

# Chapter 24

## A Framework for Understanding Adaptation by Manufacturing Industries

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### ABSTRACT

*This chapter discusses what constitutes adaptation responses by firms in the face of climate change. There are four integral components of adaptation activities undertaken by firms: assessment of risk, understanding of vulnerability, understanding the regulatory barriers to overcome the vulnerability, and, finally, adoption of policies to overcome the vulnerability. While it is easy to understand these components separately, their interdependencies make the overall picture more complicated. Also complicating the issue is the fact that most small and medium firms do not have the capacity and resources to predict the impact of such changes on their operations, and hence, to quickly make the adjustments necessary to overcome them. The response of firms also depends on the nature of the climate risk they face, whether it is sea-level rise, or temperature rise.*

### INTRODUCTION

While adaptation is not a new concept, adaptation to climate change is certainly more rapid and complex in current situations. The IPCC has defined adaptation as, “any adjustment in natural or human systems in response to actual or expected climate stimuli or their effects, which moderates harm or exploits beneficial opportunities”.<sup>1</sup> As discussed in West and Brereton (2013), while the boundaries of mitigation are clearly defined and there is a clear metric for assessing the effective-

ness of such measures, in the case of adaptation, the boundaries are more ambiguous; also, there are no widely accepted benchmarks for assessing the effectiveness of adaptation. It is in this context, that the adaptive capacity of firms needs to be understood especially in developing countries.

The effect of climate change varies across business structures so adaptation can take many forms. Adaptation is complex and a firm’s response will be determined by whether the impact, is in the short or long term. It is therefore essential to understand what constitutes adaptation responses

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by firms in face of climate change. Four components are integral to a firm's adaptation activities: assessment of risk, understanding of vulnerability, understanding the regulatory barriers to overcome the vulnerability, and, finally, adoption of policies to overcome the vulnerability. While it is easy to understand these components separately, the overall picture is more complicated, since there are interdependencies between these components. Also complicating the issue is the fact that the majority of small and medium firms do not have the capacity and resources to predict the impact of climate changes on their operations and hence quickly make the adjustments necessary to overcome these challenges.

This chapter will discuss the changes that firms need to make or, are making, in the context of climate change and situate it in the organizational structure of a firm. For that, it is necessary first to understand what adaptation means at the level of a firm. As adaptation in a firm relates to business strategy, it is important to understand adaptation in that context, since governments and international organizations might think of the issue differently (Nitkin et al. 2010).

## **BACKGROUND**

### **Definition of Adaptation**

Adaptation to climate change has been defined as any adjustment, whether passive, reactive, or anticipatory, and is "concerned with the responses to both, the adverse and positive, effects of climate change". The Stern Review (Stern, 2006) stated, 'Adaptation is the only response available for the impacts that will occur over the next several decades before mitigation measures can have an effect.' (p. xxi). It is important to understand that while the benefits of adaptation will be realized immediately, the benefits of mitigation will be relevant in the long term (FAO, 2012).

The first time adaptation was addressed was in the Second Assessment Report (SAR) of the IPCC in 1996 (Moreno et al. 2006). Adaptation was discussed in that document with respect to impacts on forests, rangelands, and health. The concept of adaptation was linked to vulnerability<sup>2</sup> for the first time in the Third Assessment Report in 2001. The determinants of adaptation are listed as economic resources, technology, information and skills, infrastructure, institutions, and equity. However, the link between poverty, the distribution of resources, and empowerment are not addressed and adaptation is viewed as taking place in relation to set of proximate factors that can be addressed without disturbing the social-political set-up (Basset and Fogelman, 2013).

Adaptation in the climate change literature means different things to different people. The IPCC's Fifth Assessment Report, AR5 (2014) underlines the fact that the adaptation literature ascribes different meanings to the terms opportunities, constraints and limits and this increases the ambiguities related to understanding the issue or addressing it (Biesbroek et al. 2013). It also points out that in moving from the general definition, it is important to understand who is adapting, to what are they adapting, and what is the process of adapting (Smit et al. 1999)?

As Smit et al. (2001) note, adaptation refers to, "adjustment in ecological, social or economic systems in response to actual or expected climatic stimuli and their impacts or effects." (p. 881). Adaptive capacity reflects the ability of a system, region or community to adapt to the effects of climate change. This in turn establishes the determinants of adaptive capacity which relate to the economic, social, institutional and technological conditions that facilitate or constrain the development and deployment of adaptive measures. While the term has specific interpretations, in social science, adaptation refers to adjustment by individuals and the collective behavior of socioeconomic systems (in this context, firms).

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