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Understanding wicked problems and organized irresponsibility: challenges for governing the sustainable intensification of chicken meat production

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Framing sustainable intensification as a wicked problem reveals how inherent trade-offs and resulting uncertainty and ambiguity block integrated problem solving as promoted by sustainable chain management approaches to production and consumption. The fragmented institutional set-up of the chains avoids that individual actors take responsibility for risks they helped to produce, resulting in 'organized irresponsibility'. Governance arrangements for sustainable chain management focus especially on reducing risk and uncertainty and ignore trade-offs instead of acknowledging them. For the Dutch chicken meat chain, this article explores how wicked problems and organized irresponsibility influence governance opportunities for sustainable intensification.

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Introduction

Sustainable intensification responds to a persistent societal challenge: growth [1]. How to feed, house and care for our growing global population has been a concern for centuries. In addition, there seems to be a silent expectation or demand that next generations have to be better off than their parents, adding a normative dimension to the challenge [2,3]. Resource intensification has been a dominant strategy to realize growth [4]. In agriculture, intensification refers to increased food production through higher yields per ha. Higher yields are needed to meet higher demand in response to population growth and changed consumption patterns [5]. Intensification in agriculture co-evolved with processes of specialization, mechanization, and industrialization leading to high environmental costs including degradation of natural resources [6,7]. Specialization has also led to changes further on in the value chain by dividing tasks, but also in eliminating tasks of a farm. For instance, the Dutch broiler production farms have developed into a landless activity so that care for clean water and soil fertility is no longer considered as a basic task of these farmers. Low margins have led to large-scale farming. The intensification in animal production has led to stocking densities often referred to as factory farming including negative trade-offs, such as reduced animal welfare, environmental and health problems [8,9]. For example, intensification of poultry meat production has led to excessive use of antibiotics. A disease problem is countered by antibiotic use, which results in natural selection among bacteria, emergence of new resistant pathogenic bacteria, which forces society to use a cocktail of other antibiotics (or even preventive use of those antibiotics), threatening not only animal health but also human health [10]. Today, we have reached the stage that society has to put the users of such antibiotics, in particular farmers applying antibiotics to their livestock, in quarantine when they enter hospitals. As a way to turn this development, *sustainable* intensification points to the need to take the boundaries of our ecological systems and natural resources into account [11]. Intensification should not exceed the regenerative capacity of these systems, and should not put the opportunities of today's and future generations to provide in their sustenance at risk.

In this special issue Struik *et al.* [12] point to the challenges of sustainable intensification. They refer to two particular features of sustainable intensification in industrial societies that make it difficult to govern: the wicked nature of the concept of sustainable intensification and that of the problem of 'organized irresponsibility' which refers to the absence of individual actor liability for negative societal consequences of the industrialized food production system. Because of the fragmented and

specialized nature of the value chain, often actors in each link focus especially on reducing the environmental and social harm of their activities while upholding the economic value of their activities. Actors have few incentives to consider their contribution to the indirect impacts and the external effects of the entire chain on society and environment. In the case of sustainable intensification these two concepts show how the inherent tensions and trade-offs between 'sustainability' and 'intensification' complicate the transition towards a sustainably intensified food production system.

In this article, we explore the implications of the concepts of 'wicked problems' and of 'organized irresponsibility' for sustainable intensification. How they are connected, and how do they influence the governance of sustainable intensification? This will help us to understand the challenges, promises and pitfalls of sustainable intensification. To do so, we first explore common managerial approaches to sustainable intensification. These tend to focus on the production side of agriculture and consider the systems of production to consumption as a value chain. Multiple actors each add value to the product that consumers eventually purchase. This value chain approach ultimately helps firms to achieve a competitive advantage. In the field of supply chain management, there have been many initiatives to include societal and environmental concerns in the decisions of actors constituting the value chain. The adjectives 'integrated', 'green', or 'sustainable' to 'supply chain management' point to the need to consider societal and environmental concerns next to, and preferably on equal footing, with economic concerns that drive actor behaviour [13]. We then consider the theoretical foundations of 'wicked problems' and 'organized irresponsibility' to understand how they complicate sustainable intensification of food producing value chains. The concept of wicked problems features prominently in many studies of planning and policy making, with Rittel and Webber [14] as their most influential founding fathers, while the concept of organized irresponsibility has been introduced by Beck in his sociological understanding of today's industrial society as a risk society, in which risks are self-produced, an endogenous feature of our production system [15]. Since both bodies of literature are aware of the urgency of the problems that suffer from these characteristics, scholars in these fields also address questions of governance: how to resolve these theoretically seemingly unsolvable problems?

For a particular case of intensification of a value chain, the Dutch broiler industry with chicken meat as the main product, we will explore how the concepts of wicked problems and organized irresponsibility play a role and how they complicate governance efforts to make this industry sustainable. We have selected the Dutch chicken meat supply chain as a case because it is a highly intensified one. For example, the Dutch boiler production has managed to become technically highly innovative and cost-efficient and reduce the carbon footprint [16], exploiting specialization. Yet the public debate on the broiler production including issues on animal welfare, increasing antibiotic resistance and environmental issues (e.g. nitrous oxide and dust emission), remains persistent [17,18]. A very practical reason for focusing on the chicken meat production chain is that we have access to the chain analysis that has been recently produced for the Dutch Scientific Council for Integral Sustainable Agriculture and Food (in Dutch: Wetenschappelijke Raad voor Integrale Duurzame Landbouw en Voeding) [19]. Given the fact that there are relatively few analyses of food value chains and how they deal with responsibility issues [20], this is an opportunity to improve our understanding of the governance challenges of sustainable intensification in this sector.

Supply chain approaches to sustainable intensification

Many agricultural activities, including meat production, are considered from a supply chain perspective [21]. This perspective helps to relate the sequence of activities needed to deliver a product to the end-user, including all the materials needed, their extraction and transport, and the information flows needed to support this process as well as the funds going up and down the chain. A supply chain perspective thus reveals the dynamics within a chain, including the continuous flow of materials, capital and information across multiple functional areas within and between chain members [22]. The perspective helps to identify the various steps in the production process, the input, throughput, and output of each of these steps, and the actors or stakeholders involved in each step. In addition, it helps to identify the value added in each step. Considering supply chains as value chains contributed to the improvement of the supply chain from an economic perspective, focusing on objectives as increasing revenues, higher and quicker returns on investments, cost reduction and above all, improved efficiency and increased output. Supply chain management refers to attempts to improve the overall competitiveness of the chain as well as the competitive position of the individual parts of the chain, thus making sure that consumer demands are met at minimal costs [21,23•].

Under influence of crises (e.g. outbreak of diseases), scandals (e.g. fraud with meat identification) and stakeholder and consumer demand (e.g. demand for cleaner products, for animal well-being) attention has grown for opportunities to make these supply chains more sustainable [24]. Often Elkington's triple bottom-line [25] is used to underline the need to reduce the negative impact of activities in the chain and in the different steps in the chain from the point of view of people, planet and profit [23•]. This has led to wide body of literature on green