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# Environmental Innovation and Societal Transitions

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## Introduction to the IST2014 special section



This special issue reports some results presented at the 5th International Sustainability Transitions (IST) conference, which took place in Utrecht, The Netherlands. The guiding theme of the conference was “Impact and Institutions”. With regard to “Impact”, various sessions devoted attention to the practical applicability of transitions research and addressed the question: Do the insights, theoretical models and new theory development sufficiently spill over to the policy and business domains? The focus on institutions reflected the observation that while the first years the community was busy establishing its identity and developing relevant new theoretical frameworks, the more established community is linking up with other areas of research. Whereas the majority of papers at previous conferences can be characterized as empirical applications of the main frameworks (SNM, MLP, TIS), now we observe a broadening where researchers strengthen the theoretical foundations of these frameworks by connecting the sustainability transitions literature to other relevant bodies of literature. Especially the link between transition and institutional theories is seen as a fruitful avenue for further research.

Institutional theories offer subtle insights into the way existing rules, both formal and informal, influence the behavior of organizations (Scott, 2001). In the thinking about transitions, the regime has become the central concept that stresses the importance of existing rules in transition processes. A good example is the recent contribution by Fuenfschilling and Truffer (2014) who use the concept of “institutional logics”, denoting the structural rules that coordinate and guide actors, to explicitly describe the regime concept. Recent developments in institutional theories also highlight how organizations in turn try to create change by purposefully contributing to changing existing rules. This involves concepts like institutional entrepreneurship (Battilana et al., 2009; DiMaggio, 1988; Garud et al., 2002) and institutional work (Lawrence et al., 2010). This trend is also reflected in the papers selected for this special issue.

In a young research field as is sustainability transition studies, it is inevitable to have debate on concepts and methods. In line with this, a special session was organized at IST2014 to debate one of the main frameworks in transitions thinking, namely the Technological Innovation Systems (TIS) approach. This turned out to be a lively debate. Some scholars criticized the approach and identified weak spots, while others stressed the strengths of the approach and highlighted avenues for improvement of TIS application to sustainability transitions. The debate is included at the end of this special issue.

The special issue opens with a contribution by Christoph Mazur, Marcello Contestabile, Gregory Offer, and Nigel Brandon (this issue). It is at the heart of the conference theme since it analyses how German car manufacturers responded to institutional changes from national and international events and policymaking. It represents a micro-level study of how the car industry decides to develop a specific low-emission technology and how this relates to events in the context of these industries. The authors find that the influence of regulatory policy on the selection of particular disruptive technologies by the automotive industry is limited, and that external pressure such as regulation of fleet emissions mainly has induced incremental innovations. This can be explained by firm-internal conditions that do not support more radical technology choices. However, the external institutional pressures put on the car industry are not entirely without effect; the effects are rather indirect. They can stimulate firm-internal change agents, such as new CEO's, to do their work more successfully and get their disruptive propositions accepted within the firm.

The second contribution by Antje Klitkou, Simon Bolwig, Teis Hansen, and Nina Wessberg (this issue) analyses lock-in mechanisms in transition processes related to energy and transportation in the Nordic countries, focusing on three technology platforms: advanced biofuels, e-mobility, and hydrogen and fuel cell electrical vehicles. The paper is based on a comparative analysis of case studies. The authors study lock-in mechanisms like learning effects, economies of scale, network externalities, technological interrelatedness, collective action, institutional learning effects, and differentiation of power. They show that existing regimes differ with regard to lock-in mechanisms and that the path dependencies generated by these lock-in mechanisms therefore set different preconditions for the development of new transition pathways.

The third contribution by Sarah Bork, Jan Schoormans, Sascha Silvester, and Peter Joore (this issue) is also an example of merging institutional theory and transition studies. This paper focuses on the legitimacy of new product categories. Five legitimacy-influencing factors are introduced: comprehension, output, compatibility, signaling and procedural justice. The authors argue that especially in the context of sustainability transitions, many actors besides consumers influence product legitimacy; actors with an interest in a new product category may influence its legitimacy through the following tools; frames, activities, products, and enactment of law. In addition, the role of the characteristics of the product itself and its design in the legitimization process are examined.

The fourth original research paper in this issue by Anna Bergek, Marko Hekkert, Staffan Jacobsson, Jochen Markard, Björn Sandén, and Bernhard Truffer (this issue) addresses the Technological Innovation Systems (TIS) framework. In this paper leading TIS scholars team up to propose a new research avenue for research on Technological Innovation Systems. They highlight that future TIS research can benefit from a more elaborated conceptualization of the contextual factors that influence TIS performance. They identify four types of context structures: technological, sectoral, geographical and political. The potential benefits of taking these context structures into account are discussed and illustrated with empirical examples. In line with the trend we observed above the authors bring together different bodies of literature to strengthen the TIS framework.

Finally, the special issue closes with a sub-section based on the TIS debate during the conference. First, Bernhard Truffer provides a background. Next, Lars Coenen, Florian Kern, Catharina Bening, Nicola Blum, and Tobias Schmidt present critical comments on the TIS approach and its applications. The closing article by Jochen Markard, Staffan Jacobsson and Marko Hekkert provides a response to the various criticisms.

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