



Eco-innovation and retailers in milk, beef and bread chains: enriching environmental supply chain management with insights from innovation studies



J. Mylan ^{a, b, *}, F.W. Geels ^{a, b}, S. Gee ^{a, b}, A. McMeekin ^a, C. Foster ^b

^a Sustainable Consumption Institute, 188 Waterloo Place, Oxford Road, University of Manchester, UK

^b Institute of Innovation Research, Manchester Business School, University of Manchester, UK

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ABSTRACT

This paper investigates why, how and to what degree supermarkets stimulate upstream eco-innovation in UK milk, beef and bread chains. To answer this question, we aim to enrich the environmental supply chain management literature with insights from innovation studies. The resulting conceptual framework distinguishes three elements: a) motivations for supermarkets to address eco-innovation (internal considerations and external pressures), b) characteristics of supply chains that hinder or enable eco-innovation attempts (e.g. breadth, length, degree of trust), c) mechanisms to stimulate eco-innovation. Regarding this third element, which is our main contribution, we distinguish: 1) economic mechanisms (supermarkets paying farmers more for eco-innovation or imposing eco-performance standards), 2) information exchange and interactive learning in networks ('innovation systems'), and 3) socio-cognitive coordination through the creation of shared meaning and visions (e.g. roadmaps). We demonstrate the usefulness of this framework with a comparative qualitative analysis of three UK sectors with different degrees of retailer-led eco-innovation: milk, beef and bread. The paper ends with three broader reflections and suggestions for further research.

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1. Introduction

Food production and consumption have major environmental implications, accounting for about 22% of UK greenhouse gas emissions (Defra, 2010). It is therefore important to improve the understanding of eco-innovation in food supply-chains, which is the general aim of this paper. We adopt the European Commission's definition of eco-innovation as: "the production, assimilation or exploitation of a novelty in products, production processes, services or in management and business methods, which aims, throughout its lifecycle, to prevent or substantially reduce environmental risk, pollution and other negative impacts of resource use (including energy)". A specific problem of eco-innovation in food is the 'distance' between the production of environmental impacts and the power within the supply chain. While a significant proportion of the ecological problems in food are linked to primary production (farming), it is supermarkets which are the most powerful actors in terms of the governance of food chains (Dolan and Humphrey,

2000). We therefore analyse eco-innovation in food chains as a distributed process, focussing on coordination mechanisms used by supermarkets to stimulate upstream eco-innovation in farming. Another consideration is that the structure and governance of food-chains vary substantially between different commodities (Fine et al., 1996). The paper therefore aims to go beyond the single case studies that permeate the debates on eco-innovation and environmental supply chain management.

The research question addressed is: Why, how and to what degree do supermarkets stimulate upstream eco-innovation in agri-food supply chains? We compare UK milk, beef and bread chains, because, despite a concentration of environmental impact at the agricultural stage of production, they differ substantially in the eco-innovation efforts coordinated by supermarkets. These differences, both in terms of degree of activity (relatively large in milk, moderate in beef, small in bread) and approach, provide contrasts that we aim to explain.

To answer this question, we build on the environmental supply chain management (ESCM) literature, but aim to enrich this literature with insights from innovation studies. The motivation for this is that ESCM, which offers many relevant insights (see Section 2), is under-developed in three respects. Firstly, although the ESCM-

* Corresponding author. Institute of Innovation Research, Manchester Business School, University of Manchester, UK. Tel.: +44 0 1612752456.

E-mail address: josephine.mylan@manchester.ac.uk (J. Mylan).

literature has usefully identified factors that motivate actors to engage in eco-innovation ('why'), it has paid less attention to the process ('how') of eco-innovation in supply chains (Van Bommel, 2011). Secondly, ESCM has a relatively limitedly theoretical grounding in social science literatures. The highly cited review paper by Seuring and Müller (2008: 1702), for instance, concludes that the ESCM literature suffers from a "deficit in the take-up of theoretical backgrounds" and "needs to build on a stronger theoretical basis". Thirdly, ESCM is sophisticated in the understanding of dyadic relations in supply chains, but less developed in the understanding of interactions across longer chains. To address these three issues, the paper imports insights from innovation studies into ESCM with the aim of providing a deeper understanding of the eco-innovation process and providing more theoretical grounding for understanding distributed innovation (focussing particularly on mechanisms used by supermarkets to stimulate upstream adoption of green novelty). Our general claim is that the different kinds of interactions between actors in the supply chain and varying prevalence of innovation and coordination mechanisms helps explain differences between the three cases.

The paper is structured as follows: Section 2 briefly describes our conceptual framework, which aims to combine insights from ESCM and innovation studies. Section 3 discusses methods and data. Section 4 describes three case studies of eco-innovation in the milk, beef, and bread sectors. These case studies address the orientations and eco-innovation strategies of supermarkets in the context of pre-existing supply chain arrangements. Section 5 makes an analysis of the three cases, and explains the differences. The paper ends with concluding comments in Section 6.

2. Conceptual framework

This section does not aim for an extensive overview of the ESCM literature, nor for a comprehensive synthesis with the field of innovation studies. Instead, it introduces concepts that can be used for the empirical analysis. Analytically, we introduce concepts to understand: a) motivations for supermarkets to address eco-innovation ('why'), b) characteristics of supply chains that hinder or enable eco-innovation attempts, c) mechanisms to stimulate eco-innovation ('how').

a) The dominant role of supermarkets operating as "lead firms" controlling food supply chains is well documented (Dolan and Humphrey, 2000). Retailers can use their power to capture increasing amounts of the value in agro-food chains (Gereffi et al., 2005). As a consequence retailers often put pressure on suppliers to reduce costs, which may lead to antagonistic and distrustful relations. They can also use their position to work more collaboratively with suppliers to stimulate eco-innovation. So, the kinds of interactions in chains can vary, depending on lead firm strategies and sector characteristics.

Much of the ESCM-literature has focused on *why* greening takes place, i.e. motivations (Srivastava, 2007; Seuring and Müller, 2008). On the one hand, the literature emphasises the importance of *external* factors such as legislative pressure, customers' requirements, pressure from the public and from environmental advocacy groups. On the other hand, it emphasises *internal* considerations such as cost reduction (e.g. eco-efficiency measures that offer win-win solutions), belief that environmental issues will become important for consumers or policymakers, and reputational and defensive reasons: firms may voluntarily engage in eco-initiatives to "pre-empt potential negative effects of not dealing adequately with a widely salient issue such as climate change, (...)

oppose demands from activists or interests groups, or (...) forestall future regulations" (Kolk and Pinkse, 2007: 201).

b) Although supermarkets are powerful actors, they are not all-powerful, autonomous supply chain managers. They are better seen as embedded actors whose ability to stimulate upstream eco-innovation also depends on strategies and interests of other actors, sector structure, and degrees of supply chain integration. A key insight from ESCM is that pre-existing chain structure matters for coordination. Omta (2001) distinguishes between the *breadth* of a supply network (number of suppliers and customers) and *length* (number of tiers in a chain or network as shown in Fig. 1). It will be more difficult for supermarkets to coordinate and stimulate upstream eco-innovation in longer networks with greater breadth (i.e. number of farmers). Longer chains also tend to have more intermediary actors, which may complicate coordination by supermarkets if these intermediary actors are reluctant or have their own agendas.

The ability of supermarkets to stimulate upstream eco-innovation also depends on existing tensions, relations and governance modes. With regard to governance modes, Gereffi et al. (2005) emphasised that different chains may be dominated by different kinds of interactions and associated modes of coordination, which correspond to varying degrees of lead-firm control. The extent to which interactions are based on formal or relational contracting is also expected to influence opportunities for distributed innovation (Powell and Grodal, 2005). Both perspectives indicate that pre-existing relations, tensions and governance modes are likely to influence both the motivations of supermarkets to stimulate upstream eco-innovation and the kinds of preferred innovation mechanisms.

c) Van Bommel (2011) made an important step by distinguishing three approaches that pay attention to *how* supply-chain eco-innovation is enacted: a) technological/economical approaches, which focus on managing flows of materials, money and other resources, b) network and inter-organisational perspectives, which focus on cooperation and interactions, c) socio-cultural perspectives, which focus on normative and interpretive schemes shared in social systems. We aim to make a next step by linking Van Bommel's suggestions more firmly to different theoretical frameworks, thus also addressing Seuring and Müller's (2008) criticism that ESCM has insufficient theoretical grounding. While innovation studies generally conceptualises innovation as a collective and interactive process, we distinguish

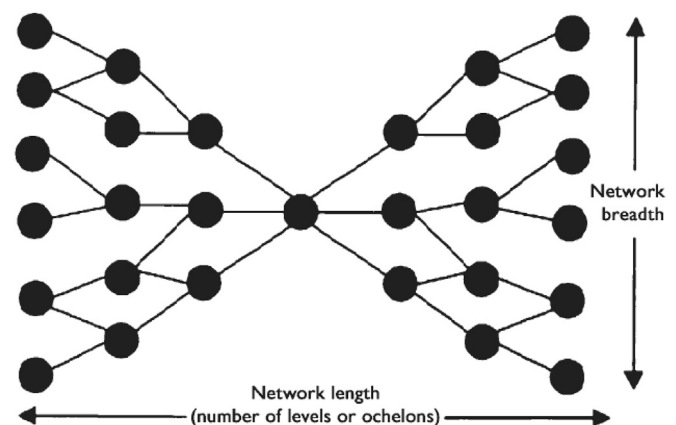


Fig. 1. Length and breadth of supply network with central position of lead firm (Omta, 2001:3).

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