AKIS and advisory services in Spain

Report for the AKIS inventory (WP3) of the PRO AKIS project

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Executive summary

The main aim of this report is to provide a comprehensive view of the Agricultural Knowledge and In-formation System (AKIS) in Spain, with a particular focus on agricultural advisory services. This description includes some aspects of the recent history, policies, funding, training system, knowledge exchange, coordination structures, and there is a section about the implementation and characteristics of Farm Advisory System (FAS).

This report represents an output of the PRO AKIS project (Prospects for Farmers' Support: Advisory Services in the European Agricultural Knowledge and Information Systems'). One of the main goals of AKIS is to describe the exchange of knowledge and supporting services between many different actors, but having farmers as final recipients. AKIS attempts to bring farmers relevant knowledge and networks around innovations in agriculture. Findings were presented at several workshops (early 2014), discussed with stakeholders and experts, and feedback integrated in the report.

Spain has historically had a very important farming sector. During the last two decades its importance in the national economy has been declining significantly, mainly due to increased production costs and increasingly smaller farm profitability. Despite this trend, Spain is a major agricultural and cattle producer within the context of the EU.

The Spanish AKIS system has a complex organization. The strategic decision-making and funding level includes structures linked both to the central government and to the regions (because the decentralized administrative system). The national scale remains fundamental as determine the design and funding of national plans of research and technological development. The two main centres are INIA and CSIC, funded by central government (but also attending calls for projects). Meanwhile regional governments have created their own research and development centres, but with two novelties, they are more specialized in specific subjects in their respective regions, and they have greater attention to the training tasks (with some of them assuming formal training responsibilities).

All research centres constitute a huge potential in terms of knowledge generation and innovation. However, the main weakness is that they do not have sufficient mechanisms for transferring that new knowledge and innovations and these are not sufficiently adapted to the farmers' needs. This is why the advisory system itself is so strategic. In the advisory system there were also changes in recent decades, with the replacement of the traditional advisory system (being the last vestige the Agricultural County Offices), traditionally led from the Ministry of Agriculture, by a fragmented system of different organisations with different natures, targets and with uneven presence in the territory. Thus there are organisations with relevant roles in different and specialised functions, such as Agricultural Training Centres and Associations for Integrated Treatment in Agriculture (dealing with plant health issues). However, those which have taken the formal role as Farm Advisory Services are mostly the professional agricultural organisations and, to a lesser extent, the agro-food cooperatives. They play a fundamental role close to farmers, also addressing issues not always related to knowledge transfer and innovations but to cross compliance with the CAP requirements.

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List of Acronyms

ADESVA:	Technological Centre for Agro-Food (Huelva, Andalucia)
AINIA:	Technological Institute for Agro-Food Industry (Valencia)
AKIS:	Agricultural Knowledge and Innovation System
ASAJA:	Agricultural Association of Young Farmers
CTAEX:	Agro-Food Technological Centre of Extremadura
CIFA:	Centre for Research and Agricultural Training of Cantabria
CITA:	Centre for Research and Agro-Food Technology of Aragon
COAG:	Coordinator of Organizations of Farmers and Stockbreeders
CSIC:	National Research Council
FAS:	Farm Advisory System
FAServices:	Farm Advisory Services
I+DEA:	Centre for Research and Agro-Food Development (Segovia, Castilla y León)
ICIA:	Institute for Agricultural Research of Canary Islands
IFAPA:	Institute for Agricultural and Fishing Research and Training of Andalusia
IMIDA:	Research and Agricultural and Food Development Institute of Murcia
IMIDRA:	Research and Rural Development, Agricultural and Food Institute of Madrid
INGACAL:	Institute of Agro-Food Quality of Galicia
INIA:	National Institute for Agricultural and Food Research and Technology
INTIA:	Institute of Technology and Agro-Food Infrastructures of Navarra
IRFAP:	Research and Training Institute for Agricultural and Fishing of Balearic Islands
IRTA:	Institute of Research and Agro-Food Technology of Catalonia
ITACYL:	Agricultural Technological Institute of Castilla and León
IVIA:	Institute for Agricultural Research of the Region of Valencia
OCA:	Agricultural County Office
OPAs:	Agricultural Professional Organization
OTRI:	Office for Transfer of the Results of Research
SECTI:	System of Science, Technology and Innovation of Extremadura
SERIDA:	Regional Service of Research and Agro-Food Development of Asturias
SITA:	Research and Agricultural Technology Service of Castilla-La Mancha
UPA:	Union of Small Farmers

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1. Main structural characteristics of agricultural sector of the country

The climate and the geographical characteristics of the country represent the optimum environmental conditions for the practice of agriculture and livestock, and to this it is added the large area of the country. This has led to an important historical tradition in the agricultural sector. However in the last two decades the importance of the sector in the national economy has been declining significantly, being the high production costs and increasingly smaller farm profitability the main reasons. Two very significant indicators highlighted this trend, the population employed in the sector (which has been reduced progressively to currently 4.2%) and the Gross Domestic Product in agriculture, livestock and fisheries (with a similar trend, currently stabilized at around 2.7%).

Despite the reduction of the importance at national level, Spain is a major agricultural and cattle producer due to a large number of farms (about one million, being the cereal, followed far behind by barley and wheat, the main crops, beside fruits and vegetables, such as tomatoes or oranges) and a high amount of heads of cattle (almost 15 million, counting 6 million of pigs, 4 million of beef and 2.3 of poultry, added to the almost 6 million tons of milk). There is also a very high Usable Agricultural Area (23.7 million hectares under exploitation), and a high amount of Annual Working Units (nine hundred thousand). As a result the sales of primary products amount to 34,000 Mill. Euros.

However, subsidies received from the European Union are substantial (almost 7,500 Mill. Euros), allocated to about one million of farmers (contrasting for example with Greece has 1,800 Mill. Euros, distributed to about 500,000 farmers).

With respect to the plots' structure, the majority of Spanish farms are of a small size (between 2 and 5 hectares, but with a much smaller average in citrus and horticulture farming). This plots' structure is one of the main factors for explaining the reduced profitability of farms, since about 55% of them obtained an income of less than 5,000 Euros.

The ageing population of farmers is one of the main features of Spanish agriculture as nearly a third of them are more than 65 years old, who normally keep their farms with the help of family members coinciding with an increased workload. Also the time spent by these farmers on their farms has steadily reduced in recent years and currently there are 20% fewer full-time farmers than in the year 2000.

Related to organic farming, this accounts for only 1.5% of the farms and a bit less than 3% of farmers, and about 6.7% of the total Usable Agricultural Area. Finally, concerning the use of polluting products, Spain uses high amount of ammonia, having worsened the evolution of this indicator since 1990, as has increased nearly 15% until 2010, reaching 343 Ktonnes. In contrast to this negative evolution in Spain, in practically all countries studied these emissions have been reduced by between 15 and 26%. Nitrogen used for agricultural practices in Spain is not excessively high compared to countries of study. Unlike ammonia, the evolution of the production of nitrogen has been positive as since 2004 it has been reduced slightly (from 97 to 89 kg / hectare). Finally, it should also be noted that the areas managed to support biodiversity have increased significantly in the last five years, as is shown by EU statistics.

2. Characteristics of Agricultural Knowledge and Information System (AKIS)

2.1 AKIS description

2.1.1 The framework

The Spanish political and territorial organization, based on a decentralized system in which the regions have much of the responsibilities and decision making powers, meaning that the AKIS system is configured differently to other countries in the European Union. On the one hand the Spanish Constitution establishes that the regions may assume competences in the promotion of research and exclusive competences in the promotion and general coordination of scientific and technical research, as well as international –scientific- relations are reserved to the central government. And on the other hand, all regions have established, in their Statutes of Autonomy (the main legal reference in each region) the assumption of competences in the field of agricultural research.

The decentralization of competences and responsibilities to the regions marked an intense period of negotiations between the new regional governments and the central government during the end of 70s and early 80s. The new regulatory framework between central and regional governments reflected the functions of the central government which were transferred to each region, the management and administration of research units agreed in each case, the execution of research projects included in the national programmes of agricultural research, etc. Meanwhile central government reserved itself mainly in the definition of basic national objectives and guidelines of the policy of agricultural research, the overall coordination of the projects collected in national programmes of agricultural research and international scientific relations in the field.

2.1.2 The main agricultural research and innovation system

The National Institute for Agricultural and Food Research and Technology (INIA) established by the Government Decree 17/1971, was the national public agency responsible for the above-mentioned functions. In addition, in order to achieve coordination and cooperation between the central government and the regional governments it was created the Agricultural Research Coordinating Committee (1987), chaired by INIA and involving several ministries (Economy and Competitiveness; Agriculture, Food and Environment, and the Ministry of Finance and Public Administration) as well as representatives of the seventeen regional governments.

Currently INIA's activity relies mainly on the National Plan of Scientific and Technical Research and Innovation (2013-2016) developed by the Ministry of Economy and Competitiveness. The sub-programme that manages the Coordinating Commission of Agricultural Research is focused on Food Safety and Quality, Productive and Sustainable Farming, Natural Resources and Marine Research. It is funded by the Central Government and is developed exclusively by regional research centres belonging to the system INIA – Regional Governments. Therefore the INIA leads such a Commission through internal departments, the General Sub- Directorate of Foresight and Coordination of Programmes (SGPCP), which coordinates and manages this sub-programme, while R+D activities are managed by the General Sub-Directorate of Research and Technology (SGIT), through its centres and departments in the whole country.

The INIA system (including regional centres) is the traditional and main framework for agricultural research in Spain. One important feature is that calls are restricted to those centres belonging to the system INIA-regional government centres. But each region independently designs and develops its own agricultural research, with different models of management and different philosophy and in accordance with their own agenda and objectives, following their own stated needs.

2.1.3 Other actors in the agricultural research system

However, as a complement to the strong core based on the system INIA-regional government centres, there are other AKIS organisations who exert a fundamental research function, seeking for funding for their research projects on open calls at national, regional (although not all regions maintain a regular open calls) or even EU levels (see AKIS diagram). Among them, by size and human capital, stands the National Research Council (CSIC), the largest public institution dedicated to research in Spain and the third in Europe. Among its eight main fields of research lies Agricultural Sciences and to a lesser extent the field of Science and Food Technology. Agricultural Sciences are structured in 12 centres and research institutes distributed throughout the country. It is worth highlighting the importance of this field, not only as reference for agricultural research in Spain but also at the European and worldwide scale, since the CSIC is one of the three world leaders along with the USDA (United States Department of Agriculture) in the USA and the INRA (National Institute for Agricultural Research) in France.

Universities and Technological Centres are the organisations that completed the most important AKIS system in Spain. The universities use their infrastructure and human capital to undertake research, either basic or applied. For its part, Technological Centres (of a private nature in many cases, although in practice it has some type of public support, more or less directly as appropriate) are usually the result of the specific need for a group of companies in the same sector investing in R+D+I. In this framework there are common partnerships among different AKIS institutions, generated for specific projects, or even other new research centres or sections sponsored by such organisations in order to promote research in a specific sector.

Many of the research centres, including universities, have specific Offices for Transfer of the Results of Research (OTRIs). They were born in 1988 as structures to encourage and facilitate cooperation in R+D+I activities between researchers and companies, both at national and European levels. The OTRIs are intermediaries in the system of science-technology -companies, and its mission is to boost the relations between the system's agents. For this purpose the OTRIs seek to identify the technological needs of the socio-economic sectors and to promote the transfer of technology between the public and private sectors, thus contributing to the application and commercialization of the results of R+D+I generated in universities and public research centres.

2.1.4 Declining and emerging actors: from agricultural chambers to agricultural farmers organizations

Agricultural chambers constituted a very solid structure present in all Spanish rural areas (even at level of many agricultural municipalities), inheritors of times when they were an instrument of control of the rural areas (hence membership to that agricultural chambers was mandatory). In 1977 a Government Decree (1336/1977) established the regulation and a certain

modernization, in an attempt to extend and fix some advisory functions to farmers and stockbreeders. They remained oriented towards the control of compliance with the various regulations from the government, management of services (e.g. irrigation) and resolution of potential conflicts (e.g. those derived of the use of common services). At a local scale some agricultural chambers constituted a transfer information point on technical and practical agricultural aspects, mostly among farmers themselves rather than from specific service structures. Their definitive decline came in the mid-80s (Act 23/1986). Despite the fact that they were going to rely on regional governments, the reform left the agricultural chambers with virtually no powers. Since the mid-90s, they are being eliminated in most regions (although in some cases a certain structure of representation at the provincial level, but with more limited powers, has been maintained).

In parallel with the decline of agricultural chambers there was the emergence of Professional Agricultural Organizations (OPAs). Basically currently there are three main OPAs in Spanish AKIS. First, the Coordinator of Organisations of Farmers and Stockbreeders (COAG), one of the most powerful agricultural farmer organisations, with a wide presence in practically all of Spain. Second, the Agricultural Association of Young Farmers (ASAJA), which was the result of a merge of several organisations in 1989, which represents rural businesses' interests and agrarian owners, but also wants to be a professional and family-farm focused organisation. Finally, the Union of Small Farmers (UPA), promoted by the trade union General Union of Workers (UGT) and the Socialist Party (PSOE), with originally two sections, a business branch (of self-employed farmers) and that of employees. Today is very active and represents an important part of farmers in some regions. Additionally some regional based organisations play a crucial role at the regional scale (e.g. L'UNIO in the region of Valencia). But these three major organisations are recognized as major partners by successive governments, national and regional ones, as it was recognised through the Act 10/2009, which established the agro-food advisory bodies of the central government.

From the point of view of its activities, the last two decades have been defined by an important process of modernization and improvement of its service delivery capacity. The cooperatives also participate significantly in this delivery capacity. The most common services include Consultation and information services (journals, publications, websites, communication through new technologies, etc.), processing of grants (CAP, plans of improvement, youth mainstreaming, agro-environmental aids, etc.), dissemination of good practices (e.g. through training programmes), management of agricultural, stockbreeders and forestry insurances, and a diversity of services (which include technical and legal advice, tax and labour services, services of management such as marketing and sales, resources, claims, and etc.).

In terms of their budget, more than half of the funding of agricultural organisations comes mainly from the services provided to farmers. Moreover, government subsidies represent only between 5-10%. The rest is divided between quotas of affiliates (which covers a very small part, around 10%) and, where appropriate, commercial activities (e.g. common sale of products through the organizations themselves). In their structure of expenditures, the staff often accounted for about two thirds.

2.1.5 Other actors at the bottom of the AKIS map

At the bottom of the Spanish AKIS map of actors there are, in direct contact with the farmers, Agro-food Cooperatives, Agricultural Training Centres, Agricultural County Offices (OCAs),

and Associations for the Integrated Treatment in Agriculture (ATRIAs). As well as being a part of the AKIS, some of them are also part of the official Farm Advisory Services (including private companies, which play a relevant role in some specific regions and sectors), as will be highlighted in the following sections. Their main global function is advice to end users. Another important function is the transfer of knowledge through training (sometimes agro-food cooperatives, but usually the Agricultural Training Centres, dependent or counting with license and control of regional governments). The Associations for Integrated Treatment in Agriculture (ATRIAs) were initially created in order to comprehensively fight against pests and diseases, and currently they exercise advisory functions on this and other issues, such as environmental practices and sustainable agriculture. The Agricultural County Offices come from the former Agricultural Extension Service, dedicated to personalized advice to farmers and stockbreeders; however since they are being dismantled in many regions, where they still are operational they are basically oriented to the processing of applications for CAP grants.

2.2 Knowledge exchange and coordination structures

The collaboration between institutions and sectors, public and private, is based on formal agreements for the realization of joint –research- projects as well as through the creation of joint organizational structures. This type of formal collaboration or structures is mainly present between institutions doing research, but those at the bottom of the system tend to have more relations with research institutions (vertical links), but scarcely with other similar organisations (horizontal links) (Fig. 1).

INIA and agro-food research regional centres work closely so that the number of signed agreements is significant, both among themselves and with other public and private institutions. Some agreements led to joint centres, such as AGROALIMED (Institute for Agricultural Research of the region of Valencia, Polytechnical University of Valencia, CSIC and INIA), Agri-biotechnology Institute (Public University of Navarra, CSIC and the Regional Government of Navarre); Institute for Research in Food Sciences - CIAL (CSIC and the Autonomous University of Madrid); Centre of Biotechnology and Plant Genomics – CBGP (Polytechnical University of Madrid and INIA); Science Institute of the Vine and Wine – ICVV- (University of La Rioja, Regional Government of La Rioja and CSIC). In Catalonia there is a dense network of join centres, such as Centre of Agro-Genomic Research (Institute of Research and Agro-Food Technology-IRTA, CSIC, Autonomous University of Barcelona and University of Barcelona), and Economics and Agro-Food Development –CREDA- (private NGO created by the Polytechnical University of Catalonia and IRTA).

In addition to this collaboration agreements between public and/or private AKIS organizations, at national level there are the Technology Platforms, whose goal is to become a formal union of numerous associations, research centres, agricultural universities and OPAs engaged in a specific sector. Numerous working groups for the specific fields of research as well as a strategic Innovation Agenda have been created, involving both above-mentioned institutions (universities, research centres, etc.) as well partners at the international level (other European platforms, European research centres, etc.).

There are currently 15 technological platforms (TP) which, according to its subject or scope, can be classified into 5 groups (Table 1), to which those at the regional level (initiated or sponsored by the regional governments) should be added. All of these are connected to agro-food and livestock, either for the processes of production, processing, distribution, marketing or management. Moreover the Ministry of Agriculture, Food and Environment together with the Polytechnic University of Madrid have recently articulated a knowledge platform that aims to be a network for professionals and stakeholders working in the sectors of agro-food, environment and rural areas in general, helping and contributing to establish relations and information exchanges between all the involved actors (*Chil*). It is open to researchers outside the country, mainly other Spanish speaking countries. The Ministry of Agriculture is doing a big effort trying to convert it in a very powerful instrument for all those working in these issues, in the different stages, institutions and related sectors. Although the platform has been established very recently, the initial results on its application and use seem to be very satisfactory.

Obviously, completing this structure there are other means of scientific communication and knowledge exchange, such as congresses, conferences, seminars, workshops and other similar activities. Moreover, the importance of the specific training on specific subjects, performed by research centres for other research centres and AKIS institutions, oriented to update and incorporate new knowledge to Farms Advisory Services should be highlighted. There is a large number of this type of non-formal training, designed in response to the needs of farmers. However, the initiative is usually from regional centres, and, where appropriate, in accordance with the Farm Advisory Services. But increasingly Farm Advisory Services are also designing and offering training courses, usually with some collaboration with regional centres.

Table 1. Main Technological Platforms in the Agro-Food System

Collaborative Platforms	1. Child: Spanish Agro-Food Knowledge Collaborative Platform
	2. FOROAGRO: Agro-Food Tecnological Research and Innovation. Latin America and Spain
Spanish Technological Platforms of Agriculture, Fisheries and Food	1. Spanish TP Food for Life (PTE-FFL)
	2. Technological Platform of Sustainable Agriculture (PTAS)
	3. Spanish TP of Fisheries and Aquaculture (PTEPA)
	4. TP of Wine (PTV)
	5. TP of Olive (ALENTA)
Spanish Technological Platforms of Environment and Eco-Innovation	6. TP for Water and Irrigation (TEWL)
	7. Spanish TP of Environmental Technologies (PLANET)
	8. Spanish Forest TP (PTFE)
Spanish Technological Platforms Power Energies	9. Spanish TP of Biomass (BOPLAT)
	10. Spanish TP of CO2 (PTECO2)
Spanish Technological Platforms of Industrial Sector	11. Spanish Robotics TP (HispaRob)
Spanish Technological Platforms of Biotechnology and Pharmaceutical sector	12. Spanish TP for Animal Health (Vet+i)
	13. Plant Biotechnology TP (BIOVEGEN)
Regional Technological Platforms	14. Andalusia: Platform Consulting and Knowledge Transfer for Agriculture and Fisheries
	15. Catalonia: Virtual Community for Agricultural, Food-Industry and Rural World (RuralCat)

Source: Ministry of Agriculture, Food and Environment, 2013 (http://www.magrama.gob.es/es/).

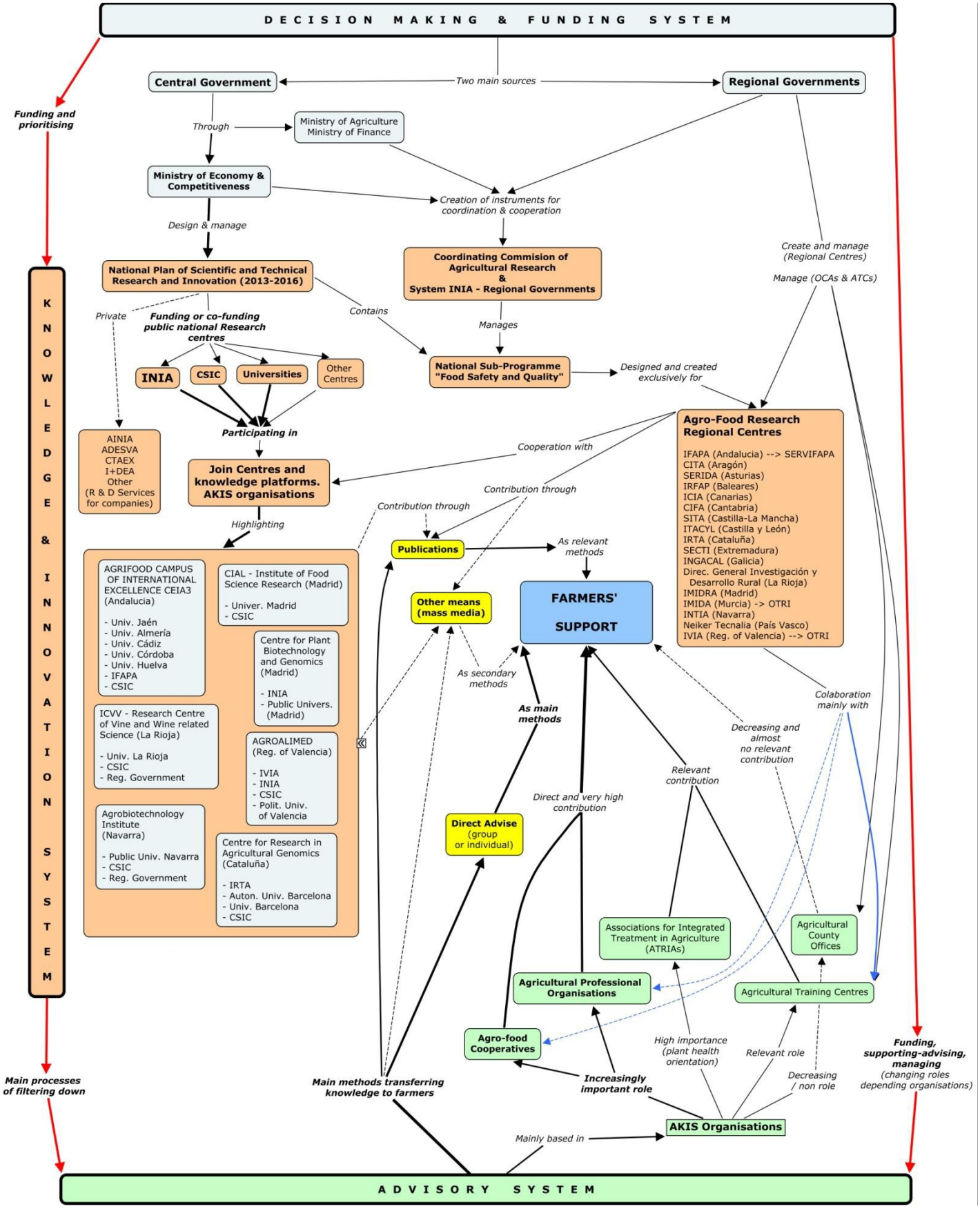


Figure 1. Agricultural and Knowledge Information System Diagram
Source: Elaborated by the authors.

2.3. AKIS main organizations: funding, human resources and planning issues

2.3.1 Funding research: source of agro-food knowledge

The source of funding for public AKIS organisations in Spain comes mostly from the Central Government. However, its funding received by contracts of collaboration with other AKIS organizations as well as from European funds is growing, although the latter assumes a very small percentage of the total amount of the funding received. Table 2 shows sources of funding for the CSIC. For the area of agricultural sciences, the budget amounted to 66,3 Mill. Euros, five million less than in the previous year.

Table 2. Consolidated Budget in the Spanish Research Council (CSIC). 2011 and 2012

	2011		2012	
FUNDING	%	Budget	Budget	%
Central Government	60,14	438.260.479,53	418.356.187,48	67,45
Competitive Open calls	38,83	282.949.006,50	191.208.136,04	30,83
Social Eur. Fund / Eur. Regional Develop. F.	1,03	7.505.229,70	10.638.491,38	1,72
TOTAL	**100**	**728.714.715,73**	**620.202.814,90**	**100**

Source: CSIC, 2013

With respect to the INIA, its general budget comes from Central Government (80%, 81,56 Mill. Euros in 2011), and the remainder of funding coming from the research activities (Table 3), with this amount being more important for research than its own general budget (certainly INIA helps those groups that did not achieve sufficient funds for their projects, but researchers are encouraged to go to public competitive calls as much as possible). It should be pointed out that external contracts and services have significantly increased globally in recent years, although it may have important variations from year to year.

Table 3. Budget of INIA (General Sub-Directorate of Research and Technology) for activities of R+D+ Innovation. (in Mill. Euros)

	2009	2010	2011
R+D+Innovation projects	**8,06**	**9,66**	**10,48**
International funding	1,52	2,07	1,68
National Plan of R+D+I	5,18	5,82	5,89
Other projects (national funding)	1,36	1,77	2,91
Contracts and services	**7,57**	**12,82**	**10,34**
TOTAL ACTIVIDADES DE I+D+I	**15,63**	**22,48**	**20,83**

Source: INIA, 2013

All these activities show the highly significant position of INIA in the R+D+I related to agricultural and food issues, being between the most relevant in the agro-food research in Spain, both because the amount of investment and the conjunction of interests of Central and regional

governments. INIA acts as the element of coordination between the capacities of the national system and those from the regions. In order to do this function effectively INIA maintains a close relation with sections in charge of the agro-food research in the regions through the Coordinating Commission of Agricultural Research INIA-Regions. In this way INIA is also contributing to the transmission of knowledge (research centres) to the productive sector (companies). The European Fund for Regional Development (ERDF) has had an important role in co-financing many of these types of actions.

2.3.2 Human resources

Human resources in the two major national research centres (CSIC and INIA) are governed by similar guidelines. Both organisations have a senior staff scientist (senior researchers, although with different categories) supported by a more numerous group of technical support staff.

CSIC is of a great size, with about 13,000 employees including scientific staff, support and management personnel, of which 11% corresponds to staff in the area of agricultural sciences. The three main functional groups of staff in this area are 35% scientists, 56% of technical support and 8.9% of staff is devoted to management. These figures are similar to the whole CSIC (with some less proportion of scientists and a bit more of technical support than the average). This staff is distributed in the different units and CSIC centres located in the regions, although the regions that have a greater number of staff are Madrid (with 45%), Andalusia (17%), Catalonia (14%) and Valencia (7.4 %).

The INIA carries out R+D+I activities in the agro-food sector in the General Sub-Directorate of Research and Technology (SGIT), through its centres of Forestry Research (CIFOR), Research in Animal Health (CISA) and Plant Genetic Resources (CRF), as well as departments of Biotechnology, Environment, Animal Genetic Improvement, Plant Protection, Animal Reproduction and Food Technology. To carry out its activities the SGIT has counted during the year 2011 a staff of 950 people, 20% of which are researchers and technologists, 40.5% are technical support, 28.5% are contracted researchers and 6.7% are fellows doing training/ temporary visits.

With respect to the gender aspect, it should be noted that in Spain, as in many other EU countries of the EU-27, the proportion of women working as a researchers is less than 40% on average. Moreover, women tend to remain mostly stagnated in the lower categories. Also it has been proven that there is a negative correlation between the invested budget and the presence of women, i.e., in organisations with more funding the presence of women tends to be lower. However these are general tendencies and there are some exceptions, for example regarding the gender of INIA staff. It should be noted that of the 950 employees in 2011, almost 60% are women, or 51% of researchers and technologists, 57% of staff of technical support, 66% of contracted staff and 63% of staff doing training/ temporary stays. In spite of that distribution, the figures make the INIA an example in gender equality, including the research sections.

2.3.3 Topics and clients: main orientations

When analysing the orientation and/or contents of the research and clients, many experts agree that there are two major trends. First, the regional research centres, which tend to focus more on applied research, due to their greater proximity to the end users and therefore more focused

on their demands and needs (farmers, stockbreeders, cooperatives, etc.). In these cases centres try to solve many – and frequently daily – problems affecting a product or sector (wine, cereals, fruits, etc.), and to bring improvements to face those problems better and/or to improve their competitiveness. In this sense we may say that regional centres are more problem-solving oriented.

Second, there is the research from INIA and CSIC, which could be described as fundamental or basic research and therefore with a lesser degree of direct application or, at least, would be one type of research that is less dependent on the demands of end users. However, although their activities are more fundamentally research oriented (therefore depending on the orientations coming from national research policy), the INIA, through its SGIT and its different research centres, to a lesser extent than regional centres, also provides scientific and technical advice to public or private organisations that request it. Thus for example the number of private companies asking for collaborations and in some cases for specific research and its outputs (in most of these cases it is applied research) is increasing. Therefore, as private demand increases, applied research is also more in demand, and although it applies much more for regional centres, it is also present in national ones.

Obviously both approaches, applied and fundamental research are necessary, and their complementarity (taking into account the good integration between regional and national centres) provides a greater strength to the research system. Despite this, the higher or lower applied component of the agro-food research is discussed in broad sectors, but in any way these are decisions in the scope of scientific and research policies of the central and regional governments and the different organizations depending of them.

The activity of INIA, through the Subdirectorate-General for Research and Technology (SGIT) orients its activities to the implementation of the priority research topics within the National Programme for R+D+I, focused on the "Society Challenges" (managed by the Ministry of Economy and Competitiveness). The main topics on which INIA (SGIT) is currently doing research in relation to the agricultural sector are those in Annex 1.

Some regions develop their own plans, as for example Catalonia. Here there is a Technology Transfer Annual Plan (PATT), collecting, programming and coordinating research and experimental actions (continued activities) as well as actions for the dissemination of technical knowledge (dissemination activities) oriented to farmers, advisors and agroindustry. Those actions are proposed and evaluated regularly by a selected number of players involved in the sector (Commission for Coordination of Technology Transfer), including representatives of the regional government working in rural areas, Agricultural Schools, Farmer's Unions, Producer's Associations, Universities and Research Institutes, local governments and LEADER Local Action Groups.

2.3.4 Training system: from knowledge and innovations transfer towards users' advice

National and regional centres do not have advisory programmes as such, but educational, more or less specialized as appropriate. In the national centres the design of these training programs responds to initiatives and proposals of the different institutes, being decision-making bodies who design programming, in this case over six months periods or an annual basis. In the last two years, training programmes in national centres have declined. The INIA for example

maintained a programme especially with Latin America accompanied by international courses, which are practically suspended. However INIA maintains the seminars programme (with more than 50 in 2012), but oriented to researchers.

Regional centres differ from the national ones for a more relevant training activity and the orientation to the demands and needs of farmers and stockbreeders in their territory (thus less research goals than in the national centres). For example, the IVIA (region of Valencia) organizes during the year 2013 about 100 courses of specialization for farmers and stockbreeders (although some of them are open for public in general). This programme of "à la carte" specialized training responds directly to the needs. The needs may have been detected by staff of the IVIA or those from advisory services, who sometimes collect direct expressions of interest by the farmers and stockbreeders. The IVIA pays much attention to the specificities related to the typical crops in the region, but on the other hand it is working hard fostering practices related to organic farming (from this point of view it takes part of the objectives of the farm advisory system). In parallel, the IVIA also has a specialized training plan for technicians (many of which are linked to the official advisory services), more extensive and specialized than those intended for farmers and stockbreeders. Other regional centres are working in a similar way, although the importance of training programmes can vary significantly.

One of the regional centres which has a more solid and developed training system is the IFAPA (Andalusia). It maintains five large institutional training projects (coping with mandatory regulations, related to integrated production, organic production, animal welfare, pesticides and incorporation to the agricultural enterprise). In addition, it develops three other large projects in the fishing sector. In parallel, it offers a wide range of short courses of specialization for farmers and stockbreeders throughout the territory. In the year 2013 there were a total of 677 courses of this type planned (combined classroom and blended mode in any of its 18 training centres in the region, and online mode via the training platform). To complement this wide system based on the IFAPA, there are more than 700 entities officially recognized to provide specific training in Andalusia. These organizations are in many cases very small, and in spite of forming part of the advisory system (through the training), they are not official FAS organisations.

Centres usually conduct satisfaction surveys to attendees, which is the main feedback for analysing the usefulness of each of the courses. However, neither in national centres nor in those of a regional nature it is usual to conduct monitoring and analysis of the impact of training initiatives, at least in a systematic and consistent way. In addition to the satisfaction surveys, the assessment is frequently informal, based on communication with those attending seminars and perceptions that transfer the staff in advisory services. These non-formalized assessments serve to identify new specialized training courses. Furthermore, among the organisations that provide advisory services, some of them repeated the scheme of seminars and courses and advice to groups of farmers on a smaller-scale. Others, namely those less experienced and with less tradition or less structures tend to only carry out the individual advice as training recognized centres as FAS. These institutions, whether they do advice to groups (courses or seminars) or if it is on an individual basis, usually do not perform systematic procedures of assessment and evaluation. As with the regional centres, their activities

are to respond more to the specific demand of farmers and, when planning training or group advice initiatives, it is a short term planning, annual or with reference to the agricultural campaign.

3. The Farm Advisory System

3.1 From the Agricultural Extension Service to advisory services. A historical change towards the new approach

The advisory services to farmers emerged in Spain in the mid-1950s, known as Agricultural Extension Service, led by the central government. At the end of the 70's (1978), the AES began to be transferred to the recently created administrative structure of regional governments. As it was completing the transfer of powers to the regions, central services were also losing functions of control and supervision over the regional centres. In order to maintain coordination between the Directorate-General (central government) and those in charge of Agricultural Extension Service in regional governments the Coordinating Board's for Agricultural Extension (Government Decree 1843 / 24 July 1980) was created. In addition, two new aspects had to be taken into account, affecting –National- Agricultural Extension Service. Firstly, the extension and research are put under the same Directorate-General of the Ministry of Agriculture. Secondly, the Ministry draws up the National Technology Dissemination Plan (PNTD, 1981), which is intended to promote the modernization of the agricultural sector and encourage adaptation to new circumstances such as the energy crisis, the revaluation of underutilized resources, integration into the EEC and the reorganization of the agro-food system.

Both events marked a turning point in the consideration of the functions of Agricultural Extension Service. The Ministry gave greater weight in its strategy and objectives to technology transfer, so it began to articulate to the Agricultural Extension Service with INIA. The Ministry also decided that the Agricultural Extension Service should to stop work at the request of the farmers to make it to the agricultural policies, and at this time (with the close perspective to entry into the EEC) its functions were focused more towards the modernization of agricultural structures. Therefore, after the PNTD the goals were focused much more on the technical and economic aspects and much less on the social aspects, producing a change in the conception of the agricultural world (they no longer thought in terms of rural communities but rather agriculture professionals).

The Agricultural Extension Service and INIA depended hierarchically on the Directorate-General of Agri-cultural Research and Training, which from 1988 (Government Decree 1532/1988) became dependent on the Secretariat of Agrarian Structures in which the National Institute of Reform and Agricultural Development (IRYDA) was also included. Due to the progressive decentralization of competencies in the field of agriculture, at the central level, the bodies of the AES were reduced to the former Central Training School, and their functions reduced to staff training, coordination and information and the provision of specialized services.

In 1991, the Agricultural Extension Service disappeared definitively as an autonomous body after the reorganisation of the Ministry of Agriculture (Government Decree 654/1991), whereas the human resources were assigned to different units in the IRYDA. Also, the General Secretariat of Agricultural Structures assumed functions from IRYDA (such as the stimulus to achieve greater competitiveness in the agricultural sector) and others related to the EU policies. The global loss of functions of the IRYDA, as well as the transfer of competencies to the regional governments reduced its importance and through a new modification of the structure of the Ministry (Government Decree 1055/1995), the IRYDA disappeared joining with the

Institute for the Conservation of the Nature (ICONA, dealing until that moment with the national forest policies) in the Autonomous Organism of National Parks (dependent of the central government).

Therefore, due to the administrative structure in Spain, the regions have taken large number of responsibilities and competences since the early 80s, including those referring to agricultural extension services. However the traditional public extension service is not being offered anymore after the transfer of competences to the regions. The change was not only related to which government, central or regional, was responsible for this service. The change was much deeper since it was related to the conception of the service itself (Table 4), coming from a conception focused on the development and demonstration of agronomic innovations to the farmers to another one focused on a set of services more oriented to the fulfilment of official requirements from the CAP.

Table 4. Process of change from extension services to advisory services approach

	Process of change	
	From	**To**
Approach	Extension Service (agronomic demonstration)	Advisory Service (general advice and advice on demand)
Period	Until 80s	To date
Responsible authorities	Central goverment	Regional governments
Scope of regulation	National	Regional (until 2003/2007)
		Adaptation to EU (2007 to date) - **FAS**
Type of supplier-s	Public (central goverment)	Public: regional research centres (decreasing)
		Private: consultants (increasing)
		Non-profit: agricultural farmer organizations and cooperatives (highly increasing)

Source: Elaborated by the authors.

The regions did not reach to provide similar services than the previous national extension service (with the exception of some training). Earlier the traditional experimental and demonstration farms (coming from the former extension approach) were oriented into the applied research, with most of them losing the traditional direct contact with farmers. Therefore the traditional extension functions were disappearing since new OPAs and federations of cooperatives started to emerge and consolidate themselves as advisory services. Thus administrative decentralization implied the change from the former national extension service to a range of regional based providers including mainly OPAs and cooperatives or their federations. This change was not just about the providers but a change in the approach (conception and type of services to be delivered) which applies to the whole system. It was a continuous process of change in the system since the 80s until very recently, reinforced with the EU regulations on Farm Advisory Services.

3.2 New actors in the advisory system: towards the Farm Advisory System (FAS)

In summary, as a consequence of the process of change since early 80s, the current structure of actors in the advisory system has been established in recent years, characterized by five main types of actors, regional research centres, agricultural county offices, professional farmer organizations, cooperatives and private companies specialized in advisory services. The last three types of actors are the base of what was the official Farm Advisory Service in Spain a few years ago.

1) Regional research centres and joint-centres, with the main functions focused on R+D+I and technology transfer. Most of them also offer training programmes (with different level of specialization according to the needs) managed directly or in coordination with some sections of the regional governments. Some of them also develop functions of – more or less occasional- advice services (for example through their experimental farms), as it is the case of IVIA in Valencia, IRTA in Catalonia or IFAPA in Andalucia. In this last region the Agency Management Agricultural and Fisheries (2011) centralizes management and processing functions of grants and records on agricultural policies, assuming also the functions of promotion and agricultural extension, management studies and training.

2) Agricultural County Offices (OCAs). This is the structure linked to the former Agricultural Extension Service. However they have lost the traditional role of personalized advice to farmers, and currently have functions focused primarily on the management of grants to farmers from CAP or some other types of administrative issues linked to the management of EU regulations.

3) Professional Farmer's Organisations. With the disappearance of national Agricultural Extension Service and the loss of functions of OCAs, OPAs have obtained most of them, exercising functions of technical and specialized advice for its affiliates. They also advise farmers in the field of public grants, even though their official management is under the responsibility of the OCAs or other institutions.

4) Cooperatives, organised formerly in regional federations, which became in confederation in 1989 after joining two main national organisations. In 2009 they became the Agro-Food Cooperatives Confederation, an umbrella organisation for the whole cooperative sector in the agriculture, livestock and agro-food activities. Although well-tuned with OPAs, they increasingly compete in the advisory system.

5) Private consultancy companies. Finally, as a result of that process of dismantling the functions of the former public Agricultural Extension Service, the emergence of new needs such as the management of public funds from EU policies, private organisations emerged. This has allowed them to incorporate new features into its advisory services. Like all of the above, this type of private organisation is present in most of the regions, although (depending on the regional requirements) just some of them became official Farm Advisory Service.

Therefore, before the creation of official advisory services, first regulated by the central government in 2006, OPAs, cooperatives and some private companies had begun to develop non-formal functions of advisory services during the 90s. Regional Centres, the only official actor with the initial responsibilities for extension and advisory services, focused first on applied research and, to a lesser extent, training, and finally on the traditional conception of extension services. However, training programmes delivered by these regional centres are a very consistent part of the current advisory system.

With national regulation in 2006 those providers came to the FAS, including all requirements of the EU and national regulations, but many of the regional governments also established some additional requirements. Due to the different requirements in each region, becoming an FAService was more or less difficult depending on the region. For example, in the eight provinces of Andalucia there are just four official organisations in its FAS (obviously with offices in all provinces), meanwhile in Extremadura, with two provinces, close to Andalucia and with similar territorial characteristics, there are more than twenty FAS organisations. In La Rioja, just one province, there were nine official organisations in 2010.

The national regulation in 2006 stipulated three important aspects. First, the creation of the National Registry of FAS. Second, that regional governments were responsible for checking the fulfilment of requirements for organisations acting in their region. Third, that central government was responsible for checking those organisations that acted in more than one region. This regulation was dropped in 2010, and currently each region is responsible for checking the fulfilment and controlling the organisations acting in its region. Therefore there is no national, but just regional, registry, and the organisations are forced to be registered in each region in which they are present (instead of a national registry).

Precise information on FAS is not easily accessible in all regions, but in spite of the difficulties we may have a whole picture of the main suppliers in the system. As noted in Table 1 the current main suppliers are non-profit OPAs as well as cooperatives. The organisations that are present practically everywhere are the three main OPAs[1] which take advantage of their high presence in most rural areas. Besides these there are some other OPAs with regional presence playing a significant role in their area, such as L'UNIO (Union of Farmers and Stockbreeders) in the region of Valencia, or Unió de Pagesos in Catalonia. The other important actor is the Agro-Food Cooperative, the umbrella organisation of much of the cooperatives in the country, being present in all the regions through their regional federations.

OPAs as well as Agro-Food Cooperatives are the most important part of the current advisory system in Spain and the ones who are present in all regions and provinces, and they probably deal with more than 95% of the services. However it is worth mentioning private –usually small- organisations, which are only present in some regions, although it is hard for them to compete with the OPAs, farm unions and cooperatives, which have large and experienced structures that can cope with the requirements of advisory services. These organisations often offer specialised services and expertise not otherwise available to farmers.

[1] ASAJA (with about 200,000 affiliates), COAG (with about 100,000 affiliates) and UPA (with about 80,000 affiliates).

3.3 Characteristics of Farm Advisory System

3.3.1 Main characteristics, services delivered and monitoring issues

Due to the administrative structure, each region has its own Rural Development Programme, which establishes the framework in which to develop its respective FAS and FAService. Particular measures that refer to it are the 114 (Use of FAServices by farmers and foresters) and the 115 (implementation of FAS, management, replacement and FAServices, as well as Forestry Advisory Services).

Organisations (whether public, semi-public, or private) providing official FAServices shall be registered in each of their respective regions. Most of the registered institutions were non-profit (171), while 21 are private profit-seeking (they are usually small business focused on services for the agricultural sector), and only two of them are public (ADE, 2009). Only non-profit organisations could receive public help. Usually they are OPAs or Agro-Food Cooperatives Confederation. Private organisations are not present everywhere, depending on the regional requirements (for example they are in Canary Islands, Catalonia, Murcia, etc.). It is worth mentioning that for example in Catalonia 27% of the officially recognised advisory bodies are private organisations.

The Government Decree 520/2006 (modified by Government Decree 108/2010) regulating FAS organisations established minimum performance requirements for those organisations. The minimum number of staff should include one specialist with an official degree in Agronomy, one more in Veterinary Medicine and one more with a degree in Biological Sciences, Environmental Sciences or Forestry. The technical staff at each office must consist of at least one technician with Professional Training in one of the above areas. All of them should have specific training in advising with proven experience and reliability in the field. Their training is done mainly through courses set by regional research centres, integrated in the system INIA-regional research centres. Although there is no formal protocol for action in training activities between these research centres and the organisations devoted to advisory services, they use to be in close contact and in some regions (e.g. Andalusia) they frequently sign agreements of collaboration, which strengthen networks of knowledge transfer and training. Regarding the gender issues in the staff, there are no mandatory rules in the national regulations.

Some regions included additional requirements to those that were mandatory from the EU and central government. Thus for example in Andalusia organic farming is a mandatory subject, FAS organisations have to be present and deliver their services across the all eight provinces, and their staff must demonstrate a minimum of 60 hours training and a commitment to follow continuing training programmes. In Catalonia three differentiate types of FAS organisations are recognised depending on the services they deliver, agricultural, livestock and/or integral advice (including diversification, marketing and business management). It is also a requirement that their staff follow at least 50 hours of training (including cross-compliance and business management) during their first two years, adding 5 hours yearly. The Basque country requires staff to have a minimum of two years of experience in all topics of advice, and introduces additional requirements of training regarding issues such as productivity improvement, analysis of economic and financial feasibility, and employment, fiscal and legal advice. Cantabria establishes that University staff should have a 5-year contract as a minimum, and prohibits subcontracting of the advisory activities. Navarre stands out as the boundary requirement that is set to the number of farms to provide advice to each office (which cannot exceed 80).

The delivered FAServices are mainly related to the advice and monitoring of the obligations in relation to grants from the CAP, such as cross-compliance (Government Decree 1782/2003 and Government Decree 2352/2004), good agricultural practices and environmental practices (Government Decree 2352/2004), support to young farmers to initiate the activity, labour safety standards (Regulation 1698 / 2005), as well as other specific requirements stated by the regional governments (e.g. annual surface declaration). FAS organisations use a range of tools to deliver their services, such as personal advice on-farm (the cost varies according to region and the nature of advice, being in 2008 between 60 to almost 500 euros, which corresponds to the 20% paid by the farmer), personal advice outside farm, advice for small groups in the farm (this service is not given in all regions) or outside the farm, and the most classical ways either individual (telephone and email) or general (web, publications, brochures, etc.).

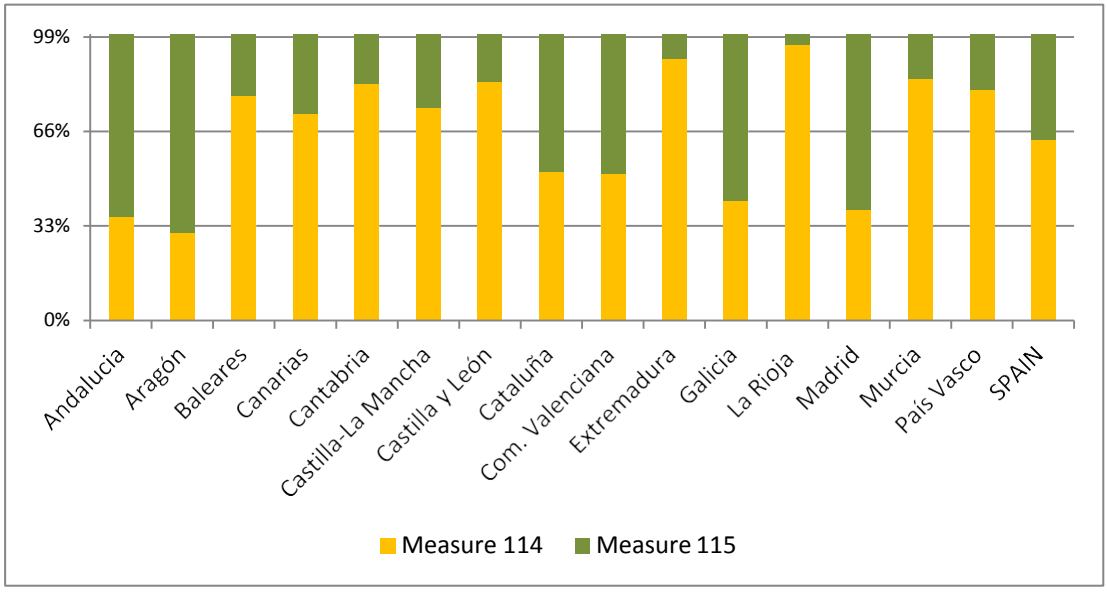
In relation to the coordination, although FAS are the responsibility of the regional governments, the Ministry of Agriculture launched monitoring committees. However, since the national registry was not set up, no real monitoring or control is being done at a national scale. Regional governments are responsible for coordinating advisory services, but again there are no real – or effective- coordination mechanisms for the FAServices providers here, concentrating mainly in the compulsory administrative control. There are some exceptions, such as in Catalonia, since the regional government also conducts different coordinating actions (Code of Good Practices, a yearly meeting of coordination for all Advisory Bodies, and currently they are about to launch an Advisory Virtual Community within the system RuralCat).

For conducting monitoring three main methods are used, surveys on farmers' satisfaction, visits to FAService providers (in theory between 10 to 20% of FAServices' organisations, but in fact frequently there are just meetings with representatives of each organisation, not necessarily with a sample of offices delivering services), and opinions from staff through surveys, interviews and informal meetings. Eventually it could be visits to farmers. Nevertheless, it still lacks a comprehensive system to widely assess FAS in much of the regions, additional to the administrative and budgetary controls.

3.3.2 Funding issues

Spain is the country with the highest use of measure 115 during the period 2007-2013 (the main source of funding for starting up a FAS), far away from the rest of EU countries (almost 83 Mill. Euros, of which 46% was private funding), as is stated in the regional Rural Development Programmes. Certainly the country needed support for this stage of starting up of FAS, but some doubts emerge on the efficiency both using better the previous structures and the opportunity cost not devoting more budgetary efforts helping and encouraging farmers to use the FAServices (mainly measure 114, to which almost 142 Mill. Euros has been allocated). Fig. 2 and Annex 2 shows some significant regional differences in the effort devoted to both measures, which depend on the previous structures, policy orientations and probably different level of effectiveness using available resources and putting the whole system in place.

Figure 2. Distribution of Total Budget devoted to measures 114 and 115. Rural Development Programmes 2007-2013.

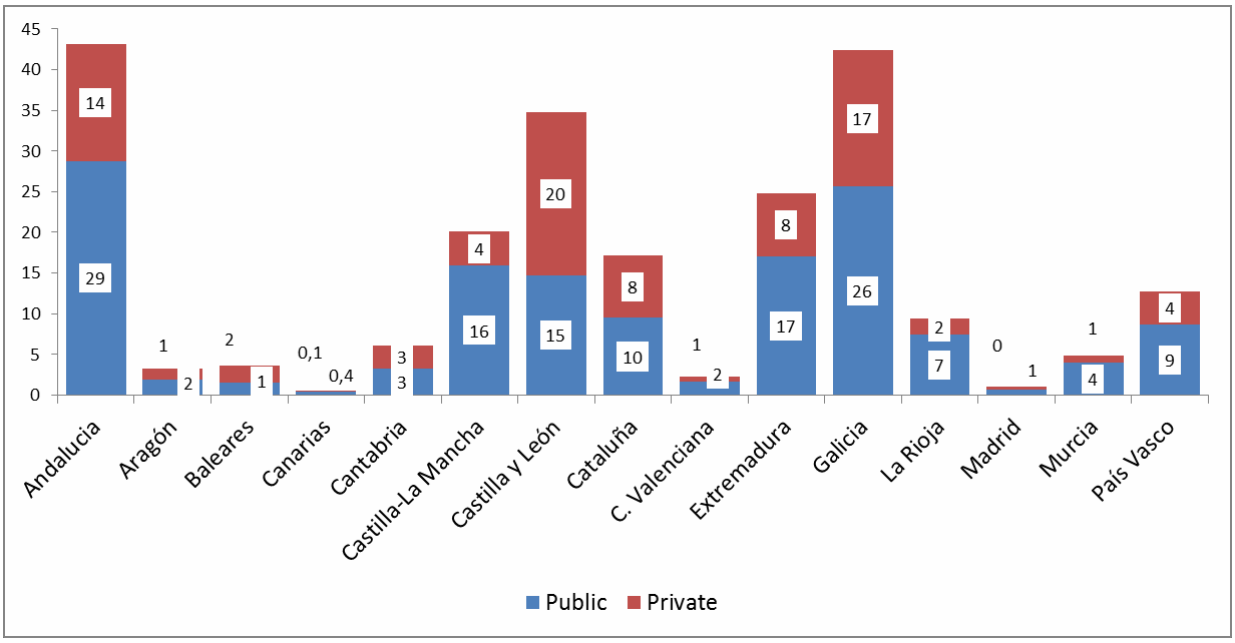


Source: Compiled by the authors from regional Rural Development Programmes, 2007-2013.

Farmers contributions may have co-funding by the EAFRD up to 20% (measure 114). However, this is not a sufficient incentive for many farmers to widely use the services. Spanish authorities request an increased EAFRD contribution, so cost for farmers could be reduced. The use of measure 115 is variable but implies lower contribution from EAFRD. Fig. 3 and Annex 2 show a summary by type of funding and regions. Spain devoted a total of 226 Mill. Euros (of which almost 38 % is private funding) to both measures, 2/3 of which was addressed to co-funding the creation of the system (45 Mill. Euros) and the use of FAServices by farmers (96 Mill. Euros).

The distribution from EAFRD (80.2 Mill. Euros) and central government (37.6 Mill. Euros) was the same in terms of total figures, but regional governments do a major effort, with 81% in measure 114 (being 12.3 their total contribution). Globally, in measure 114 the public sector addressed 68% (of a total of about 141 Mill. Euros) with 56% of these being private contributions (of a total of 85.1 Mill. Euros).

Figure 3. Total Budget devoted to Farm Advisory Services (measures 114 and 115 in the Rural Development Programmes, 2007-2013), by regions (in Mill. Euros)



Source: Compiled by the authors from regional Rural Development Programmes, 2007-2013.

3.3.3 Main detected problems

A set of problems in FAS and FAServices could be identified. First it lacks an effective coordination of FAS both at regional and national scales. This is connected with the wide range of possibilities to improve a comprehensive system of evaluation of FAServices, an aspect which is especially important since they are dealing more and more with critical aspects of the process of change and adaptation of farms to the most innovative aspects (e.g. environmental issues, new practices, use of alternative sources of energy, etc.). Second, related to FAServices (which ultimately is also a problem affecting the whole FAS), in some regions and from the perspective of farmers there is still some confusing overlapping (which could be seen as an inefficient explanation of allocation of responsibilities) between the FAServices and the County Agricultural Offices, for example related to the matters related to regulations from the CAP (cross-compliance). Third, transferring knowledge to FAS, national centres do not play a significant role, although regional research centres are more suited to dealing with this task, and some of them are doing it effectively. However, and finally, there is a lack of a consistent protocol in all regions for training activities for the staff delivering FAServices (although certainly they are usually professionals highly committed to their work).

4. Summary, conclusions and main strengths and weaknesses

4.1 Key concerns of the current AKIS

As is also happening elsewhere in other surrounding countries, the agricultural sector is experiencing significant structural problems. The new agricultural techniques, the training of farmers, the profitability of farms, and the changes in the CAP, are vital elements for strengthening the sector. The research in the agro-food sector and the technology and knowledge transfer by research centres therefore plays a key role in the development and strengthening of the sector.

In Spain the AKIS network has a very scattered structure in the territory, not only physically but also in terms of management or organisation. It is necessary to remember that the decentralization from the central government towards the 17 regions configured a complex administrative structure, with the assumption of much of the competences transferred to the regional governments, including that of agriculture, livestock, fisheries and forestry.

At the national level there are two main public centres of research, currently under the Ministry of Economy and Competitiveness, CSIC (formerly under the Ministry of Education and Science) and INIA (formerly under the Ministry of Agriculture). Both centres lead and/or coordinate other centres created in the different regions. CSIC has delegations in all the regions as well as a research structure which encompasses many scientific areas, among which the agricultural sciences stands out for their international recognition. Moreover, since INIA leads the Coordination Commission of Agricultural Research they partially coordinate the activity of public research centres dependent on the regional governments (although each of the regional centres are independent in terms of their budgets, organisation and research planning). One important aspect is that in the decision making structure (Governing Council in the case of INIA and Executive Council in CSIC), especially at the time of designing the research policy, they seek the participation of the key stakeholders involved in the sector (mainly OPAs, cooperatives, regional research centres, representatives of the Ministry of Agriculture and Economy and Competitiveness in the case of INIA, and the last one in the case of CSIC, added to the universities also in this case). Moreover, the strategic programme of CSIC is assessed by an international committee, which brings high prestige to the centre.

In addition to these two main centres and regional institutes, there is a wide variety of centres, usually public, carrying out important research in different fields of the agro-food issues. Universities and centres which depend on them play a very important role in this regard. On the other hand research centres created from contributions from other public organisations and centres such as the CSIC, INIA or different universities centres (new join centres), are increasing their importance since they contribute to the generation of new and collaborative knowledge but also to the transfer of knowledge and technology between research centres.

The relationship between AKIS organisations is not only addressed in the creation of these joint centres but also through signing cooperation agreements and collaborating in projects or joint research. Furthermore, knowledge transfer between AKIS organisations, although it could be significantly improved, is normally done through training courses, publications or cooperation of available services for this purpose (OTRIs), etc. The Technological Centres participated by private institutions complete the framework of research in Spain.

National or regional governments participate in the functioning budget of its respective centres. However, funding for research for those public AKIS organisations mostly comes from the central government, mainly through the National R+D+I Plan. Central government exerts a sort of coordination since it decides the topics for the research programmes in which the competitive calls are based. The main programme affecting agriculture research includes four main topics, the challenge in security and quality food, productive and sustainable agricultural activities, natural resources, and marine research. This programme is managed by the national Coordinating Committee for Agricultural Research, being exclusively addressed to INIA and the regional centres included in the system INIA – regions. This means a reserved funding for the regional research centres and some dependence from INIA guidelines (at least in the way that this Committee decides what topics are to be included in each call and that funding is controlled by the Committee).

The remaining programmes and sub-programmes have non-restricted calls, thus all research institutions (including universities, CSIC or any other research public or private organisations) may present their projects in different ways, individually or collaborating with some other research institutions. If joint proposals improve the relationships and knowledge transfer between institutions, they are increasingly favoured, being one of the criteria to improve the possibility of obtaining funding.

With regard to the type of research carried out in the regional centres, it tends to be usually a research applied to the needs of the sector. However INIA and CSIC conducts more fundamental or basic research since their researchers are not in such close contact with the final users at the basis of the agro-food sector (farmers, stockbreeders, etc.).

The planning of each national (INIA and CSIC) or regional research centre is carried out not only by Directorate of the Centre but also often there are technical committees of the institutes, external committees from universities, OPAs, representatives of regional governments and/or national government, etc., according to the issues concerned and the scope of the centre involved (we have to remember that both within the INIA and CSIC there are diverse sections and sub- centres, sometimes with certain autonomy). Thus the planning of activities is done, in principle and theoretically, with the agreement of all involved stakeholders. CSIC has an additional input in their programming since after the design of the strategic planning these documents are usually sent to international committees to check out and make suggestions. This way of working brings high prestige to the centre.

As a conclusion, the main strengths and weaknesses of AKIS in Spain may be summarized.

Related to AKIS the main strengths are:

- The presence of two national centres, which conducts basic and fundamental research, and constitute one of the bases and a fundamental pillar of the Spanish knowledge system. The –at least formal- participation of stakeholders in their governing councils should ensure a design of research policy taking into account the needs of the sector.

- The extensive network of regional technological centres. They became a crucial pillar of the knowledge transfer system since they play two fundamental functions. First, their applied oriented research (whereas the national research centres focus on fundamental and basic research), needed for the modernization of the agro-food sector. Second, their training programmes, which ensure knowledge transfer to the sector since they combine applied research with training for the final users.
- Despite the fact that regional technological centres are highly autonomous, there is an important link with the National Institute for Agricultural and Food Research and Technology (INIA) through the restricted research programme and the call for proposals just for researchers of the system INIA-regional centres.

However, there are also a number of weaknesses:

- The strong reduction of budgets during recent years (especially in the National Research Council, CSIC), which is seriously threatening the viability of many investigations already underway.
- The reduction of training programmes, among which may have a particularly negative impact in the case of courses, scientific conferences and seminars aimed at knowledge transfer with researchers from regional centres.
- The lack -or weaknesses- of a system of knowledge transfer between sufficiently established and comprehensive national centres and regional centres. Transfer currently depends on individual initiatives, seminars and conferences and the availability of budgets for their organisation and/or assistance to them. On the other hand, the knowledge transfer from national centres is more frequent within the academic fields (more recognized) than in the professional ones. This explains the tendency for researchers to be much more aware of the scientific publications than effective dissemination and knowledge transfer to the agricultural sector.

Even though the research programme restricted to system INIA-regional centres exerts certain coordination from the INIA, it lacks a more robust system of coordination focused on strategic orientations of research policies of AKIS at the national level, taking into account the regional centres. There is not a coordination body of the regional centres nor a solid enough and well established discussion forum on the strategic orientations of the research policy (if we discard the initial design). Each centre and or region has their own strategic orientations.

4.2. Key characteristics of the Advisory Services and the FAS

Regarding Farm Advisory System and Farm Advisory Services, in Spain it was a precedent in the Agricultural Extension Service (born in 1955) and their County Agricultural Offices (born in 1956). The Agricultural Extension Service (AES) had knowledge transfer and informal training to farmers and stockbreeders in the country as a main objective, to be implemented through County Agricultural Offices (OCAs). The AES, with the transfer of competences to the regions at the end of the 1980s, disappeared as a national and centralized managed service, being consumed mainly by regional research centres and OPAs, under the control of regional governments. During the 80s, now belonging to the regional governments, the staff of the OCAs had to change from their traditional role offering extension services to the new role

related to the legal CAP requirements and the challenges posed to the farmers.

Nevertheless, in parallel, after the transfer of competences from the central to regional governments and the emergence of regional AKIS centres, most of them developed functions of specialized advice to farmers and stockbreeders beside their research functions. This is a process of knowledge transfer that is very necessary for the agricultural sector, even critical because its modernization depends to a large degree on that transfer. In this regard, some regions developed a strong training system (for example, Andalusia) oriented to the final users, farmers and stockbreeders, as well as to the staff members of the FAServices. In fact the training of staff of the FAServices is done mainly through courses established by those regional research centres integrated in the system INIA-regions as well as other public research centres that are greatly involved in the knowledge transfer.

During the last decade, and mainly during its second half, regions had to adapt and develop a comprehensive system of FAServices for farmers and stockbreeders. The training functions of the regional centres were not sufficient for an advice system. Therefore a large number of organisations (some of them very small, but many others, the most powerful, linked to OPAs and regional federations of cooperatives) began to improve their capabilities dealing with the new requirements from the EU, national and regional regulations. Close work with the regional centres was an important aspect to acquiring the knowledge to improve their services for farmers and stockbreeders.

Certainly in the advisory sector we found a wide range of institutions, from OPAs and other farmers and stockbreeders organisations, Associations for Integrated Treatment in Agriculture (ATRIAs), agro-food cooperatives and agricultural training centres. County Agricultural Offices (that traditionally played this role although focused on the administrative tasks related with grants from the CAP), depending on the region, tried in some way have their place in this new system. But finally they continued losing power and capacity to act, partially because their potential functions were more and more in the hands of regional AKIS centres and the new organizations emerged or developed in the light of the coming FAS.

Regional Governments are just responsible for the records of FAServices organizations, meeting the requirements set by the European and Spanish legislation. The most powerful are OPAs, Agro-Food Cooperatives Confederation, and in some regions small organizations present through the rural areas. For example in Andalusia the regional government has a requirement that FAServices organisations must be present in all eight provinces. As a result, there are only four organisations delivering official FAServices. In Extremadura, with other requisites, there is a dense network, with about 28 official organisations. In Catalonia a total of 106 organisations are recognised as Farm Advisory Bodies, of which 27% are of a private nature. In other places more noticeable cases could be found, such as a rural savings bank (Cuenca), due to the close relation between many rural saving banks (regulated officially as credit union) and farmers.

Farmers and stockbreeders have been supported in their costs for advisory services (provided by the FAServices) mainly through two measures in the Rural Development Programmes in each of the regions, number 114 (about the use of advice services by farmers, stockbreeders, foresters, etc.) and number 115 (implementation of services of management, replacement and FAServices,

as well as forestry advisory services). The FAS organisations focus their work on a series of services, such as advising and monitoring farmers' obligations in relation to cross compliance grants (art. 4 and Annex III of Act 1782/2003, and Annex of Act 2352/2004), the good agricultural and environmental practices (Act 2352/2004), those related to supporting the initiation of activities by young farmers, labour safety standards (Regulation 1698/2005), as well as other issues that are requested in order to provide a comprehensive advice, which requires a versatile staff, trained in many different fields and with the necessary skills and knowledge to effectively provide the information to the farmer.

As a conclusion, the main strengths and weaknesses of FAS and FAServices and in Spain can be summarized.

The main strengths to be pointed out are:

- Regional centres developing functions of training-advice to the end users, farmers and stockbreeders.
- Training programmes by the regional centres are close to the needs and demands of the farmers and stockbreeders and their OPAs.
- Regional centres perform knowledge transfer to end users taking into account the objectives of modernization, innovation and improvement of competiveness of the agricultural, livestock and forestry sectors.
- During the last decade OPAs, and many cooperatives (those more powerful and better established, but mainly through the national Agro-Food Cooperatives Confederation) were able to convert themselves to become FAServices, using their past experience working very close with the farmers and extensive knowledge of the agricultural and livestock sector. The model of a very few number of FAS organisations comes from Andalusia, but they have a presence in all eight provinces through their network of offices.
- In addition to OPAs and regional federations of agro-food cooperatives, in the regions with significant weight of the agricultural sector, and due to the demand from farmers and stockbreeders, a dense network of FAServices with an extensive presence in the rural areas has emerged (such as in Extremadura or La Rioja).
- The close links between farmers and their professional organisations with the industry (mainly providers) constitutes an increasingly important source of knowledge and transfer of innovations to the farmers.

However the important amount of organisations being part of the different regional FAS, they have some **weaknesses** to deal with:

- It lacks a regional body in charge of the coordination of FAS. The regional ministries of agriculture only play a role of control, monitoring and registration in this regard, but not of coordination of the activities of the FAS (with some exceptions as mentioned above). Obviously each organisation is in charge to coordinate their services in the region or area in which they are present.

- The County Agricultural Offices (OCAs) were, from the opinion of some experts, potentially able to develop such a role as advisory services first, starting during the 80s, and could have been coordinating FAServices later on, during the 90s and after EU regulations related to the compulsory implementation of FAS. However, the daily evolution and the legal framework (within the regions) have shown that duplication and overlap of functions among OCAs and the FAS organizations were growing. In addition the regional governments are dealing with this overlap, and for example most of them have been gradually emptying the contents and functions of the OCAs, and in some regions they have virtually disappeared (for example in Andalusia).
- National and regional regulations establish a minimum of expertise and grades for each FAServices organisation. However, there are not protocols, homogeneous system and any commitment for staff members to update themselves and follow some kind of continuous training programme (with the exception of some regions). To be updated it depends very much on their own initiative. The regional governments bring opportunities through courses and seminars offered by regional centres, but there is not a system to ensure training update for FAServices staff. The creation of such a protocol would facilitate and would formalize the relationship and knowledge transfer between research institutions and advisory bodies.
- From the point of view of staff in organisations coping with advisory services to farmers, knowledge and innovation transfer to them from research centres is insufficient and not addressing the real and daily needs of farmers. With the exception of training courses, those research centres do not do much, sufficient and effective transfer effort to staff in FAS organisations (and much less to the farmers).

Some observations on the collection of information and gaps elaborating the report

The Spanish AKIS system is diverse and complex because the variety of organisations and the administrative model based in regions which have the competences on agricultural policies and different models of organisation of their regional AKIS system. This has been a challenge but also imply limitations.

There were some difficulties in compiling the report. Firstly, the report requires a comprehensive analysis of the situation and characteristics of a wide and very diverse AKIS system, decentralized and with different modes of operation. We could not sufficiently reflect this diversity. Secondly, due to the variety of organisations and the absence of a national general coordination body for the AKIS organisations, it has been difficult to adapt and gather the information on the budgets of each type of AKIS organisation. To conduct one by one contact was not an efficient use of time.

Thirdly, although the regulations specified that from 2007 the FAS it should be properly running, some regional governments did not adapt to this framework until 2009, or even later. This generates a short experience, the absence of reliable suitable results that can be properly analyzed, and a lack of assessment and efficiency evaluation from the regional governments.

Fourthly, mainly due to rejection by relevant policy makers and civil servants to properly complete the surveys, they were not completed as much as we wished. Just some technical intermediate staff in FAServices were able to fill it in. Policy makers offered to have interviews as well as pointing us to some publications and reports to complete the necessary information. Therefore, we could conduct interviews at all levels of the AKIS system. At the central government, we had three interviews with persons in charge in the Ministry of Agriculture (in different sections of the Central Government), and one interview with the National Institute for Agricultural and Food Research and Technology (INIA).

At the regional level, we had interviews with the Institute for Agricultural Research of the region of Valencia (IVIA), and The Institute for Research and Agriculture and Fishery Training (IFAPA, in the region of Andalusia). We also had informal conversations with other members of regional centres. As regard for the FAServices, we had an interview with IVIFA (Foundation Institute of Research and Training of the region of Valencia, under the trade union Farmers and Stockbreeders L'UNIO), and informal conversations with several NOGs acting as FAS. All these interviews offer a direct view from the stakeholders involved in the system. Catalonia and Navarra have some unique qualities and we would have liked to interviewed the persons in charge. However, a lack of time prevented us carrying out the interviews with the proper persons.

Finally, due to the huge number of AKIS organisations at the national level and especially at the regional one, and the absence of comprehensive databases, there was not considered to be enough time (or interest) to build a detailed table with a complete list of all AKIS organisations. These apply mainly to the large number of agro-food cooperatives, Agricultural County Offices, ATRIAs, OPAs, and agricultural training centres.

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REAL DECRETO 520/2006, de 28 de abril, por el que se regulan las entidades que presten servicio de asesoramiento a las explotaciones agrarias y la concesión de ayudas a su creación, adaptación y utilización. BOE núm. 102

REAL DECRETO 521/2006, de 28 de abril, por el que se establece el régimen de los organismos pagadores y de coordinación de los fondos europeos agrícolas. BOE núm. 117.

Main web resources

European Commission: ec.europa.eu

Ministry of Agriculture, Food and Environment (*Ministerio de Agricultura, Alimentación y Medio Ambiente*): www.magrama.gob.es/

Ministry of Economy and Competitiveness, Secretary of State of Research, Development and Innovation (*Ministerio de Economía y Competitividad. Secretaría de Estado de Investigación, Desarrollo e Innovación*): www.idi.mineco.gob.es

AKIS (official web) www.proakis.eu

National Institute for Agricultural and Food Research and Technology (*Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria)* (INIA): www.inia.es

Institute for Agricultural Research of the Region of Valencia (*Instituto Valenciano de Investigaciones Agrarias*) (IVIA): www.ivia.es

Institute for Agricultural and Fishing Research and Training of Andalusia (*Instituto de Investigación y Formación Agraria y Pesquera*): www.ifapa.es

National Research Council *(Consejo Superior de Investigaciones Científicas)*: www.csic.es

Asociation for Research in Agro-Food Industry *(Asociación de Investigación de la Industria Agroalimentaria*): www.ainia.es

Institute of Research and Agro-Food Technology of Catalonia (*Instituto de Investigación y Tecnología Agraria*) (IRTA): www.irta.cat

Technological Platform of Sustainable Agriculture (*Plataforma Tecnológica de Agricultura Sostenible*) (PTAS): www.agriculturasostenible.org

Chil Platform (Plataforma Chil): www.chil.org

Confederation of cooperatives: http://www.agro-alimentarias.coop/1/1_1.php

9. Appendices

Annex 1: Main topics in the research centres of the National Institute for Agricultural and Food Research and Technology (INIA)

INIA's Research Centre	Topic
Animal Health Research Centre (CISA)	Immunoprophylaxis of vector borne viral diseases
	Immunology applied to animal health
	Control strategies of porcine viral diseases
	Molecular and cellular biology of prions
	Emerging and transboundary diseases
	Epidemiology and environmental health
	Animal parasitology
Forest Research Centre (CIFOR)	Population genetics and evolution
	Genomics, ecophysiology and biotechnology of forest species
	Applied forest ecology
	Climate change and damage to forests
	Silviculture
	Forest fires
	Remote sensing of forests
	Wood and cork technology
	Cellulose and paper
	Forest chemistry
Plant Genetic Resources Centre (CRF)	Conservation of plant genetic resources
	Documentation and coordination of plant genetic resources
	Characterisation and evaluation of plant genetic resources
Department of Biotechnology	Fish genomics and vaccination
	Biotechnology of animal viruses
	Biotechnology and molecular and cellular biology
	Swine immunology
	Plant virus biotechnology
	Biology of plant development: biotechnological implications
	Cellular division and growth: response to abiotic stimuli
	Genetic, molecular and biotechnological analysis of plants of agronomic interest
Department of Environment	Agronomy
	Depuration and agricultural use of animal manure and urban wastes
	Endocrine disruption and toxicity of contaminants
	Ecotoxicology and environmental risk assessment
	Environmental chemistry
Department of Animal	Modelling in selection and conservation programmes

INIA's Research Centre	Topic
Breeding	Poultry breeding and conservation
	Pig breeding and conservation
	Ruminants breeding
Plant Protection Department	Agricultural and forest entomology
	Weed control
	Plant pathology
	Plant viruses
Department of Animal Reproduction	Conservation of zoogenetic resources
	Physiology and technologies of reproduction in small ruminants
	Molecular embryology, stem cells and transgenesis
	Assisted reproduction and preimplantation embryology in bovine
	Physiology and technology of reproduction in swine
Department of Food Technology	Food microbiological safety
	Technology of dairy and meat products
	Carcass and meat quality
	Biochemistry and safety of plant foods
Technical Directorate for Evaluation of Plant Varieties and Plant Protection Products	Seeds and nursery plants unit
	Plant protection products unit
Food Quality Centre	The functional composition of different legumes and edible mushrooms
	The conservation of genetic resources of food interest
Organic and Mountain Agriculture Centre (CAEM)	Plant varieties for organic agriculture, feeding alternatives for organic livestock, pest and diseases of the chestnut tree, populations of wild grapevine, climate change and extension of agricultural pests
National R&D Centre for Iberian Swine	The feeding regime during the fattening period of Iberian pigs

Source: INIA (2013) and www.inia.es (15-06-2013).

Annex 2: Budget for FAS (measures 114 and 115 in the Rural Development Programmes, 2007-2013)*

REGION	Measure	UE - EAFRD (€)	Central Govern. (€)	Regional Govern. (€)	Total public budget (€ and %)		Total private budget (€ and %)		Total funding (€)
Andalucía	114	75%	20%	5%	12.488.371	80%	3.122.093	20%	15.610.464
	115	75%	20%	5%	16.268.902	59%	11.276.020	41%	27.544.922
Total		75%	20%	5%	**28.757.273**	67%	**14.398.113**	33%	**43.155.386**
Aragón	114	35%	33%	33%	800.500	80%	200.125	20%	1.000.625
	115	34%	33%	33%	1.123.429	50%	1.123.429	50%	2.246.858
Total		34%	33%	33%	**1.923.929**	59%	**1.323.554**	41%	**3.247.483**
Baleares	114	35%	40%	25%	1.000.000	36%	1.800.000	64%	2.800.000
	115	35%	40%	25%	463.160	61%	300.000	39%	763.160
Total		35%	40%	25%	**1.463.160**	41%	**2.100.000**	59%	**3.563.160**
Canarias	114	85%	15%	0%	270.000	70%	116.100	30%	386.100
	115	85%	15%	0%	119.000	80%	29.750	20%	148.750
Total		85%	15%	0%	**389.000**	73%	**145.850**	27%	**534.850**
Cantabria	114	50%	25%	25%	2.636.620	52%	2.400.000	48%	5.036.620
	115	50%	25%	25%	600.000	57%	450.000	43%	1.050.000
Total		50%	25%	25%	**3.236.620**	53%	**2.850.000**	47%	**6.086.620**
Castilla La Mancha	114	69%	0%	0%	12.119.617	81%	2.826.047	19%	14.945.664
	115	69%	0%	0%	3.809.273	73%	1.402.954	27%	5.212.227
Total		69%	0%	0%	**15.928.890**	79%	**4.229.001**	21%	**20.157.891**
Castilla y León	114	36%	24%	40%	12.858.563	44%	16.149.127	56%	29.007.690
	115	43%	29%	29%	1.876.445	32%	3.940.537	68%	5.816.982
Total		37%	25%	38%	**14.735.008**	42%	**20.089.664**	58%	**34.824.672**
Cataluña	114	24%	76%	0%	5.363.825	61%	3.500.000	39%	8.863.825
	115	24%	76%	0%	4.160.155	50%	4.100.000	50%	8.260.155
Total		24%	76%	0%	**9.523.980**	56%	**7.600.000**	44%	**17.123.980**
Com. Valenciana	114	22%	72%	6%	950.217	80%	237.554	20%	1.187.771
	115	22%	48%	29%	675.054	60%	450.036	40%	1.125.090
Total		22%	62%	16%	**1.625.271**	70%	**687.590**	30%	**2.312.861**
Extremadura	114	71%	29%	0%	15.932.931	70%	6.674.845	30%	22.607.776
	115	71%	29%	0%	1.114.817	51%	1.056.058	49%	2.170.875
Total		71%	29%	0%	**17.047.748**	69%	**7.730.903**	31%	**24.778.651**
Galicia	114	66%	34%	0%	14.150.505	80%	3.562.995	20%	17.713.500
	115	65%	35%	0%	11.459.419	47%	13.171.216	53%	24.630.635
Total		66%	34%	0%	**25.609.924**	60%	**16.734.211**	40%	**42.344.135**
La Rioja	114	29%	31%	40%	7.266.667	80%	1.816.667	20%	9.083.334
	115	29%	31%	40%	169.298	50%	169.298	50%	338.596
Total		29%	31%	40%	**7.435.965**	79%	**1.985.965**	21%	**9.421.930**
Madrid	114	50%	25%	25%	300.000	80%	75.000	20%	375.000
	115	50%	25%	25%	300.000	50%	300.000	50%	600.000
Total		50%	25%	25%	**600.000**	62%	**375.000**	38%	**975.000**
Murcia	114	66%	0%	0%	3.270.284	80%	817.571	20%	4.087.855
	115	58%	0%	0%	748.639	100%	0	0%	748.639
Total		64%	0%	0%	**4.018.923**	83%	**817.571**	17%	**4.836.494**
País Vasco	114	27%	26%	0%	6.544.983	62%	4.080.000	38%	10.624.983
	115	37%	0%	0%	2.117.059	100%	0	0%	2.117.059
Total		30%	20%	0%	**8.662.042**	68%	**4.080.000**	32%	**12.742.042**
TOTAL	**114**	55%	26%	10%	**95.953.083**	67%	47.378.124	33%	**143.331.207**
	115	61%	28%	5%	**45.004.650**	54%	37.769.298	46%	**82.773.948**
				TOTAL	**140.957.733**	62%	85.147.422	38%	**226.105.155**

* There is not budget for 114 and 115 measures in Asturias and Navarre.
Source: Compiled by the authors from regional Rural Development Programmes, 2007-2013.