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Analyzing a transition to a sustainability-oriented science system in Germany

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ABSTRACT

The multi-level perspective has successfully been applied to the analysis of complex sector transitions in the energy, the health or the food production sector. Is this framework also helpful to understand and give prescriptive advice for sustainability transformations within a national science system? Based on a comprehensive study of the diffusion of transdisciplinary sustainability research in Germany, this article analyzes the institutional dimension of a changing science-society relation in the German science system. It uses the multi-level perspective as a fruitful heuristic in order to identify potential pathways for a broader diffusion of transdisciplinary sustainability science. The importance of niche coalitions of frontrunner universities and research institutes are highlighted.

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1. Introduction

Sustainability challenges (such as climate change, resource scarcity, biodiversity loss) gain growing importance in modern societies. The causes as well as the solutions for these challenges are knowledge-driven: the majority of the problems are related to the high energy- and resource-consumption of modern, technology-based knowledge societies. These challenges cannot be met without knowledge-driven, ecologically oriented technological solutions as well as by a better understanding of comprehensive societal and economic transitions toward a more sustainable development.

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However, problems related to sustainability are usually complex, ambiguous and multi-dimensional, thus generally precluding the existence of simple solutions. To fully capture such problems, different perspectives on problem perception and various types of knowledge need to be integrated. Above all, a new perspective on scientific knowledge in general is needed, in order to deal with such problems.

In order to fully grasp this fundamental challenge, this paper will analytically frame the development of sustainability-oriented transdisciplinary research approaches as part of an envisaged, wide-ranging transition process—where a radical niche development is in conflict with an existing institutional setting and aims at changing it.

To some extent such an application of a transition research framework is a self-application of this theoretical approach to its own institutional preconditions: Transition research itself is a specific form of transdisciplinary research. Understanding how the science system has to change, in order to foster a broader diffusion of this kind of research, is methodologically inspiring: It makes transition scientists change agents in their own system and helps to better understand the potential of guiding principles delivered by the multi-level perspective. It provides opportunities for an educated “trial and error” (following the idea and importance of experimental settings in the transition approach) and shows how the heuristic of the multi-level perspective facilitates the identification of successful institutional strategies to change the system. A number of such strategies can be observed within the German science system.

The following section will introduce the concept of transdisciplinary sustainability research and its institutional implications for the science system. Section 3 will then give an overview of how structural change processes are conceptualized in the literature on socio-technical transitions. In Section 4, a multi-level transition framework is applied to the German science system. Based on this, the potential of various niche strategies for triggering a transition toward transdisciplinary sustainability research will be analyzed in Section 5. In the final section, the results of the multi-level analysis will be discussed and conclusions will be drawn.

2. Transdisciplinary sustainability research as a new challenge for the science system

New perspectives on the production of knowledge and scientific research (however, not necessarily related to sustainability) have been introduced by Gibbons and others in the debate about a mode-2-science during the 1990s: Whereas mode-1-science follows classical rules of analytical knowledge production (mainly found in the natural sciences) and “tells truth to politics”, mode-2-science defines its research questions together with the relevant actors (creating “target knowledge”) and incorporates the contextual knowledge of actors. In mode-2 science, there is no absolute or ultimate knowledge, discovered and authorized by scientists; rather, knowledge is co-produced by all kinds of actors and at most points in time remains provisional and constantly developing (CASS, 1997; Gibbons et al., 1994; Kemp and Marten, 2007; Nowotny et al., 2001).

In a similar vein, the concept of transdisciplinarity calls for research that transcends disciplinary boundaries and integrates lay knowledge (see for the different types of such a knowledge integration Bergmann et al., 2010, more critical Zierhofer and Burger, 2007). Transdisciplinary research has been defined as an approach that can: “(a) grasp the complexity of problems, (b) take into account the diversity of life-world and scientific perceptions of problems, (c) link abstract and case-specific knowledge, and (d) develop knowledge and practices that promote what is perceived to be the common good” (Pohl and Hirsch Hadorn, 2007, p. 20).

With regard to sustainability problems, some scholars have advocated the development of a new field of ‘sustainability science’, which acknowledges the ambiguous and uncertain character of real-world problems and the need for new types of knowledge production. It includes a new role of the science system in general, the major function of which is to produce knowledge that is relevant for public actors and includes a normative and practice-oriented dimension, in order to assist societies in developing in a more sustainable way. A major difference with regard to traditional science is that solutions for sustainability problems have to be sought, often at a time where it has not yet been possible to study these problems in a sufficiently comprehensive way. Here, tensions become apparent between this problem-solving approach and the traditional process of basic research followed by applied research. Thus, sustainability science should be problem-oriented, inter- and transdisciplinary

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