Facilitated networks and innovation: Relating structure to purpose

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Recent developments have led to widespread changes in the role of the public sector for agricultural extension (Rivera, 2011). Many extension organisations that used to be publically funded have been privatised. Furthermore, our awareness of the complex relation between agriculture and sustainability (Veldkamp et al., 2009) has changed the nature of the innovation processes that extension used to foster (Leeuwis and Aarts, 2011), and also the professional situation as change agents encounter it (Cerf, Guillot & Olry, 2011). As a consequence, governments in many countries need to revisit the ways in which they support agricultural innovation.

Facilitated networks for innovation policy are seeing increasing public interest as a new instrument for governments. Such networks offer opportunities to combine financial and technical resources, and they offer the infrastructure that is necessary for spreading and sharing knowledge and information. They can play an important role in agricultural and rural innovation processes (Klerkx & Leeuwis, 2009). However, little is known about the relation between these networks and the process of innovation. Does it matter whether sustainability challenges require gradual or abrupt change (e.g., Cerf, Guillot & Olry, 2011; Loorbach & Rotmans, 2006)? Should support networks be specific for phase of innovation (cf. Regeer, Mager & Van Oorsouw, 2011)? Do value differences (Hisschemöller & Hoppe, 1995-96) change the requirements for network composition?

Facilitated networks can take many different forms such as innovation platforms, farmer field schools and peer learning structures. Extension/advisory services can acts as network facilitators. In this contribution, we explore how various networks, in terms of their composition and activities, are related to the composition and activities of facilitated

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networks. In the introduction, we first introduce the concept of network, after which conceptualise the innovation process and the related goals that networks might have. We then introduce the 5 cases that we explored in this study, and discuss how their characteristics fit with their goals. In the conclusion, we address some criteria for using facilitated networks as a policy instrument.

Networks

Both policy makers and scientists often use the term "network" in the context of public policy (e.g., Caniëls & Romijn, 2008; Hustad, 2007; Smart, Bessant & Gupta, 2007). However, rarely do such publications *define* the concept of network. Furthermore, in the area of policy practice many similar and related terms co-exist, which might confuse the reader. Especially the terms "project" and "community of practice" (Brown & Duguid, 1991; Lave & Wenger, 1991) are very similar to network, and yet different in imporant ways.

A *community of practice* (Lave en Wenger, 1991) consists of people that share a profession, craft, art or interest, and a shared repertoire of tools, concepts, styles and stories about its practice (cf. Wenger, 1998). Furthermore, membership of the community is based on engaging is this practice (to distinguish it from different kinds of communities). A community of practice cannot be organised or established (although the term is sometimes used in this way), but rather emerges from the actions of its constituents. However, the emergence of a community of practice can be fostered or facilitated. Communities of practice have joint enterprise, their members are mutually engaged in the practice (Wenger, 1998). This suggests that communities of practice will be quite homogeneous with regard to goals and values. Value diversity would exist *between* rather than *within* communities of practice.

A *project* also concerns a grouping of people, but is it different in the sense that most project groups are carefully composed of the "right" people. Furthermore, projects often have specific goals, with preset deadlines. The project ceases to exist when its done, or when the money has run out. Projects are organised, specific and demarcated. Project membership presumes that the project members are committed to the project goal, either because they are themselves committed, or they work for someone else (their organisation, a constituency) with commitment to the project goal. The specific characteristics of a project do not fit well with complex societal issues, because they are fraught with uncertainty and value diversity. The uncertainties severely limit the extent to which project deadlines can be set, or even project

goals. The value diversity can be at odds with setting up a project, because it is hard to define a shared project goal when the values and interests of the project members are very diverse.

Of the terms dealt with here, *network* has the least specific connotations. Going on the literature (Caniëls & Romijn, 2008; Klerkx & Leeuwis, 2009), it appears that any network with societal and policy relevance has at least the following characteristcs:

- It consists of individuals that potentially can act in each other's benefit, they can act in each other's interests.
- Network members know who's who, to a certain extent; they know some of opinions, abilities and goals of the other network members.
- Networks are, in principe, 'self-organising'; they emerge when people meet, share, and then become aware of keeping in contact.
- Networks do not organise activities. Rather, they are a resource for finding partners to initiate new activities.

A network as a policy instrument often has a project-like character, because the policy makers cannot give goal-free, unlimited-time support. Nonetheless, networks do have in important potential for the public sector in their role for knowledge creation and information dispersal. In the case of the Dutch ministry of Economic Affairs, Agriculture and Innovation, the "network support" often concerns supporting a project that strengthens networks because it requires the project partners to meet more often, and it requires them to get to know other relevant parties as well. In other words, the project is worded so, that existing networks are strengthened and that new networks might emerge. The network-as-policy instrument temporarily facilitates a network to help it grow and become independent.

Optimisation versus Transition

Many researchers in the sustainability sciences distinguish between two different types of innovation . On the one hand we have "system optimisation." This type of innovation as based on acceptance of the status quo and focussed on improving a certain sector. In such cases, innovation processes often focus on efficiency improvements, automatisation, decreasing labour, improving raw materials, etcetera. On the other hand we have "transition" (Rotmans, Kemp & Van Asselt, 2001) or "system transformation." In this case, innovation goes against the grain of the status quo. The associated innovation processes are often focused on niche

developments (Schot, Hoogma & Elzen, 1994) that harbour the potential for radical change in a societal sector (although even radical changes sometimes occur at "glacial" speeds; Geels & Kemp, 2007).

These two different innovation goals—optimisation versus transition—can be traced to specific characteristics of underlying problems. In the case of optimisation, acceptance of the status quo is implied. The innovation goal does not challenge hegemonic values, nor does it put forward new agendas based on alternative values. The contrary holds for transition. For transitions, the unsustainability of the status quo often acts as a starting point. The resulting innovation processes are oriented at alternatives to the status quo, and these alternatives often engender different values. Indeed, some would say that value differences are an important resource in transition processes (Regeer et al., 2011). In sum, optimisation processes can generally be said to harbour low value diversity, whereas transition processes appear to have high value diversity. Facilitated networks may be applicable to both optimisation and transition.

Innovation processes

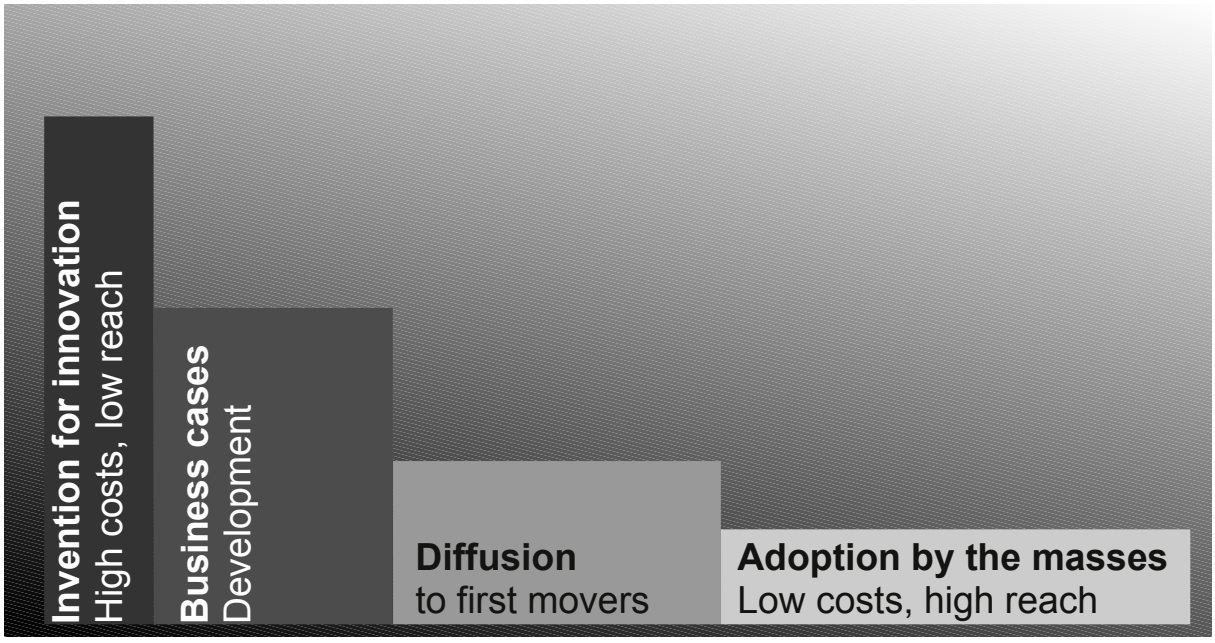

Figure 1. Phases of innovation processes

As regards phases in innovation processes, it is important to note that a purely linear model of innovation—a research-extension-farmer continuum—has been found inadequate. Innovation

is mostly seen as a multi-actor collaboration process with co-evolution of technological and socio-organizational arrangements (Leeuwis & Aarts, 2011). Still, appealing new technologies and practices do spread across agricultural and rural communities and this can thus be regarded as a diffusion process.

One can conceptualise this as shown in Figure 1. Innovation processes start with *inventions* (i.e., a working prototype), which form the basis for the development of implementable *business cases* (i.e., a first implementation of the prototype in a profitable business). The third phase concerns the spread of the business case to the wider community of *first movers*, finally resulting in *widespread adoption* (generally with continuous adaptations; see Douthwaite et al., 2000).

A framework

Innovation phase	System transformation / high value diversity	System optimisation / low value diversity
Invention		
Business case development		
Diffusion to first movers		
Mass adoption		

We hypothesise that facilitated networks have different goals in different phases of an innovation process and that network composition and network activities should be specific for each phase. Also we hypothesise that system transformation and system optimisation involve specific networks. Our research questions:

- What is the relation between network composition and the phases of innovation processes?
- What is the relation between network composition, system transformation and system optimisation?

- How do network activities relate to the impacts of networks on innovation success?

Methods

We studied five facilitated networks for agricultural innovation in the Netherlands, concerning multifunctional agriculture, pig husbandry, diary farming, organic agriculture and economic opportunity building for agriculture. Each of these networks was supported by the Dutch ministry of Economic Affairs, Agriculture and Innovation.

Participants

Semi-structured interviews were held with a total 21 members of these networks. For each network, the network leader was interviewed. Furthermore, s/he provided contact details for additional interviewees. To enable a broad, balanced view, interviewees were selected from diverse societal groupings: entrepreneurs, education, research, policy makers and NGO's. We selected at least one interviewee for each of these groups, provided that this group was represented in the network in question.

Procedure

The interviews were conducted by three interviewers, who all used the same semi-structured interview guideline. Because of the limited availability of some of the interviews, some interviews were conducted by phone. Others were conducted face-to-face. All interviews were summarised by the interviewer. The summaries were then submitted for correction to the interviewees. The corrected interviews were then used in the analysis.

Analysis

The interview data were analysed by two analysts. Every interview was analysed in full by one of the analyst. The resulting analysis was reviewed by the other analyst. Disagreements between the analysts were then discussed and solved.

Five coding categories were used for the interview analysis:

- Goals and activities; What is the goal of the network, and how does it work toward that goal?

- Funding (public/government vs. private/participant funding); Who are the funding partners? How else do parties contribute to the network?
- Network composition (heterogeneity vs. homogeneity); How diverse are the networks? What is the role of value diversity?
- Facilitation modality; Does the network use specific facilitation to support its goals?

Cases

The Dairy Academy

Goals and activities

The Dairy Academy (in Dutch: Melkvee Academie) is a network of dairy farmers with the aim to support innovation and making knowledge widely available. Farmer needs and questions form the basis for all of the activities of the Dairy Academy.
The main goal of the Dairy Academy is a market-oriented, sustainable daire sector. To reach that goal, the Dairy Academy aims to support entrepreneurship amongst its members by helping them meet each other to share knowledge, and by attracting new knowledge towards the sector. Furthermore, the Dairy Academy wants to foster a dialogue about societal concerns regarding agriculture in general and dairy farming in particular, to raise awareness about sustainability and the future.

The Dairy Academy has a small repertoire of regular activities. In “Farmer on Tour”, a group of farmers visits a specific company, for instance because of its innovative character. The “Dairy Café” is a regional evening of debate about current issues for dairy farmers. Furthermore, the Dairy Academy has a number of knowledge brokers with the explicit purpose of supporting smaller sub-networks to concentrate on a specific theme or topic. Finally, the Dairy Academy hosts a website with Web-2.0 capabilities such as public and private meeting rooms and work spaces, in which the members can collaborate and share.

Actors and public-private partnerships

Individual dairy farmers are the most important category of Dairy Academy members. The Dairy Academy has 1200 contributing members who partake in the academy’s activities, who play an important role in agenda setting, and who act as a resource for knowledge and

information. Other entrepreneurial actors that are in close contact with the Dairy Academy are producers of animal foodstuffs and advisory companies.

Researchers are important for the Dairy Academy as a source of knowledge. Researchers get invited to speak at Dairy Café events and within sub-networks by knowledge brokers.
The agenda setting is done as much as possible by the members themselves. To that end, they are consulted at Dairy Academy meetings, and sometimes also contacted by phone. The Dutch Federation of Agriculture and Horticulture and the Dutch ministry of Economic Affairs, Agriculture and Innovation act as partners of the Dairy Academy for agenda setting for the longer term. Agenda setting is mainly oriented at the sector itself.

Until 2011, the government was an important source of funding for the Dairy Academy. However, even in that role, the government did not involve itself very much with the activities of the Dairy Academy, preferring a role in the background. There has been sporadic collaboration with educational institutes. NGO's play a marginal role in the Dairy Academy. However, the Dairy Academy does support the discussion about societal issues such as animal welfare, climate change and intensive animal husbandry.

Facilitation modality

Facilitation with the Dairy Academy is mainly done by the knowledge brokers. The Dairy Academy does not work on creating new knowledge. Instead, the knowledge brokers concentrating on linking people to share knowledge. Furthermore, the Dairy Café's can be seen as a facilitative support for discussing values that can be at odds with the interests of the sector. In other words, there is some facilitation of value diversity and value exchange, but it is rarely, if ever, done by inviting the NGO's that champion those values.

PigNET

Goals and activities

PigNET (in Dutch: VarkensNET) aims to make the Dutch pig husbandry sector more future proof by raising the innovative capacity of pig farmers. In doing so, PigNET tries to fill an increasing gap in the sector: as the number of pig farmers has steadily decreased it has become harder for the pig farmers to meet and share experiences. Furthermore, with the increasing rates of innovation, it has become more important than ever to share. PigNET

therefore stimulates entrepreneurs to work together on their professional development, in the spirit of life-long learning.

PigNET hosts an online forum where pig farmers can meet, where they can collaborate online, and where they can share knowledge in the online information database. Also, the PigNET NET-mentors facilitate sub-networks of pig farmers to work on one topic or theme for a prolonged time. These sub-networks use an online room to collaborate.
Furthermore, PigNET organises several face-to-face activities, such as visits to innovative farms and companies to help pig farmers get inspiration for innovation ("On the road with PigNET") and meetings, named "Rooting with...", in which the network members take an afternoon or an evening to share knowledge and information about a predefined theme or topic. The Rooting with...-meetings focus on the translation of knowledge towards implementation.

PigNET is very similar in its set-up to the Dairy Academy: "On the road with PigNET" is like "Farmer on Tour", and "Rooting with..." is like the "Dairy Café". And indeed, PigNET is modeled after the Dairy Academy. The main difference appears to be that PigNET has more focus on its online activities.

Actors and public-private partnerships

Entrepreneurs are the most important partners of PigNET. They are both the participants and the experts, and they have a dearth of experience. Chain companies act mostly as funding organisations, but they do not appear to be a very structural partner in the regular PigNET activities. The government is the other main financing party of PigNET.

Researchers act as scientific expert in PigNET. They sometimes use PigNET as a dissemination platform for their research results. Also, they put up calls for participants in research projects. As of this writing, the role of education has been rather small. Efforts are under way to increase the interaction between students and entrepreneurs.

The agenda of PigNET is predominantly set by the pig farmers themselves. The NET-mentors have in important role with regard to agenda-setting, because they survey the pig farmers' needs. Furthermore, PigNET has steering board with representatives from the ministry of Economic Affairs, Agriculture and Innovation, the Northern branch of the The Dutch

Federation of Agriculture and Horticulture and Wageningen University and Research Centre.

Facilitation modality

PigNET's facilitation functions are mainly focused on connecting people. Additionally, the NET-mentor facilitate knowledge sharing and building in sub-networks, both in terms of connecting people and facilitating the process. Real collaboration, however, is rather rare, and depends on the NET-mentor in question.

Bioconnect

Goals and activities

Bioconnect is a network of farmers and other entrepreneurs, research institutes and advisory organisation for innovation of organic food and farming. The main challenge for the Dutch organic farming sector is to facilitate a rather young sector to better prepare organic farming and its projects for the consumer market. This requires working on matters of efficiency and innovative, cost-effective production. In other words, Bioconnect aims at development of professionalisation of the organic farming sector.

Bioconnect is predominantly busy with articulating the research demands of organic famers and programming research projects that can meet these demands. The sector gives voice to its needs and ambitions and Bioconnect translates these to knowledge developmentand innovation. Bioconnect is in the position to programme existing research funds this way, which are not part of the network funding *per se*, but they are under close control of the network. The main difference with traditional research funding is that demand articulation plays a much more important role.

Bioconnect works with theme working groups that meet for four to five times a year. Each working group plays a role in the programming of part of the research funds. The theme groups consist of at least entrepreneurs and researchers. The final decision about the full programme resides in a task force with representatives of government, education, entrepreneur and research.

Additionally, Bioconnect organises company networks that enable entrepreneurs to share their knowledge and experience. These networks contribute to the use and application of scientific

knowledge. Finally, Bioconnect organises several nation-wide meetings for the organic agriculture sector.

Actors and public-private partnerships

Within Bioconnect, various parties in the organic food and farming chain are involved in company networks, including the primary producers. Furthermore, various governments (e.g., national and provincial) act as funding partners in Bioconnect. Education is an active partner, and acts as a knowledge dissemination channel. Researchers contribute in their capacity to judge to what extent and how questions from practice can be addressed by research. Finally, NGO's are also part of Bioconnect.

Facilitation modality

Bioconnect acts as a facilitation organisation on various fronts. First, Bioconnect facilitates the dialogue between researchers and entrepreneurs by bringing them together for research programming. Second, by facilitating company networks they facilitate entrepreneurs to connect with each other and apply research knowledge in practice.

Knowledge Network Multifunctional Agriculture

Goals and activities

The funded part of the Knowledge Network Multifunctional Agriculture (KNMA) is a small task force consisting of two leaders, three to four knowledge brokers and a secretariate. This appears to be very similar to the set-up of Bioconnect. The network in its entirety is composed mainly of researchers, entrepreneurs and people from education. Government is involved in the task force itself.

The Knowledge Network Multifunctional Agriculture aims to connect entrepreneurs, governments and researchers. Together, they can share knowledge and apply it in practice to strengthen the Dutch multifunctional agriculture sector and contribute to its development and growth. A sustainable growth of multifunctional agriculturel, in turn, contributes to the satisfaction of societal needs such as space, peace, nature, recreation, and a thriving countryside.

KNMA's main focus is on research programming, based on the questions and needs from the sector itself. The knowledge brokers gather the questions and needs, and the task force decides on the priorities. Some questions are addressed in specific projects, financed by the

ministry of Economic Affairs, Agriculture and Innovation, whereas other questions are forwarded to other research networks, in the hope that they will find a receptive research audience there. Furtjermore, KNMA actively engages in knowledge dissemination by organising workshops with innovators and national meetings for entrepreneurs. The KNMA has a website that it uses to spread knowledge about entrepreneurship and competence development.

Actors and public-private partnerships

The KNMA is a quite complex network because Dutch multifunctional agriculture is divided into six different sectors, which each have their own ties with the Dutch Federation of Agriculture and Horticulture. While entrepreneurs are the main 'clients' of knowledge in the KNMA, the actual agenda is directly the decided by researchers and policy makers. Entrepreneurs only act in the role of demand articulation, the same as NGO's, without direct influence on the agenda. This may be a side-effect of the many sub-sectors in multifunctional agridulture. The ministry of Economic Affairs, Agriculture and Innovation is closely involved in the task force, acts as the main funding party, and also has an internal policy agenda focussed on multifunctional agriculture. Education institutes are a party in the dissemination of knowledge, and is actively working on anchoring this knowledge in existing curricula.

Facilitation modality

As in Bioconnect, the KNMA uses knowledge brokers to facilitate the translation of questions form practice to a research programma. However, it is different in the sense that it relies on survey methods and individual networks instead of dialogues. Furthermore, the actual agenda setting is decided in the end by researchers and policy makers, without facilitation. Other goals of facilitation concern the translation of science to practice, but it is not very clear to what extent the KNMA has an active policy toward this goal.

Syntens

Goals and activities

The main goal of Syntens, which, in fact, is a private advisory company, is to boost the innovative power of Dutch small and medium enterprise. This study was limited to a specific part of Syntens' activities, which was focussed on agriculture and funded by the ministry of Economic Affairs, Agriculture and Innovation. For this particular group, sustainability is an

additional goal.

Syntens' main acitivity consist of giving one-on-one advise to entrepreneurs. Additionally, Syntes facilitates the formation of innovating clusters of companies. Part of this activity is the organisation of small-scale meetings of several days, at which Syntens facilitates the "discovery" of innovations.

Actors and public-private partnerships

Entrepreneurs and companies are the main participant, as target group, in Syntens. Researchers sometimes act in the role of expert, to complement or complete the advise given by Syntens itself. The ministry of Economic Affairs, Agriculture and Innovation is the main funding organisation for Syntens' activities in the field of agriculture. In this capacity, the ministry also has a say in Syntens' agenda. Up until now, the ministry has only used its influence to target Syntens towards specific sectors, and not to put specific policy topics on the agenda. Education does not have a structural role in Syntens.

Facilitation modality

One might say that facilitation is Syntens' main activity, although one might not speak of networks in the case of one-on-one advise. However, all workshops and clustering activities are foremost facilitation-driven, and Syntens does not push a topical agenda. Syntens als actively produces tools that can be used to support facilitation.

Discussion

Striking similarities

Each network that was studies appears to hold to the conviction that the translation of scientific knowledge to practice is a problem. Bare knowledge transfer will not contribute to innovation, because knowledge can only be applied when it is translated to something that is meaningful to an entrepreneur. Distributing research reports does not help, visiting an innovative company to learn from it as an example does. The key concept here seems to be interaction: interaction among entrepreneurs, and interaction between entrepreneurs, researchers, and other societal actors. This is also apparent in the activities from each of the networks, because all networks organise activities that require or stimulate interaction.

A second striking similarity is the relative absence of NGO's. NGO's are hardly at all (Dairy Academy, PigNET) or only marginally (Bioconnect, KNMA) involved, even though many Dutch NGO's have agendas that concern the agricultural activities of the networks in this study. This does not mean that these networks are deaf to this agenda. Indeed topics like envirnonmental health and animal welfare do get discussed in the Dairy Academy and PigNET, and Bioconnect and the KNMA can even be seen as representatives of NGO agendas. All networks involved have a specific aim to engage societal debate. Nonetheless, the associated discussion appear to be held within the own ranks, and not with the societal opposition.

Striking differences

The networks studied here can be divided in three groupings. The Dairy Academy and PigNET both concern mature sectors. Value diversity appears to play at most a small role in these networks. In terms of innovation goals, they appear to be mainly involved in system optimisation. Furthermore, they seem to be mostly concerned with the last to phases of the innovation process, adoption by first movers and widespread adoption.

Bioconnect and KNMA both concern growing sectors that are still young and developing. Some say that bothe these networks put a structurally different perspective on Dutch agriculture, championing sectors that have a potential to lead to a transition. In that sense, these networks are aimed at system transformation. Value diversity is more important in these networks, possible due to varying opinions about the way Dutch agriculture should develop. Bioconnect and KNMA appear to be mainly oriented at business development, and, to a smaller extent, adoption of innovation by first movers.

Syntens is specific in the sense that it does not have a specific sectoral approach. Furthermore, Syntens' approach appears to be most specifically oriented at the invention and business case developmet phases of the innovation process. This holds especially for the innovative clusters that Syntes facilitates. Syntens does not appear to concentrate on either system transformation or system optimisation.

Another difference between the networks is the type of entrepreneurs involved. The Dairy Academy and PigNET are dominated by primary producers. This means that the differences between the entrepreneurs involved are rather small. In the case of Bioconnect and KNMA,

these differences are larger, because these networks both cover larger sets of subsectors; the involve primary producers from various branches of either organic or multifunctional agrictulture. In Syntens, the entrepreneurs are still more different, als involving parties from the chain other than the primary producers. In various cases, multiple links in the chain are involved in one innovative cluster. This is important from the perspective of innovation, because inventions often necessitate changes in the chain before they can capture value (Jacobsen, Beers & Fischer, 2011). It appears that Syntens, of all networks discussed here, focusses on the least mature networks.

The composition of the networks involved seems to be quite heterogeneous. Especially the literature on transitions stresses the importance of diversity for innovation (e.g., Regeer, Mager & Van Oorsouw, 2011). Heterogeneous parties can contribute specific resources, values and interests, and combining these to give shape to an innovation would be the best option for change. Given the relatively small role of value diversity in the various networks, the conclusion appears to be warranted that they are not particularly fit to the goal of system transformation. The conclusion appears to be warranted that the networks involved will be especially fit for system optimisation, albeit sometimes in emerging markets.

Conclusion

Different networks could be related to different innovation phases. The pig husbandry and dairy farming networks concerned mature agricultural sectors under increasing societal pressure. They focussed on knowledge sharing among entrepreneurs to increase the sector's adaptive capacity for change. These networks were predominantly homogeneous (many entrepreneurs with an occasional researcher, no chain actors).

The organic agriculture and multifunctional agriculture networks appeared to be somewhere in-between the business case and diffusion phases. The sectors involved were relatively immature (not being established, or "mainstream"). Their activities focussed on making research and entrepreneurs co-create new knowledge and innovations. Furthermore, these networks were especially heterogeneous, with researchers, entrepreneurs, NGO-representatives and policy makers all adding to a dynamic mix.

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