



PRO AKIS - Prospect for Farmers' Support: Advisory Services in European AKIS

WP2 - Advisory services within AKIS: International debates

Deliverable WP.2-1

**Concepts and theories available to describe
the functioning and dynamics of agricultural advisory services**

Pierre LABARTHE, Monica CAGGIANO, Catherine LAURENT, Guy FAURE, Marianne CERF

*with the collaboration of Artur CRISTOVÃO, Andrea KNIERIM, Ismaïl MOUMOUNI, Katrin PRAGER,
Lee-Ann SUTHERLAND*

Abstract

The aim of this document is to produce a state-of-the-art of the academic literature in order to identify theories and concepts available for: a) describing the structure, the dynamics and the functioning of agricultural advisory services; b) understanding how these services are embedded into national Agricultural Knowledge and Innovation Systems (AKIS), and into various agricultural and rural policies across the European Union (EU) countries; c) providing some conceptual elements to support the methodology for an inventory of agricultural advisory services in EU 27 countries (WP3 of the PRO AKIS project), and for the selection of case studies (WP4 of the PRO AKIS project) . Recent reviews of the literature indicate some challenges for the analysis, the implementation and the evaluation of agricultural advisory services (Faure et al. 2012, Birner et al. 2009). These reviews stress the need to switch towards a best fit perspective: *"promoting "one-size-fits-all" approaches are inappropriate for agricultural advisory services.[...] What is important is to build capacity among policy-planners, managers and researchers to identify modes of providing and (...) advisory services that "best fit" the specific conditions and development priorities of their countries"* (Birner et al 2009). If such debates have a growing importance in the contexts of South countries, they need to be intensified in Europe through comparative analyses. The report proposes an analysis of agricultural advisory services according to the diversity of i) their methods, ii) their funding principles and iii) their aims, beyond their common characteristics. It is also possible to propose a consistent set of tools for describing these three dimensions. All these issues also open a new research agenda. Some of them will be considered in the realm of the PRO AKIS project (e.g. systematic reviews of available knowledge on the effectiveness of farm advisory services carried out in WP2; case studies on innovation dynamics in different EU countries in WP4). This document, as well as the project more globally, aims at contributing to the policy debate, emphasizing the need for a more integrated vision of advisory services as instruments of European policies involving agriculture and innovation.

Keywords

Agriculture, Advisory services, Public policies, Agricultural Knowledge and Information Systems

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Introduction

The aim of this document is to produce a state-of-the-art of the academic literature in order to identify theories and concepts available for:

- a) describing the structure, the dynamics and the functioning of agricultural advisory services;
- b) understanding how these services are embedded into national Agricultural Knowledge and Innovation Systems (AKIS), and into various agricultural and rural policies across the European Union (EU) countries;
- c) providing some conceptual elements to support the methodology of the WP3, which aims at proposing an inventory of agricultural advisory services of EU 27 countries. Particular inputs are for instance expected for building the questionnaire and for identifying and selecting the actors to be included in the inventory. In the report, we use the indication "link to WP3" to emphasize this connection.

In all economic sectors, knowledge is more and more considered as a key resource for production. This is also the case in agriculture. There are at the moment many debates about how to organise the production, accumulation and distribution of this resource so as to help farmers to tackle new issues (e.g. combining production, environment, health and social cohesion related objectives). The ongoing debates deal mainly with the need for reforming AKIS in order to fully acknowledge the current change of the agricultural technological paradigms: a transition towards agro-ecological practices would imply a new configuration of the knowledge system to support new bottom-up innovation processes based on local networks (Dockès *et al.* 2011, EU SCAR 2012, Cristovao *et al.* 2012, CREPE 2011). Moreover the current economic crisis poses even greater challenges and further constraints on these processes.

Such analyses often underestimate the role of the infrastructure of the knowledge and innovation systems. This infrastructure¹ includes a specific set of networks and material elements (e.g. databases, experimental settings, laboratories, training centres, etc) that are considered as key elements in R&D literature dealing with knowledge production and accumulation. For each period, the pattern of the inherited infrastructure will be the basis for new possible development paths of the AKIS, for new tangible and intangible investments. The pattern of this infrastructure shapes the networks of the actors that support the production and circulation of knowledge (research, education, advisory services, farmers' organisations...) and the configuration of the institutions, but it is also transformed by the initiatives of the actors. Including this infrastructure in the analysis appears to be all the more important as it has been deeply transformed by new relations between private and public sectors (Garforth *et al.* 2003, Kidd *et al.* 2000). Possibilities of new development paths for AKIS have been modified accordingly. These transformations have led to new and very diverse situations in the EU and need to be better understood (OECD 2012).

In this paper, as in the PRO AKIS project more globally, the focus is put on agricultural advisory services. This choice is driven by the central role that such services play at two levels: i) as an activity

¹ "Smith refers to a knowledge infrastructure as a complex of public and private organizations and institutions whose role is the production, maintenance, distribution, management and protection of knowledge. These institutions possess technical and economic characteristics that are not dissimilar to those of physical infrastructure. Whereas this definition appears to focus principally on the supply side of the knowledge infrastructure, current innovation systems thinking emphasizes the role of the user in the co-creation of knowledge" (Klerkx 2009).

of knowledge production and circulation for and with the farmers; ii) as a pillar of the infrastructure of the broader AKIS (both in its dimensions of investments and networks) and of the dynamics of knowledge flows involved in it.

The document is organised as follows:

- **In the first part, we discuss the analytical frameworks that could be chosen to analyse the patterns of agricultural advisory services and how they are embedded within the broader AKIS.** This implies to choose between various conceptions regarding agricultural knowledge system. As our aim is to describe both the infrastructure of AKIS and the knowledge flows within it, we propose here to use the concept of AKIS rather than Agricultural Innovation Systems (AIS) (Hall *et al.* 2006) ([link to WP3: discussions about the categories of actors to include in the mapping of AKIS](#)).

- **In a second part, we propose a definition of farm advice** as a social and economic activity and as a key component of AKIS. We use definitions developed by researchers on service activities to identify the core characteristics of advice ([link to WP3: This enables to limit the range of agricultural advisory organisations on which to focus for the analysis and the inventory](#)).

- **In a third part, we propose to analyse agricultural advisory services according to the diversity of i) their methods, ii) their funding principles and iii) their aims, beyond the common characteristics highlighted in section 2.** We propose a consistent set of tools for describing these three dimensions ([link to WP3: it calls for a systematic description of the aims and functions assigned to agricultural advisory services by national agricultural and rural policies: funding schemes...](#)).

At this stage of our work, we do not claim to be exhaustive in describing the different concepts available but we have selected some that proved to be operational in former research operations or expertise. Each section ends with a box presenting operational tools for WP3.

1. How to map the embedness of advisory services within AKIS?

The aim of the PRO AKIS project is to rely on theory to propose an inventory of agricultural advisory services in the EU 27 Member States. Such an inventory would include a description of the knowledge flows and of the dynamics between advisory service organizations and the other actors of the agricultural knowledge system.

This implies to choose a theoretical model to describe these knowledge flows. Our aim is to provide a model i) that can be operational and useful to support a survey of advisory services within AKIS in 27 EU countries; ii) that can integrate some major trends and issues in the transformations of advisory services and AKIS today. Among these trends, the economic crisis and the decrease of public expenditure are major ones. In such a context, it seems to be particularly important to understand the new relations and distributions of roles between public and private sectors, as these new configurations may change the levels and aims of investments in knowledge for agricultural and rural development, but also the relations between the different actors of AKIS. In other words, the framework should help us understand how the changes over the last decade did impact the infrastructure of AKIS, both in terms of investments and networks supporting knowledge flows between actors.

Even if there is a general consensus on the adoption of a systemic approach, in both academic and institutional settings, there is no universally shared definition of this system, including its components, boundaries and functions. There is a very long history of academic work that proposed frameworks to describe the knowledge flows and the information or innovation system within the

agricultural sector (Nagel 1979, Röling and Engel 1990). There have been recently many efforts to synthesize and review the different theories available (Balzat and Hanisch 2004, Dockès *et al.* 2011, Faure *et al.* 2012, Hall *et al.* 2006, Kania *et al.* 2011, Klerkx *et al.* 2012) in academic or operational perspectives.

In particular, two main frameworks have emerged in the last decades as a critical response to the linear technology transfer model mainly exemplified in the National Agricultural Research System (NARS):

- i) the Agricultural Knowledge and Information Systems (AKIS) or Agricultural Knowledge and Innovation Systems (AKIS);
- ii) and the Agricultural and Innovation Systems (AIS)².

According to the World Bank definition (World Bank 2012):

- *National agricultural research system (NARS) indicates the entities responsible within a given country for organizing, coordinating, or executing research that contributes explicitly to the development of the country's agriculture and maintenance of its natural resource base.*
- *Agricultural knowledge and information system (AKIS) indicates a system that links people and institutions to promote mutual learning and generate, share, and utilize agriculture related technology, knowledge, and information. The system integrates farmers, agricultural educators, researchers, and extensionists to harness knowledge and information from various sources for improved livelihoods. Farmers are at the heart of this knowledge triangle.*
- *Agricultural innovation system (AIS) indicates a network of organizations, enterprises, and individuals focused on bringing new products, new processes, and new forms of organization into economic use, together with the institutions and policies that affect their behaviour and performance.*

The AKIS and AIS concepts still coexist, and have several points in common as well as major trade-offs (see table 1. for a summary and appendix 4. for an extensive description of these common points and differences).

There are two ways of considering these concepts, either as competing notions, or as complementary notions, built for different aims. For some authors (e.g. Dockès *et al.* 2011) AKIS and AIS correspond to competing approaches, and only one should be kept. In this normative view, it is argued that a new vision of AIS is needed to tackle the issue of sustainable development of agriculture. A new form of AIS would, thus, be needed to support new innovation processes and help agro-ecological innovations emerge from niches, following the concept of the transition theory (Geels and Schot 2007). A main characteristic of this new form of AIS would be that they integrate a much broader range of actors. AIS *"in contrast to AKIS, do not just involve players in the 'knowledge infrastructure' (classically: universities, strategic and applied research institutes, education and extension) but the whole network of public and private stakeholders on which innovation depends"* (Leeuwis 2012).

² Even though the academic debate recognizes relevant differences between the two frameworks, sometimes the boundaries between AIS and AKIS (where in the AKIS acronym I stands for Innovation) in practice are very labile, up to becoming used as interchangeable terms.

Table 1. Comparing NASR/AKIS/AIS (adapted from Hall *et al.* 2006)

	NARS	AKIS	AIS
Purpose	Planning capacity for agricultural research, technology development, and technology transfer	Strengthening communication and knowledge delivery services to people in the rural sector	Strengthening the capacity to innovate throughout the agricultural production and marketing system
Actors	National agricultural research organizations, agricultural universities or faculties of agriculture, extension services, and farmers	National agricultural research organizations, agricultural universities or faculties of agriculture, extension services, people exercising a farm activity, NGOs, and entrepreneurs in rural areas	Potentially all actors in the public and private sectors involved in the creation, diffusion, adaptation, and use of all types of knowledge relevant to agricultural production and marketing
Organizing principle	Using science to create inventions	Accessing agricultural knowledge	New uses of knowledge for social and economic change

For other authors, each of these coexisting approaches place emphasis on a specific dimension of the reality, follows its own objectives, and each of them yield evidence that may be combined for the practice (Hall *et al.* 2006, Klerkx *et al.* 2012).

Klerkx *et al.* (2012) thus propose the idea that applying “system thinking” to describe innovation systems in the agricultural sector may follow three distinct analytical frameworks:

- An infrastructural view on the system, *“that makes a predominantly static analysis of the presence and interaction of actors (e.g. research institutes, financing organizations), and the infrastructures that govern the behaviour of actors in innovation processes (rules and regulation and physical infrastructures like transportation systems) and which exercise direct influence on innovation outcomes (e.g. intellectual property laws) present in countries. The main question is to what extent this system supports, or does not support and even constrain, agricultural innovation (e.g. Sorensen 2011). [...] Such studies interpret AIS both as a national innovation system and as a (sub-)sectoral or even regional innovation system.”* (Klerkx *et al.* 2012, p. 464).
- A process view of the systems: *“This often results in a more dynamic analysis to assess the co-evolutionary process of interactive development of technology, practices, markets and institutions. This implies seeing innovation systems as self-organizing growing networks of actors connected to the development of a certain novelty, emerging from a dominant incumbent production system (characterized by certain technologies, practices) or value chain configuration and moving towards an alternative to the incumbent system or even replacing it (Ekboir 2003).”* (Klerkx *et al.* 2012, p. 465). This conception is in the line with transition theories (Geels and Schott 2007), and could result in the fact that there are as many innovation systems as there are innovations.
- A functionalist view of the system, which tends to focus on whether or not specific functions are fulfilled (Hekkert *et al.* 2007). But many debates remain about which functions to consider within the system.

As far as the PRO AKIS project is concerned, the “infrastructural view” seems to be the more appropriate and relevant. Nevertheless, such a view might not be seen as necessarily static. The idea would rather be, at a time of economic crisis, to understand how the infrastructure of the system has been transformed, so as to feed a discussion about the possible consequences of the changes which occurred on the innovation processes and technological regimes. Such a perspective on the evolution of infrastructure would be complementary to the work carried out in a process view of AIS within the SOLINSA project, which proposes a rich collection of bottom-up networks conceptualized as “*Learning and Innovation Networks for Sustainable Agriculture’ (LINSAs) that mostly operate on the principle of knowledge sharing and learning between farmers and other stakeholders*” (SOLINSA project).

As a consequence, it seems preferable for the WP3 of the PROAKIS project to pursue a study where the system boundaries map onto the AKIS conception, rather than following the AIS conception where the system is followed along a specific process of innovation. This choice is relevant from many perspectives (For more details see appendix 4):

- the AKIS concept aims at describing knowledge infrastructures (Klerkx *et al.* 2012);
- it gives a central role to the analysis of agricultural advisory services (Assefa *et al.* 2009);
- it aims at better understanding knowledge flows within the system, focusing on the issue of knowledge access for a diversity of actors (Hall *et al.* 2006);
- it works at a scale (mostly national or regional) that fits with our study aimed at describing the situations in the EU 27 member states.

Choosing AKIS rather than AIS does not mean that we will be locked in a conception of AKIS that was built to analyze the situation of the 90s. We will integrate the fact that AKIS now have to face new issues (new form of international competition, environmental constraints, major policy changes involving the enlargement of the EU and the resulting structural heterogeneity of EU agriculture, etc.) (Nagel 2003). *De facto*, these new issues change their thematic boundaries (Ingram and Morris, 2007), as well as the new power balance between private and public actors may imply to enlarge the range of actors considered (Morgan and Murdoch, 2000). Nevertheless, both for academic and practical reasons, we find it legitimate to focus the analysis on the actors engaged specifically in knowledge exchange with agricultural advisory services, rather than to focus on the whole set of actors that may be involved in innovation. Moreover, such a conception of AKIS has proven to be very operational when combined with methodologies of international comparison (Blum 1991, Laurent *et al.* 2006, Knierim 2007, Kania 2007).

Consequences for WP3:

- Acknowledging the fact that we focus on an infrastructure perspective as well as on the connection between advisory services and other actors of AKIS.

- Focusing our conception to AKIS (and not to a broader AIS) to better acknowledge the transformations of knowledge flows at a time of crisis. We propose therefore to get a better understanding of the new relation between advisory services and i) policy making; ii) (public or private) education; iii) (public or private) research; iv) NGO, farmers’ organisations, farm workers’ unions...

- Acknowledging the transformation of agriculture since the concept of AKIS has emerged

* new themes for innovation (that may vary according to countries) ...

2. Defining farm advice as intangible services and investments for the co-production of knowledge for and with the people

The choice to focus our analysis on agricultural advisory services is in the line with the concerns of policy makers, who acknowledge their central role within AKIS (in direct relations with both farms and research) but who also raise many questions about the effectiveness of the implementation of these services (about the methods used, the funding mechanisms, the public targeted...) (ADE 2009). The questions under discussion even include the very definition of services.

Defining agricultural advisory services has always been a matter of academic debates. In the early 1980s, van den Ban stressed the fact that even the terminology used to define this activity differs according to the countries: *"the English language term, extension, like the French vulgarisation, suggests the popularization of knowledge. The German term Förderung means "furthering" while the Koreans think of extension as rural guidance. Both imply stimulation of desirable agricultural developments. The Dutch voorlichting can be translated as "lightning the way", and the Indonesian penyuluhan is a more poetic "agricultural illumination", underscoring the insight and learning that extension brings"* (van den Ban 1981, p. 293). Since the 1990s, there is a form of international standardization: in many countries, it is spoken of "agricultural (and/or) rural advisory services "rather than of extension"³ (from "voorlichting" to "advies" in Dutch, from "extension" to "advice" in English, from "vulgarisation" to "conseil" in French, from "Förderung" to "Beratung" in German...). Despite this trend, there does not seem to be a unified way of picturing farm advice, as the diversity of definitions that has flourished since the late 1990s illustrates it, both for academic definitions (appendix 1), or institutional ones (appendix 2).

In this section, our aim is to propose a definition of farm advice as an intangible service activity (for the diverse categories of people working in agriculture), and also as intangible investments (within the agricultural sector). To do so, we propose to rely on definitions of advisory services developed by people from within and out the agricultural sector. Indeed, there have been academic debates (mainly in sociology and economics) for defining these services according to these two dimensions (activity and investment). They emphasize some specificity of intangible services: i) the importance of the relations between clients and providers in the very process of the production of the service; ii) the nature of the intangible investments necessary for the development of the production systems of service suppliers (for renewing knowledge).

2.1 Defining farm advice as an intangible service activity

The differences between primary production (agriculture, mines), industry and services have been extensively researched in economics. These sectors have distinct rationales of development (level of investment, geographic flexibility, etc.); they use productive resources (land, capital, labour, knowledge) in very different ways. To fully acknowledge the specificity of the service enterprises, and the conditions of their efficiency, it is necessary to start from the characteristics of the service activity.

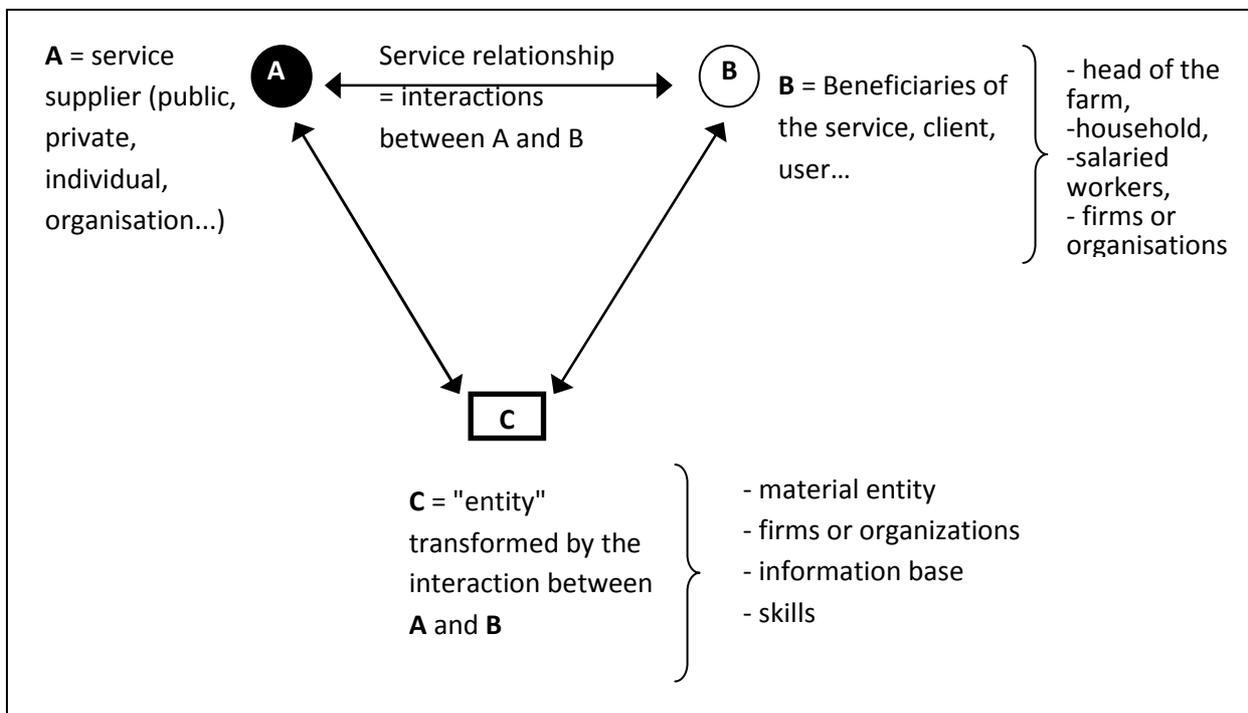
³*"The term extension itself was first used to describe adult education programs organized by Oxford and Cambridge universities in England starting in 1867; these educational programs helped extend the work of universities beyond the campus and into the neighboring communities. This term was later formally adopted in the United States in conjunction with the land grant universities that were originally established as teaching institutions during the 1860s. Research activities were added in 1887, and extension activities were started in the 1890s and then formally added in 1914 as part of each university's official mandate"* (Swanson and Rajalhati 2010, p.1).

The definition of service activities has been for a long time a matter of academic debates (Bell 1973, Stanback 1979, Hill 1999, Gadrey 2000). These debates were embodied in the discussion between Peter Hill and Jean Gadrey (see appendix 3.), which were quite influenced by the seminal work of Erving Goffmann (1961, 1983), who first highlighted the importance of the interactions between beneficiaries and suppliers in the production of a service, based on empirical studies of the health sector. Gadrey identified two core characteristics of services: i) the intangibility - or the difficulty to measure - the product of services, which could consist in a change of the situation of the client (or a change of an entity that belongs to the client); and ii) the interactions between providers and clients in the very process of production of the service.

Gadrey (2000, pp 382-383) proposed the following definition: *"any purchase of services by an economic agent B (whether an individual or organization) would, therefore, be the purchase from organization A of the right to use, generally for a specified period, a technical and human capacity owned or controlled by A in order to produce useful effects on agent B or on goods or entities C owned by agent B or for which he or she is responsible."* This definition has led to a classic representation of services through a triangular scheme (figure 1), representing the fact that the provider and the client of the service work jointly in the very process of the services, that is, the transformation of an entity that belongs to the client.

Such a representation is coherent with the two key characteristics mentioned above: i) the joint implication of the providers and the beneficiaries of the service in the production (through "interactions" or "coproduction processes"); ii) the fact that the service is targeted on transforming an entity belonging to the beneficiaries of the service.

Figure 1. The triangle of the service relationship (adapted from Gadrey, 1994)



This latter idea – defining and identifying the entity supporting the services and the property right(s) applying or not to it - has been the subject of many debates within and between academic disciplines (Hill 1999, Zarifian and Gadrey 2002). Nevertheless, it enables to propose a first typology of services⁴: they differ according to the entity they aim at transforming:

- material entity (car repair,...)
- individual (health services...)
- information-based (ICTs services...)
- knowledge and skills (education, in-course training, consulting...).

For agricultural advisory services, we consider that the entity transformed by the services is mainly the skills, knowledge and attitudes of the people exercising a farm activity.

We propose to integrate all the former elements so as to adapt the definition of Birner *et al.* (2009), and to represent **agricultural advisory services as the entire set of organizations that will enable the farmers to co-produce farm-level solutions by establishing service relationships with advisers so as to produce knowledge and enhance skills**. Such a definition implies to open the debate about the categorisations of the beneficiaries of the services (see box below).

Diversity of the situations of people exercising a farm activity and ambiguities of the notion of “farmer”

The Pro-Akis project aims at considering the possible impact of farm advisory services for all the categories of farm labour as defined in the Eurofarm / Eurostat methodological guide, e.g. heads of agricultural holdings (family farms or managers, full and part time), family labour working of the farm (spouses, children etc. / full and part time), permanent salaried workers (full and part time), casual labour, workers working on the farm but employed by an other enterprise.

Any of this group may be targeted by advisory services for specific purpose. For instance family labour (spouses, mainly women) for interventions aiming at developing farm-based tourism activities, casual labour (including migrants) for interventions related to work safety (e.g. protection against chemical risk associated with pesticide use, that can be cumulated during the occupational trajectory in different farms), etc.

The notion of “farmer” is sometimes used as a shortcut to denominate all this population. Whenever this is the case in our documents, it should be understood as such.

However, we should be very cautious when we use it. This notion is misleading for several reasons.

- There is no unified definition of what is “a farmer” in the EU and even within a country, especially when the recognition of the social status of “farmer” generates access to specific supports (health insurance, retirement schemes, etc.) as it is the case in several countries (Laurent 2002). Therefore, the use of this notion does not provide clear information on the population that is at stake.

- The notion of “farmers” is an implicit reference to the head of the farm. This could be an acceptable approximation if the wide majority of the farms were family farms with one agricultural working unit, the head of the farm. But we are not in this situation. Therefore the use of this notion focus the attention (and may lead to focus the resources) on a limited part of the population providing farm labour.

For analytical purpose it could be wise to keep the categories of the Eurostat description of the agricultural labour population. In addition, for each country, it would be interesting to identify the categories of farms that are usually included or excluded from advisory services and the criteria for these exclusion (e.g. in France, size, occupational status regarding health insurance for pluriactive farmers, inclusion in farmers union networks...).

⁴ The nature of the object of the service can thus lead to sub-classification within services, and help better defining advisory services, which can be classified as Knowledge Business and Information Services (KIBS, Toivonen 2004): “KIBS firms are organizations that are particularly representative of the knowledge economy, since knowledge constitutes both their main input and output... the activity of KIBS providers can be said to consist of the production of knowledge from knowledge.” (Gallouj 2002).

Such a definition enables to better characterize services as an activity, and is coherent with diverse disciplinary perspectives. It is coherent with the conceptions from institutional economics (Gadrey 2000, Gallouj 2002, Toivonen 2004), as well as from sociology, where the product of services may be defined as a change in the conditions of activities and of competences of the beneficiary (Zarifian 2000), or from psychology, which depicts advisory services as *“a means to support voluntary change of human behaviour”* (Albrecht *et al.* 1987). But such a definition also deliberately leaves open some dimensions of the services, such as its drivers and methods. Considerable research has demonstrated that advisory services hide a huge diversity of conceptions and methods (Swanson and Rajalhati 2010).

Knierim (2007) and others emphasized the fact that this conception of services supporting changes for beneficiaries is a dialectic concept which is based *“on the one hand, on humanistic psychology theories that entirely acknowledge the individual’s decision-making authority according to subjectively perceived needs, with motivations as drivers for action. On the other hand, the concept relies on social psychology findings where the importance of social interaction in influencing individual agency is emphasised. The external advisor, continuously seeking his/her way between too much and not enough direct intervention, gets orientation from the organisation’s goals and objectives. Extension systems are usually developed with reference to one or more political goals and they can cover the whole range from ‘transfer of technology’ to ‘human resource development’”* (Nagel 1997, quoted by Knierim 2007)⁵. In other words, the change that agricultural advisory services aim at supporting can neither be defined from a universal point of view nor restricted to the expression of the demand of any category of people working on the farm. It is also the result of political choice, and it is therefore embedded in the history of agricultural and rural policies. Thus, it might be preferable to characterize the specificities of the organization and institutions of the production of agricultural advisory services (Labarthe 2009).

2.2 Defining farm advice as an intangible investment

A first way of looking at the services production system is to describe the institutional settings in which the service relationships between farmers and advisers are embedded (figure 2).

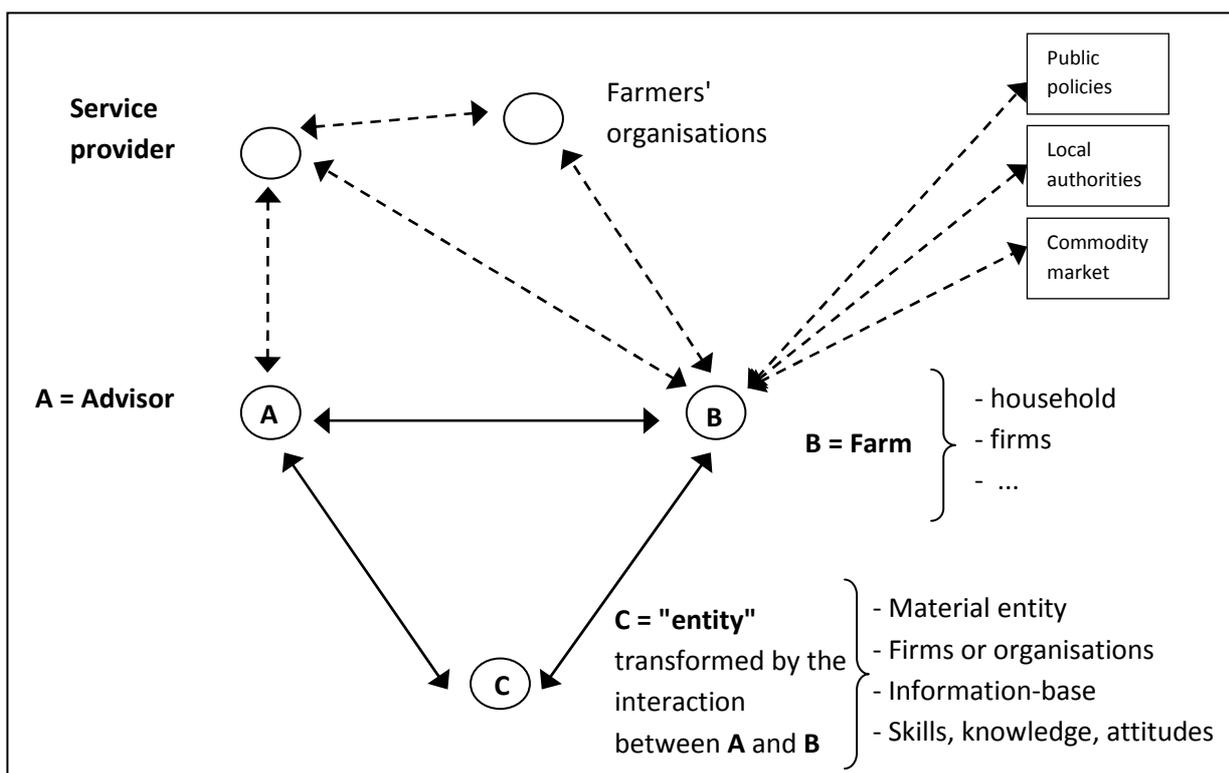
These institutional settings concern both the advisor and the farmer. The organization employing the advisor has institutional characteristics that may vary, according to their own status and source of financing (state service, cooperative, independent consultant, input supplier firm...) and to the links they have with other actors (private industry, state organizations, farmers’ organisations, farm workers’ union, etc.) (Labarthe *et al.* 2012, Klerkx and Proctor 2012, Sutherland *et al.* 2013). On his side the farmer’s activity is embedded in several networks and several policy realms.

In other words, the advisory relationship, defined at a micro level, can help us to delineate the population of the service providers that will be included in the study. But the analysis must include other determinants of the evolution of the agricultural advisory services, at macro and meso levels, in particular:

⁵ This consideration joins the idea developed by Gadrey (1994) that advisory activities are always caught in a dialectic between, on the one hand, the need to contextualize knowledge in order to solve particular problems (whether technical, organizational, strategic, etc.) and, on the other, the necessity to build upon codified and validated knowledge (Gadrey 1994, Nonaka 1994).

- the existence of institutional framework that set national / regional policy objectives to agricultural advisory services (in particular regarding the target groups of these services, which is a key concern for our project) (Labarthe and Laurent 2013) (Klerkx and Jansen 2010).
- the infrastructure of the back office of advisory services at firm and sector levels. Agricultural advisory services are indeed based on two different levels of knowledge production: *front-office* or *back-office* activities (Labarthe and Laurent 2013b). The *front-office* of the advisory services stands for the direct interactions between the advisors and the beneficiaries of the advice. The *back-office* corresponds to R&D, scientific monitoring and all the activities guaranteeing that farm advice will be based on the best possible evidence in each particular situation. Back-office also enable the advisers to better understand the context of its activity, to build expertise about the farms and their problems so as to better elaborate solutions for and with the beneficiaries of the service. The capacity of a service provider to provide reliable and adequate evidence to support various types of farms (and/or groups of people having a farming activity) strongly depends upon its ability to secure relevant back-office activities (Labarthe and Laurent 2013b) and to organize relations with other organizations that will provide this support (research...) (Klerkx and Proctor 2012).
- the existence of governance bodies at a national and/or regional level to coordinate the intervention of various types of farm advice providers and also to favour the co-construction of demand and supply of new advisory interventions (and which type of stakeholder is represented e.g. farm owner, salaried workers, casual workers, women...). There is a need to secure a certain level of contacts between the advisory services, representatives of different categories of farm labour and representative of other interest (rural development, environmental NGO...) in order to co-formulate new problems and design new type of offer according to available knowledge (Frisvold and Fernicola 2001, Hanson and Just 2001, Laurent *et al.* 2006, Klerkx and Leeuwis 2008).

Figure 2. The institutional settings of agricultural advisory services (adapted from Gadrey 1994, Faure *et al.* 2011, Labarthe 2009)



2.3 Consequences for WP3

- If we agree on the definitions proposed of advisory services as an activity (section 1.1) and an intangible investment (section 1.2), it would have two potential consequences on the inventory of the WP3.

- It would help having a clear picture of the advisory organizations that should be at the centre of the inventory: organizations that enable the farmers to co-produce farm-level solutions by establishing service relationships with advisers so as to produce knowledge and enhance skills. Such a definition excludes *de facto* some organizations: organizations that produce generic knowledge out of service relationships with farmers (universities, research institutes, newspaper, websites). It also excludes services providers who will directly do the work and have a direct impact on diverse entities of the farm without effects on farmers' skills (e.g. a veterinary doctor who only comes to cure a cow, an accountant who only makes the accountancy of the farm). Some organizations would nevertheless appear to be on boundaries (in-course training organizations, applied research institutes providing expertise, etc.)

- It highlights some key features for censusing the resources of these organizations within AKIS

* *in front-office* : what are the human resources available for interactions with farmers?

* *in back-office* : what are the investments to renew the knowledge of the organization (investments, networks...), and the linkages with other organizations supporting that role, such as universities, research centres, etc.)?

3. Acknowledging the diversity of agricultural advisory services across EU countries

The proposed approach to define agricultural advisory services would help to set the limits of the population of advisory services organisations to be included in the analysis. It also deliberately leaves open different aspects of agricultural advisory services:

- the precise goal of these services: which dimension of the farm performance does the advisory service aim to enhance? This is crucial in a context where the multifunctionality of agriculture (MFA) is acknowledged, and which sets a diversity of performance criteria for farms: production, food safety, environment (biodiversity...), social cohesion, etc. (section 2.1)

- the institutional dimension of the services (the type of relation between demand and supply: who funds the services? Who implements them?...). (section 2.2)

- the nature of service relationship and of the methods chosen by service suppliers (what is the level of interaction with clients: individual advice? Group? Participatory?...). (section 2.3).

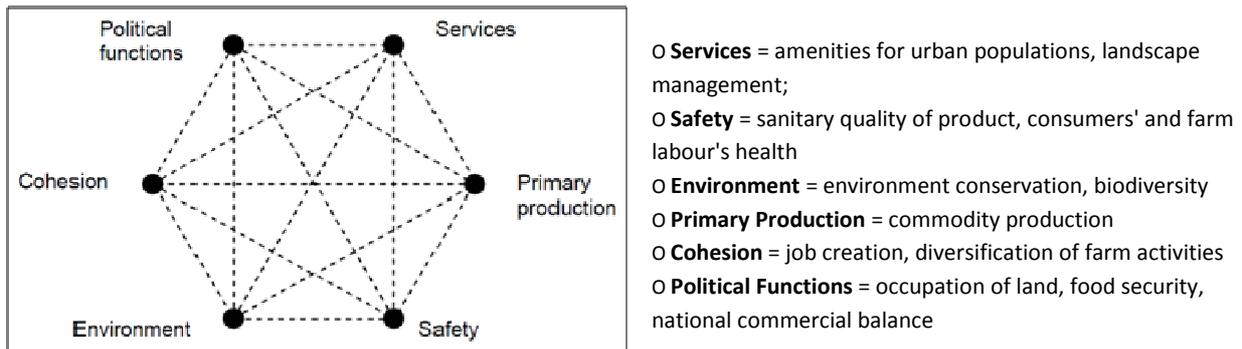
Our idea is to avoid to be normative regarding these three dimensions, but rather to identify tools and concepts in the literature to acknowledge and describe them.

3.1 The diversity of objectives for agricultural advisory services

In our definition of farm advice, these services aim at enhancing skills and access to knowledge and information so as to increase the performance of the farm activity, but without being normative regarding the function of farms targeted by the advice (production? environment? health? contribution to rural development?...). Many studies have emphasized not only the fact that MFA is important in many European contexts, but also that the expression of MFA varies according to these

contexts and is a matter of choices and arrangements within national agricultural and rural policies. Thus, we do not aim here to be normative about the themes and domains that agricultural advisory services should cover. But it may be necessary that we choose a common framework to picture the goals assigned to agricultural advisory services. In that respect, we propose to use the scheme formalized by Laurent (2001) and Renting and al. (2005) so as to describe the plurality of conceptions of MFA given the diverse national rural and agricultural policies (figure 3.)

Figure 3. The different functions that can be assigned to agricultural advisory services (adapted from Laurent 2001, Renting *et al.* 2005)



The multifunctionality of agriculture may be defined (Laurent 2001) as the full range of contributions of agriculture to economic and social development as a whole. The official recognition of MFA reflects the intention that these different contributions be sustainably and coherently associated according to modalities deemed satisfactory by citizens. These contributions concern a wide range of functions: commodity production, safety (quality products, consumers' and farm labor's health), environmental conservation, services (amenities for urban populations, landscape management, etc), contribution to social and economic cohesion in rural areas (through job creation, diversification of farm activities), and political functions (occupation of land, food security). According to its level of modernization, the employment situation in rural areas, etc., each country will emphasize certain functions. Thus each country will ask agricultural advisory services to focus on these (selected) functions and eventually on the trade-offs that they generate (e.g. environment/ production, food quality/ volumes of commodity production, etc.).

3.2 The diversity of institutional arrangements for agricultural advisory services

A second important aspect of the diversity of the agricultural advisory services stems from the modalities of regulation of the relation between demand and supply. Our aim here is not to provide a state-of-the-art of the theories available to tackle this issue, but rather to provide operational tools for describing the structure of this sector of activity (including the new relations between public and private actors), the pattern of its embedness in the broader AKIS, and the dynamics of the supply of services. Two dimensions seem important in that respect:

- i) what is the involvement of the state in the funding and implementation of services (which funding schemes? Level of expenditure?...);
- ii) how to classify concretely the organization supplying of the service?

For the first aspect, we propose to use the classic typology of Rivera (2000) that differentiates six strategies of the state for supporting advisory services according to whether it is involved in the funding and/or provision of services (table 2). Applying such a taxonomy to each member state would enable to draw a map of the strategies of the state regarding the supply of agricultural advisory services in Europe.

Table 2. Role of state in agricultural advisory services (adapted from Rivera 2000)

	Financing of the service	Provision of the service
Deconcentration	National funding	State provides services through autonomous local agencies
Decentralisation	Regional funding	Independent regional agencies
Co-management	Co-funding state / federations of farmers	State participate in the management of advice (e.g. chambers of agriculture)
Delegation of service	National funding	No participation to the implementation (contracts with private firms or associations)
Commercialisation	No national funding	State agencies that charge the service to farmers (cost recovery)
Privatisation	State does not finance any service	State does not provide any service

For the second aspect, we propose to use a typology of Birner et al. (2006) that is based on the same criteria as Rivera's (who does fund? who does provide the service?), but which is not focused on the role of the state, but rather relies on a typology of actors. Their matrix (see table 3) differentiates four types of actors: public actors, private actors, third sector actors (NGOs) and third sector farmers' based organizations. The aim here would be for each country to have an easy-to-read typology of the supply of services in the different countries.

Nevertheless, the situation in Europe is even more complex, as many advisory organisations mix different sources of funding, and as the boundaries between private/public/third sector organisations is sometimes hard to draw. For instance, how to categorize private consulting companies owned by farmers unions, or private university selling advice to farms, or chambers of agriculture in France whose head or manager works under the control of elected farmers on the basis of unions' lists while the Chambers are largely funded by the State (delegation of public service)?

Table 3. A typology of the supplier of services (from Birner et al. 2006)

Provision of the service	Financing of the service				
	Public sector	Private sector: Farmers	Private sector: Companies	Third sector: NGOs	Third sector: FBOs
Public sector	Public sector extension (different degrees of decentralization)	Fee-for-service extension	Private or third sector contracting extension agents from public sector		
Private sector: Companies	Publicly financed contracts or subsidies to service providers from private or third sector	Private extension agents, farmers pay fees	Information provided with sale of inputs	Extension agents from private company hired by NGOs	FBO contracting extension agent from company
Third sector: non-governmental organizations - NGOs		Extension agents hired by NGO, farmers pay fees		Extension agents hired by NGO, service provided free of charge	
Third sector: Farmer-based organizations (FBOs)		Extension agents hired by FBO, farmers pay fees		NGO financing extension agents who are employed by FBO	Extension agents hired by FBO, service free to members

For these different reasons, we propose to adjust such a matrix to the European realities (table 4), by being much more specific about provision and funding of the services. Rather than having general blocks for the financing (public/private/NGOs), we might rather propose some categories that better fit with the EU context, such as public funds (EU, national, or regional), farms' levees, farm's contribution, services billed to farms. In term of funding, we need to find a way to aggregate data. One way could be to see the types of hierarchy of the funding for the different organization.

Filling such a table might still present some difficulties. Nevertheless, we could adopt some norms and conventions to do so, for instance about how to classify such organisations at the boundaries:

- for major companies: who owns the capital? (farmers?)
- for NGOs/associations: which status? Who is in the member of the executive board? How is the head or manager nominated? (by whom?)

Such a matrix might be useful to give some consistency to the inventory and to the infrastructure, by mapping the distribution of resources of agricultural advisory services between different types of actors (in terms of distribution of total number of employees, of total number of advisers, or of turnover). According to the national pattern of each agricultural advisory service system, not only the number of enterprises in each cell of the matrix will differ, but also the variability of their structure. Therefore, it will be necessary to provide an idea of this diversity (at least qualitative comments) and to discuss its consequences for the accuracy of the data collected for each cell.

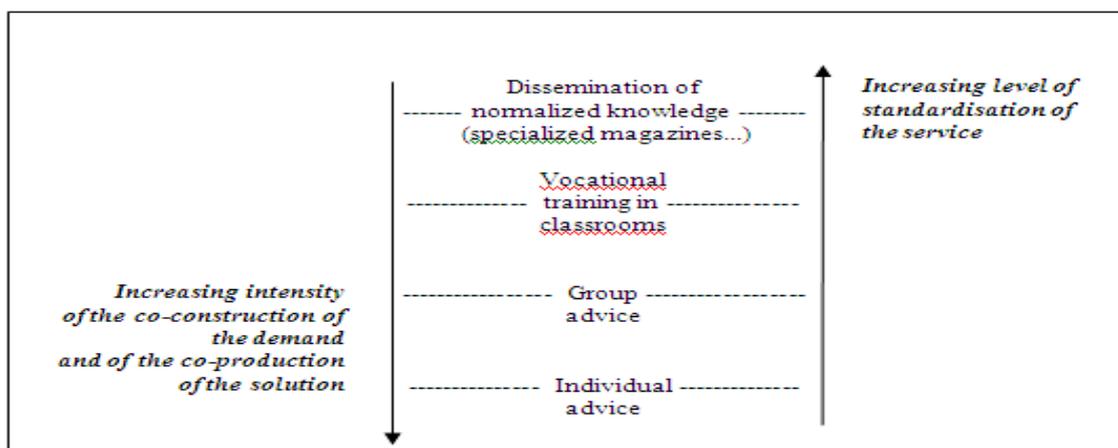
Table 4. Advisory services provision and financing (Our processing based on Birner *et al.* 2006)

Provision of service				Source of financing								
Status of the organisation	Type of organisation	Number of organisations	Number of advisors	Public funds			Farmers			Private	NGO	Other (specify)
				EU funds	National funds	Regional funds	Farmers' levies	Farmers' contribution	Billing services	Other products (inputs, outputs)	Foundation	
Public sector	Advisory department of the Ministry of agriculture											
	Local/regional agencies											
	Other (specify)											
Research and Education	University											
	Research Institute											
	Other education bodies (specify)											
Private sector	Upstream industries											
	Downstream industries											
	Independent consultant											
	Private agricultural advice company											
	Farmers' owned advice company											
	Other (specify)											
Farmer based organisations	Farmers' cooperative											
	Chambers of agriculture											
	Farmers' circles/groups											
	Other											
NGO												

3.3 The diversity of methods for agricultural advisory services

This axis of diversity of the services lies in the modalities of interactions between advisers and their clients. The various forms of services which may coexist (individual advice, group advice, etc.) are not equal as they imply a variable degree of interaction between advisors and farmers (Figure 4). This typology is rather rough if one considers the way advisors and their clients interplay in the course of an interaction. So a great variability can take place within each of the forms identified in Figure 4. For example working with a group can be performed in a facilitating and participatory approach or in an expert position. Both, in group and in individual advice, normalized knowledge can be used to trigger some change in the way decisions are taken. If the name of the categories might be discussed according to these remarks, the idea is that we can position the service according to the intensity of the co-construction of the solution on the one hand, and the standardization of the service on the other hand.

Figure. 4 Technical support to farmers and different types of service relationship (from Laurent et al. 2002)



3.4 Consequences for WP3:

- The idea in this section is to provide some operational tools and conceptual frameworks that could be applied so as to standardize the countries national reports describing the advisory systems in the inventory at two levels.

- i) At the level of the role of the state:

* the hexagon of MFA could be used to picture the aim assigned to advisory services within rural and advisory policies;

* the table adapted from Rivera could qualify the strategy of state in supporting agricultural advisory services. This could be complemented by an extensive description of the funding schemes (and level of investments of the state in agricultural advisory services).

- ii) At the level of suppliers

* the table of Birner may help establishing a typology of the service suppliers in each county

* the figure from Laurent et al. could be useful to qualify the main advisory methods implemented by these suppliers.

Conclusion

Recent reviews of the literature indicate some challenges for the analysis, the implementation and the evaluation of agricultural advisory services (Faure et al. 2012, Birner et al. 2009). These reviews stress the need to switch towards a best fit perspective: *"promoting "one-size-fits-all" approaches are inappropriate for agricultural advisory services.[...] What is important is to build capacity among policy-planners, managers and researchers to identify modes of providing and (...)advisory services that "best fit" the specific conditions and development priorities of their countries"* (Birner et al. 2009). If such debates have a growing importance in the contexts of South countries, they need to be intensified in Europe through comparative analyses. The report proposes an analysis of agricultural advisory services according to the diversity of i) their methods, ii) their funding principles and iii) their aims, beyond the common characteristics highlighted in section 2. It is also possible to propose a consistent set of tools for describing these three dimensions (which can be used in this project for the WP3 dedicated to the inventory of the EU farm advisory services in the 27 EU Member States).

In addition, academic literature and political working papers point out several questions that would deserve further investigations:

- how effective are the advisory services to meet the demands of diverse types of farmers, including diverse types of small scale farmers who may play an important role in several countries (e.g. semi-subsistence farmers in Eastern European countries; diversified small commercial in South Europe; commercial part-time and hobby farms in western Europe, etc.)? This issue involves the various dimensions of the systems of advisory services: the methods (individual vs. collective, role of ICTs), the institutional arrangements for providing pluralistic advice integrating productive, environmental, social and sanitary goals (especially when advice is provided by private companies), the modes of coordination of the supply of service (level of governance of this coordination? role of participatory approaches?...);
- what is the capability of advisory services to bridge research with farmers' knowledge? This issue concerns the investments made by extension suppliers (both private or public) in back-office activities, but also to the possibility to benefit from shared infrastructures (data bases, libraries, experimental stations...). It also makes it necessary to better understand the role of academic actors (Universities, research institutes...) in this dynamics, as well as the new logics of public intervention (incentives, calls for tender, participatory approaches...);
- how can advisory services facilitate the connection between AKIS and other actors of innovation systems within supply chains, rural areas and also urban and peri-urban agricultures;
- which contribution can be made by advisory services to design, implement and maintain (rural) innovation networks that would enhance farmers' skills and empowerment? This issue calls for in depth investigations regarding the very conception of innovation, as a source of added-value for farmers, but also as a social innovations territorially embedded.
- which kind of methodologies should be adopted / recommended to evaluate the public policies and the instruments supporting farm advisory services (self-evaluation vs external expertise? ex-ante vs ex-post evaluation? quantitative assessment of impact or/and qualitative appraisal of mechanisms?).

All these issues open a new research agenda. Some of them will be considered in the realm of the PRO AKIS project (e.g. systematic reviews of available knowledge on the effectiveness of farm advisory services carried out in WP2; case studies on innovation dynamics in different EU countries in WP4). This document, as well as the project more globally, aims at contributing to the policy debate, emphasizing the need for a more integrated vision of advisory services as instruments of European public policies involving agriculture and innovation.

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Appendix 1. Some definitions of extension or agricultural advisory services in the academic literature

- *"Extension [is] a series of embedded communicative interventions that are meant, among others, to develop and/or induce innovations which supposedly help to resolve (usually multi-actor) problematic situations"* (Leeuwis and van den Ban 2004).
- *"Agricultural advisory services' are defined as the entire set of organisations that support and facilitate people engaged in agricultural production to solve problems and to obtain information, skills, and technologies to improve their livelihoods and well-being".* (Birner et al. 2009).
- *"Extension is defined as systems that should facilitate the access of farmers, their organisations and other market actors to knowledge, information and technologies; facilitate their interaction with partners in research, education, agri-business, and other relevant institutions; and assist them to develop their own technical, organisational and management skills and practices"* (Christoplos 2010).
- *"Advisory work (...) is the process whereby the extension worker tries to motivate his extension partner and, by offering encouragement and ideas, seeks to give him the capability to act to solve his acute problems. In this way, partners acquire greater insight into the network of problems affecting them and recognize the alternative solutions available. They gain from this both the incentive to embark on problem solving and the direction to take. Through advisory work, otherwise untapped human resources are set free and utilised."* (Hoffmann et al. 2009, slightly revising Albrecht et al. 1987).

Appendix 2. An illustration of the diversity of the definitions of extension or agricultural advisory services in institutional documents

- " The Farm Advisory System aims at helping farmers to better understand and meet the EU rules for environment, public and animal health, animal welfare and the good agricultural and environmental condition." (European Commission).
- " Rural Advisory Services are about strengthening capacities, empowering rural people, and promoting innovations. RAS support people to obtain skills and information, and to address challenges so as to improve their livelihoods and well-being. Traditionally, RAS disseminate information about technologies, markets, inputs and financial services, and assist farmers to develop their farming and management skills. But RAS also broker interactions between farmers, the private sector, research, education, and government. RAS coach different actors to improve market access, deal with changing patterns of risk, and protect the environment." (GFRAS).
- "Extension and rural information services provide critical access to the knowledge and information that rural people need to increase the productivity and sustainability of their production systems, and thus improve the quality of their lives and livelihoods. A growing consensus has recognized that agricultural extension systems must be pluralistic networks of institutions providing varied information and innovation services to rural peoples. Such extension systems must be demand-driven with closer linkages to clients, must become more efficient, and must develop more sustainable sources of financing. Increasingly, extension services are market driven integrated services that are tailor made to meet the needs of the clients" (World Bank).
- "What is currently considered «agricultural and rural extension» may eventually become «food and agriculture, rural and urban extension». In fact, extension in high-income countries is already providing information and education services in urban areas, extending beyond technical agriculture and rural development alone" (FAO).
- Agricultural extension operates within a broader knowledge system that includes research and agricultural education. FAO and the World Bank refer to this larger system as AKIS/RD - Agricultural Knowledge and Information Systems for Rural Development (FAO/World Bank 2000). The OECD countries refer to it simply as the Agricultural Knowledge System (AKS) or Agricultural Knowledge and Innovation System (AKIS).
- The African Forum for Agricultural Advisory Services adopts explicitly the definition of Christoplos (Box 1).

Appendix 3. Defining Services: a definition resulting from a debate between Jean Gadrey and Robert Hill

Confronted to the heterogeneity and to the difficulties of representation of service activities in national accountancy systems, Hill (1977) has first proposed the following definition of services: "*a change in the condition of a person, or a good belonging to some economic unit, which is brought about as a result of the activity of some other economic unit, with the prior agreement of the former person or economic unit*". Other authors have emphasized the intangible character of services, which cannot be stored nor even exist independently from the beneficiary of the service (Stanback 1979). Thus, Delaunay and Gadrey (1987) had proposed a slightly different definition of services that insist on the fact that services do not lead to a product that could be circulated independently from the support of the service: "*a service activity is an operation aimed at the transformation of the state of a reality C possessed or used by a consumer (or client or user) B, implemented by a supplier A upon the request of B, and often in relation with B and that does not result in the production of a good that could circulate independently from C*". (Gadrey 1992). Following these debates, Gadrey and Hill have both proposed new definitions of services in the early 2000s. Hill (1999) states that five conditions are necessary to consider an activity as a service activity:

- a service is different from an entity;
- a service implies a form of relation between the supplier and the beneficiary of the service;
- a service deals with an entity C;
- a service has for product S the transformation of an entity C;
- there is no property right attached to such a product: there is no possibility to sell S independently from C.

For Hill, among these characteristics, the establishment of a relation between supplier and beneficiary of the service is a major key for differentiating activities of production of goods and services: "*the production of services implies a relation between two (or more) economic units, and the existence of absence of such a relation may determine if an activity leads to a production of a good or a service, more than the activity itself*" (Hill, 1999). Gadrey however objects that establishing relations might not be totally specific to service activities. Thus, certain academic researchers propose an integrated approach of goods and services, describing the growing importance of relations also for goods in markets (Barcey and Bonamy, 1988 and 1999), acknowledging a service dimension in many industrial production systems (Zarifian 1987, Hatchuel 1994) or even in agriculture (Nefussi and Nahon 2002, Reboud 1994).

Appendix 4. Differences between Agricultural Knowledge and Innovation Systems and Agricultural Innovation Systems

Even if there is a general consensus on the adoption of systemic approach, in both academic and institutional settings, there is no universally accepted definition of this system, including its components, boundaries and functions. In particular, two main frameworks have emerged in the last decades as a critical response to the linear technology transfer model mainly exemplified in the National agricultural research systems (NARS):

- the Agricultural Knowledge and Information Systems (AKIS) or Agricultural Knowledge and Innovation Systems (AKIS),
- the Agricultural and Innovation Systems (AIS).

According to the World Bank definition⁶:

- *National agricultural research system (NARS)* indicates the entities responsible within a given country for organizing, coordinating, or executing research that contributes explicitly to the development of the country's agriculture and maintenance of its natural resource base.
- *Agricultural knowledge and information system (AKIS)* indicates a system that links people and institutions to promote mutual learning and generate, share, and utilize agriculture-related technology, knowledge, and information. The system integrates farmers, agricultural educators, researchers, and extensionists to harness knowledge and information from various sources for improved livelihoods. Farmers are at the heart of this knowledge triangle.
- *Agricultural innovation system (AIS)* indicates a network of organizations, enterprises, and individuals focused on bringing new products, new processes, and new forms of organization into economic use, together with the institutions and policies that affect their behavior and performance.

The Table 4 synthesizes the major differences between the three frameworks according to the FAO, World Bank (2002) and Hall (2006).

⁶World Bank. 2012. *Agricultural Innovation Systems : An Investment Sourcebook*.

Table 4. Defining features of NARS, AKIS and AIS perspectives related to agricultural innovation systems

Defining feature	NARS	AKIS	Agricultural innovation System
Purpose	Planning capacity for agricultural research, technology development, and technology transfer	Strengthening communication and knowledge delivery services to people in the rural sector	Strengthening the capacity to innovate throughout the agricultural production and marketing system
Actors	National agricultural Research organizations, Agricultural universities or faculties of agriculture, extension services, and farmers	National agricultural research organizations, agricultural universities or faculties of agriculture, extension services, farmers, NGOs, and entrepreneurs in rural areas	Potentially all actors in the public and private sectors involved in the creation, diffusion, adaptation, and use of all types of knowledge relevant to agricultural production and marketing
Organizing principle	Using science to create inventions	Accessing agricultural Knowledge	New uses of knowledge for social and economic change
Mechanism for Innovation	Transfer of technology	Interactive learning	Interactive learning
Degree of market Integration	Nil	Low	High
Role of policy	Resource allocation, priority	Enabling framework	Setting Integrated component and enabling framework
Nature of capacity strengthening	Infrastructure and human resource development Strengthening	communication between actors in rural areas	Strengthening interactions between actors; institutional development and change to support interaction, learning and innovation; creating an enabling environment
Outcome	Technology invention and technology transfer	Technology adoption and innovation in agricultural production	Combinations of technical and institutional innovations throughout the production, marketing, policy research, and enterprise domains

Source: as defined by FAO and World Bank (2002), adapted from Hall (2006).

The AKIS acronym, proposed by Rölting in 1989⁷, as Agricultural Knowledge and Information System has since evolved to describe Agricultural Knowledge and *Innovation* Systems, “a concept that seeks to encompass and influence the complexity of knowledge and innovation processes in the rural sphere” (SCAR 2012).

The AKIS and AIS perspectives have several points in common, including:

- the constructivist paradigm,
- to consider innovation as a social phenomenon that takes place in the complex interaction of diverse social actors rather than in the isolated and controlled environment of researchers,
- to recognize scientific knowledge coming from research organizations and other sources as an important, but not the only, input for innovation to happen,
- to share the principle that there are multiple sources of innovation in agricultural innovation, and both – in principle – recognize the innovative capacity of farmers (Assefa et al. 2009).

The academic debate recognizes also relevant differences between the two frameworks, although the boundaries between AIS and AKIS (where in the AKIS acronym I stands for Innovation) in practice sometimes are very labile, until arriving to be used as interchangeable terms.

There are two ways of looking at these concepts, as notions in competition, or as complementary notions, built for different aims.

In the first perspective, there is the idea that a new vision of innovation system (AIS) alternative with respect to AKIS is needed so as to tackle the issue of sustainable development (Dockès et al. 2011). A new form of AIS would thus be needed to support new process of innovation.

A main characteristic of this new form of AIS would be that they integrate a much broader scope of actors. “AKIS, however, is limited in its ability to conduct analysis beyond the nexus of the public sector and to consider the heterogeneity among agents, the institutional context that conditions their behaviours and the learning processes that determine their capacity to change” (Speilman, 2005).

“Agricultural innovation does not turn out in a one-dimensional, linear knowledge circulation and adoption process of research-extension-farmer configurations, but rather, it depends on learning and meaning creation among multiple stakeholders (farmers, inputs and processing industry actors, agricultural traders, retailers, policymakers, consumers and NGOs), networks and reconfiguration of socio-cognitive elements such as perception, rules, agreements, identities and relationships” (Leeuwis & Van den Ban 2004).

A second way of looking at this diversity would be to consider AKIS and AIS as following different objectives and perspectives of analysis, thus they could result complementary in practices (Hall 2006, Klerkx et al 2012).

⁷Rölting defines AKIS as “the set of agricultural institutions, organizations, persons and their linkages and interactions, engaged in the generation, transformation, transmission, storage, retrieval, regulation, consolidation, dissemination, diffusion and utilization of knowledge and information, with the purpose of working synergically to support opinion formation, decision making, problem solving and/or innovation in a given sector, branch, discipline or other domain” (Rölting 1989).

The major difference between AKIS and AIS results in emphasis and in choices of areas of interest rather than in the basic philosophies and principles (Assefa et al., 2009). The AKIS framework comes from the extension perspective⁸, while the AIS derives from a researcher perspective, as a social construct based on the industrial notion of National Innovation Systems (NIS), with roots in evolutionary economics (Balzat and Hanusch, 2002).

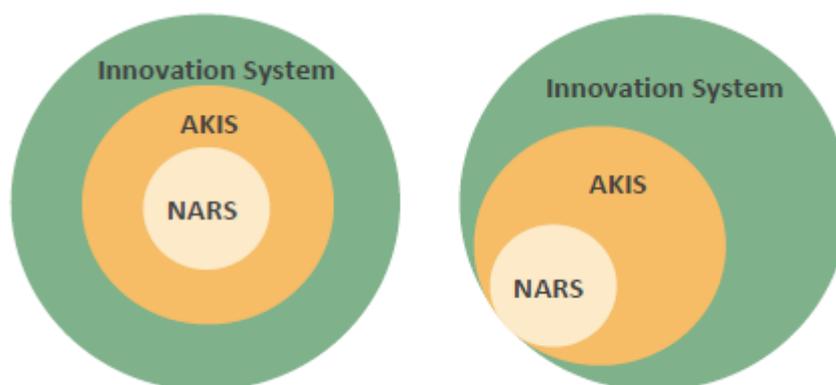
According to Assefa et al. (2009), these differences have some relevant implications:

- *public institutions play a strong role in the innovation process from the AKIS perspective but not from the AIS perspective,*
- *in terms of technological innovation, in the AIS case studies the private sector takes the lead, through building own capacities and buying services from elsewhere. It depends very little on public research institutions for knowledge,*
- *the question is about making choices between developing commercial goods (in which AIS is most interested) and targeting public goods, which AKIS often does.*

The more market-orientated approach is also pointed out by the World Bank definition of AIS as “a network...focused on bringing new products, new processes, and new forms of organization into economic use”.

Some authors conclude considering the two, or even three, system concepts as interlinked and cumulative: “NARS focuses on the generation of knowledge, AKIS on the generation and diffusion of knowledge, and AIS on the generation, diffusion, and application of knowledge” (Roseboom 2011).

Figure 5. Linking national agricultural research systems and agricultural knowledge and information systems within an agricultural innovation systems perspective



Source: Chema, Gilbert, and Roseboom (2003).

“A more accurate way of depicting the link is shown in the right-hand side of the figure, in which the NARS is no longer seen as the epicenter of innovation but as one of its sources. Knowledge and information may spill into the AIS from domains other than NARS and, perhaps even more crucially, knowledge and information may emerge from outside the realm of formal research because of on-farm, as well as off-farm, learning (up and down the agricultural production chain)—that is, learning through doing, using, and interacting. Institutional, organizational, and managerial types of innovation, in particular, more often have their origins in on-site learning processes rather than off-site formal research. These forms of innovation are often far more complex and difficult because one cannot experiment with and fine-tune them off-site (Chema, Gilbert, and Roseboom 2003)” (Roseboom 2011).

⁸Röling explicitly recognizes that AKIS is «a concept that I developed based on the work of Nagel (1980) and Swanson and Peterson (1989, Swanson, 1990), especially using the Soft Systems notion of Checkland (1981 and with Scholes, 1990). Engel and Salomon (1997) played key roles in further elaborating the concept and in developing a powerful methodology called RAAKS based on it» (Röling 2004).

Klerkx et al. propose the idea that applying “system thinking” to describe innovation systems in the agricultural sector may follow three distinct objectives:

- An infrastructural view on the system, *“that makes a predominantly static analysis of the presence and interaction of actors (e.g. research institutes, financing organizations), and the infrastructures that govern the behaviour of actors in innovation processes (rules and regulation and physical infrastructures like transportation systems) and which exercise direct influence on innovation outcomes (e.g. intellectual property laws) present in countries. The main question is to what extent this system supports, or does not support and even constrain, agricultural innovation (e.g. Sorensen 2011). [...] Such studies interpret AIS both as a national innovation system (Temel2004 ;Leitgeb et al. 2011 ; Sorensen 2011) and as a (sub-) sectoral innovation system (Blay-Palmer 2005 ; Gildemacher et al. 2009).”* (Klerkx et al., 2012, p. 464).
- A process view of the systems: *“this often results in a more dynamic analysis to assess the co-evolutionary process of interactive development of technology, practices, markets and institutions. This implies seeing innovation systems as self-organizing growing networks of actors connected to the development of a certain novelty, emerging from a dominant incumbent production system (characterized by certain technologies, practices) or value chain configuration and moving towards an alternative to the incumbent system or even replacing it (Ekboir 2003 ; Hall and Clark 2010 ; Klerkx et al. 2010).”* (Klerkx et al. 2012, p. 465). This conception is in the line with transition theories, and could result in the fact that there are as many innovation systems as there are innovations.
- A functionalist view of the system, which tends to focus on whether or not specific functions are fulfilled (Hekkert et al. 2007).