



Contents lists available at ScienceDirect

Journal of Cleaner Production

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

Experiments in climate governance – A systematic review of research on energy and built environment transitions

Paula Kivimaa ^{a, b, *}, Mikael Hildén ^b, Dave Huitema ^{c, d}, Andrew Jordan ^e, Jens Newig ^f

^a Science Policy Research Unit SPRU, University of Sussex, Jubilee Building, Falmer, Brighton BN1 9SL, UK

^b Finnish Environment Institute, P.O. Box 140, 00260 Helsinki, Finland

^c IVM Institute for Environmental Studies, VU University Amsterdam, De Boelelaan 1087, 1081 HV Amsterdam, The Netherlands

^d Department of Science, Open University of the Netherlands, Valkenburgerweg 177, 6419 AT Heerlen, The Netherlands

^e Tyndall Centre, University of East Anglia, Norwich, UK

^f Leuphana University Lüneburg, Germany

ARTICLE INFO

Article history:

Received 28 January 2016

Received in revised form

26 October 2016

Accepted 5 January 2017

Available online xxx

Keywords:

Governance experiments

Experimentation

Transitions

Climate policy

Climate governance

Governance innovation

ABSTRACT

Experimentation has been proposed as a key way in which governance drives sustainability transitions, notably by creating space for innovative solutions to emerge. In seeking to bring greater coherence to the literatures on climate and sustainability governance experiments, this article reports on a systematic review of articles published between 2009 and 2015. Based on these results a new definition and typology of climate governance experiments is suggested. The typology distinguishes between the various purposes experiments can have, including niche creation, market creation, spatial development, and societal problem solving. It deepens the understanding of the diversity in experimenting by highlighting the salient features of different types of governance experiments. It can therefore guide future research to generate more cumulative research findings contributing to a better understanding of the role and outcomes of experiments in societal transitions. The findings also suggest that real transitions towards low-carbon and climate-resilient societies will require a systematic deliberate combination of different types of experiments.

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1. Introduction

Experimental approaches to governance have recently received increasing attention in the academic literature. Experimentation can challenge the *status quo* and enable the exploration of governance innovations, technologies and services in a temporary space (Sanderson, 2002; Berkhout et al., 2010; Heilmann, 2008). In the literature on sustainability transitions, experimentation is a key theme, with experiments often seen as a way of establishing niches, i.e. fringe spaces for emerging technologies or alternatives to current methods of governance (e.g. Schot and Geels, 2008; Berkhout et al., 2010; Frantzeskaki et al., 2012).

Experiments have also received political attention. One example is the Finnish Government Programme of 2015 that aspires to create a ‘culture of experimentation’ to strengthen policy

development with extensive trials and several smaller experiments, systematic experimentation and a legal basis to facilitate the arrangement of experiments (Government Programme, 2015). Another example is the current UK Cabinet Office which has organised an open “governance lab”. Previous UK governments have been keen on pilot projects and seen them as a way to engage in evidence based-policy making. Also urban living labs emphasising an experimental approach to governing cities (Voytenko et al., 2016) are increasingly popular. More generally, experiments have been advocated as a way to enhance the evidence basis underpinning policy interventions (e.g. Sanderson, 2002).

A particularly interesting context for experiments is climate governance. Experimentation is claimed to be better suited to address the multidimensional and complex nature of climate change than more traditional modes of governance (e.g. Castán

* Corresponding author. Science Policy Research Unit SPRU, University of Sussex, Jubilee Building, Falmer, Brighton BN1 9SL, UK.

E-mail addresses: p.kivimaa@sussex.ac.uk, paula.kivimaa@ymparisto.fi (P. Kivimaa), Mikael.hilden@ymparisto.fi (M. Hildén), Dave.Huitema@vu.nl (D. Huitema), A.Jordan@uea.ac.uk (A. Jordan), newig@uni.leuphana.de (J. Newig).

<http://dx.doi.org/10.1016/j.jclepro.2017.01.027>

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Broto and Bulkeley, 2013; Bulkeley et al., 2014a). Literatures on urban experimentation (Bulkeley et al., 2014a) and polycentric governance (Jordan et al., 2015) acknowledge the restricted ability of national and transnational governance structures to address global problems, even post the Paris Climate Agreement. There has also been an increasing upsurge of experimental actions by cities, regions, businesses and civil society organisations (Chan et al., 2015) that can be subsumed under the scope of climate governance experimentation.

The concept of experiments is used in very different ways by academics and policy makers. To begin with, there is much variety in the understandings of what constitutes an experiment (particularly in governance) and what types of experiments exist. Some academic authors tend to emphasise (only) novelty when they use the term (Hoffman, 2011), whereas others suggest that it only applies when a test is performed (McFadgen and Huitema, in progress). Tassej (2014) sees experiments as offering some flexibility and the opportunity to test novel policy options on a limited scale and that the interventions are at least to some extent reversible. In turn, Sabel and Zeitlin (2012: 1) emphasise the repetitive nature of experimenting and define experimental governance as “a recursive process of provisional goal-setting and revision based on learning from the comparison of alternative approaches to advancing them in different contexts”.

Despite the centrality of experiments, De Bruijne et al. (2010, p. 276) have argued that the literature on sustainability transitions is “vague and ambiguous with regard to how experiments should be set up and managed in practice to contribute to transitions”. This article argues that the inconsistent conceptualisation of experiments is inhibiting cumulative understanding across case studies. An additional problem is that normative values (what experiments should do) and positive analyses (of what they actually do) are often subtly interwoven in the writings on experimentation. Furthermore, Bos and Brown (2012) have stated that the transitions literature has paid disproportionate attention to technical experimentation, with a lacking focus on the dynamics of how governance experimentation unfolds. Kern and Howlett (2009) also point out that empirical studies of transition management have tended to focus on technically oriented experiments coupled with conservative funding criteria.

This article sets out to bring some order to the field by systematically exploring how the concept of experiments is used in the literature studied for this review. In this it also contributes to a call for more research on the outcomes of experiments (Bulkeley et al. (2014b) on urban experiments; Verbong et al. (2010) on Indian biogas experiments, Nair and Howlett (2015) on policy experiments in the water sector). It does so by reviewing experiments that were either deliberately conducted as governance experiments (e.g., trials with new measures, institutions or principles in the form of policy experiments in public or private governance) or as research experiments with the aim to inform governance. The academic literature included in the systematic review is scrutinised as to what contexts experiments have been undertaken in, and what outputs and outcomes they are reported to have generated.

Throughout, the aim is to learn from previous, in particular empirical, research on experiments with a view to advance the study of this diverse phenomenon. The discussion is based on a systematic review (Petticrew and Roberts, 2006) of experiments reported in published peer-reviewed journal articles, as the authors were not aware of previous systematic reviews on the topic during the time of the study. One of the aims is to derive a typology of experiments. To this end, specific questions were formulated:

- What is the nature and focus of experiments that link sustainability transitions to climate governance?

- What kind of outputs and outcomes do these experiments generate? And what is their specific role in low carbon or climate resilience transitions?

Particular attention is devoted to identifying *governance* experiments that may contribute to transitions, as this angle is largely absent from the transition literature (e.g. Bos et al., 2013). Heilmann (2008, p.2) stresses that governance experimentation refers to interventions done in a deliberate way, allowing for systematic learning. The systematic review informing this article therefore took into account both systematic experiments that variegated with governance measures, institutions, or principles (based on Kooiman, 2003), and experiments that potentially challenge or question existing governance structures and practices.

Section 2 begins by discussing the literature on experiments. The research approach and the case survey method are explained in Section 3, and Section 4 presents the findings of the systematic review. Section 5 discusses the findings, and Section 6 provides conclusions.

2. Governance innovation and transition experiments: background and theory

This article focuses on experiments in climate governance with respect to sustainability transitions. Following Kooiman (2003) governance is understood here as “the patterns that emerge from the governing activities of social, political and administrative actors” (Kooiman, 1993: 2). (See also Kohler-Koch, 1999: 14). Lange et al., 2013 stress that governance includes articulations of policy, politics and polity. Policy has been defined as “a relatively stable, purposive course of action followed by an actor or a set of actors dealing with a problem or a matter of concern” (Anderson, 2006: p. 6). Because of the close links between governance and policy, many governance experiments are often – but not always – also policy experiments. Experiments that successfully challenge existing policies may result in policy innovations, when inventions in, for example, policy design or implementation are taken into use.

Experiments can contribute in important ways to governance. They can either constitute (deliberate) interventions that aim at solving problems or developing new practices (as in pilots or demonstration projects), or they are conducted in order to learn about the effects of (limited) interventions for future (more large-scale) interventions. Their potential strength lies in the opportunity to tinker with new approaches, practices or institutions on a small scale and/or temporarily. They can circumvent or challenge dominant values and bring in new actors. Knowledge about how something (e.g. a technology, a service, a policy, etc.) ‘works in the real world’ is typically expected to be an output. This means that learning is an essential justification for experiments (cf. Kemp et al., 2007; Brown and Vergragt, 2008; Tassej, 2014). Experiments may also, for example, provide market impact data (Tassej, 2014), test and introduce a new technology or service (Brown and Vergragt, 2008), or identify governance problems and create cooperative networks or visions (Kemp et al., 2007). However, often experiments are also expected to create more long-term outcomes, for example, initiate a process of broader socio-technical change in markets or practices (e.g. Brown and Vergragt, 2008; Berkhout et al., 2010).

Linking experimentation to governance innovation is important, as governance choices (often embodied in public and private policies) are expected to affect behaviour, practices, investments and social and technological innovation to a large degree. Although they may not in the beginning impose significant changes in institutions, experiments – being more flexible and adaptive – do offer a way of dealing with uncertainty and variability, and, at the outset, have the

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