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Framing niche-regime linkage as adaptation: An analysis of learning and innovation networks for sustainable agriculture across Europe

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ABSTRACT

This paper draws on the transition literature to examine niche-regime interaction. Specifically it aims to reveal and contribute to an understanding of the processes that link sustainable agriculture innovation networks to the agricultural regime. It analyses findings from participatory workshops with actors in 17 Learning and Innovation Networks for Sustainable Agriculture (LINSA) across Europe. Framing linkage as an adaptive process, whereby regime actors and entities adapt to incorporate LINSA, and vice versa, reveals different patterns and processes of adaptation. Five adaptation modes are distinguished and described corresponding to different levels of adaptation between LINSA and the agricultural regime. Understanding adaptive linkage processes within and across these modes as reflexive, learning and networking processes enabled and facilitated by individuals and organisations provides more insights into linkage processes than a hierarchical approach. Analysis of results from 17 LINSA from a number of different contexts across Europe allows a broad empirical analysis and an overview of the interplay of processes contributing to the agricultural regime's adaptive capacity.

1. Introduction: incorporating diversity into an understanding of agricultural transition

There are growing debates about the need to re-orientate the food production-centred food system towards more ecological, social and environmental lines and address the growing demands from society on agricultural systems (Marsden, 2013). It is increasingly acknowledged that meeting this sustainability challenge in the agri-food system will require system innovation (Elzen et al., 2004) and transition (Hargreaves et al., 2013; Hinrich, 2014).

From the socio-technical transition perspective a transition entails a fundamental change in co-evolving structures, cultures and practices so that the way a societal system functions is profoundly altered (de Haan and Rotmans, 2011). In agriculture the notion of transition applies to a shift from an agri-food system with the societal function of producing food, characterised by having the goal of increasing productivity, to one built around the wider principles of sustainable production and rural development (Brunori et al., 2013). A number of alternative models of agriculture have emerged which potentially can contribute to such a shift including, for example, low-input agricultural approaches, multifunctional agriculture and locally embedded production and consumption (e.g. Horling and Marsden, 2011). Within these approaches, networks of actors experimenting with innovative sustainable solutions at the local level are understood to play an important role in seeding a more sustainable form of agriculture (Wiskerke and van der Ploeg, 2004; Klerkx et al., 2010). It is known that the solutions they propose deviate from, and hence are often resisted by, the prevailing agri-food system however the nature of their interaction with the agri-food system is still to be fully explored (van der Ploeg et al., 2004; Knickel et al., 2009).

The socio-technical transitions literature provides useful perspectives for examining this interaction. In this literature a socio-technical regime is described as "the structured complex of more established practices and associated rules that stabilise existing systems" (Geels, 2011, p26). Regimes are relatively inert and resistant to change being structured to incremental innovation following established trajectories. According to Seyfang and Smith (2007, p588) the regime's "entrenched cognitive, social, economic, institutional and technological processes lock us into trajectories and lock out sustainable alternatives". The technological, organizational and institutional arrangements which support the

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dominant mode of agricultural production can be thought of as a socio-technical regime. In the transitions perspective niche are important sources of ideas and practices which challenge the regime and can potentially initiate a sustainable regime transformation, if conditions are right (Kemp et al., 1998). This regime transformation is seen to occur through an accumulation of novelties in 'niche spaces' which allow, through learning and experimentation, radical innovations to develop (Schot and Geels, 2008). Regimes do not always recognise that novelties can be the key to effective innovations and as such the novelties often remain hidden (van der Ploeg et al., 2004). These novelties can be thought of as synonymous with networks proposing innovative sustainable solutions.

Thus studies using this perspective have drawn attention to the interplay between the entrenched regime and innovative niche. This interplay has been conceptualised within different strands of the transitions literature. The multi-level framework proposes that radical innovation emerges from complex interactions between processes occurring at, and between, three inter-related levels (niche, regime and landscape) (Geels, 2002, 2006). Developed for technological innovations in various industries and supported by historical analysis, this provides a heuristic structure for guiding the search for patterns, causes and impacts of different phenomena during transition. A parallel set of literature sharing the same concepts considers how the transition (and niche in particular) can be managed to break into the mainstream, this has been applied to emerging innovations in sustainable development contexts (e.g. Shove and Walker, 2007). Thus the transitions perspective offers concepts for understanding how innovative networks experimenting with sustainable agricultural practices might interact with the dominant agri-food system.

However, multi level analysis has been criticised as offering an overly functional and structural (and hierarchical) explanation of transition, and as not taking account of the heterogeneous characteristics of niche and regime and their interaction, nor of their adaptive capacity, or the dynamic nature of their interaction within sustainable agriculture contexts (Raven et al., 2011). Descriptions and analyses are seen as abstract from the messy dynamics that occur within and between networks of actors that are involved at all levels in innovation processes (Elzen et al., 2012; Farla et al., 2012). In the same way critics argue that the orientation in system innovation theory and transition management towards the niche, typically focussing on how and under what conditions a niche influences a system, neglects the *processes that link* niche and incumbent regime entities, which can be characterised by reflexive and adaptive processes (e.g. Geels, 2002; Smith, 2007).

These criticisms are pertinent to understanding the relationship between the multiplicity of networks operating within sustainable agriculture niches and the multi-faceted agricultural regime. As Rotmans et al. (2001) notes, transitions have an inherent complexity and uncertainty due to the multiple developments in a number of spheres that are intertwined, multi-actor in nature, and to the existence of radical shifts. This is no more so than in agriculture, which is multi-dimensional and where a number of diverse and qualitatively different sustainability innovations are emerging. These differ from technological ones conceptualised as niche, as they are concerned with sustainable forms of agriculture and do not develop in predictable ways but are characterised by adaptability and flexibility (Roep et al., 2003; Veldkamp et al., 2009). Also, as Geels (2010) notes, sustainability transitions differ significantly from technological (and historic) transitions.

Furthermore the agricultural regime's adaptive capacity, which can involve drawing in and offering some protection to niches, creates a situation where multiple agricultural transitions result from push-and-pull efforts by niche actors in cooperation with regime actors or, a mix between 'top-down' induced and 'bottom-up' sprouted action (Klerkx et al., 2010). Commentators have described bottom-up networks emerging in a self-organising fashion and coordinated by rural actors (traditional and non-traditional), coalition networks with regime actors, or emanating from within the regime itself (Berkhout et al., 2004; Aarts et al., 2007; Knickel et al., 2009; Elzen et al., 2012). Thus networks of actors collectively engaged in innovation emerging in, and operating across, all levels are seen to contribute to transition in what some commentators call a Complex Adaptive System (CAS) (Klerkx et al., 2010; Rotmans and Loorbach, 2010).

This complexity highlights, not only the need for a more nuanced understanding of the relationship between niche and regime than offered by existing transition perspectives such as multi-level analysis, but also the need for closer attention to the adaptive nature of niche-regime linkage and the networks and processes involved. This leads to the main questions of the paper, namely: How can analysis of the niche-regime linkage be framed to take account of these dynamic and multiple interactions? Are the analytical concepts of regime and niche relevant to understanding the relationship between the multiple sustainable agricultural networks operating at niche and regime levels in agriculture? Is adaptive capacity a useful concept to explore this relationship? Although alternative theoretical framings (e.g. structuration theory (Giddens, 1984)) may offer insights into these phenomena the focus here is on sustainable agricultural *innovations* and their development with respect to the agricultural regime, hence the transition constructs would seem appropriate. This paper therefore aims to extend this theory to better incorporate the inconsistencies described.

This paper aims to reveal, and contribute to an understanding of niche-regime linkage specifically the processes that connect innovation networks in sustainable agriculture to elements of the agricultural regime. It draws on analysis of 17 Learning and Innovation Networks for Sustainable Agriculture (LINSA) from across Europe. These are networks of actors with a diversity of components and ambitions which have an environmental, social or economic goal (Brunori et al., 2013). LINSA were identified within the SOLINSA[1] project as "networks of producers, customers, experts, NGOs, SMEs, local administrations, as well as official researchers and extensionists that are mutually engaged with common goals for sustainable agriculture and rural development – cooperating, sharing resources and co-producing new knowledge by creating conditions for communication" (Brunori et al., 2013, p4).

Specifically the paper aims to make theoretical and empirical contributions to niche-regime linkage in three ways. Firstly by using LINSA-regime as an analytical space for understanding linkage; secondly by conceptualising linkage as an adaptation process to account for the dynamic and heterogeneous nature of niche-regime interaction; thirdly by drawing on data from 17 LINSA across Europe to provide rich empirical insights and expand the scope of analysis beyond previous research.

The paper is structured in the following way. In the next section conceptualisations of niche and regime are explained, theories concerning their interaction are reviewed and their limitations considered with reference to the agricultural context. A discussion of reframing niche-regime linkage as adaptation follows. The LINSA concept and methods of LINSA selection and analysis are described next, and then five adaptation modes are distinguished and described corresponding to different levels of adaptation between LINSA and the agricultural regime. A discussion and conclusion complete the paper.

[1] SOLINSA- Support of Learning and Innovation Networks for Sustainable Agriculture.