



Contents lists available at ScienceDirect

Journal of Cleaner Production

journal homepage: www.elsevier.com/locate/jclepro

Exploring a scale of organizational barriers for enterprises' climate change adaptation strategies

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ARTICLE INFO

Article history:

Received 30 March 2016
Received in revised form
14 November 2016
Accepted 2 March 2017
Available online xxx

Keywords:

Multinational enterprises
Small and medium-sized enterprises
Supply chain
Barriers to change
Climate change (adaptation)
Context-specificity

ABSTRACT

Enterprises face changing climate conditions within their daily business. Thus, they are affected directly through climate change impacts on their operations or indirectly by climate change impacts on the supply chain. Even if enterprises are aware of the relevance of adapting to climate change, there exist barriers that impede organizational change strategies. In order to mainstream research on barrier categorization of climate change adaptation, we want to explore a scale of organizational barriers for enterprises' climate change adaptation strategies. By developing a barrier scale, we contribute to future research by allowing conclusive causal explanations for the occurrence of barriers and how they can be overcome. As barriers are context-specific, we decided for an empirical setting in a specific context regarding organizational climate change adaptation. In this study, we focus on multinational enterprises' supply chains, especially the stakeholder group of small and medium-sized suppliers. As small and medium-sized enterprises are stakeholders of multinational enterprises, their adaptation to climate change is relevant for multinational enterprises as well. The value of our study is threefold: First, we present the first empirically explored scale of organizational barriers for enterprises' climate change strategies by factor analysis. Second, we describe what multinational enterprises should learn for their strategic practices concerning an effective and efficient climate change adaptation in the supply chain. And third, even if we confirm that barriers are contextspecific, we would suggest our explored scale for organizational barriers for other context-specific changes strategies.

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1. Introduction

As one of the greatest global challenges (IPCC, 2014; Rockstroem et al., 2009; Steffen et al., 2015; World Economic Forum, 2010), climate change influences a wide variety of sectors such as agriculture, commerce, and trade as well as local government units (Peñalba et al., 2012) and regions such as Europe, North or South America, and Africa (Linnenluecke et al., 2011). Enterprises face this changing ecological environment within their daily business. They are affected directly through climate change impacts on their operations or indirectly by climate change impacts on the supply chain (Busch, 2011; Linnenluecke et al., 2011; Wedawatta et al., 2010; Winn et al., 2011; Wittneben and Kiyar, 2009). Thus, the adaptation of internal activities, structures, and management practices are important, as are the engagement and the activities of

the stakeholders (Lozano, 2012). Besides climate change mitigation, climate change adaptation is essential (IPCC, 2014). However, measures of climate change adaptation, as the second response to climate change, are less or even not applied in enterprises. As the potential of climate change mitigation efforts are limited, adaptation will play an increasing role in developing strategies against climate change impacts. Thus, scientists claim that the attention to adaptation has to increase (IPCC, 2014; Tashman, 2011; Winn et al., 2011).

Levy and Kolk (2002) state a growing need for more research in the strategic behavior of multinational enterprises (MNEs) to climate change. Hence, we focus the analysis on MNEs and more specifically their supply chains as upstream and downstream activities of enterprises are still under research (De Marchi et al., 2013; Kolk and Pinkse, 2008, 2012; Long and Young, 2015; Morya and Dwivedi, 2009; Vurro et al., 2010). Specifically, MNEs should act before the impacts of climate change occur and, thus, develop specific adaptation measures (Schotter and Goodsite, 2013). Given that climate change affects the supply chains of MNEs substantially

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(Busch, 2011), MNEs' suppliers, mostly small and medium-sized enterprises (SMEs) (Morya and Dwivedi, 2009; Wilton and Reavill, 1997), should consider adaptation to climate change (Wedawatta et al., 2010). SMEs are important stakeholders in procurement and production processes and bear a significant share of the responsibility regarding the delivery of products in time, as well as other relevant services. MNEs are confronted with increasing risk if the supplying SMEs fail to adapt to changing conditions (Jorgensen and Knudsen, 2006). On the other hand, MNEs obtain firm-specific advantages if they consider a wide range of locational factors (Kolk and Pinkse, 2012). To create value in the business environment it is essential to control all actors of the supply chain through MNEs and SMEs (Morya and Dwivedi, 2009; Wilton and Reavill, 1997). "Firms controlling one part of a supply chain will have to negotiate with firms controlling adjacent parts of the supply chain, since neither can operate successfully without the other" (Casson and Wadson, 2013, p. 166). For this reason, Morya and Dwivedi (2009) draw the conclusion that SMEs are significant for the supply chains of MNEs, independent of the specific industry sector. Thus, in this study we (1) focus on the indirect impacts of climate change and therefore consider the supply chains of MNEs and take a closer look at the climate change adaptation strategies of SMEs. We (2) imply the theoretical setting of organizational learning theory as Berkhout et al. (2006) argues that climate change adaptation exhibits numerous similarities with the processes of organizational learning and, furthermore, "organizational learning is central to the success of organizations, [as] a greater understanding of organizational learning promises to improve the performance of organizations and the prosperity of their members" (Argote, 2011, p. 444).

2. Climate change adaptation and barriers

Currently, the literature provides plenty of publications focusing on organizational climate change adaptation. Especially the insurance sector (e.g. Dlugolecki, 2000; Dlugolecki and Keykhah, 2002; Herweijer et al., 2009), the tourism sector (e.g. Bicknell and McManus, 2006; Elasser and Buerki, 2002; Hoy et al., 2011), the construction sector (e.g. Hertin et al., 2003; Morton et al., 2011; Wedawatta et al., 2010), and the water supply sector (e.g. Charlton and Arnell, 2011; Subak, 2000; Thorne and Fenner, 2008) have been the focus of research. The publications follow the same basic assumption: (1) enterprises of different sectors are affected by climate change impacts (Busch, 2011; Linnenluecke et al., 2011; Wedawatta et al., 2010; Winn et al., 2011; Wittneben and Kiyar, 2009) and (2) enterprises have to adapt to these impacts. Adger et al. (2005) distinguish especially the necessity of climate change adaptation as the impacts of climate change are "already occurring, and will occur with greater urgency in the future at a range of scales" (Adger et al., 2005, p. 85) In order to handle the impacts of climate change, it is a requirement for enterprises to recognize the changing climate (Busch, 2011; Stechemesser et al., 2015a,b) and to interpret the connected threats and opportunities for the enterprises (CDP, 2015). This allows enterprises to gain competitiveness by entering new markets and developing new products and services (Eberlein and Matten, 2009; Kolk and Pinkse, 2012; Pinkse and Kolk, 2012).

Nevertheless, even if enterprises are aware of the relevance of adapting to climate change, there exist barriers that impede organizational change strategies; barriers can focus on different organizational aspects such as knowledge, awareness, human resources, or governance or can address different contextual factors like technological, physical, biological, economic, financial, social,

cultural, and institutional context (Klein et al., 2014). Adger et al. (2009) consider mainly the societal barriers to successful adaptation to climate change - ethics, lack of precise knowledge, perception of risk, and undervaluing of places and cultures. Social barriers are also one part of the categorization of barriers to climate change adaptation by Jones and Boyd (2011). Reflecting on literature, Jones and Boyd (2011) deduct three categories of barriers to adaptation: social (normative, institutional), human and informational (knowledge, technological, economical), and natural barriers (physical, ecological). However, the study concentrates mainly on social barriers. Similarly, Gifford (2011) refers more precisely to psychological barriers such as limited cognition, ideologies, perceived risk, and limited behavior. In contrast, Eisenack and Stecker (2012) developed a framework to analyze adaptation from the action-oriented perspective. Therefore, they categorized, exemplarily, the barriers to climate change adaptation along the dimensions of the operator and the means in missing operators, missing means, unemployed means, and complex actor relations. There exist even more categorizations of barriers to organizational change as summarized by Eisenack et al. (2014) and Herrmann et al. (2014).

In order to mainstream research on barrier categorization of climate change adaptation, we want to explore a scale of organizational barriers for enterprises' climate change adaptation strategies. By developing a barrier scale, we contribute to future research by allowing conclusive causal explanations for the occurrence of barriers and how they can be overcome (Eisenack et al., 2014). In the existing literature, to the best of our knowledge, only two studies (Enete and Onyekuru, 2011; Ozor et al., 2010) have applied the statistical method of factor analysis to develop a scale of barriers to climate change adaptation as it exists in adjacent research areas. Given that barriers are context-specific (Hueske et al., 2015; Hueske and Guenther, 2015), we follow Eisenack et al. (2014), who define a barrier for climate change adaptation as "... (1) an impediment (2) to specified adaptations (3) for specified actors in their given context that (4) arise from a condition or set of conditions. A barrier can be (5) valued differently by different actors, and (6) can, in principle, be reduced or overcome" (Eisenack et al., 2014, p. 868). Thus, the study considers climate change as a specific context for the empirical analysis. Furthermore, Eisenack et al. (2014) propose more explanatory research on barriers for climate change adaptation. To address these research gaps the study seeks to answer the following research question.

Research question 1. How can we best describe a scale of organizational adaptation barriers to contextual change, especially to climate change?

Due to the fact that the supply chains of MNEs depend on SMEs' capabilities to adapt to contextual changes, we want to answer:

Research question 2. What should MNEs learn for their strategic practices concerning an effective and efficient climate change adaptation in the supply chain?

In the following we provide an overview of existing organizational barrier research regarding studies of contextual barrier factors. Second, we describe the material and methodology of the survey, and the method of the factor analysis followed by the results of the factor analysis. We explore three possible scales that fulfill the required quality criteria. In the discussion we provide

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