

# A systems approach to explore transformative socio-technical innovations

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## Introduction

The agri-food system is urged to transform towards sustainability due to various challenges such as urbanization, depletion of natural resources, internal price volatility and unequal power relations (Fischer et al. 2012; Dicks et al. 2013). Therefore, the agri-food system requires collective solutions and actions as well as system innovations (Klerkx et al. 2010; Ingram et al. 2015; Hubeau et al. 2017a). Recently, transformative social innovations emerge to change the existing technologies, practices, institutions and culture. These transformative social innovations intent to challenge, alter and change the conventional agri-food system in some way and occur at the level of niches as well as regime (Seyfang and Smith 2007; Hermans et al. 2016; Avelino et al. 2017).

Existing research (e.g. Bos and Brown 2012; Hermans et al. 2013; Porter et al. 2015; Luederitz et al. 2016; Hubeau et al. 2017b) shows that innovations often fail or discontinue before the expected change or transformation has been realized. Moreover, research projects often struggle with effective collective action. This well-known and often observed knowledge-action gap should be prevented. Multiple approaches exist to avoid this gap such as participatory methods, transdisciplinary approaches or collaborative approaches, which share the common characteristic of involving multiple stakeholders and focusing on creating a shared understanding and a shared objective. However, the challenge to effectively act collectively and change the agri-food system is still highly present.

Therefore, this paper aims to create a systems approach that integrates technological, socio-economic and natural aspects of the agri-food system. It should be analytical and reflexive. As a result, it consists of a reflexive assessment framework which is practice- and actor-oriented and an implementation method. To develop and test this approach, a case study of a regional initiative in Flanders is used. The case study explores the sustainability transition of the Flemish agri-food system focussing on how existing innovations could increase their impact into practice.

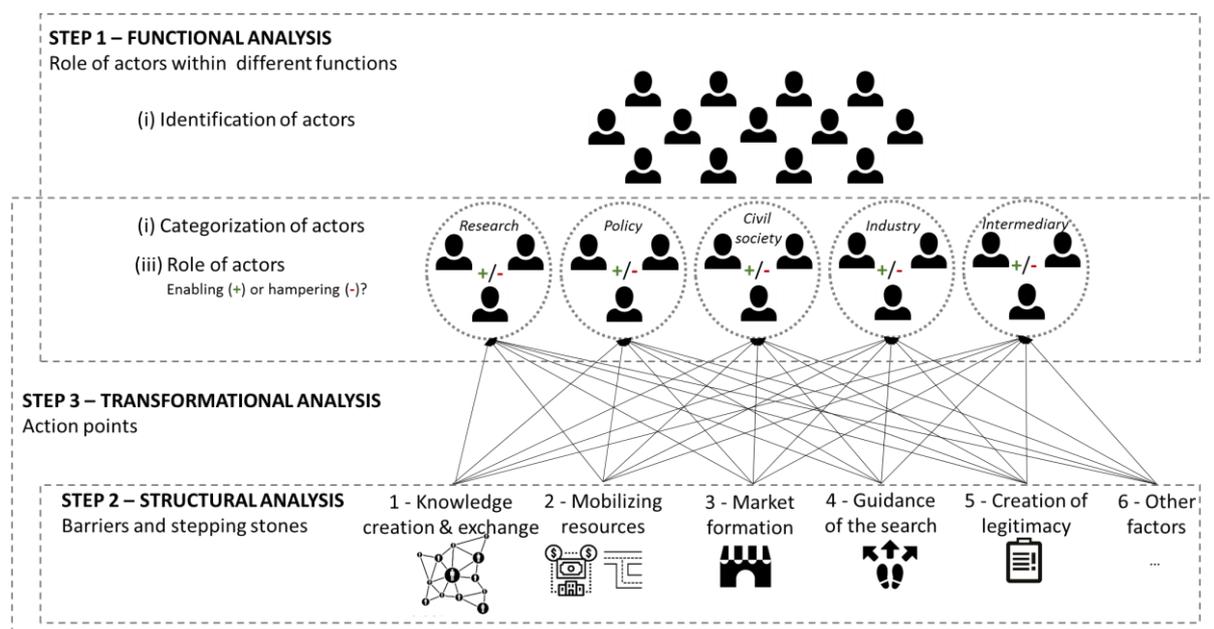
## Systems approach

### Reflexive assessment framework

Multiple frameworks to analyse transformative social innovations exist (e.g. Hekkert et al. 2007; Bergek et al. 2008; Lamprinopoulou et al. 2014). However, most of these frameworks

are conceptual in nature and lack a practice-oriented focus. Moreover, data gathering is time-consuming and concepts could be misinterpreted. Also, these frameworks are often inaccessible for practitioners for self-reflection (Borremans et al. 2018).

The aim of our assessment framework is (i) to identify and specify the role of actors, (ii) to identify barriers and stepping stones of transformative innovation pathways, and (iii) to inform these actors about which action they can undertake to increase the impact of innovations. Moreover, the framework aims to be user friendly and increase cross-case comparison by developing a hands-on template. To develop such a framework, we used and modified existing frameworks with an emphasis on the framework of Lamprinopoulou et al. (2014), as it emphasizes the role of multiple actors and allows to study social innovations aiming to transform the agri-food system. We revised and adjusted the conceptual framework into a more practice-oriented assessment framework to increase the user-friendliness and comparability. The resulting framework consists of three analytical steps. The analytical framework is represented in Figure 1.



**Figure 1.** Reflexive assessment framework to reflect upon transformative social innovations

The first step is the functional analysis which identifies and categorizes the actors and specifies their current role within the transformative social innovation. We distinguish five type of actors, i.e. research, policy, civil society, industry and intermediary which represents the social pentagon (Rotmans and Loorbach 2008). Also, for each actor group, we identify if they have an enabling (+) or a hampering (-) role and specify which factors influence this role.

The second step is the structural analysis which aims to identify and describe the barriers and stepping stones of the innovation. More specifically, these barriers and stepping stones are described in five categories, namely (i) knowledge creation & exchange including the current knowledge, how knowledge is developed and exchanged, the knowledge infrastructure and the availability of knowledge, (ii) mobilizing resources representing the physical and human resources such as financial means, physical infrastructure (e.g. roads, building), time, expertise and energy, (iii) market formation covering commercial experiments, market and support of consumers, (iv) guidance of the search including shared vision and goals, shared culture, shared values and norms and choices, (v) creation of legitimacy, and (vi) other barriers or stepping stones that do not fit any category.

The third and final step is the transformational analysis bridging the actors and the barriers and stepping stones by identifying specific action points for specific actor groups that could increase the impact of the transformative social innovations in practice.

Although Figure 1 represents the different steps linearly, the process is iterative as for instance, a new barrier can arise when action points are identified.

### **Application assessment framework**

We applied and tested the assessment framework in a case study in Flanders, the northern part of Belgium. The Flemish food system is highly successful at producing sufficient, qualitative and affordable food. However, it increasingly encounters its boundaries concerning production and consumption at the ecological and socio-economic level. The framework was tested in a transdisciplinary research project TRANSFOOD. The aim of the project is to study the transition of the Flemish agri-food system and how the impact of existing transformative social innovation can be increased.

A transdisciplinary process is developed to study how the transformation of the agri-food system towards sustainability can be fostered by increasing the impact of existing innovations by formulating concrete actions. The transdisciplinary process consists of two phases, i.e. the development of the assessment framework and the analysis and reflection phase. During the first phase, researchers developed the reflexive assessment framework. Throughout the development, an expert discussion group and a focus group with other researchers were organized to present and adjust the framework. Secondly, the framework is tested by performing 30 semi-structured interviews and one focus group. Interviewees and focus group participants are researchers, field experts and policy actors.

### **Preliminary results**

The preliminary results indicate that the system approach is applicable if a number of boundary conditions are taken into account. Some boundary conditions are clear definitions, practice-based examples, and identification of societal as well as scientific relevance of the complex problem. The empirical results, as well as the discussion and future research opportunities will be presented at the conference.

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