AgriLink. Agricultural Knowledge: Linking farmers, advisors and researchers to boost innovation

Deliverable 2.2: Synthesis Country Report (Version 1.0)
Partner: Innovatiesteunpunt

The role of advisory services in farmers' decision making for innovation uptake. Insights from case studies in *Belgium*

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List of acronyms

AgriLink	Agricultural Knowledge: Linking farmers, advisors and researchers to boost innovation
AOS	Advisory Organisation Supplier
AKIS	Agricultural Knowledge and Innovation System
CMO	Common organisation of the markets
CHP	Combined Heat and Power
DoA	Description of the Action
EIP	European Innovation Partnership
EU	European Union
ILVO	Institute for Agricultural and Fisheries research
IWT	Society for Innovation by Science and Technology
Micro-AKIS	Micro-level Agricultural Knowledge and Innovation System
NGO	Non-Governmental Organisations
NUTS	Nomenclature of Territorial Units for Statistics
REO	The REO Auction is a leader in the national and international fresh fruit and vegetable market
R-FAS	Regional Farming Advisory System
TCM	Trigger-Cycle Model
WP	Work package
VLIF	Flemish Agricultural Investment Fund

Executive Summary

WP2 outline: The goal of WP2 is twofold. Firstly, it aims to understand why, how and from whom European farmers gather and exchange information during their decision-making process regarding implementation and/or development of different types of innovations. A second goal of WP2 is to investigate which role advisors play during these processes. The range of advisory services available in a series of focus regions across Europe is taken into account for this research.

Methodology and sampling: For both case studies, data were collected by means of interviews with farmers and key AKIS actors across our focus region of Flanders. The survey part of the interview entailed both open and closed questions, enabling to draw conclusions from both qualitative and quantitative data. For each case study, a random and relevant sample population was selected and appointments with the farmers were made through the telephone. For case study 1, the target population consisted of all farmers who had recently installed or thought about installing a pocket digester. For case study 2, the target population comprised all farmers in Flanders, as cooperatives are an innovation that exists in all sectors of agriculture. This process resulted in the participation of 38 farmers and 4 advisory organisations for case study 1, and 31 farmers and 10 advisory organisations for case study 2.

Highlights: In general, it appears that farmers in Flanders have access to quite some affordable advice. They have a solid AKIS on which they can fall back on, which is mostly comprised of large players who have already been part of the advisory landscape for a long time.

The first case study demonstrated that the story of the pocket digester might be an indication for advisory services in Flanders that they should try to determine whether innovations are really ready for the market, and whether the companies behind them are financially healthy and if their management is in good hands. Furthermore, advisory service could try to become experts in the very early phases of market introduction, so they can better support the pioneers.

From the second case study on cooperatives we have learned that advisory services should stress to the farmers that all members have a vote in the cooperatives, and that it should be used. Furthermore, advisory instances should try to invest in the ability to provide specific information for individual farms, since what is good for the sector is not necessarily good for an individual company. For the smaller and younger cooperatives, most pioneers were pleased with the support that they had received when founding their cooperative. They did stress that advisory services could promote joining a cooperative more to other farmers. A role which they definitely should play, as cooperatives could help farmers to work together and to build a more sustainable agriculture.

A general lesson that can be extracted from the combination of both case studies is that farmers experience a great need for independent advice amongst the multitude of biased advice that they receive from advisors representing private companies, cooperatives, etc. In fact, they were rather pleased with the advice during the stages of the TCM model, but they stressed that they specifically felt a need for unbiased advice after the implementation of innovations. They thought that advisory services could do a better job of following up existing innovations, and providing continuous support after the installation.

1 Introduction

The general goal of WP2 (Innovation case studies in Focus Regions: micro to meso analysis) is twofold. Firstly, WP2 aims at understanding why, how and from whom European farmers and farm managers gather and exchange information to underpin their decision-making on development and /or implementation of different types of innovation. A second aim of WP2 is to analyse the role played by advisors in these processes accounting for the range of advisory services available in a series of focus regions across Europe. The Focus Region is a key concept adopted by AgriLink, and was defined as a farm census region supplying the socio-demographical and farm structural context that might help to explain the farmers' micro-AKIS diversity and its implications to innovation up-take and the role played by advisors.

The conceptual framework (Deliverable D1.1) underlying the implementation of these goals relied on three major assumptions. The first was that the diversity of farmers and farms leads to different decision-making processes and influences the type of advisors and the roles they play on them. Second assumption consisted in assuming that innovation might not be in convergence with the sustainable development purposes, meaning that innovation can affect negatively or be indifferent regarding the sustainability dimension. Hence our willingness to investigate both adoption and non-adoption situations. Finally, a third assumption establishes that the diversity and the transformation in advisory landscape in European countries and regions is a relevant variable explaining the role advisors play (or not) in the farmers' decision-making processes related with the innovation uptake.

AgriLink developed an integrated research framework (Deliverable D2.1) aimed at gathering empirical data for the micro-scale concept of AKIS (Agricultural Knowledge and Information System), the farmer micro-AKIS, and for the mesoscale concept of R-FAS (Regional Farming Advisory System), in relation with the up-take processes of diverse types of innovation by farmers across the EU. This deliverable (D2.2) prepared by the 13 partners involved in WP2 offers a synthesis of the qualitative insights on the farmers' micro-AKIS and the role played by advisors in the selected case studies. These were delimitated at the census region level and focused on a group of farmers representative of a specific innovation (e.g. biologic pest control), comprising both adopters and non-adopters.

The first case study that was chosen was the one of pocket digesters (renewable energy), which falls under the domain of developing new activities. Pocket digestion is a technology where the anaerobic digestion process is applied to proprietary biomass flows for the on-site production of renewable energy. This energy is made available in the form of electricity and heat after combustion of the biogas in a combined heat and power (CHP) installation. This innovation was chosen because we had a very clear view on the innovation process of this technique, we had an advisory service on this case, we already had a complete list of droppers, adopters and non-adopters, and because it is a very local innovation. Up to this date, there are about 120 active pocket digesters in Flanders. It was expected that this number would increase significantly, but for reasons that will be explained in this report, this was not the case. The main challenges for advisory organisations regarding the innovation include giving unbiased technical, economic and legal advice, measuring energy profiles and relating it to the digester's production, matching the stable and manure handling to the digester and finding financial aids for independent advice.

For the second case study, the innovation of joining a cooperative was selected, which falls under the domain of labour innovative arrangements. An agricultural cooperative is a formal form of farmer collective action for the marketing and processing of farm products and/or for the purchase and production of farm inputs. They aim to increase members' production and income by helping them to better link their production and income with finance, agricultural inputs, information, and output markets. This innovation was chosen because struggling to work together is one of the main hurdles for sustainable agriculture. Subsequently, persuading farmers to work together in one of the main challenges for advisory instances regarding this innovation. With this research, we try to investigate how advisory services can help farmers to take this hurdle and start to cooperate.

For case study 1, the focus region initially selected was the region of Antwerp. This region was chosen because it is the region where the pocket digester originated. Furthermore, it is the region where the most digesters were adopted and it is Flanders' most innovative region for dairy in general. For the second case study, West-Flanders was the region initially chosen because it is the region with the most farmers in general and the most farmers in a cooperative. However, since these two Flemish provinces (NUTS 2) are both too small to provide sufficient information about the role advisory organisations play during the implementation of innovation, the focus region was expanded to all of Flanders for both case studies. For the first case study, the farmers that were eligible were all farmers who had installed a pocket digester, or had shown interest to do so. For the second case studies, all Flemish farmers were eligible, since cooperatives exist across all sectors of agriculture.

In the remainder of this report, we will start off with an overview of the AgriLink key concepts and case studies. Next up, we will provide an overview of the country-case-studies, the farmers groups and the advisory suppliers. After displaying and discussing the results in an attempt to answer the research questions, some interesting cases are selected and discussed in more detail in the narratives part. In the concluding section, the highlights and insights of this research are presented.

2 AgriLink key concepts and research questions

AgriLink key concepts which are relevant for data collection in WP2 comprise the: Focus Region, farmers' micro-level Agricultural Knowledge and Information System (micro-AKIS), mesoscale concept of R-FAS (Regional Farming Advisory System), and the trigger-cycle model (TCM). These concepts were established in the AgriLink DoA and elaborated by the project conceptual framework (see Deliverable D1.1).

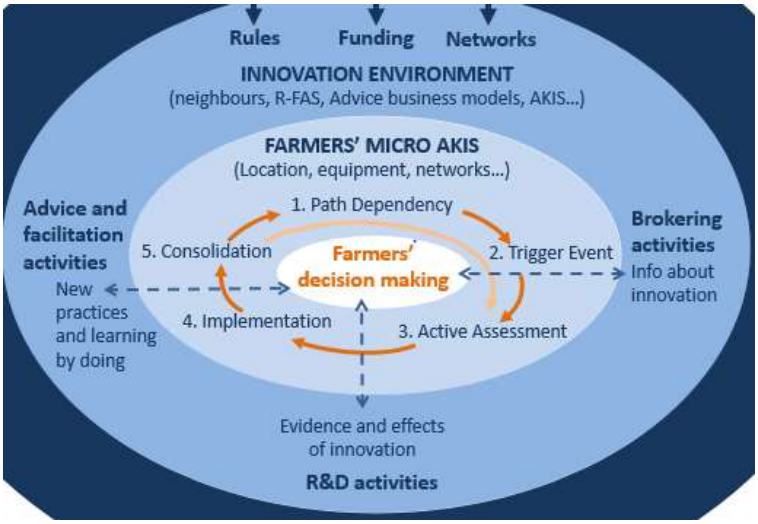
The Focus Region is as a farm census region that establishes the boundaries of the case study for data collection on micro-AKIS and R-FAS. Preferential geographical region is defined at NUTS 3, which is in certain cases replaced by NUTS 2 to achieve a better case study delimitation.

The micro-AKIS describes the micro scale knowledge-system that farmers personally assemble, including the range of individuals and organisations from whom they seek service and exchange knowledge with, the processes involved, and how they translate this into innovative activities (or not). Empirical uptake of this concept entails answering two questions: a) who influences farmers (and farm households) in decision-making on adopting or choosing to not adopt innovations; and, b) how, i.e., what are the processes describing the knowledge assemblage by the farmers and role played by the different sources involved (see D2.1)

AgriLink defines the R-FAS as the set of organisations that enable farmers to develop farm-level solutions, enhance skills and coproduce knowledge with advisors. These are envisaged by AgriLink in a pluralist view, including traditional advice providers (chambers of agriculture, public bodies, etc.), farmer-based organisations (unions, associations, cooperatives, etc.), independent consultants, NGOs, upstream or downstream industries, and high-tech sectors. Hence, R-FAS covers the full range of these organisations in a given region, and their connection to wider AKIS organisations, and as well as a range of services, including research, advice and brokering, meaning they can be active at different steps of the farmers' decision-making processes, and use different methods at these different steps.

The trigger-cycle model established that farmers' decision-making regarding the innovation uptake is driven by a triggering event that initiates a path-dependency break cycle composed by three main phases, that can be described to account for the advisors role: a) farmers' awareness of the innovation, encompassing brokering activities developed by advisors to disseminate the innovation and to (co-)create trigger events influencing farmers' decision-making processes; b) active assessing innovation entailing advisors assemblage of information on the innovation costs, benefits, and side-effects by developing and involving in R&D activities; c) supporting farmers in innovation implementation by delivering advice and carrying out facilitation activities. The figure 1 offers an integrated view of the TCM and the key concepts that were implemented in WP2 through the case studies delimitation and the data collection at farm micro-level and at the R-FAS meso-level.

Figure 1: Integrated view of the TCM and Agrilink key concepts



Source: AgriLink

The research questions to be answered with the empirical approach of WP2 are synthesised in Box 1. The research questions aim at responding the WP2 goals through the empirical approach delineated in D2.1 build on the AgriLink conceptual framework (presented by the deliverable D1.1).

Box 1: AgriLink empirical research questions for WP2

1. ***What roles do advisory services play in the cycles of farmers' decision making?***
   - The cycles comprising the trigger-cycle model developed by the AgriLink conceptual framework to understand farmers' decision-making processes regarding innovation up-take and to describe respective micro-AKIS; Advisor's role is investigated at three phases of this model: a) Farmers' awareness of the innovation, encompassing brokering activities developed by advisors to disseminate the innovation and to (co-)create trigger events influencing farmers' decision-making processes; b) active assessing innovation entailing advisors assemblage of information on the innovation costs, benefits, and side-effects by developing and involving in R&D activities; c) supporting farmers in innovation implementation by delivering advice and carrying out facilitation activities.
2. ***What is the relationship between different types of farmer and advisory suppliers in the decision-making process?***
   - Comprising heterogeneity in farmers profile, farm structural features and farm business models; the nature of the innovation; regional context; R-FAS landscape and business models (including models associated to digitization of agriculture); role of advisory in different stages of farmers' decision making cycles and if these are creating new advisory supply opportunities and /or new functions, and as well as new forms of path dependency
3. ***How does the transformation of advisory suppliers landscape influence farmers' decision making and uptake of innovation?***
   - Accounting for R-FAS history and on how new configurations of R-FAS (generally depicted as more fragmented and pluralistic) play on the relation between farmers and advice, and respecting this relation: a) allow for more creativity, triggers, and a diversity of knowledge and information channels for farmers; b) influence farmers' access to information and knowledge, and equity on farmers' information access.

Source: AgriLink

3 WP2 case studies overview and methodological approach

3.1 WP2 case studies selection

The case study delimitation in AgriLink was built through two dimensions. One of the dimensions was the spatial delimitation of the R-FAS boundaries at the focus region level, and the second the farmers selection in relation to the innovation type. Table 1 presents the selected innovation according respective innovation type and the sustainability challenge addressed by innovation.

Table 1: Selected innovations and sustainability challenges

Type of innovation	Innovation cluster	Selection focus	Sustainability challenge addressed
Technological	Autonomous vehicles, robots, drones, intelligent sensors/Precision Farming	IT (Information technologies)	Climate change, Eco-efficiency, Pests & diseases
			Growth and jobs – Digitalization
			Food security – Biodiversity, Food provision
Process (farming practices)	Biological Pest Control	Integrated ecological farming	Climate change, Eco-efficiency, Pests & diseases
	Soil Improving cropping systems		Food security – Biodiversity, Food provision
Marketing and financing	Retro-innovation	Diversification	Growth and jobs – Business diversification, Social cohesion
	Introducing new crops		
	Direct marketing		Eco-efficiency
	Developing new activities		
Social and organisational	Natural resources common management	Collaborative organisations	Growth and jobs – Social cohesion, Digitalization
	Labour Innovative arrangements		Food security – Biodiversity
			Eco-efficiency, Pests & diseases

Source: AgriLink

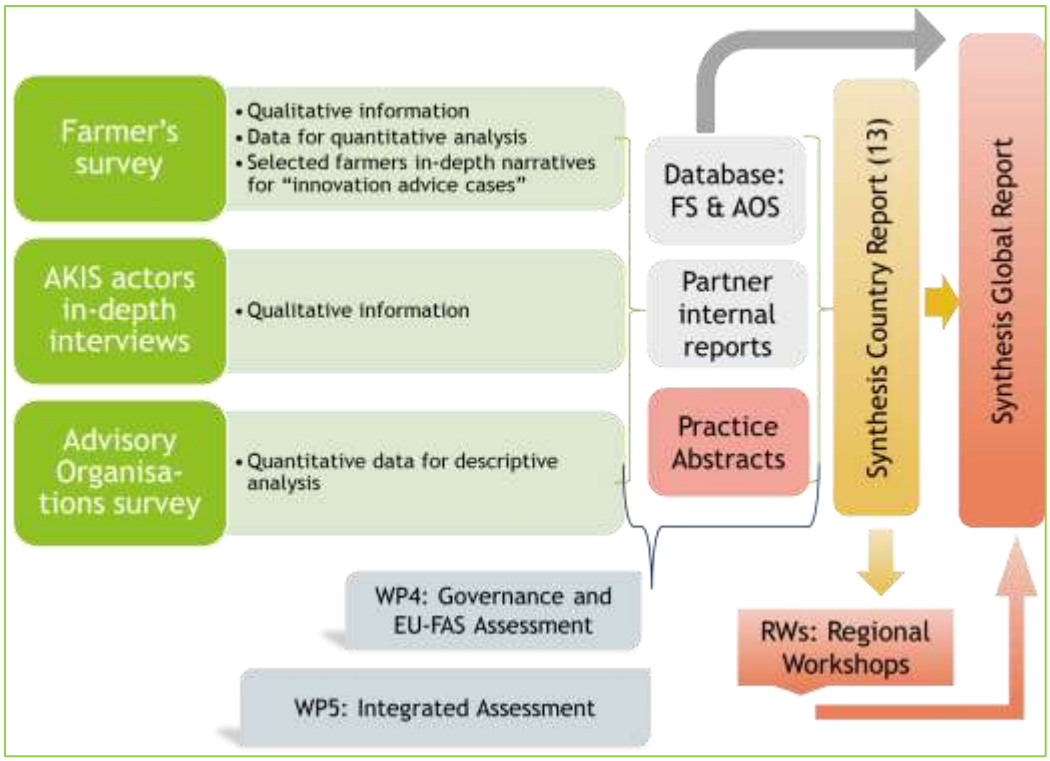
The farmers' selection in each case study built on targeting groups of farmers amongst whom the innovation is already widespread, so that it would be possible to characterise the micro-AKIS supporting innovation up-take of adopters, as well as the micro-AKIS of non-adopters.

3.2 WP2 methodological framework

The methodological framework implemented in WP2 consists on mixed-method strategy (for a detailed description see WP2 research protocol in D2.1), combining case study approach with quantitative survey-type data collection. It is implemented in three steps. Firstly the case studies selection, already described. Second step consisted on delineating and implementing two major surveys: a) to farmers to collect the data for describing the micro-AKIS and the role the advisory providers play on it; and, b) to advisory providers to enable describing R-FAS in relation with the innovation addressed by each case study.

Figure 2 depicts an overview of the WP2 data collection strategy, highlighting the intermediate outputs and the outcomes to be generated from the data analysis, including the inputs to subsequent WPs.

Figure 2: Overview of WP2 data collection and reporting



Source: AgriLink

Farmers' survey was conducted through a question-guide comprising both open-ended and closed-ended questions intended to gather quantitative data on whom and how type of questions (who are the advisory services providers and how these are provided), along with qualitative data on the why and how type of questions allowing for in-depth understanding of farmers' micro-AKIS. Quantitative data from farmers' survey (FS) were entered on a database, while qualitative information and narratives descriptions were recorded and analysed in order to provide the descriptive and analytical insights. This deliverable, the synthesis country report, presents the outputs of both, the data analysis and description and the qualitative insights for each case study.

Farmers' survey was implemented through face-to-face interviews, conducted by members of research teams or duly trained students, following a question-guide including open, mixed and closed questions to collect data on the trigger events, the farmers' innovation evaluation, knowledge and information sources, flows and social networks, farmer profile and demographics, business model and farm structure. FS comprised a set of matrixes to gather data to describe farmer micro-AKIS for the three main stages of the TCM (awareness, active assessment and implementation of the innovation), and on the micro-AKIS used by the respondent for farm management in general, and as optional the household micro-AKIS for the family farms when family members show to be influential actors for information and knowledge flows assembled by farm decision-maker(s). Detailed information on the farmer survey and respective question-guide is available at the Deliverable D2.1.

The advisory organisation supplier's (AOS) question-guide builds mainly on closed-ended questions and addressed formal providers of advice (see Box 2), excluding informal providers. Formal advisory suppliers comprise organisations providing advisory services as a secondary activity and /or providing them for free

(e.g. associated with the supply of inputs or software). In-depth information on the R-FAS is gathered through complementary in-depth semi-structured interviews delivered to a small number of regional AKIS actors.

Box 2: Definitions on advisory for R-FAS survey

Advisory services
- A service activity that enable farmers to develop farm-level solutions, enhance skills and coproduce knowledge with advisors.

Advisory suppliers
- Any organisation that delivers advisory services to farmers.

Advisory organisations
- Traditional suppliers specialized in the supply of advisory services to farmers. This corresponds to former 'extension suppliers'

Source: AgriLink

The question-guide for advisory organisations comprised mostly closed questions and addressed data collection to: a) describe the organisation, including its ownership status, action level, advisory services supplied, funding resources and in-house R&D facilities; b) characterise its human resources, their distribution according to front-office and back-office activities, qualifications, certification and training, and on the methods they use for supplying advisory services; c) describe the type of advisory services clients and the main topics of these services; d) identify the national and regional public support to the advisory organisation, including funding and other type of support to back-office activities (training, R&D and networking activities); e) assess organisation benefit from current EU level policy instruments, such as EU-FAS, EIP-AGRI, and rural development programmes; f) describe the organisation advisory services supplied in relation with the innovation at stake in the case study, and the back-office activities undertaken by the organisation to support the supply of these services; and, g) collect the organisation's vision regarding the major challenges to be faced in the next years by the advisory suppliers, in the focus region, regarding the innovation development.

The in-depth interviews to AKIS key actors collected their knowledge on the innovation path in the region, on major innovation triggers, and on their evaluation on the farmers' knowledge and information needs and demands along the various stages of the innovation TCM and to what extent R-FAS is responding to these demands. The target number of interviews to key actors was established as five, whereas they can be lesser depending on the number of relevant actors is each case study.

The data analysis and qualitative insights obtained in each case study are also part of this deliverable, the synthesis country report. Detailed information on the advisory organisation supplier survey and respective question-guide is available at the Deliverable D2.1.

In addition, this deliverable comprises the description and the insights gathered from detailed narratives of farmers' decision-making processes regarding the uptake of the innovation build on the TCM and addressing the advisory supplier's role. Three narratives per case study were included in the data collection conducted by the WP2 to generate information for the integrated assessment to be carry on by the WP5.

3.3 WP2 sampling strategy

The target population for sampling purposes was a group of farmers with similar technical-economic orientation amongst whom the innovation is already widespread, enabling to identify adopters and non-adopters that choose to not adopt the innovation. Hence the target population to be sampled is defined by two criteria: a) innovation adopters and (informed) non-adopters; with, b) a similar technical-economic orientation, whilst addressing farm structural heterogeneity among the targeted group of farmers, which might lead to the inclusion of farmers with different farm styles and/or business models. In addition, specific categories of non-adopters, such as droppers, or of adopters, such as partial adopters, were accounted for sampling purposes when found to be relevant in the targeted population.

A sample of 40 to 50 farmers was required by each case study. A snowball-type sampling procedure was adopted relying on the support of key-informants ('gatekeepers') familiar with the targeted group of farmers, which might include farmer associations, researchers, and other AKIS actors and experts. To avoid selection bias, different information sources need to be used and cross-checked (See Deliverable D2.1 for a detailed description of farmers sampling strategy).

The advisory organisations were sampled through a snowball process relying on diverse sources to ensure that the complete spectrum of advisory organisations supplying (or that could supply) advisory or related services are included in the sample. A minimum of 20 organisations was established for the cases were sampling was needed to cover the advisory diversity. In other cases, with little formal suppliers on the ground the strategy was to interview the maximum of existing organisations.

4 Country case-studies, farmers groups and advisory suppliers

4.1 The case studies and focus regions

This report presents two case studies:

- Case Study 1: Developing New Activities: Pocket Digestions (Renewable Energy)
- Case Study 2: Labour Innovative Arrangements: Cooperatives

4.1.1 Case study 1 - Developing New Activities: *Pocket Digestions* (Renewable Energy)

This case of the pocket digestion was chosen because of the following four reasons:

- We had a very clear view on the innovation process of this technique
- We already had a complete list of who were the droppers, adopters and non-adopters
- We had an advisory service on this case
- This is an innovation that is very local, so very interesting to find out where advice for a farmer is coming from

Small-scale or pocket digestion is a technology where the anaerobic digestion process is applied to proprietary biomass flows for the on-site production of renewable energy. After combustion of the biogas in a combined heat and power (CHP) installation, this energy is made available in the form of electricity and heat and is used to a maximum on-site.

The popularity of pocket digestion has increased greatly in the last few years in the Flemish region of Belgium and a number of neighbouring countries. In Flanders there are about 120 sold pocket installations to this date and at first it was expected that this number would increase significantly. However, for reasons that will be explained during this report, this was not the case.

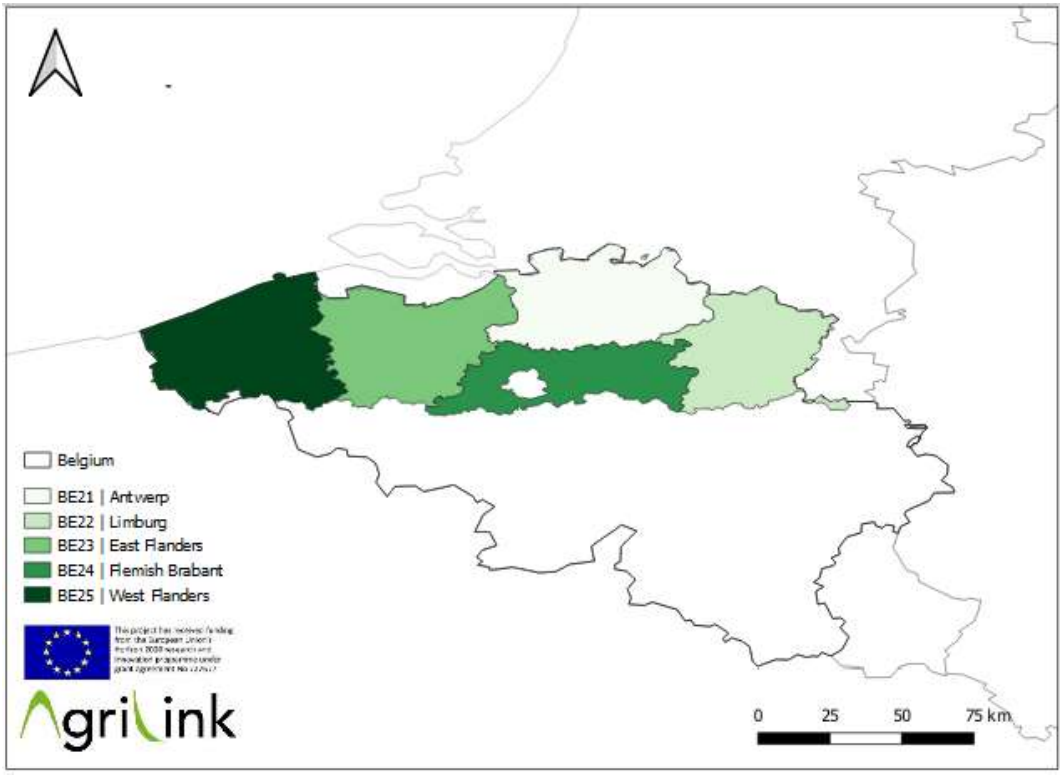
Figure 3: Picture of a pocket digester by Bioelectric

The choice of focus region in relation to the selected innovation was the province of Antwerp (BE21 – NUTS 2, see figure 4). This region was chosen because of the following reasons:

- This is where the innovation originated
- This is the region where the most innovations (digesters) were adopted
- This is Flanders' most innovative region for dairy

However, because this region wasn't big enough to get the complete picture of the case study, we had to include all the Flanders, which became the focus region in this case study. In the following paragraphs, the focus region will be described and mapped.

Figure 4: Focus region of Belgium case studies



Given that the province of Antwerp was the region that initiated the innovation and collects up-to-date data from the agricultural and horticultural sector annually, this region is briefly described in the following paragraphs.

Agriculture and horticulture in figures

Approximately 92,500 hectares (about 1/3) of the area of the province of Antwerp is used for agriculture. The province contains 3,627 professional agricultural and horticultural companies. The cultivation of forage crops accounts for 79% of the agricultural area in the province. Of these, maize and grass are the most grown crops. In 2014, only 1% of the forage crops consisted of other forage crops than maize and grass, such as fodder beet and clover.

Arable farming accounts for 15% of the agricultural area and consists of grain maize (52%), potatoes (28%), grains (16%) and industrial crops (4%). Only 6% of the agricultural area is taken up by horticulture. Of this, 5% is located in the open air, mainly divided into vegetable growing (43%) and tree nursery (35.5%) and a smaller part of ornamental horticulture, orchards, strawberries and small fruit. With 45% of the area in Flanders, Antwerp is the Flemish leader in strawberries in open air. In this region, tree nursery is a strongly emerging sector. About 1% of the provincial agricultural area is taken up by greenhouse horticulture. Despite this seemingly small number, this puts Antwerp at Flanders' forefront with 42% of its total greenhouse horticulture area. Greenhouse horticulture is strong in fresh vegetables and strawberries with 59% and 45% of the Flemish area respectively. In terms of fresh vegetables, tomato cultivation is the largest (63%), followed by bell pepper cultivation (13%). Cultivations include dry-harvested legumes, such as beans and peas, but these are hardly found in the province of Antwerp.

Livestock

More than half of the number of farms in the province is owned by cattle farmers, which explains the large area of forage crops. In the province of Antwerp, dairy (goat) farms, beef calve farms, and poultry farms are highly specialized. Antwerp is at the forefront of the other Flemish provinces in the number of broiler chickens and veal calves.

The main challenges for advisory organisations regarding the digesters are the following:

- Giving the right unbiased technical and economical advice to the farmers. It is a completely new technique, so getting the right figures is quite a challenge
- Giving the needed legal advice to farmers where the digesters did not work and the farmers needed to terminate the leasing contract
- Measuring energy profile and relating it to the digester's production
- Matching the stable and manure handling to the digester
- Finding financial aids for independent advice

4.1.2 Case study 2 - Cooperatives

This case was chosen because as innovation support service we were integrating a new advisory service on cooperatives in our organisation. One of the main hurdles for sustainable and innovative agriculture is that farmers are struggling to work together. The question is how advisory services can help farmers take this hurdle and start to cooperate.

A cooperative is "an independent association of women and men, united voluntarily to meet their common, social, cultural needs and aspirations through a jointly owned and democratically controlled enterprise". Agricultural cooperatives unite mainly farmers who are owner, decision maker and manager of the company (cooperative) that realise a common goal like marketing and processing of their farm products, the purchase and production of farm inputs or machineries, research... Most of the cooperatives aim to increase members' income or facilitate the business of the individual farmers by helping them to better link their production and income with finance, agricultural inputs, information, or output markets. The cooperative might specialise in production, service provision, or marketing. It also might offer support within some (or all) of these various stages. In this case we want to study how the advisory system on cooperatives works nowadays and how it aids farmers in setting up new cooperatives. Furthermore, we

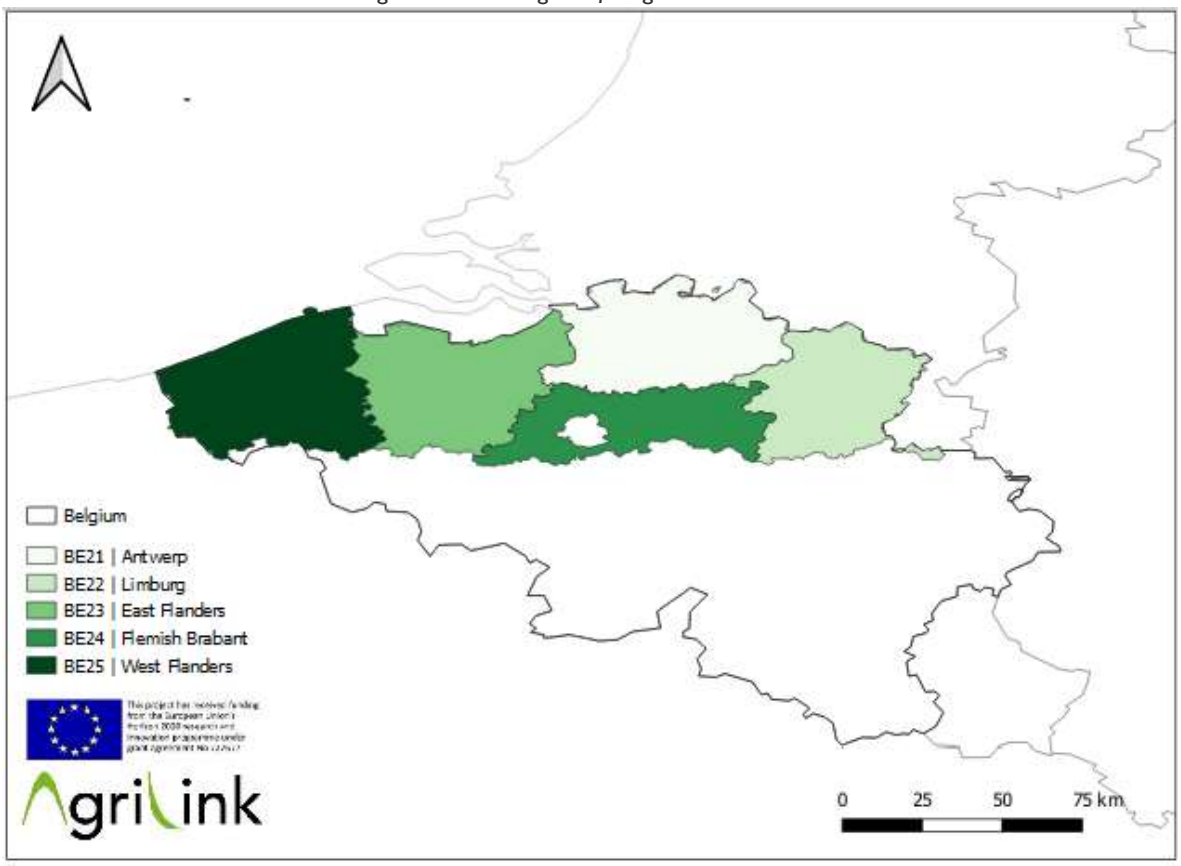
want to examine how existing cooperatives handle their governance, and we inform whether they are getting help from advisors to strengthen the cooperative on different aspects (governance, member engagement, …). Finally, we want to find out if setting up new cooperatives can stimulate innovation in agriculture because some farmers believe that, if you are too small to innovate on your own, you can do it together.

The focus region that was initially chosen in relation to the selected innovation was the province of West-Flanders (BE25 – Nuts 2 – Rings, see figure 5). This region was chosen because:

- This is the region in Flanders with the largest amount of farmers in Flanders
- This is the region with the most farmers that are in a cooperative

However, because this region was not large enough to get the complete picture of the case study, we had all the provinces of Flanders (NUTS 2 of Antwerp, Limburg, East Flanders, Flemish Brabant) in addition to the West Flanders.

Figure 5: Focus region of Belgium case studies



In May of 2013, a total of 8,678 agricultural and horticultural businesses were counted in West Flanders, which is 34.9% of the Flemish total. This situation is reflected in the distribution of agricultural area in Flanders. In West Flanders, a total of 205,764 hectares are used as agricultural land, which is exactly one third of the Flemish total. Almost three quarters (74.1%) of the 15.1 million animals in the West-Flemish herd was poultry; 23% of the total were pigs. It is clear that a process of scaling up is going on in agriculture

and horticulture. In May of 2009, the average horticultural company in West Flanders consisted of 21.8 hectares of land; in 2013 this had increased to 24.6 ha.

4.2 Group of farmers target and sampling strategy

For the first case study, the target group consisted of all dairy farmers in Flanders. Specifically, the farmers targeted were those dairy farmers who bought or thought about buying a digester. Farmers who leased a digester – which was an option in the early years of the innovation – and then terminated the leasing contract were part of the selection as well. In this paragraph, a description of the dairy sector in Flanders is provided.

In 2017, there were 309,605 dairy cows in production in Flanders. The dairy herd has again risen sharply over the past decade (+ 10% compared to 2007) after many years of phasing out. The introduction of milk quotas and the increase in milk yield per cow were important reasons for this reduction. The turnaround since 2012 shows the effect of the planned abolition of the milk quota. From 2009 limited production increases were allowed and from 2015 the quota definitively disappeared. The growth seems to have come to an end in 2017, with a slight decrease again for the first time (-1%). In 2017, dairy cattle were kept on a quarter of all Flemish farms, or 5,794 farms. That number showed a downward trend until 2012, partly due to large productivity increases. The number rose again in 2013 and 2014, but again in 2017 there was a strong decrease (-12% compared to 2016). 12% of Flemish farms (2,756 companies) specialize in dairy cattle. In 2017 there was a decrease in specialized dairy farms, albeit less large than the decrease in the total number of dairy farms (-4% compared to 2016). From 2007 to 2017, the average number of dairy cows per farm increased from 38 to 56. The average number of dairy cows rose noticeably more strongly at specialized dairy farms (+ 70%, from 50 dairy cows in 2007 to 85 in 2017).

For the second case study, we targeted all farmers who were current member of a cooperative, recently stopped their membership, or thought about forming a cooperative. There were no restrictions for the sector in which these farmers worked, hence the target group of the second case study consisted of all farmers in Flanders. In this paragraph, we provide a short overview of the Flemish agricultural landscape. There were 22,225 agricultural companies in Flanders in 2017, of which 78% were professional. This is only three quarters of the number of companies in 2007, which comes down to a decrease in the total number of farms of 3% per year. Especially the smaller farms are disappearing, leading to an upscaling: compared to 2007, the average area of cultivated land has risen by a third to 26 hectares. 88% of the farms are specialized in one of Flanders' tree main subsectors. Livestock farming is the most important specialisation (50%), followed by arable farming (26%) and horticulture (12%). Within livestock farming, cattle farming are the most important subsector. Organic farming – which can also be seen as a type of specialisation – is on the rise in Flanders. In 2017 there were 468 organic farms. The number of producers of organic products has shown an average growth of 9% per year over the past five years. (Platteau et al., Landbouwrapport 2018)

For the first case study, the sampling procedure went as follows. In Flanders around 120 dairy farmers had interest in a pocket digester or had purchased one. Due to an EIP Operational group we had a complete list of these farmers, which was the basis of the sampling procedure. Farmers from this list were contacted at random, and were asked to participate in this project. A similar sampling procedure was applied for case study 2. We made a list of all farmers from whom we know that they are or have been a member of a

cooperative. They were divided into three categories: regular members, board members, and farmers who were once a member but dropped out of the cooperative. This list consisted mainly of farmers from the dairy sector and fruit and vegetable auctions. The names were found within our own network. Table 2 provides an overview of the farmers that were surveyed per case study.

Table 2: Farmers surveyed per case study

Innovation case study	Adopters	Non-adopters	Droppers	Pioneer	Total
NACT	13	9	10	6	38
LABO	17	3	7	4	31

Source: AgriLink – Country

4.3 AKIS experts and advisory organisations

We identified all advisory organisations in Flanders who give advice on cooperatives and renewable energy. The main advisory organisations within these two themes are summarized in table 3 below.

Table 3: Overview of the interviewed advisory organisations

Contact Details					
Advisory Organisation	Address	Postal Code	City	Tel:	Province
Cera Coopburo	Muntstraat 1	3000	Leuven	016 27 96 88	Vlaams-Brabant
Coopkracht	Posthoflei 3	2600	Berchem	03 294 16 70	Antwerpen
Febecoop	Barricadeplein 1	1000	Brussel	02 500 53 02	Brussel
LIBA	Dorpsstraat 21	3950	Bocholt	089 46 46 06	Limburg
KBC	De Slogen 102	3550	Bolderberg	0476 66 70 27	Limburg
Innovatiesteunpunt	Diestevest 40	3000	Leuven	016 28 61 02	Vlaams-Brabant
Veiling Hoogstraten	Loenhoutseweg 59	2320	Hoogstraten	033 40 02 11	Antwerpen
Belorta	Mechelsesteenweg 120	2860	St-Katelijne-Waver	015 56 53 31	Antwerpen
Reo	Oostnieuwkerksesteenweg 101	8800	Roeselare	051 23 12 11	West-Vlaanderen
Essamco	Kleine Horendonk 15	2910	Essen	0498 19 95 50	Antwerpen
Milcobel	Fabriekstraat 141	9120	Kallo	0475 43 58 61	Oost-Vlaanderen
Biomilk	Westouterstraat 5	8950	Heuvelland	0478 60 76 39	West-Vlaanderen
Innovatiesteunpunt	Diestevest 40	3000	Leuven	016 28 61 02	Vlaams-Brabant
Inagro	Ieperseweg 87	8800	Rumbeke Beitem	051 27 33 81/ 051 27 33 91	West-Vlaanderen
Biolectric	Jan de Malschelaan 2	9140	Temse	0474 83 72 84	Oost-Vlaanderen

Hooibeekhoeve	Hooibeeksedijk 1	2440	Geel	014 85 27 07	Antwerpen
Biogas-E	Graaf Karel de Goedelaan 34	8500	Kortrijk	056 24 12 63	West-Vlaanderen
SBB	Denen 157	9080	Lochristi	09 356 05 21	Oost-Vlaanderen

4.4 Farmers selected for in-depth narrative interviews

In general, we have selected cases that were typical for the case studies. This was a relatively easy task, as we frequently heard similar stories from different farmers we had interviewed. In the following paragraphs, we discuss more in detail why we have chosen for which stories per case study.

For case study 1, we have selected two farmers for the in-depth narrative interviews; one non-adopter and one dropper. The non-adopter was chosen because he had searched for information in a variety of sources, and he wanted to gather as much information about the pocket digester as possible. Therefore, it was interesting to see whom this farmer thought gave the most relevant advice and supported him best. The dropper was chosen because it perfectly portrays the interaction of the farmers with the installing firm under the leasing contract. It shows where the firm and the advisory instances might have fallen short, and what can be done better in the future.

In the second case study, again two farmers were selected for the in-depth narrative interviews. This time it consists of one adopter and one dropper. The adopter was a pioneer, who encountered a clearly defined trigger event that forced him to change his farming practices. The farmer in question chose to respond to this event by assessing several possible options, and sought for guidance during this whole process. Ultimately he decided to found a cooperative with like-minded farmers in his region. The second story is a totally different one, of a farmer who had joined a large cooperative to which he delivered all of his production. As was confirmed by a lot of his colleagues, this farmer also had the feeling that the cooperative mainly cared about the interests of the average farmer. Being a relatively large farm himself, this farmer decided to break with the cooperative and to try his luck on his own with the private sector.

5 Results

In this section, the results of the two case studies will be discussed. It will be structured as follows. First, the case study of the pocket digester will be examined. Subsequently, we will have a look at the second case study which consists of cooperatives. For both cases, an overview of the structure of the participating farms and their interaction with advisory organisations when considering an innovation will be provided.

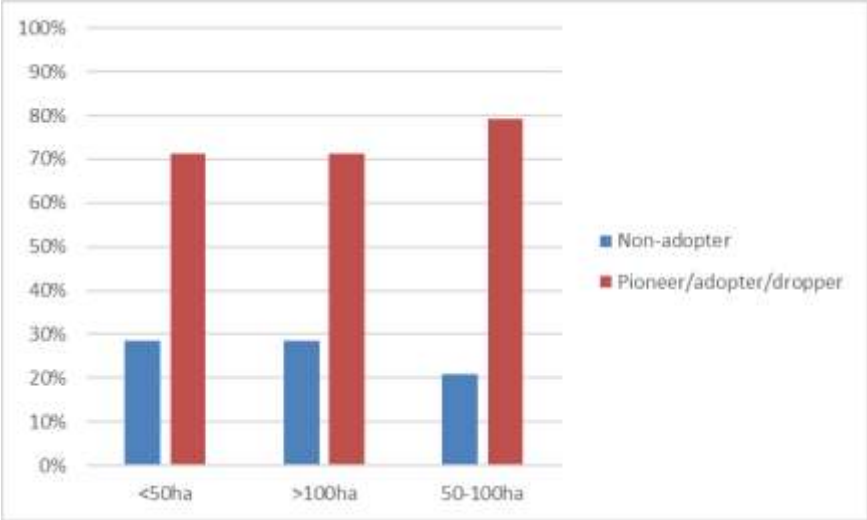
5.1 Case 1: the role of farm advice in innovation case study 1 Developing New Activities: *Pocket Digesters* (Renewable Energy)

5.1.1 Findings related to the Farmers' survey

5.1.1.1 Farmers' profile and farm structure

A total of 38 farmers participated in this case study, who owned a joined total of 2,910 hectares of land. This comes down to an average of 76.8 hectares of land per farm, of which the farmers on average owned 24.6 hectares themselves and leased or rented 51.9 hectares. The occupation of this land is mainly green maize (31.1ha on average) followed by permanent and temporary grass land, with on average 19.7 and 18.9 hectares of land used respectively. The relationship between farm size and decision to implement is provided by figure 6. For each farm size category, farmers are divided between the ones who have come to the decision to start implementing the innovation (pioneers, adopters and droppers) and farmers that have never decided to start the implementation (non-adopters). Their distribution do not differ significantly between different farm sizes, suggesting that the decision whether or not to implement this innovation was not directly dependent on farm size.

Figure 6: Relation between farm size and level of adoption



As the pocket digester uses manure to produce energy, the vast majority of the respondents were dairy cattle farmers. The average farm housed 328.8 cows. In fact, only one farm that was included in the study did not house dairy cattle, but was a pig farm with 5150 pigs. However, this farm was a non-adopter.

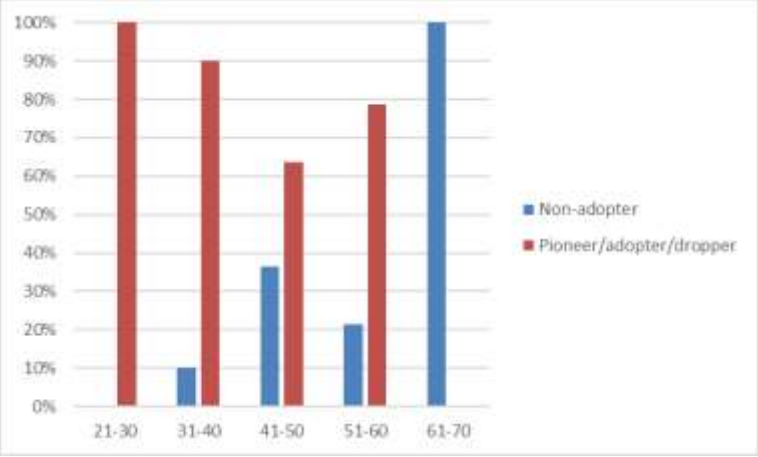
Hence, all farms in the study that implemented the innovation of the pocket digester were dairy cattle farmers.

For all farms, the total sales represented 100% of the final production. 79% of the farmers did not make any sales directly to consumers. Even if farmers sold directly to consumers, this was generally only marginal. Of the remaining 21% that did so, only one farmer sold more than 35% of his total sales directly to consumers. This farm also was one of only three farms that conducted the agricultural holding not solely for commercial purposes, but partially to preserve the environment as well. 26.3% of the farmers had been engaged in other gainful activities directly related to the agricultural holding, half of which consisted of the provision of health, social or educational services. In all cases, this represented less than 25% of their total revenues. All but one farmer stated they had benefited from agricultural subsidies, representing less than 25% of the total revenues of the holding for all farmers that received them. 60.5% of the farmers stated they benefited from financial support for innovation, of which slightly more than half (56.5%) came from operational groups.

All 38 farmers lived in their agricultural holding. There were on average between 1 and 2 permanently hired workers, but in high season the number of hired workers could rise to 20 or more people. The number of family workers ranges from 1 to 4. A clear general trend is that farmers tend to involve their spouses as well as their permanently hired workers in the innovation decision.

The largest part of the interviewed farmers (36.8%) came out of the age category of between 51 and 60 years old, closely followed by between 41 and 50 years old (28.9%) and between 31 and 40 years old (26.3%). Only two farmers were younger than 30 and only one was older than 61. Despite the fact that the oldest and youngest age categories are somewhat underrepresented in the sample, figure 7 reveals a general trend that younger farmers (40 years old and younger) are more prone to start implementing the innovation than older farmers. This might result from the fact that younger farmers tend to be less risk averse, and are perhaps less intimidated by the extra knowledge and labour required for its use.

Figure 7: Relation between age and level of adoption



The years of experience reflect the age of the surveyed farmers. 34% had 30 years or more of experience, 47% between 15 and 29, 13% between 5 and 14 and only 5% had less than 5 years of experience. Of the 22 farmers that were asked the question, 12 admitted they did not yet know who would be their successor.

However, only one farmer stated he would stop instead of searching for one. For 7 of the 8 farmers that already had a successor, it consisted of their sons or daughters. 45% of the surveyed farmers had a high school diploma in agriculture, 13% had a vocational training in agriculture, and 16% had a university degree, of which only one was not in agriculture.

5.1.1.2 Farmers' attitude towards innovation and change

One of the main sources of information for the farmers are farmers' unions (e.g. Boerenbond). The most frequent form of interaction through which the information is spread is individual advice, training sessions, workshops and seminars and magazines. The same ways of spreading information were often used by farmer associations, which were a second important source of information for most of the farmers.

Another important source of information is the private sector. Most farmers gained information from both independent advisors and input and machinery companies on a regular basis, with whom they always had individual contacts.

The farmer associations, cooperatives and independent advisors from the private sector gave information about a very wide range of topics. All topics, from technical support through certification and marketing were covered by these three main providers of information. The type of support of the input and machinery companies was generally limited to technical advice.

Apart from these advisory organisations and input and machinery suppliers, all farmers also sought information with their colleagues. They all would frequently talk to others, or visit neighbouring farms to assess innovations. Often the reasoning was to wait until the innovation proved to work with other farms and then implementing it, rather than being a pioneer and facing the risks that are involved with it.

Most farmers stated they were satisfied with the current support they received, although multiple farmers pointed out a lack of support in the form of independent advice when assessing relatively new innovations.

5.1.1.3 Farmers' innovation paths and trigger cycle change model

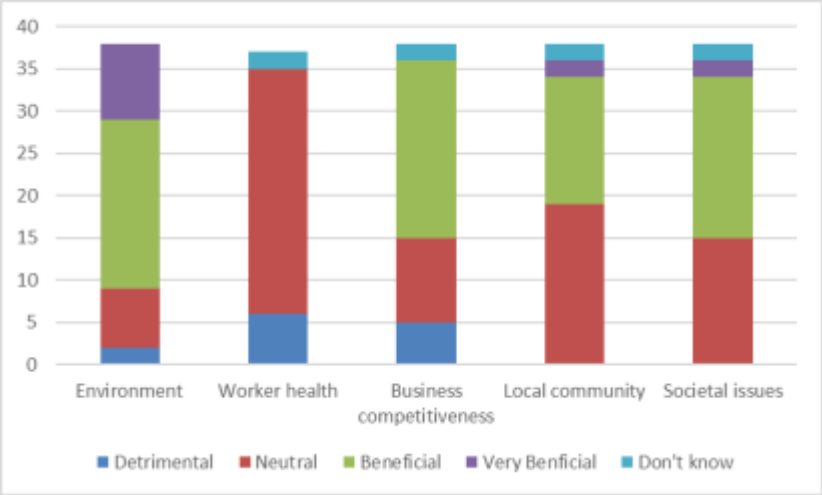
Within this survey, there are 16 adopters and 22 non-adopters, 13 of these 22 non-adopters are droppers, meaning they had the pocket digester installed and running at a time, but have decided to stop using it. Six of the 16 adopters consider themselves pioneers, meaning they consider themselves responsible for the introduction of the pocket digester in Flanders. Although most of the farmers saw the potential benefits on the pocket digester, it often was the case that farmers preferred to let their colleagues try it first before, and when it had proven to be a robust innovation, they would try it themselves.

When discussing the dissemination of the pocket digesters, farmers would generally compare with the couple of farmers they knew in their neighbourhood. All farmers knew at least one farmer that had also installed a pocket digester, but also one that opted not to do it. Several farmers also knew both farmers with whom the pocket digester performed (extremely) well, as well as farmers with whom the innovation did not perform as well as expected, or even did not perform at all.

Figure 8 provides an overview of the opinions of the farmers on the effect of installing a pocket digester. Almost all farmers agreed that the pocket digester did not significantly affect their productivity or product quality, so these were not included in the graph. They stated this innovation was beneficial to very beneficial for the environment, since it produces renewable electricity. On top of that, methane is captured instead of being released into the environment and manure quality is improved, making it more efficient for plants to take up its nitrogen. For the same reasons most farmers thought the pocket digester had a beneficial

effect on societal issues and the local community. However, several farmers thought a windmill or solar panels to be more attractive alternatives, since they require less labour and maintenance. A benefit of the pocket digester on the other hand is the fact that it provides a more stable electricity supply than do solar panels. The impact of the innovation on worker health and wellbeing ranged from neutral to detrimental. Some farmers considered it detrimental because of the extra maintenance labour. In broken installations, this often required the farmers to go inside the motor container, where there were irritable gasses. Furthermore, it was also argued that there were risks for explosions. However, other farmers pointed out this risk was substantially reduced in the second generation of pocket digesters, which consisted of silo's instead of plastic bags to store and process the manure. The opinions regarding the business competitiveness differed considerably between adopters and droppers. Adopters estimated the effect to be beneficial to neutral, whereas droppers thought the effect was neutral to detrimental. They not only attributed this to the fact that they didn´t recover the investment, but also to the extra working hours to address the (frequent) problems with the installation. The adopters on the other hand argued that the inexpensive electricity that is produced reduces the electricity bill and the green certificates generate extra revenue, both enhancing their business' competitiveness.

Figure 8: Farmers' opinions on the effect of installing a pocket digester



Generally, the farmers based their experience on the experiences of others. They all valued the shared experiences and advice from other farmers greatly. Hence, they mostly had a positive image concerning the innovation itself, but remained sceptical because of the maintenance issues and the lacking service of the technical supplier

During the awareness stage, the most important supportive actors and entities were farmers' unions and associations, who highlighted the existence of pocket digesters through technical brochures or websites, or via individual contact and group meetings with the farmers. Another important source of awareness was individual contact with other farmers who were implementing the innovation. Farmers would often go and visit the farms of colleagues who had recently installed their pocket digester. The innovation was also highlighted during agricultural fairs. The installing firm had won an innovation prize at the Agribex fair with their pocket digester in 2011, which sparked its publicity. Finally, the last important actor raising awareness of the existence of the pocket digester was the installing firm itself, which came to promote its

innovation in person at farms. Several farmers first heard of the pocket digester at a fair, in a magazine or from another farmer, and subsequently planned a meeting with the installing company. Farmers stated that during the awareness stage the flow of information was mostly uni-directional, as the farmers that were interested in the pocket digester listened to what the supportive actors/entities had to say. They did not know the product yet so were not able to provide a lot of input during the early conversations.

Almost all farmers were clearly able to distinguish the awareness stage from the active assessment stage. This might result from the fact that the pocket digester is a rather big and specific investment. Hence, the conditions had to be assured before starting to consider making such an investment. For some farmers the active assessment stage started within days after becoming aware of the existence of the pocket digester, whereas for some farmers these two stages were separate by months or even years.

The triggers that made farmers think seriously about the pocket digester on their farm often were the energy high prices and consumption. Other frequently cited triggers were feasibility studies performed by innovation advisors from farmers' unions (e.g. Innovatiesteunpunt). In multiple cases the farm was too small to install a pocket digester initially, so the plans to install one were often coupled to an expansion of the farm. For example, four of the surveyed farmers were planning installing milking robots that required a lot of electricity on their farms, so the pocket digester was a cost-effective and ecological way to fill the electricity gap. Another frequently identified trigger was the fact that during the early stages of the market integration of the pocket digester, the installing firm offered leasing contracts to pioneer farmers. This entailed a free installation and maintenance of the pocket digester, in exchange for which the installing firm would then receive the green power certificates. Hence, when installing the pocket digester they would not have to carry the high investment burden, reducing the financial risk. A final important trigger to start actively assessing the innovation was farmers seeing with their own eyes that the pocket digester worked at other farms.

During the assessment stage, farmers gathered as much information as they could, with other farmers and the advisors from the installing firm as the main sources of information. Farmers would often visit farms of implementers and discuss the innovation with them. The advisors from the installing firm always paid a visit to the farms of farmers assessing the installation. Again, the duration of the assessment period varied considerably between farmers, ranging from a minimum of several days to a maximum of more than a year. The pieces of information most often indicated as important were the cost of installation and maintenance, the economic benefits (electricity production and subsidies), the adaptations that were needed for handling the manure, and the required licences and technical data. Farmers reported not having too many difficulties obtaining this information. Most of their questions were answered by colleagues, advisors from the installing firm, or group meetings organised by cooperatives (Innovatiesteunpunt) or by local advisory departments of the Ministry of Agriculture (Inagro). However, several farmers pointed out that they would have preferred to receive more independent information about the pocket digester and other electricity saving or –producing techniques in general. They feel that they were redirected to the manufacturer (and hence got biased advice) too soon, instead of gaining independent advice from farmers' unions. More than once, it happened farmers were not satisfied with the information the installing firm provided them during the assessment stage, as they thought it was biased and incomplete. Moreover, several farmers denounced the fact that there was little or no room for feedback coming from the farmer when discussing with the installing firm.

The most cited benefits of the innovation included own energy production, improved manure quality, the generation of hot water, the eco-friendliness and the positive image that was created. The reliability of the machine (and the extra labour accompanying technical failures) was considered the main risk of the implementation. The installing firm tried to ensure farmers they could considerably reduce this risk by offering maintenance contracts. However, farmers saw this as a risk as well, since they heard from colleagues that the service of the installing firm was not satisfactory. A general shortcoming of the pocket digesters was the lack of guarantee from the installation company. In general, the implementation of the pocket digester was always weighed off against alternative methods to more self-sufficient in energy, such as solar panels or windmills. Another general remark is that farmers are not easily discouraged by having to learn new technologies, but mostly care about the economic viability of an innovation.

If farmers came to the decision to implement the innovation on their farms, the main motivations to do so were the cheap electricity, better manure quality and sustainability. In the case of doubt in the early cases, the leasing contract often was the trigger to decide to go through with the implementation. The vast majority of farmers (79%) received assistance from the installing firm during the implementation of the pocket digester. Employees of the firm would sporadically visit the farms and give individual advice, and even check the installation frequently in the case of maintenance contracts. Although most farmers would call or visit other farmers who had already implemented the innovation, they stated the largest share of technical knowledge about the implementation came from. Farmers also received help from an innovation advisory organisation of farmers' unions (Innovatiesteunpunt), under the form of individual advice and training sessions/workshops. About a third of the farmers (39%) went to visit farms of colleagues that had already installed the pocket digester during this implementation stage. The most important information during this stage was technical information about the adaptations required, such as plumbing, piping and internet.

In the early cases with the leasing contracts the installing firm did all of the installations itself, so farmers did not have to cope with it. Even though the contract would normally ensure that farmers did not have to do any of the maintenance either, there were small problems so often that farmers did have to address them themselves. In the cases where the implementation of the pocket digester went together with an expansion of the farm, farmers often got personal support from a stable builder as well.

As was already mentioned before, the general trend is farmers not being satisfied with the services of the installing firm. Several farmers report that there was not really room for feedback towards the installing company after installation and that it took long before would solve occurring problems. Some farmers mentioned that they did not like the fact that they had little control over the settings. A couple of farmers who were not satisfied with the service of The installing firm contacted external maintenance companies (e.g. Krivalec/Greenservice, Biotechnic), who did provide good service. However, due to legal issues this firm has been hindered to support farmers that had a pocket digester from The installing firm.

In response to these lacking services, farmers with pocket digesters have united themselves in a group (Pocket Boeren) that holds three to four meetings a year to discuss practical problems with the pocket digester. All farmers that have joined this group have reported it is very helpful, and they are thankful for its existence. Some farmers also attended meetings organised by cooperatives or local advisory departments from the Ministry of Agriculture, which they found very useful.

Regarding perspectives for the future, about half of the farmers plans on maintaining the innovation but not developing it further. They do not want to invest on it anymore or want to wait for The installing firm

to gain more experience. Some farmers want to optimize the working of the installation, and plan on doing so by gaining information from formal (Boerenbond) and informal (Facebook) groups they have joined. Some farmers plan to stop using the pocket digester as soon as they will no longer receive the green power certificates. They are tired of putting effort into it and keep it running for only about 30% of the time. A small minority has plans on performing some small adaptations, such as building extra storage for the manure.

Generally, farmers did not want to be the first ones to test the new innovation, but rather wait to see how it worked out with colleagues. The extra labour involved after implementing was pointed out as barrier for the implementation. For some farmers their farm was too small for the digester. Another major point of doubt was the negative feedback from other farmers concerning the maintenance problems and the lack of support from the installing firm.

In order to implement the pocket digester in the future, farmers would first want more certainty. They think the idea of extracting energy out of manure is promising, but miss some kind of guarantee it will work. Several partners feel like there is a lack of independent advice besides that of the installing company. The large investment costs are pointed as well as an obstacle, and one farmer adds that he thinks farmer organisations should put more effort in trying to convince the government to give more subsidies to green innovations such as the pocket digester. He thinks an investment subsidy would be a better alternative to the current green power certificates.

All of the farmers who decided to drop out of using the pocket digester attributed it to the occurrence of too many technical problems. They did not get sufficient support from The installing firm. One farmers adds the fact that farmers were not given access to the operating settings, so he was not allowed to intervene when he thought it was necessary. Several pioneer farmers clarified that they had to pay a learning price without being compensated for it. The installing firm would observe from the failures of the installations on the farms of pioneers, and would sell adjusted installations at the same price to other farmers.

Considering reintroduction of the installation on farms where the farmer decided to stop the use of the innovation, only three farmers planned on doing so. One surveyed farmer states he would consider re-introducing the innovation with another supporting firm. Two other farmers will wait until the leasing contract expires so they can start solving the problems themselves instead of being dependent on The installing firm. For support, they plan on turning to cooperatives such as Boerenbond for advice.

5.1.1.4 Farmers' innovation micro-AKIS

The farmers' micro-AKIS remained generally the same during the awareness and the assessment stage. Three groups of actors clearly stand out. A lot of awareness and assessment info is provided by farmers' unions. This mainly happened through technical magazines, working groups and meetings and websites. Secondly, the private company associates (The installing firm) played an important role. They made farmers aware of the existence of the innovation at agricultural fairs, and discussed the innovation one to one with the farmers during one or more farms visits. The final key supportive actors were neighbour farmers or peers. Throughout the whole process of gaining awareness and information, farmers would rely on each other by calling on the phone or visiting each other's farms. This micro-AKIS was not only consistent throughout different stages of the triggering change model, but between different farmers as well. Both

adopters and non-adopters relied on the same supporting entities when considering the implementation of this innovation.

During the implementation stage, adopters mostly relied on the support from the private company associates (The installing firm). Farmers who had signed a leasing contract could leave the implementation process completely up to the installing firm. Farmers who had not signed such contract and faced difficulties during implementation formed and joined groups to offer each other advice. This happened both formally under supervision of a cooperative (e.g. Boerenbond) as well as informally (Facebook groups, informal group meetings).

This micro-AKIS remains similar for the general management as well. Farmers stay up to date with the latest discoveries through magazines, websites and working groups from farmers' unions. They frequently discuss management with their neighbour farmers and peers, and frequently receive visits from advisors from private companies. When they start assessing any kind of innovation, they actively search for (independent) information using Internet, magazines, advisors, working groups and individual contact with peers.

5.1.2 Findings from the AKIS experts interviews and advisory organisations survey

5.1.2.1 Advisory landscape in the focus region

Labarthe and Moumouni (2014) provided an overview of the advisory landscape in Flanders in their Report for the AKIS inventory (WP3) of the PRO AKIS project. They found that there were eight key actors of the AKIS in Flanders. The **universities** of Ghent and Leuven are directly involved in agricultural research but do not train advisors. There is a main **research institute** (ILVO) that conducts research for all the sub-sectors of agriculture. 14 **experimental stations** are a central element of the Flemish AKIS, as is the **Agency for Innovation by Science and Technology (IWT)**, which helps Flemish companies and research centres with funding, advice, and support to networks of potential partners. Another important role is played by **(professional) advisory services**. There are three main **farmers' associations**, namely Boerenbond, Bioforum, and Algemeen Boerensyndicaat. Finally, Labarthe and Moumouni (2014) stress the importance of **support systems** (knowledge from input suppliers or production collectors) and **education**, with both secondary and higher education offering agricultural programs.

Four advisory organisations were surveyed during this case study. An overview of the organisations, their operating region, type and role is provided by table 4. All surveyed advisory organisations operate at the regional level, and the Hooibeekhoeve operates also at European level.

Table 4: Advisory organisations in the focus region

Organisation	Region	Type	Role
Hooibeekhoeve	Antwerp	Research institute	Support agricultural education

Innovatiesteunpunt	Flanders	Farmer based cooperative	Support innovation for agricultural and rural development
Inagro	West-Flanders	(Semi-) public organisation	Research and advisory organisation for agriculture and horticulture
Biogas-E	Flanders	Organisation for anaerobic digestion	Information provision and project and policy support

5.1.2.2 Key players of advice for the innovation area in the focus region

Hooibeekhoeve only informed farmers about the existence of the pocket digester, but did not go any further in advising farmers on the matter. Biogas-E went one step further and also provided assistance during the implementation of the innovation. Innovatiesteunpunt and Inagro have played a role during all stages of the trigger change cycle. They informed farmers about the existence of the innovation, guided them during the assessment of the positive and negative aspects of the innovation, and supported them during the implementation of the innovation on the farm. Whereas the actual construction was mainly performed by the installing firm, these advisory organs took care of the permits. They both play a similar role during the whole process, but Innovatiesteunpunt has a larger operating area than does Inagro. The experts think their advice is most valuable during the assessment stage.

The experts from the advisory organisations agree that the first adopters of the innovation were mainly influenced by the advisors from the selling company (The installing firm). In the beginning there were no evaluations of the innovation available yet, because of the short time span between the installations of different pocket digesters in the focus region. Hence, the advisors from this company were the only available source of information for potential adopters. They describe the main triggers for farmers as the reduction of the energy cost, better manure, low payback period and government support. They did not intervene in the decision process of the farmers to stop the use of the pocket digester. Farmers made this decision on their own, taking into account the amount of money and labour they are willing and able to invest into it.

Despite its promising start, the experts state that the market for the pocket digester is dormant now. Farmers have lost their trust in the technology, mainly due to the negative experiences of their neighbour farmers or peers. They also highlight the importance of market competition, which was completely lacking in this case study.

Farmers have looked for information regarding the pocket digester to be able to assess it properly. Nowadays, the main role of advisory organisations regarding the pocket digester is warning farmers about the possible negative effects.

The experts thought that in order to realise the sustainability promise of the innovation, better communication and more involvement of people with business knowledge of agriculture is needed. They pointed out that a challenge for advisory organisations consists of providing individual advice, since farms in the focus region tend to differ from each other, and these differences need to be taken into account when assessing innovations. Finally they stressed the importance of independent advice to prevent disturbing the market and the importance of following up on the developments on their client's farms.

5.1.2.3 Transformation of advisory landscape

The advisory organisations received their funds from contracts with local authorities, a farmer-based cooperative (Boerenbond), and from fees for services and projects. Two of the surveyed organizations had their own research facilities to their disposal, and they all had their own knowledge platforms. Innovatiesteunpunt was the only organisation that did not have open access to this platform, but limited it to its members. The amount of permanent staff members ranged from 2 to over 200, and the number of advisors from 2 to 50.

The main methods of advisory work are individually via phone or e-mail, small group advice both on and outside farms, large group open advice, internet portals, publications and one to one advice on farms. The average frequency of interaction of the advisors with farmers is daily or weekly, and on average 800 to 5,000 clients are served in this way. These clients do not only consist of farmers, but schools, industry, government, and other advisory organisations as well. None of the advisory organisations served large commercial farms, but small to medium sized commercial farms made up a major group of their clientele. Young farmers were identified as a major group of the clientele as well. The main topics that are offer by the advisory organisations are renewable energies, environment, rural development, plant and animal production and business diversification.

Regarding the pocket digester, farmers approached the advisory organisations and the other way around. The methods of advisory work for this innovation did not differ significantly from the general approaches of the advisory organisations. None of the organisations invested in back-office activities regarding this innovation. Only the advisors from a local advisory department of the Ministry of Agriculture (Inagro) received training on the pocket digester, provided by a private training enterprise. The most identified important sources of information were the private company (The installing firm), public research/knowledge centres, and farmers.

For the moment, the most asked for advice regarding the innovation is problem solving. The experts state that they will only have to provide more advice regarding the pocket digesters when (if) the confidence of the farmers is restored and the market recovers. In conclusion, they stress that in the future more farm-specific advice can and should be provided, which can be achieved by following up existing installations.

5.2 Case 2: the role of farm advice in innovation case study *Cooperatives*

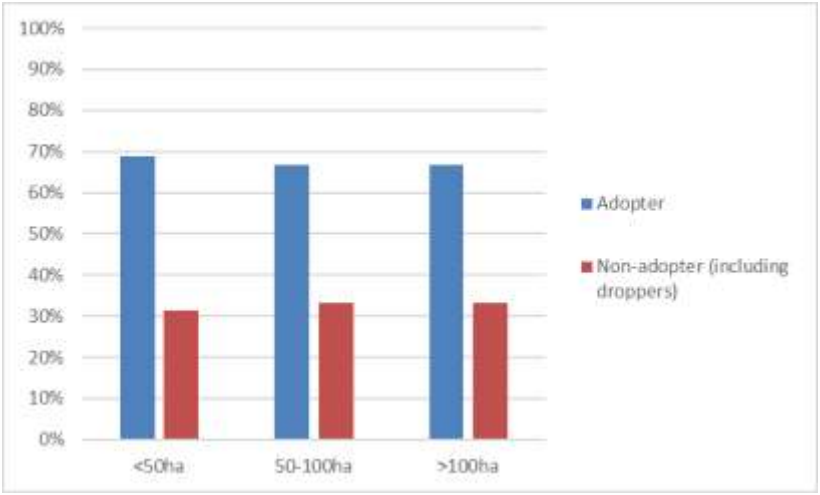
5.2.1 Findings related to the Farmers' survey

5.2.1.1 Farmers' profile and farm structure

In this second case study about joining a cooperative as a form of innovation, a total of 31 farmers were interviewed. The average farm consisted of 64 hectares, of which 26 hectares was owned by the farmer and the remaining 38 hectares were leased or rented. The sample consists of dairy farmers, pig farmers, vegetable farmers, fruit farmers and even one floriculture farmer. Hence, the occupation of the land consisted of many different crops. Figure 9 gives an overview of the relation between farm size and level of adoption. For each farm size category, farmers are divided between the ones who are still member of a cooperative (pioneers and adopters) and farmers that are not members at the time (non-adopters and droppers). The figure shows similar distributions between different farms sizes, suggesting that joining a

cooperative is an equally attractive option for small and large farms, and hence the final decision does not depend on farm size.

Figure 9: Relation between farm size and level of adoption



The vast majority of the farmers (91%) lived on the agricultural holding, whereas only 3 farmers (9%) did not. The number of permanently hired workers ranged from zero to 25, with an average of 2.7. During the high season the numbers of hired workers could rise sharply, with an average of 10 temporarily hired workers per season. In 31% of the cases there were family members working at the farm part time.

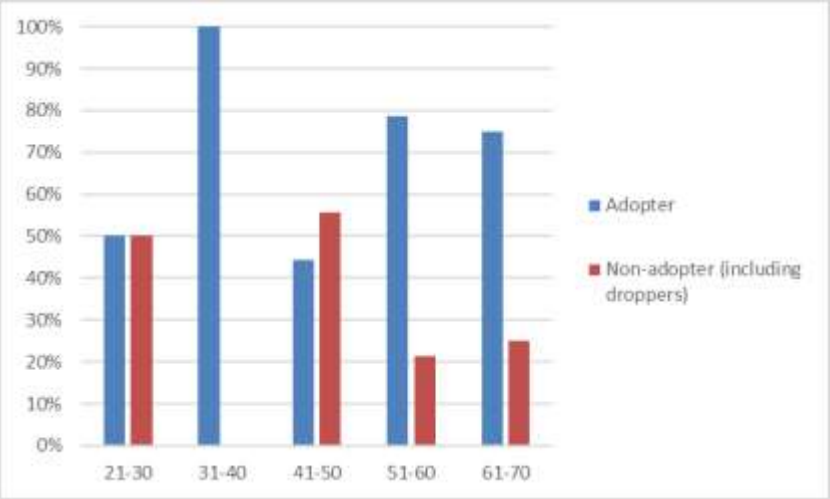
For 81% of the farmers, the total sales represented 100% of the final production. For 16% (5 farmers), this was between 50% and 100% and for only one farmer (the floriculture farmer) the total sales represented less than 50% of the final production. 66% of the farmers made no sales directly to consumers. For 22% of the farmers, sales directly to consumers made up less than 35% of the total sales. For two farmers this percentage was between 35% and 75%, and the floriculture farmer sold more than 75% of his production directly to consumers. 25% of the farms had been involved in gainful activities other than production. These activities entailed the processing of agricultural products and the provision of social, health and educational services. In most cases, the share of the revenue from these activities was less than 25% of their total revenue. Farmers often included their spouses when assessing the option to join a cooperative. For the hired workforces, this was almost never the case.

26 of the farmers (81%) stated that they had received agricultural subsidies, which always were less than 25% of the total revenue. 59% of the surveyed farmers had received financial support for innovation, of which most came from the Flemish agricultural investment fund (VLIF). In almost all cases this support came either at the final stage of implementation to reduce equipment costs, or even after the implementation of the innovation.

14 of the farmers (45%) were between 51 and 60 years old, 29% was between 41 and 50, and 13% was between 61 and 70 years old. Only 2 farmers were between 31 and 40 years old, and another 2 farmers were between 21 and 30 years old. Of all the farmers that had answered the question, about half had an idea about who their successor would be, who always was a son or a daughter of the farmer. The number of years of experience in agriculture again reflected the farmers' age. The majority (52%) had been working in the sector for at least thirty years. 42% had been working as a farmer between 15 and 29 years, and

only two farmers (6%) had less than 14 years of experience. An overview of the relation between farmer age and level of adoption is given by figure 10.

Figure 10: Relation between age and level of adoption



39% of the interviewed farmers had a high school diploma in agriculture. 23% had followed a vocational training in agriculture. Another 23% had a university degree, of which the majority was in agriculture. 13% had a high school diploma in another discipline than agriculture, and one farmer had a vocational training in another discipline than agriculture.

5.2.1.2 Farmers' attitude towards innovation and change

Since the regions of Flanders are so small, we were forced to use the whole Flanders area for both case studies in order to interview enough respondents. Hence, the general farmers' micro-AKIS and the advisory landscape of the focus region are similar for both case studies. Small differences may arise because the sample of farmers interviewed in this case study (about cooperatives) is more heterogeneous, i.e., it consists of farmers with different types of production. A cooperative is a concept that can be interpreted in multiple ways as well. On one hand, this case study has investigated very large cooperatives that buy the bulk of the production of their members (e.g. Milcobel for dairy farmers) or auctions (e.g. Belorta for fruit or vegetable farmers). On the other hand, we have interviewed members of smaller cooperatives with only a couple of members, for example farmers who have formed a machine cooperative to share their machinery. This provided us with a very interesting mix of information, of which the following paragraphs give a general overview.

As was the case in the first case study, one of the major suppliers of information were farmers' unions (e.g. Boerenbond) who advise farmers about all kinds of topics in several ways, but mostly through individual contacts, meetings and magazines. Farmer based associations were important providers of general advice as well, mostly through individual contact and magazines. Furthermore, almost all farmers stated they received advice from independent advisors from the private sector. This was almost always in the form of individual advice in person, where the advisors would pay a visit to the farm. Farmers also indicated that they learnt a lot from other farmers, as observing on other farms and talking to other farmers were

mentioned very frequently as being useful for the general management. To a lesser extent, other instances such as local advisory departments from the Ministry of Agriculture, research institutions and advisors from input and machinery companies were identified as advisors for the general management as well.

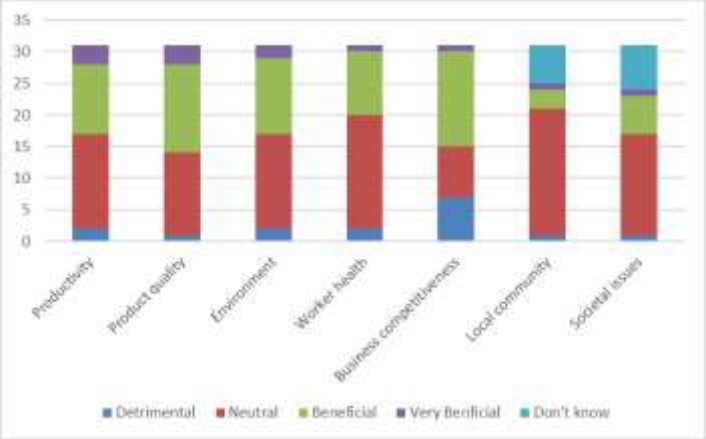
5.2.1.3 Farmers' innovation paths and trigger cycle change model

In this case study, we interviewed 31 farmers. 21 of those were adopters, 7 were droppers and 3 were non-adopters. 4 farmers out of the 21 adopters considered themselves to be pioneers, i.e. they consider themselves to be responsible for the introduction or foundation of the cooperative.

For the larger cooperatives, the interviewed farmers frequently stated that joining a cooperative has grown historically. They think it is beneficial for farmers that they do not have to take care of the marketing of their produce themselves. Moreover, most farmers that are member of a cooperative agree that it increases their financial security because of the certainty of delivery and payment. However, several farmers indicate that they think they would be able to get this security without the cooperative as well. Several farmers know of other farmers who are member of a cooperative, and of other farmers who have left the cooperative or have never joined one. They have heard of several reasons not to join or to drop out of the cooperative, such as a risk of financial default of the cooperative (e.g. during "milk crisis"), not wanting to pay the entry fee or large farms thinking they are big enough to stand alone and do the negotiations themselves, not needing the support from the cooperative. Other farmers thought that the decision-making in the board of the cooperative was too cumbersome, or that they could get better prices from the private sector. Another important aspect of the decision whether to deliver to a cooperative or to a private company is their location. Often farmers choose for the option that is closest to their farm. A couple of farmers added that it is important to have the cooperative mindset. Some farmers also stated that they did not really have an alternative to joining the cooperative. For smaller cooperatives (when a couple farmers try to persuade other farmers to join them), a farmer highlighted that most farmers prefer to work alone, and it takes a really good plan to change that.

Figure 11 provides an overview of the farmers' opinions of the effect of joining a cooperative. For the large cooperatives, the impact on productivity was rated positive. Farmers can leave sales to the cooperative and only have to worry about the core of their business: production. Furthermore, there also is a positive impact on product quality because of the demands set by the cooperative and their centralised quality controls. Oftentimes (especially for fruits and vegetables) the cooperatives base their prices a quality measure, further encouraging the farmer to deliver high quality products. The cooperative's quality demands can be set under the form of labels, which can positively affect the environment and the worker health. These labels and demands also make farmers more aware of their environmental impact. The efficiency rises, enhancing the business' competitiveness. However, for some farmers the quality norms are too strict, which has a detrimental effect on the productivity and business competitiveness. One farmer pointed out that joining a cooperative is positive for his wellbeing, as he greatly values the social contact with his peers and gets a great feeling of satisfaction for accomplishments made in group. Farmers also think it is pleasant that they have a say in the decisions of the cooperative. For the local community the effect is positive for smaller cooperatives, where the emphasis often is on locally produced foods. This effect can also be positive for large auctions, which provide work for the local community. Smaller cooperatives can also provide access to machinery that would otherwise be too expensive, greatly increasing productivity and product quality.

Figure 11: Farmers' opinions on the effect of joining a cooperative



For large cooperatives, the awareness stage was mostly not clearly defined. Being a member of such a cooperative often grows historically and since their parents already were members, farmers have been aware of the existence of the cooperative since childhood. For the same reason, there was not a clear trigger moment either. The assessment stage was mostly reduced to some discussions with the parents. Farmers frequently reported that joining the cooperative was the only logical thing to do, and there was no alternative. In the cases were there was an assessment stage, farmers would turn to farmers' unions (e.g. Boerenbond) for advice. This would happen under the form of one-to-one advice in person, or by attending workshops organised by these instances. Some farmers also report that they received helpful information from peers who already were member.

The main benefits of joining a cooperative considered in the assessment stage (if there was one) were the certainty of delivery and payment. It was also seen as beneficial that advice could be gained from the cooperative when problems arise and that the cooperative promotes the sector. The costs considered were the entry fee, promotion costs, research costs and the cost of the shares the entrant had to buy. Of course these shares would also return a dividend, which was included in the consideration of the benefits. Farmers also wanted to know which exact tasks the cooperative would perform. It was important for farmers that they would not have to worry about logistics and administration anymore. Farmers thought that a risk lied in the fact that if the cooperative would fail, this would affect them as well as they would lose the value of their shares. But because the cooperative is controlled by members themselves, there are fewer risks than in the private sector. This reduction in risks and uncertainties was even indicated as one of the motivations to join a cooperative. Often cited negative side-effect were the dependency on other members, and the tensions between members. The most important reasons for going through with the implementation were the economic, logistic and administrative advantages discussed above. The implementation itself was very easy, as it was mostly sufficient to meet once with a representative of the cooperative to take care of everything and hence no support was needed.

In the case of smaller or younger cooperatives, there often were more distinguishable awareness and assessment stages. Here, the trigger is often that farmers realise they could achieve more when they would start working together. Sometimes the trigger would also come from external factors instead of from the farmers themselves. For BioNoord-IVEP (a pig manure processing cooperative) for example, farmers had to do something to respond to new legislations. Farmers first wanted to work with private companies, but

it soon became clear that they had different interests. Farmers wanted their manure to be processed at the lowest price while investors wanted the processing to be profitable. In these cases, farmers often became aware of the existence of the cooperative when a peer farmer asked them to join. Another important source of information were farmers' unions (e.g. Boerenbond) or local advisory organs from the Ministry of Agriculture (e.g. Inagro) who would organise meetings and courses or give individual advice. When pioneers would assess the foundation of a cooperative, they would seek knowledge and negotiate with several parties, such as the private sector, farmers' unions (e.g. Innovatiesteunpunt), environmental workers, accounting offices, peers from other countries… These same actors played a part in the implementation stage as well, and during both stages almost all of the contact was through individual advice in person. In these smaller cooperatives the dependency on each other is even greater, because when one other member goes bankrupt this most certainly will affect the other members. The main point of discussion here was deciding who would take up which role and responsibilities.

Although it is not reflected in figure 8, several farmers highlighted that the cooperative serves the interest of the average farmer. Hence, if a farmer runs a too small holding, then he cannot meet the demands of the cooperative. On the other hand, when his operating scale is too large he might not need the cooperative's support. This is not the only problem caused by the cooperative's general trend to serve the interest of the average farmer. For instance one organic farmer argued that his cooperative set too high demands based on conventional farming, which caused almost all organic farmers to leave the cooperative.

There is a rather strict division of farmers: some farmers are very pleased with the cooperative whereas other are not at all pleased with it. The most important reasons not to be pleased include the log and inefficient working of the (large) cooperative, the idea that some (larger) farmers have more to say, the fact that they do not get added value and the feeling that they are left to their fate when their product does not meet the cooperative's demands. Moreover, some farmers feel like the cooperative makes farmer lazier and lose their sense of entrepreneurship.

Regarding further development, some farmers are planning on remaining members or even becoming board members, whereas others are thinking to leave the cooperative. The farmers who want to remain members identify as major challenges fighting the rising individualism. When farmers are assessing the option to leave, triggers are often the way things are handled within the cooperative, for example at the meetings. Others think they do not need the cooperative for financial security. Some farmers feel like their voice is not heard in the cooperative, and denounce the fact that some board members have been in their function for too long periods of time. Furthermore, one farmer adds that he thinks that the retail is evolving to a more personal approach, where consumers want to know the farmer that produces their food to experience a feeling of authenticity. He thinks his cooperative should adapt to this changing market, but fears it will take too much time. For advice, doubters turn to advisors from farmers' unions (e.g. Boerenbond) or talk to other farmers. The main obstacle for doubters to remain member of the cooperatives is the fact that the private sector does not give any guarantees. Regarding the members of the smaller cooperatives, it seemed that they did not contemplate the decision to leave their cooperative, but were rather satisfied with its working. They were not necessarily looking for expanding in terms of number of members, but they often did want to intensify their cooperative and start sharing more tasks.

The farmers who are non-adopters preferred delivering their produce to private companies because they (think that they) get better prices from the private sector. One non-adopter (a dairy farmer) states that

the cooperative and its members both only care for their individual interests. The cooperative wants to buy more milk to sell more and the farmer wants to grow (which is best for him individually) so he produces more milk. Because all farmers reason like this these results in an overproduction of milk, where in the end everyone is off worse. In general, these farmers are satisfied with their relationship with their buyer and do not see any reason to leave.

For the droppers, reasons to leave the cooperative included the lack of transparency and the fact that they thought to be better off financially when selling their produce to the private sector. According to the farmers, the reason for this lies in the fact that the private sector focuses more on creating products with high added-value, while cooperatives focus on bulk products. Some farmers wanted to increase their short food chain selling, as they believe this will grow in importance in the future. Furthermore, droppers missed the entrepreneurship and felt like they were not 'equal to' the board of CEOs, who they accuse of sitting in an ivory tower. The large farms state that they did not really benefit from the things that the cooperatives did for the average farmer. Moreover, they liked that they could negotiate the prices for themselves, rather than took the prices being fixed by the cooperative.

5.2.1.4 Farmers' innovation micro-AKIS

Given the fact that large cooperatives (e.g. Milcobel, BelOrta) have been part of the agricultural landscape in Flanders for such a long time, there were not a lot of advisors involved in the awareness or assessment stages. Most farmers became aware of the existence of these cooperatives during childhood, and discussed them with their parents and neighbour farmers. Joining one of these cooperatives is a very simple process, only involving a transaction of shares and a one-time individual visit from a representative of the cooperative. Although they were not necessarily involved in the TCM stages, instances such as farmers' unions (e.g. Boerenbond) and local advisory departments of the Ministry of Agriculture (e.g. Inagro) did provide general advice under the form of meetings and seminars or individual advice.

For the smaller cooperatives, the micro-AKIS looks a lot different. Here, farmers would seek information from a variety of sources, with the most important ones being farmers' unions (e.g. Innovatiesteunpunt), independent accountants, and neighbouring farmers (peer-to-peer). These parties would guide the pioneers through the assessment and implementation stages. Other farmers would mostly hear about the existence of these cooperatives from farmers who already were member, and would gather most of their information through them. Farmers' unions (e.g. Boerenbond) would sometimes provide assistance as well.

The general farmer micro-AKIS differs somewhat from the one in this specific case, and looks more like the micro-AKIS from the previous case study. In general, farmers stay up to date with the latest discoveries through magazines, websites and working groups from farmers' unions. They frequently discuss management with their neighbour farmers and peers, and frequently receive visits from advisors from private companies. When they start assessing any kind of innovation, they actively search for (independent) information using Internet, magazines, advisors, working groups and individual contact with peers.

5.2.2 Findings form the AKIS experts interviews and advisory suppliers survey

5.2.2.1 Advisory landscape in the focus region

As the focus region is all of Flanders for both case studies, this paragraph is identical to paragraph 5.1.2.1 from case study 1. Labarthe and Moumouni (2014) provided an overview of the advisory landscape in

Flanders in their Report for the AKIS inventory (WP3) of the PRO AKIS project. They found that there were eight key actors of the AKIS in Flanders. The universities of Ghent and Leuven are directly involved in agricultural research but do not train advisors. There is a main research institute (ILVO) that conducts research for all the sub-sectors of agriculture. 14 experimental stations are a central element of the Flemish AKIS, as is the Agency for Innovation by Science and Technology (IWT), which helps Flemish companies and research centres with funding, advice, and support to networks of potential partners. Another important role is played by (professional) advisory services. There are three main farmers' associations, namely Boerenbond, BioForum, and Algemeen Boerensyndicaat. Finally, Labarthe and Moumouni (2014) stress the importance of support systems (knowledge from input suppliers or production collectors) and education, with both secondary and higher education offering agricultural programs.

During this case study, ten advisory organisations were surveyed. An overview of the organisations, their operating region, type and role is provided by table 5. These advisory organisations operate at a wide range of levels, from a regional to a worldwide level.

Table 5: Advisory organisations in the focus region

Organisation	Region	Type	Role
Cera Coopburo	Flanders	Cooperative	Advise and support concerning cooperative entrepreneurship
Innovatiesteunpunt	Flanders	Advisory organisation for innovation	Support innovation for agricultural and rural development
SBB	Flanders	Advisory organisation for accounting	Accountancy for entrepreneurs
Veiling Hoogstraten	Antwerpen	Farmer based cooperative	Cooperative fruit & vegetable auction
Coopkracht	Flanders	Advisory organisation for cooperatives	Advise and support concerning cooperative entrepreneurship
Febecoop	Flanders	Advisory organisation for cooperatives	Promote and develop the cooperative business model
Belorta	Flanders	Farmer based cooperative	Cooperative fruit & vegetable auction
KBC	Flanders	Bank & insurances	Providing loans and insurances
REO veiling	West-Vlaanderen	Farmer based cooperative	Cooperative fruit & vegetable auction
Milcobel	Flanders	Farmer based dairy cooperative	Process and sell dairy worldwide

5.2.2.2 Key players of advice for the innovation area in the focus region

The representatives from the advisory organisations indicated that there is an increase in the accession of cooperatives since the economic crisis. Over time, smaller cooperatives have got 'absorbed' by larger ones, resulting in a small number of large cooperatives with a lot of diversity in their members. They also confirmed that most farmers join a cooperative out of tradition, because their parents already were members.

When farmers want to join an existing cooperative, they do not really seek advice because everything is handled by the cooperative itself and it often goes from father to son. However, when they want to start a new cooperative, they want as much information as they can get. Therefore, they meet up with other

cooperatives, lawyers, financial institutions, among others. The kind of information they seek varies from inspiration (early development) to operational and practical information (when the business model is already worked out). After this implementation, farmers also seek help from advisory organisations for evaluations of their cooperative. The main trigger to start up a new cooperative often is that farmers think that they can achieve more together (sell product, buy machinery…). The surveyed advisory instances provided several different services concerning the topic of cooperatives, such as academic research, education, networking, or offering workshops.

When discussing the advantages and disadvantages of joining a cooperative, the advisory organisations agree that a cooperative enables a bigger capacity and makes farmers stand stronger in the market. Furthermore, costs will decrease because they are carried together. The delivery right gives a certainty to the farmers. The negative consequences are possible frustrations about being in a group where not everyone necessarily shares the same vision and the majority rule is applied. Another source of frustration is that the cooperative is sometimes slow to innovate.

They highlight that in order to be successful cooperatives should be transparent and 'people-centred'. The added-value of their products should flow back to the farmers and not to the stores. A challenge for the future lies in the fact that the agricultural market is rapidly changing, while the concept of cooperatives is working long-range. Furthermore, because of the great diversity in partners, it might be difficult to work together as a team. The cooperatives are working locally, but part of their products will be sold in the global markets as a commodity. It is important for the board to keep in mind that the vision of the local farmers will not reach the international market. The goals of the cooperative, and how to reach them, should be evaluated regularly and reconsidered when necessary.

The advisory instances thought that farmers became more individualistic when the market was having a bad time, when there were disagreements between the farmer and the management or when their companies became too big. These were identified as the most important reasons for dropping or non-adopting.

The interviewees agree that the educational system should include more business related themes in their classes, so that young people know what cooperatives are all about. Furthermore, they stress that individual advice is crucial, since what is good for the sector is not necessarily good for a single company. Advisors need to constantly be trained to be fully informed about legal and economic issues to help with business plans and statutes. It can be challenging to gain this expertise and to transfer it to the partners. This is even further complicated by the challenge of keeping the advice affordable. On the other hand, one interviewee stated that the advice is too cheap now that it loses its value. Several of the interviewees stressed that an advisor should have a very broad vision and skillset and a high degree of involvement towards the members. The importance of maintaining an information flow after a member has joined a cooperative and following up why a member would leave a cooperative were also stressed. Multiple interviewees added that the development of ICT-tools to decrease the money and time investment required for new cooperatives could be of great significance. Another challenge for the future is making farmers aware that they can and should seek help from advisory organisations from the very start. Nowadays, some farmers wait too long and come for help when writing the legal statutes, while their business model is not worked out yet. Almost all representatives from the advisory instances agreed that it is extremely important for their advice to be neutral and objective. Several advisory instances agreed that the different instances should share information with each other, bringing out all the good and bad

stories and constantly educating their advisors. Despite being financially challenging, becoming better at advising farmers about cooperatives is essential since cooperative entrepreneurship is on the rise in Flanders.

As for the role of European policy, some money from European funds (e.g. from the CMO-program and sustainability program) is given to producer organizations, which are established as cooperative in Flanders.

5.2.2.3 Transformation of advisory landscape

These advisory instance received their funds from a variety of ways, such as EU funds, contracts with the national state, project money, dividend money (Cera coopburo), fees of advisory services paid by entrepreneurs, and joint commercial transactions of agricultural products (REO, BelOrta, Milcobel, Veiling Hoogstraten). Three of the advisory organisations owned their own experimental facilities and they all had their own knowledge platforms, of which half were with restricted access. The number of staff members ranged from 2 to 2000 with a median of 95, and the number of advisors ranged from 2 to 250 with a median of 20. In six of the ten advisory organisations, the advisors had received training about cooperatives in the past year, which was internal in five out of the six cases. They would get their information from universities, farmers, private companies, authorities and other cooperatives.

The most frequently used methods of providing advice were individually through mail or telephone, by way of an internet portal, small group advice outside the farm and one to one advice on the farm. The average frequency of this advice varied from daily to a couple of times per year. Coopkracht and Febecoop advised respectively to 15 and 20 cooperatives, and the others advised on average to 3000 individuals. Nine of the advisory instances advise to other clients than farmers, including distributors, rural residents and organisations, retailers, and anyone with a cooperative business model. Medium to small commercial farms were identified as a major group of the clientele by each advisory organisation. The topics about which the organisations provided advice were of a very wide range, from production and machinery to bookkeeping, the cooperative business model and the environment. Three of the advisory organisations receive public funding. Two of them under the form of project money, the other under the form of the CMO program. These organisations were approached by farmers looking for a cooperative, as well as the other way around. Four of the advisory organisations invested in back-office activities regarding cooperatives.

Expectations for the future are that more attention will be given to the cooperative business model and more people will have knowledge about it. One interviewee predicts that cooperatives will transform from purchase and sales organisations to broader services. Moreover, it was stated that the laws of different business models are changing so there will be a change in the statutes. This will lead to an increase in questions being asked and support required. It was also predicted that the cooperatives would grow even larger, and they will spread across borders. One interviewee stated that a larger share of the advice would be provided through online platforms.

6 Discussion: Answering research questions

6.1 Role of advisory suppliers in the farmers' TCM and innovation paths

What roles do advisory services play in the cycles of farmers' decision making?

For case study 1, farmers often read about the existence of the pocket digester in technical magazines or on websites from advisory organisations such as farmers' unions (e.g. Boerenbond). Besides those, individual contact with other farmers who had already implemented the innovation was another major source of information. Farmers would often go and visit the farms of colleagues who had recently installed their pocket digester. Furthermore, farmers also would visit agricultural fairs to find out the latest innovations in agriculture. The pocket digester had won an innovation prize at the Agribex fair in 2011, sparking its publicity. At these fairs, farmers could also meet representatives from the installing firm who were final important actors during the awareness stage. During the assessment stage, farmers would talk to representatives from The installing firm and with peer farmers who had already installed a pocket digester. They also turned to farmers' unions (e.g. Innovatiesteunpunt), where they could meet up with advisors individually or follow workshops. These instances also provided additional services such as feasibility studies. The main (and often the only) supporting actors during the implementation stage clearly were representatives from The installing firm. They would follow up on the installation of the digester by visiting the farm in person, or even perform the installation themselves in the cases where farmers opted for a leasing contract.

For the second case study, a distinction can be made between the large, traditional cooperatives and the smaller, younger ones. For the former, advisory organisations hardly played a role during the awareness and assessment stages. Farmers stated that joining cooperatives has grown historically, and that they gradually became aware of their existence through their parents while growing up. There was not really an active assessment stage, as joining the cooperative often seemed like the only logical thing to do, or even went automatically when taking over the farm of their parents. In the few cases were there was an active assessment stage, farmers would gain advice from farmers' unions (e.g. Boerenbond) under the form of one-to-one advice in person, or through organised workshops. The implementation stage often reduced to a single meeting with representatives from the cooperative, where the shares were purchased and everything was arranged. For the smaller and younger cooperatives, the role of advisory instances was more prominent. Pioneers who had the idea of starting a cooperative would try to gain as much as advice as they could, from a variety of sources. They would meet up and negotiate with representatives from the private sector, farmers' unions (e.g. Innovatiesteunpunt), environmental workers, accounting offices, peers from other countries. These same actors played a part in the implementation stage as well. New members often would hear about the existence of these new cooperatives through other farmers who already were member or via farmers' unions (e.g. Boerenbond).

6.2 Farmers diversity and role of advisory in innovation uptake processes

What is the relationship between different types of farmer and advisory providers in the decision-making process?

In general, the AKIS of most farmers was quite similar. Hence, it is not really possible to relate differences in farm characteristics to differences in the role of advice in decision-making based on this survey. One difference that did stand out however was the regional presence of Inagro (a local advisory department of the Ministry of Agriculture) in West-Flanders. Almost all farmers from this region were advised by this organisation about a variety of topics including the innovations from both case studies, and the farmers were generally very pleased with their support. But in conclusion, despite this small regional difference, most farmers would seek advice from similar advisory actors about the same topics, regardless whether they were old or young or whether their farms were large or small.

There is not really an integration of new business models of advisory suppliers in the farmers' decision-making cycles. The classical method of one-to-one advice in person still was the most popular form of advice provision and the awareness was often triggered by reading magazines or visiting fairs. Hence although farmers do use the internet a lot for research, the older methods remain very prominently present as well. However, the fact that some of the farmers from case study 1 who had installed the pocket digester organised themselves in a group on Facebook. This small example of digitization in agriculture was helpful for sharing knowledge between farmers fast, and jointly discussing problems and opportunities. The emergence of such groups enables farmers to gain easy and free access to very relevant information.

6.3 Transformation of advisory suppliers and farmers' innovation uptake processes

How does the transformation of advisory providers landscape influence farmers' decision-making and uptake of innovation?

In these two case studies, the new configurations of R-FAS and the new governance of models of farm advice that tend to be more fragmented, pluralistic and decentralised were not really observable. Almost all farmers regularly met up with advisors from farmers' unions (e.g. Boerenbond), checked their website, read their magazines, or followed workshops that they organised. Independent advisors from private companies were important actors in most of the farmers' AKIS as well. They would pay visits to the farms to discuss their products or services with farmers one-to-one. The third and final important actor of the farmers' AKIS was neighbour farmers. All farmers had a network of other farmers that they would often contact to follow up on their activities, and ask for support when needed. In the region of West-Flanders, the advisory organisation Inagro played an important advisory role for most farmers next to the other three actors discussed above. Inagro provides services similar to Boerenbond, and gives individual advice, spreads information through its website and magazines and organizes workshops on a broad range of topics. Since Flanders is a small region, there are no sub-regions that are too hard to reach and hence face difficulties to access advice. The relevant active organisations are present in all of Flanders sub-regions, which ensure the equity of information access.

The advisors from private companies change at the rate at which new private companies that support farmers join the market. However, the other important supporting actors such as Boerenbond and Inagro

have been part of the advisory landscape in Flanders for a very long time, and it appears that this will not dramatically change in the coming years.

7 Case study narratives

This section was remove due to GDPR regulations.

8 Conclusions: Insights & Highlights

INSIGHTS

In general, it appears that farmers in Flanders have access to quite some affordable advice. They have a solid AKIS on which they can fall back on. As such, there exist several **good stories** in both case studies, where farmers received all the information they needed. In these cases, this usually came from a variety of sources, with farmers' unions, private companies and neighbour farmers as the most important providers of support. However, for both case studies, some **failure stories** exist as well. In the second case study these were not necessarily the result of a lack in advice, but rather a decision of a farmer after gaining advice. In the first case study, on the other hand, these stories were almost always a combination of technical problems and **gaps** within R-FAS. Although farmers felt like they got the information they needed during the stages of the TCM model, they mostly felt like this was biased since it all came from the installing company during the early market introduction stages of the pocket digester. Moreover, farmers felt like they had no one to turn to for advice after the installing company neglected the farmers who faced problems after the installation of their digester.

HIGHLIGHTS

The first case study on pocket digesters demonstrated that there were several problems with the early versions of the pocket digester, and that this innovation probably entered the market too soon. The installation was not on point yet, and the installing company could not keep up with the problems, nor could it deliver the service it had promised. This could be an indication for advisory services that they should try to determine whether innovations are really ready for the market, and whether the companies behind them are financially healthy and if their management is in good hands. Furthermore, some farmers felt like they had no one to turn to during the early stages of the emergence of the installation. Hence, advisory service could try to become experts in the very early phases of market introduction, so they can better support the pioneers.

From the second case study on cooperatives we have learned that a main reason for farmers to be displeased with their (large) cooperative is that they feel like the board sits in an "ivory tower" and does not listen to its members. However, when asked whether they attended general meetings, most farmers admitted not doing so. Hence, advisory services should stress to the farmers that all members have a vote in the cooperatives, and that power should be used by them. Furthermore, advisory instances should try to invest in the ability to provide specific information for individual farms, since what is good for the sector is not necessarily good for an individual company. For the smaller and younger cooperatives, most pioneers were pleased with the support that they had received when founding their cooperative. They did stress that advisory services could promote joining a cooperative more to other farmers. A role that they definitely should play, as cooperatives could help farmers work together and help build a more sustainable agriculture.

A general lesson that can be extracted from the combination of both case studies is that when considering the decision to implement an innovation environment and sustainability play a role, but the main motive remains the financial aspect. If an innovation is not economically profitable, the farmers will probably not

invest in it. A confirmation of this trend lies in the fact that government support for (sustainable) investments is often mentioned as one of the motivations to go through with them, or keep them running (pocket digester) after installing. Secondly, both case studies revealed that farmers experience a great need for independent advice amongst the multitude of biased advice that they receive from advisors representing private companies, cooperatives, etc. In fact, they were rather pleased with the advice during the stages of the TCM model, but they stressed that they specifically felt a need for unbiased advice after the implementation of innovations. They thought that advisory services could do a better job of following up existing innovations, and providing continuous support after the installation.

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