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University partnerships for co-designing and co-producing urban sustainability

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ABSTRACT

Universities are playing an increasingly central role in advancing sustainability at the local, regional and national scale through cross-sector collaborations. Accompanying the launch of Future Earth, interest is mounting in the co-design and co-production of knowledge and solutions for advancing global sustainability, particularly in urban areas. Place-based university partnerships appear as particularly significant vehicles for enacting co-design and co-production in the context of urban sustainability. However, the nature and role of these partnerships are not well understood, in part due to the absence of systematic analyses across multiple cases. To fill this gap, the objectives of this paper were to conduct a large-scale international survey focusing on university partnerships for urban sustainability in industrialised Europe, Asia and North America to (1) determine defining features such as focus areas, geographical scales, mechanisms, actors and motivations, and (2) identify commonly encountered drivers, barriers and potential impacts.

Results indicate that partnerships most typically target energy, buildings, governance and social systems, unfold at local or city-scales, and involve collaborations with local or regional government. Our analysis shows that potential outcomes of university initiatives to co-design and co-produce urban sustainability are not limited to knowledge and policy. They also encompass the creation of new technological prototypes, businesses and new socio-technical systems, in addition to transformations of the built and natural environment. Findings also suggest that individual partnerships are making strong social, environmental and sustainability impacts, with less evidence of economic contributions. Strategies are required to enhance project management and ensure that projects address contrasting priorities and time horizons in academia and local government. Implications for policy include findings that targeted funding programmes can play a key role in fostering partnerships. Measures are also required to challenge academic norms and incentive structures that, in some cases, hinder university efforts to engage in place-based initiatives to co-design and co-produce urban sustainability.

1. Introduction

The grand sustainability challenges of our time such as climate change, food, water and resource security, pollution, environmental degradation and other socio-economic concerns are symptomatic of systematic failures (Rotmans and Loorbach, 2008). Tackling such problems requires fundamental re-configuration of interconnected technological, environmental, social, economic and political systems and processes (McCormick et al., 2013; O'Brian et al., 2012). Cities are loci where many of these problems coexist and such systems and processes intertwine (Grimm et al., 2008). With the majority of humanity concentrated in urban areas, cities are widely regarded as central arenas in the pursuit of global sustainability (Clark, 2003; Kamal-Chaoui and Robert, 2009; Nevens et al., 2013). However, creating societal transformations towards greater sustainability surpasses the resources or expertise of any single player or organisation (Kania and Kramer, 2011). The

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advancement of urban sustainability therefore requires collaboration between academia, government, industry and civil society (Clark and Holiday, 2006; Yarime et al., 2012).

With the ten-year Future Earth initiative officially launched at the UN Conference on Sustainable Development (Rio + 20), the *co-design* of research agendas and *co-production* of scientific knowledge and societal transformations towards sustainability has been advocated as a new model of science (Future Earth, 2013; Mauser et al., 2013). Universities are well placed to assume a central role in the co-design and co-production of knowledge and tools for societal transformations towards sustainability with diverse external stakeholders from industry, government and civil society. Universities generate scientific, technological and social innovation and educate next generation leaders (Cortese, 2009; M'Gonigle and Starke, 2006), link differing sectors of expertise and mediate across these networks (Arbo and Benneworth, 2007; Cash et al., 2003; Sedlacek, 2013), amass research funds and donations, hold extensive urban real estate assets (Perry and Wiewel, 2005), and enjoy a high level of societal trust from their non-profit status and commitment to the public good (Bok, 2003; Stephens et al., 2008).

Cross-sector university partnerships for urban sustainability appear to be flourishing across the world (Trencher, 2014; Trencher et al., 2013, 2014) heralding a significant development in the functions of the modern research university. Yet the relative newness of this trend has so far prevented a thorough understanding of the defining attributes, mechanisms by which university actors engage with and transform society, and the extent to which partnerships reflect principles of co-design and co-production. Scholars (Hoover and Harder, 2014; Karatzoglou, 2013; Stephens et al., 2009) observe that the literature on this topic is dominated by single or small sets of case studies, mostly descriptive, and the absence of robust analytical frameworks. To date there has been no systematic comparison and statistical analysis across a large number of cases.

In this study, to offer a multi-national perspective moving beyond Anglophone countries, we conducted a large-*n* survey on place-based university partnerships for co-producing knowledge, tools and societal transformations to advance urban sustainability. This survey of industrialised nations in Europe, Asia and North America has two core objectives: (1) to determine key attributes (urban systems, geographical scale of activities, partners and stakeholders involved, motivations and mechanisms) of collaborative efforts to co-design and co-produce urban sustainability, and (2) to identify commonly encountered drivers, barriers and potential impacts. By doing so, this paper builds the empirical foundations for interpreting the worldwide emergence of university partnerships for urban sustainability. Also offering a critical perspective of various tensions and driving forces, our study suggests potential strategies and policies for fostering the formation and effectiveness of university partnerships to co-design and co-produce knowledge and solutions for advancing urban sustainability.

2. Theoretical perspectives on university partnerships for urban sustainability

Experimentation is crucial for advancing sustainability (König and Evans, 2013). University partnerships are typically experimental due to research activities and an innovative, exploratory nature. Systems innovation literature has taken a high interest in the importance of 'sustainability experiments' for trialling novel configurations of technological, social and institutional arrangements (Bai et al., 2009, 2010; Berkhourt et al., 2010). This body of scholarship defines sustainability experiments as "planned initiatives that embody a highly novel socio-technical configuration likely to lead to substantial (environmental) sustainability gains" (Berkhourt et al., 2010). In addition to technological advancement, sustainability experiments can potentially facilitate learning on social and human dimensions of sustainability (Brown et al., 2003). As no individual societal player possesses the knowledge or resources to single-handedly bring about socio-technical transformations (Kania and Kramer, 2011), sustainability experiments must entail the mobilisation of knowledge, capabilities and resources from various societal sectors (i.e., industry, government, academia and civil society). Sustainability experiments resonate with the principles of co-design and co-production, which are attracting renewed interest as potential drivers of societal transformations towards sustainability (Mauser et al., 2013). A key challenge for emerging global-level research programmes such as Future Earth is to determine how specific geographical locations can function as strategic sites for knowledge production and socio-technical experiments for triggering societal transformations towards greater sustainability.

In this context, interest is mounting in collaborative innovation models for urban sustainability—particularly those targeted at neighbourhoods or cities. An emerging conceptual lens to describe the application of sustainability experiments to specific urban zones is the notion of a 'living' urban laboratory (Bulkeley et al., 2011; Evans and Karvonen, 2011, 2014). Corresponding with the idea of creating protected 'niches' of innovation (Geels, 2002; Smith and Raven, 2012), complexity and uncertainty means that initiatives to create societal transformations towards sustainability should start small before up-scaling and exporting elsewhere. Empirical evidence suggests that local government actors around the world are increasingly willingly to engage in such cross-sector experiments to carry out sustainability and climate commitments (Bai, 2007; Bulkeley et al., 2014; Castan Broto and Bulkeley, 2013). Fuelling a rising interest in experimental approaches to urban governance are failures by national or international level political frameworks to shift local and regional level development trajectories towards sustainability (Hoffman, 2011; McCormick et al., 2013; Orr, 2013). For experiments involving scientific knowledge production with academics, a key driver appears to be a broader transition in science towards pragmatic epistemologies and research agendas with greater societal relevance (Evans and Karvonen, 2011; Gibbons, 1999; Lubchenco, 1988). Often described as a move from 'mode 1' to 'mode 2' type knowledge production, scientific knowledge is increasingly produced in application and in response to stakeholder needs (Etzkowitz, 2002; Nowotny et al., 2001). This shift reflects a growing awareness that greater innovation can result from collaboration and open networks (Gorman, 2010; Schaffers and Turkama, 2012; Shrum et al., 2007) with both horizontal and vertical linkages (Bai et al., 2009).

Universities can play a crucial role in such experiments. Scholars have documented partnerships where university and societal actors collaboratively use urban areas as test-beds for emerging technologies in energy, construction and transport (Evans and Karvonen, 2011; Keyson et al., 2013; König, 2013; Lienin et al., 2004, 2005; Molnar et al., 2011; Trencher et al., 2013, 2014; Yarime et al., 2012). Others (De Kraker et al., 2013; Valkering et al., 2013) describe a process of mutual learning where researchers, government authorities and citizens exploit social innovation at the local scale to spur wider societal transitions by sharing experiences across trans-border networks. Some (Horrigan, 2014; Pothukuchi, 2011) document the collaborative process of creating social value and increasing resiliency by stimulating local food consumption and creating new urban food networks, whilst others (Evans and Karvonen, 2014; Trencher et al., 2014) describe cross-sector attempts to combat socio-economic decline through real-estate development and efforts to spur low-carbon, knowledge-driven growth.