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How cities prepare for climate change: Comparing Hamburg and Rotterdam

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ABSTRACT

This paper compares the different ways in which the cities of Hamburg and Rotterdam are taking preemptive action to adapt to climate change. Literature, interviews, secondary data, official statistics, project reports and policy briefs were used to identify institutional arrangements used by the city governments to encourage innovations in climate adaptation strategies and involve the private sector in climate change policy implementation. We focus on cases that create positive opportunities; exploring how innovations are facilitated within the theoretical frameworks of the Porter hypothesis and eco-innovation. We examine two possible pathways of climate change governance, firstly strict regulation and formal enforcement, and secondly institutional eco-innovation and voluntary measures. We found that different emphasis is placed on the preferred pathway in each of the case studies. Hamburg focuses on formal enforcements while the Rotterdam city government encourages institutional eco-innovation by acting as a platform and also providing incentives. Our findings suggest that a well-designed institutional framework can enhance innovation and increase environmental and business performance. The framework could vary in instruments and patterns, using both formal constraints and incentives to increase voluntary actions to shape policy. The formal rules could be stringent or incentivising to shape the climate change measures. The research aims to contribute to both practice and science by providing examples that might motivate and inspire other cities to design appropriate institutions for climate change policy implementation.

1. Introduction

Future climate projections predict an increase in extreme weather events, such as heat waves or heavy precipitation, as well as continuing rise of global mean sea level (Pachauri, Mayer, & Intergovernmental Panel on Climate Change, 2015). The most vulnerable societies are in coastal and river floodplains, and those whose economies are closely linked with climate-sensitive resources, especially where rapid urbanization is occurring. Currently more than half of the world's population lives in coastal areas, and 75% of all large cities are located on the coast. IPCC projections indicate that Europe will be subject to increased storm frequency; and sea level rise will cause increased risk of tidal and storm floods with greater erosion. Many European and East Asian cities have defences against flooding and erosion in coastal areas, particularly in cities where climate change impacts are likely to be costly, for example Tokyo, Shanghai, Hamburg, Rotterdam and London (Field & Intergovernmental Panel on Climate Change, 2012). However, in many cities there is little action compared to the level of threat (Aylett, 2013). Implementing climate change policy, such as mitigation and adaptation, requires well designed institutional frameworks (Adger, 2000; Bakker, 1999; John Heinz, & Center for Science, Economics, and the Environment, 2002; Næss, Bang, Eriksen, & Vevatne, 2005; Tol, 2005). In this paper we explore the institutional frameworks that two cities, Hamburg and Rotterdam, use to mitigate and adapt to climate change.

The following section briefly reviews relevant literature. The theoretical framework section discusses the theoretical foundations used in the paper. The methodology section describes the methodology; and the results and discussion section provides an overview of the results with detailed discussions comparing the two case studies in the context of the Porter hypothesis and eco-innovation. In the conclusion we discuss the significance and implications of the case studies in terms of the research question: how are institutional frameworks designed to transform climate change from a challenge to an opportunity in Hamburg and Rotterdam? To answer this question we examine policy instruments used in Hamburg and Rotterdam to efficiently implement climate change policy; and compare the role of strict regulation and formal enforcements versus eco-innovation in influencing performance and competitiveness.

2. Literature review

Much of the existing climate change governance literature focuses on the global level. For example, regime theory scholars discuss how international climate instruments, such as the United Nations Framework on Climate Change Convention, could affect the behaviour and commitment of states. Less attention has been paid to regional, national and

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sub-national levels (Doelle, Henschel, Smith, Tollefson, & Wellstead, 2012). Importance of the participation of local authorities in climate change has been highlighted (Gibbs, 1997; Tuxworth, 1996; Welford & Gouldson, 1993). If there is to be a shift towards a polycentric solution to climate change, then case studies at municipal level are needed to demonstrate appropriate pathways (Biermann et al., 2010; Bulkeley & Newell, 2010; Ostrom, 2010). Ostrom (2010) emphasised the key role of civil participation at community level to manage natural resource and climate change problems with the goal of achieving efficient economic outcomes. However, Gibbs (1997) argues that urban sustainability and economic competitiveness are incompatible and considers that implementing local competitiveness strategies will lead to degradation and exploitation of the environment. Conventional environmental management and economics literature assumes that strict environmental policy imposes costs for companies, which affects their competitiveness, and hence has negative economic impacts such as lower employment and worse economic performance (Brännlund & Lundgren, 2009). However, this conventional perspective has been challenged by the Porter hypothesis, which proposes a positive causal link between regulation and encouraging innovations, which then enhance business performance (Lanoie, Patry, & Lajeunesse, 2008; Porter, 1990, 1991; Porter & Van der Linde, 1995). Evidence for the Porter hypothesis indicates that both strictness of environmental policies and flexibility have positive effects (Lanoie et al., 2008). For example, according to studies by Berman and Bui (2001) and Alpay, Kerkvliet, and Buccola (2002), refineries in the Los Angeles area perform significantly better than other U.S. refineries despite stricter air regulation; similarly, food-processing industries in Mexico have higher productivity when under pressure from environmental regulation (Ambec, Cohen, Elgie, & Lanoie, 2013).

In addition to use of strict formal enforcements, another approach is that stimulation of 'eco-innovation' by institutions for climate change governance. The definition of eco-innovation (OECD, 2009; OECD & Eurostat, 2005; Reid & Miedzinski, 2008) is the implementation of renewed, or greatly improved products, services, processes, methods, organisational structures or institutional arrangements which (with or without intent) lead to environmental improvements. Rennings (2000)suggests that eco-innovation also has social and institutional aspects, in that it involves changes in institutional structures with actors working in partnership, including governments and the private sector, to leverage more environmental benefits from the innovation. Eco-innovation literature also provides case studies to show that competitiveness can co-exist with pro-environment strategies (Demirel & Kesidou, 2011; Kesidou & Demirel, 2012; Lovett et al., 2012). In searching for efficient and effective ways for cities to adapt to climate change, this paper seeks to use a theoretical framework based on the Porter hypothesis and institutional economics to look at both formal arrangements and eco-innovation for climate change governance at the city level. As an important part of the institutional framework, policy instruments are central to effective enforcements (North, 1990) and so we identify policy instruments implemented in both cities.

3. Theoretical framework

A theoretical framework based on institutional economics is used in this research (North, 1990), with the Porter hypothesis and eco-innovation concept used in the analysis (Ambec et al., 2013; Porter, 1990, 1991; Porter & Van der Linde, 1995). Institutions are as defined by North (1990, p. 360): "the humanly devised constraints that structure human interaction". The institutional matrix that provides the incentive structure for human society consists of formal rules, informal constraints, and the characteristics and effectiveness of enforcement (North, 1990). Formal rules include laws, regulations, codes and formally established rules in societies. In addition to formal instruments, other informal constraints are often the factors that shape decision making. For example, climate change impacts, high labour costs, conservative local government, lack of an internal market, or high standards of technology can often lead to governments making different decisions. The informal instruments, for example, habits, perception, and awareness, come from socially transmitted information and are a part of the culture.

In order to analyse the case studies, we developed a framework to ascertain if a particular institutional pathway leads to a more efficient economic and environmental outcome (Fig. 1).

The Porter hypothesis proposes that stringent environmental regulation in a well-designed institutional framework can motivate innovations in firms and enhance competitiveness. A properly designed environmental regulation can trigger innovations if strict regulations are performance based with clear goals and flexibility. This provides freedom and incentives for them to use the most efficient and effective strategies to achieve the goals. If correct, this approach would lead cities and local industries to achieve better environmental and/or better business performance and thus enhance competitiveness.

In addition to the emphasis on strict regulations, the alternative approach, promoting eco-innovations through institutional structures (OECD, 2009; Rennings, 2000), proposes that a partnership with the actors involved, such as government and the private sector, could leverage more environmental benefits from an innovative structure. An institutional eco-innovation is defined as any change in institutional structure, including structural change, which redefines the roles and relations across involved actors (OECD, 2009). By looking at how the two cities plan and implement their climate change strategies, we expect to see into the institutional framework to observe whether the cities implement renewed, or greatly improved processes, methods, organisational structures or institutional arrangements that lead to environmental improvements. In this study we aim to examine whether such institutional frameworks could encourage a synergy of economic competitiveness and environmental sustainability.

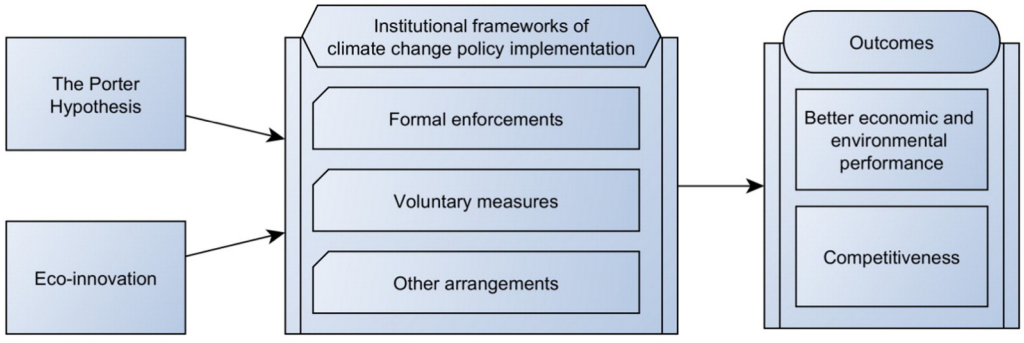

Fig. 1. Theoretical framework based on the Porter hypothesis and institutional economics. Adapted from North (1990) and Porter (1990).

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