-to-date, we shall fail in climate adaptation in Bangladesh. Instead of reducing climate hazards, our wrong policy will increase risks and may lead to maladaptation.

Researcher: *Do you think the climate change has any influence on policy making in Bangladesh? If yes, please explain.*

Interviewee: Yes. Now and then, while making any policy regarding development, as such energy regulation, infrastructure development, we try to incorporate climate change mitigation and adaptation issues.

Every Ministry works independently but they need co-ordination among themselves. Most of the developing countries have same lacking in co-ordination. Within few years, we will resolve this issue and integrated policy will help implementation of adaptation projects.

Researcher: *In what extent the does the organization address the environmental and social responsibility of business?*

Interviewee: Our businesses are still less concern about their social responsibility. They only want to involve into those activities that give them direct benefits. It will take time to engage private sector in adaptation to climate change because business organizations only look for profit. Many adaptation needs of our country are directly related to the community engagement or public relation of business.

In Bangladesh, publishing sustainability report or CSR report is not mandatory for all types of businesses. Only banks and financial service providers have been reporting their social responsibility since 2008 by the special order of Central Government Bank (Bangladesh Bank). Many multinational or large companies do CSR activities voluntarily to increase their reputation. Business organizations can reorganize and redirect their CRS activities towards the actual needs of vulnerable community.

Researcher: *Do you want the business organizations in Bangladesh to produce the products or services in climate friendly ways?*

Interviewee: Yes, because it is beneficial for their business themselves. If they improve their process for resource efficiency, it will reduce their production cost and improve reputation for environmental concern. Moreover, climate proofing products will be available in market for vulnerable people to adapt to climate change.

Researcher: *What factors motivate the organization to adapt to climate change?*

Interviewee: Their own experience about climate hazard, awareness and ability to take adaptation measures.

Researcher: *What are the main barriers that prevent the business to adapt?*

Interviewee: Awareness and corruption. Still corporate leaders in Bangladesh perceive responding to climate change as taking mitigation actions to reduce emission or going green. But, adaptation concept is quite unclear to them. As the yearly energy cost is a small fraction of total profit or revenue, corporation ignore it. Businesses are not bothering about whether the energy is coming from fossil fuel or renewable resources.

Though we are non-annexed country under the Kyoto Protocol, we try to ensure low-carbon development all over the country as per commitment on BCCSAP-2009. But, till now we can manage only a few business organizations to have benefit from our JCM or CDM projects due to huge corruption in energy utility companies in Bangladesh.

Researcher: *What is JCM?*

Interviewee: Joint Crediting Mechanism (JCM) was established in 2013 jointly by Japanese government and Bangladesh government to promote investment and deployment of low carbon technologies, products, system services and infrastructures to achieve low carbon growth in Bangladesh. Through this mechanism if any industry or organization buy low carbon technology from Japan, Japanese government will bear the 50% cost of the project. Within the last 3 years, only 2 projects were successful and 4 projects are going to be finished soon. Projects under CDM (Clean Development Mechanism) of UNFCCC are still not satisfactory in Bangladesh. Due to corruption in energy market, many giant corporations give less energy bill than they actually

consumed. That is why, though there exist energy crisis and high demand for renewable energy, private organization are less interested to get the benefits of JCM or CDM.

Researcher: *Do you think the organization's ongoing business activities have any positive impacts on climate change adaptation in Bangladesh?*

Interviewee: I am not sure whether current business practices are targeted directly to climate adaptation or not. However, we can see lot of CSR activities that definitely contributes to improve the overall development of community and natural environment.

Researcher: *How business can be more engaged in adaptation to climate?*

Interviewee: Adaptation to climate change is beneficial for business themselves. Government can give rebate or incentives only when government can get financial support from international donors or developed countries that are responsible for emission. Our government cannot lose revenue for the problem caused by other governments.

Appendix E

Journal Publications

1. **Islam, M., & Mohd-Nor, R.** (2017). Business engagement in adaptation to climate change in developing countries: a case study based on behavioural perspective. *International Journal of Business and Society*, 18(S4), 742-753.
2. **Islam, M., & Mohd-Nor, R.** (2018). Business adaptation to climate change: a case study in Bangladesh. *Global Business and Management Research: An International Journal*, 10(2), 41-51.