

Function: Notes of C. Lamprinopoulou et al.(2014)

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Create Date: 2020/04/25

Last Modify: 2020/04/26 20:50

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0.Abstract

Main Idea:

Applying a comprehensive innovation systems analytical framework, reconciling analyses of systemic structures, functions, failures and merits of innovation systems to assess and compare the performance of the agricultural innovation systems of Scotland and the Netherlands.

Organization of this paper:

- section 2: present the integrated analytical framework, clarifying the particular analytical tools;
- section 3: describe the methods;
- section 4: present the results of cross-country comparison;
- section 5: discussion of the implications of the findings;
- section 6: some concluding remarks.

1.Introduction

This paper combine several analytical tools into an integrated framework aiming to assess performance of innovation systems and to formulate related policy recommendations.

What this paper adds is that it discusses which dynamics exist between all key structures and functions of innovation systems, and which policy instruments may affect these dynamics in a way that transform systemic failures into merits. The key aims of this paper are hence to:

- identify amongst the existing innovation systems frameworks the analytical building blocks necessary to holistically describe and investigate an AIS;
- operationalize and combine these building blocks into an integrated analytical framework;
- apply the integrated analytical framework in the context of the Scottish and Dutch agri-food sectors with the aim of revealing from the informants viewpoint where particular strengths and weaknesses exist as regards innovation and what are the underlying reasons for this,
- inform innovation systems policies.

2.Integrated Analytical Framework

2.1 Structures: actors and institutions in innovation systems

See table 3 of the paper.

According Arnold and Bell's (2001), actors can be classified into four categories(domains):

DOMAINS	SPECIFIC
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DOMAINS	SPECIFIC
research, enterprise domain	research: universities, research institutes or private R&D departments. enterprise: the supply chain actors, i.e. input suppliers, farmers, food manufactures or retailers.
indirect demand/innovation influencing domain	final consumers, policymakers, social interest groups and markets complementary
intermediary domain	Organizations that are playing a catalytic role in joining fragmented IS actors and facilitating knowledge/innovation flows

2.2 Adding functional analysis to enrich structural analysis

Functional analysis emerged to complement the structural focus with a process-oriented analysis, identifying different functions of an IS.

2.3 Analyzing how structures enable or disable innovation system functions by means of detection "system failures"

Structural analysis served to study structural elements of innovation systems, including the actors, institutions and infrastructures.

Different categories of innovation system failures:

CATEGORIES	EXPLANATION
Infrastructural failures	concern the physical infrastructure, such as railroads telecom, machines, buildings, harbors etc.
Institutional failure	refers to either laws, regulations and strategies any other formalized rules (the so-called "hard institutions"), or a set of unwritten rules, common habits, routines and shared norms/values used by humans in repetitive situations;

CATEGORIES	EXPLANATION
Capabilities failure	points to actors "capacity to learn, innovate or utilize available resources; to identify and articulate their needs; and to develop visions and strategies"
Market structure failures	refer to the positions of and relations between market parties. Such as a monopoly or the lack of transparency in the ever enlarging food chains, but also imperfections in the "knowledge market".
Directionality failure	implies that socio-technical transformational change is closely linked to direction and the setting of collective priorities for the system
Policy coordination failure	refers to coordination and coherence problems at policy levels e.g regional-national-European or technological versus sectoral innovation policies.
Demand articulation failure	"reflects a deficit in anticipating and learning about user needs..."
Reflexivity failure	concerns the insufficient ability of the system to engage actors in a self-governance process, to constantly monitor progress against the transformational goals, and finally to anticipate and develop an adaptation strategy.

2.4 Towards an integrated framework

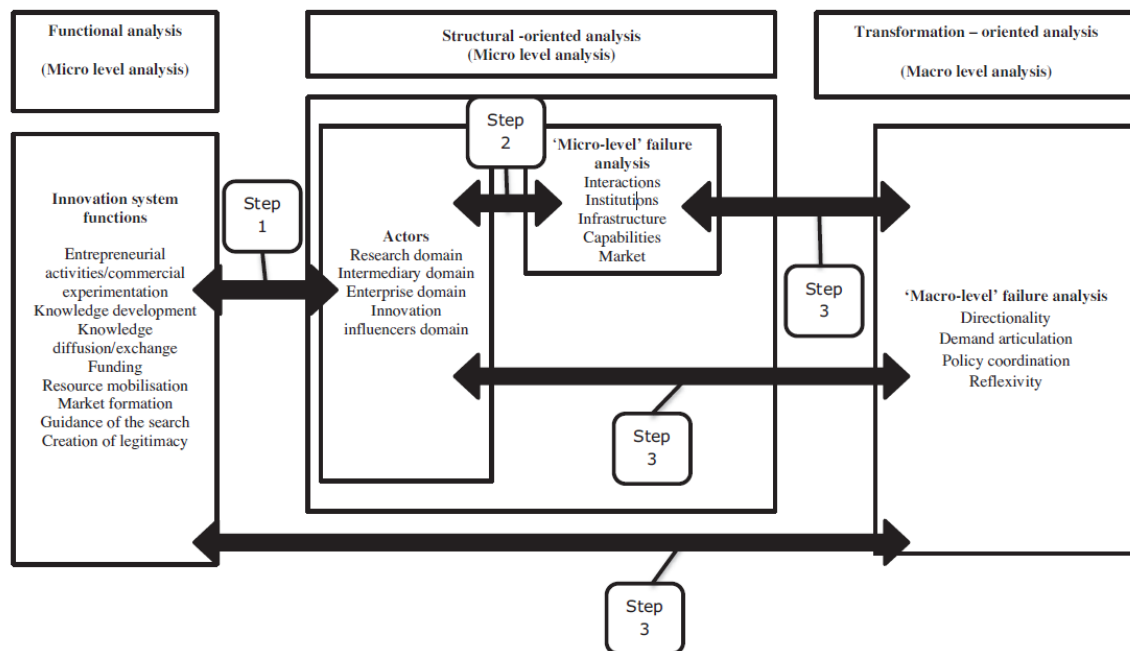


Fig. 1. Integrated framework – conceptual level.

As shown in Fig.1, within a successful innovation system, individual actors are engaged in innovation ‘activities’, which contribute to the overall innovation system functions, and for which different actors will play different roles.

Beyond this level, analysis needs also to examine functioning of the entire system at its most aggregated form. This transformation-oriented approach is alternatively called "positive external-economies functioning".

3. Case selection and research methods

3.1 Case Selection

Why choose Dutch and Scottish compare?

- First, there are perceptions that the Dutch have one of the most innovative agri-food sectors in Europe and therefore can provide a useful 'benchmark' against which to evaluate Scotland.

- Second, as both countries are EU members they have the obligation to comply with common EU agricultural, environmental and innovation policies;
- Third, both countries followed the logic of liberalization and embarked on a process of privatization of extension services and research establishments from the 1980s which led to a proliferation of new knowledge creators and providers.

3.2 Methods

Data: primary data derived from interviews and workshops in Netherland and Scotland.

Participants were selected on the basis of:

- their knowledge/insight in the Scottish/Dutch agricultural innovation landscape;
- their ability to articulate their opinion;
- their influence/power within their organization and in the wider agricultural innovation landscape (opinion leaders), and
- the position of their organization in the innovation system as recognized by other informants

3.3 Data analysis

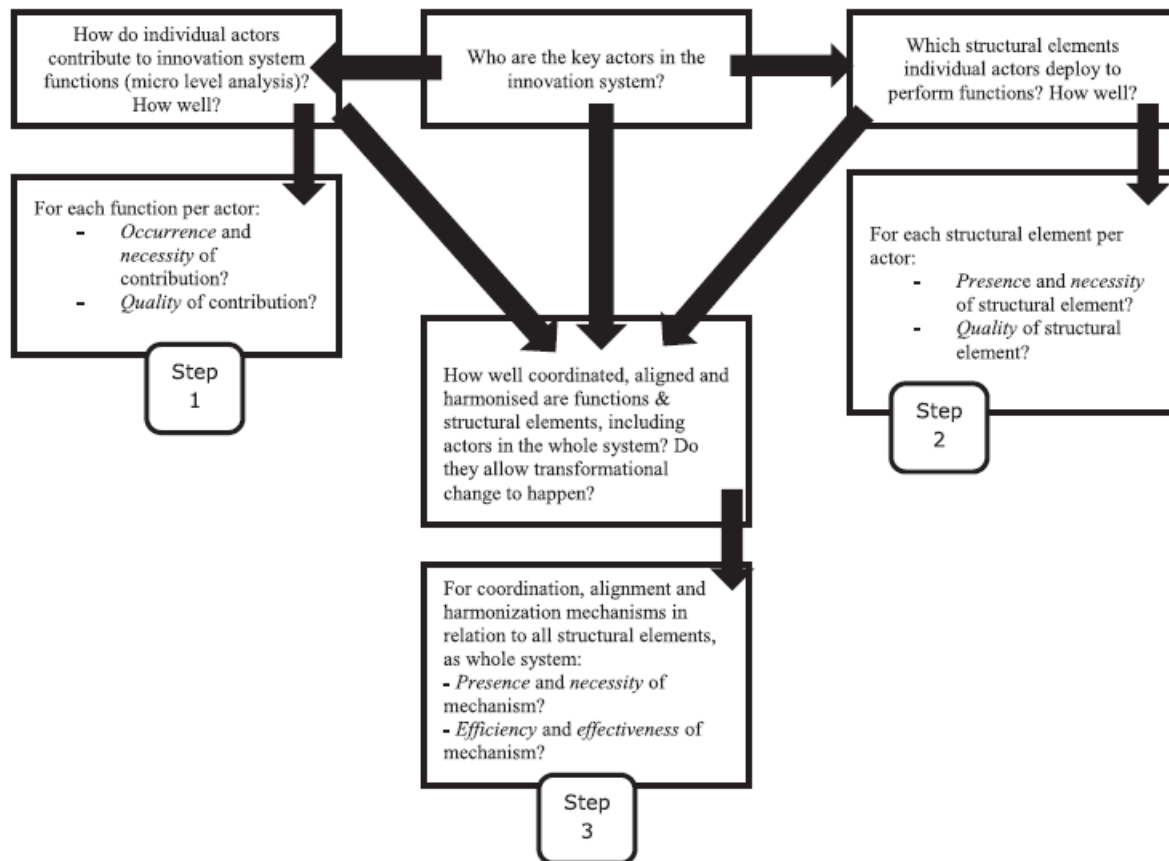


Fig. 2. Integrated framework – analytical level.

Step 1: to diagnose contribution of innovation actors to innovation system function.

Table 1

Matrix 1: to diagnose contribution of innovation actors to innovation system functions (Step 1) (adapted from Wiczorek and Hekkert, 2012). The diagnostic questions (Occurrence? Necessity? Weakness?) are asked for all Functions (indicated by ...).

Functions- innovation actors	Function 1: knowledge development	Function 2: Commercial experimentation	Function 3: Knowledge diffusion	Function 4: Funding	Function 5: Mobilise resources	Function 6: Market formation	Function 7: Search guidance	Function 8: Creation of legitimacy
Research domain	Occurrence? Necessity? Weakness?	Occurrence? Necessity? Weakness?	...	...	...	...	...	...
Direct demand/ enterprise domain	Occurrence? Necessity? Weakness?	...	...	...	...	...	...	...
Indirect demand domain	...	...	...	...	...	...	...	...
Intermediary domain	...	...	...	...	...	...	...	...

Step 2: to diagnose role of innovation actors in relation to system failures.

Table 2

Matrix 2: to diagnose role of innovation actors in relation to system failures (Step 2) (Adapted from [Wieczorek and Hekkert, 2012](#); [Weber and Rohracher, 2012](#)). The diagnostic questions (e.g. Presence? Necessity? Quality?) are asked for all domains (indicated by ...).

Categories of failures/ merits	Innovation actors-types of failures/ successes	Research domain	Direct demand/ enterprise domain	Indirect demand domain	Intermediary domain
Structural system failures (F)/merits (S)	Infrastructural F/S (knowledge & physical infrastructure)	Presence? Necessity? Quality?	...	...	...
	Institutional F/S (hard & soft institutions)	Presence? Necessity? Quality?	...	...	...
	Interaction or network F/S	Presence? Necessity? Quality?	...	...	...
	Capabilities F/S	Presence? Necessity? Quality?	...	...	...
Market structure failure (F)/merit (S)		Presence? Necessity? Quality?	...	...	...
Transformational failures (F)/merits (S)	Directionality F/S	Presence? Necessity? Efficiency? Effectiveness?	...	...	...
	Demand articulation F/S	Presence? Necessity? Efficiency? Effectiveness?	...	...	...
	Policy coordination F/S	Presence? Necessity? Efficiency? Effectiveness?	...	...	...
	Reflexivity F/S	Presence? Necessity? Efficiency? Effectiveness?	...	...	...
		Efficiency? Effectiveness?	...	...	...

4. Findings

The analysis follows the structures derived from the analytical framework. First, an overview of actors is given and the results related to functional performance are considered before the analysis of systemic failures and merits.

4.1 Contribution of actors to fulfilling innovation system functions

The table below summarizes the types of actors identified within each domain.

Table 3
Contribution to realising innovation system functions by Dutch and Scottish AIS actors.

Domain type	Actors type	Typical innovation system functions this actor contributes to	Under-performing contribution to innovation system functions
Research domain	Universities; Research institutes; Private R&D departments (e.g. of companies or NGOs)	Knowledge development; Knowledge diffusion/transfer; Entrepreneurial activities/commercial experimentation; Market formation	SC: Knowledge diffusion/transfer; Commercial experimentation; Market formation NL: Actors in the research domain tend to have stronger performance than Scottish counterparts, but there is still room for improvement
Direct demand/enterprise domain	Food supply chain actors (e.g. agricultural input suppliers; farmers, processors; retailers) SMEs; Large enterprises; Cooperatives	Knowledge development; Knowledge diffusion/exchange; Entrepreneurial activities/commercial experimentation; Market formation; Guidance of search; Resource mobilisation; Creation of legitimacy	SC: Except for some multinational input suppliers, multiple retailers, other supply actors (especially farmers and indigenous SMEs) underperform in Knowledge development, Commercial experimentation; Market formation. Input suppliers and retailers underperform in Knowledge diffusion/exchange NL: Direct demand actors have stronger performance than Scottish counterparts, but there is room for improvement especially for farmers and SMEs
Indirect demand domain	Final consumers; Governmental agencies; Other policymakers; social interest groups (e.g. charities and NGOs); Related market (e.g. pharmaceutical market)	Knowledge diffusion/exchange; Entrepreneurial activities/Commercial experimentation; Market formation; Guidance of search; Resource mobilisation; Funding; Creation of legitimacy	NL: The Dutch AIS underperforms in Market formation; Creation of legitimacy, but performs better than the Scottish AIS in Innovation brokering
Intermediary domain	Education; Extensive services; Consultants; Actively-supporting levy/trade bodies; Systemic innovation brokers	Knowledge diffusion/exchange; Entrepreneurial activities/Commercial experimentation; Market formation; Guidance of search; Resource mobilisation; Funding; Creation of legitimacy	SC: Generally the intermediary actors underperform in Knowledge diffusion/exchange; Guidance of search; Resource mobilisation; Funding NL: Innovation intermediary actors have stronger performance than Scottish counterparts

*Explanation of abbreviations: Netherlands (NL); Scotland (SC).

4.2 Systemic structural failures and merits

TYPES	CONTENTS
Knowledge infrastructure	
Physical infrastructure	
funding infrastructure	
hard institutions	
Soft institutions	
Weak networks	
Strong networks	
Capabilities	

4.3 Market structure failures and merits

4.4 Systemic transformational failures and merits

TYPES	CONTENTS
Demand articulation failures and merits	

TYPES	CONTENTS
Directionality failures and merits	
Policy coordination failures and merits	
Reflexivity failures and merits	

5. Discussion and policy implications

Reflecting upon findings with regards to:

- the performance of the different innovation systems;
- policy implications for strengthen the innovation capacity in both countries;
- applicability of the integrated framework

5.1 Comparison of the performance of the Dutch and Scottish agri-food systems



5.2 Policy implications

- impact of country's innovation culture
- challenges of collective learning and managing the accumulated experiences
- importance of involvement of more multi-stakeholders
- impact of blurred boundaries in the roles of innovation actors
- importance of assessment of fields of expertise of insufficient commercial interest.

5.3 Reflections on the use of the integrated framework

The findings confirm the appropriateness of considering actors, functions, systemic structural, market and transformational failures(or merits) together as complementary analytical tools to evaluate the performance of AIS. The integrated framework has helped to produce a richer and more systematic analysis, compared to using some of the aforementioned analytical tools in isolation.

Limitations of this study:

- the focus on only two countries, both belonging to the EU. We anticipate that the application of the integrated framework on the national AIS of more countries, including those outside the EU will enable better assessment of its validity, and strengthen its value as an analytical tool;
- the study has an ex-post character, which means circumstances may have changed in the meantime, and respondents' information may be not be completely up-to-date;
- Its requirements in terms of data, means that substantial investment is needed to gather data from informants and broad literature review.

6. Conclusion

The paper facilitates the design of policies that fulfil multiple aims in an integrated manner, supporting the design of 'systemic innovation policy mixes'. Thus the proposed integrated framework represents a checklist of areas of improvement and elements worth preserving within a defined AIS.