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TRABAJO FINAL DE GRADO:

Operational groups and their role as innovation intermediaries within the framework of EIP-agri.

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Contents

1. Introduction	7
1.1 Abstract	7
1.1.1 Resumen	7
1.2 Objectives	8
1.3 Methodology	8
1.4 BT structure and courses relationship	9
2. Agricultural innovation framework	11
2.1 Global challenges and the importance of innovation	11
2.2 Evolution on agricultural innovation approach	14
2.3 Agricultural Innovation Systems	16
2.3.1 Model implications	16
2.3.2 Criticism and proposals	18
2.3.3 Elements	18
2.4 AIS operationalization	20
2.4.1 Budget reality	20
2.4.2 Strengthening AIS policies	21
3. Facilitating innovation through OGs	24
3.1 Facilitation role	24
3.2 Innovation networks	27
3.2.1 Concept	27
3.2.2 Building innovation networks	28
3.2.3 Collaborative learning	28
3.3 EIP-AGRI Operational Groups	29
3.3.1 Funding policies	29
3.3.2 OGs program	30
4. Survey with OG members	31
4.1 Method rationale	31
4.2 Survey design	31
4.2.1 Sample	31
4.2.2 Questions	32
4.2.3 Data collection	35
4.3 Further considerations	35
4.3.1 Clustering exercise	35
4.3.2 Analysis considerations	37
5. Survey analysis	38
5.1 Response	38
5.2 Survey results	39
5.2.1 Demand articulation	40
5.2.2 Institutional support	42
5.2.3 Network brokering	43
5.2.4 Capacity building	45
5.2.5 Innovation process management	46

5.2.6 Knowledge brokering	48
5.3 EIP-AGRI Perception	49
5.3 Lessons	50
<i>Conclusions</i>	52
<i>References</i>	56
Annex 1: Questionnaire OG Members (Spanish).....	59

List of tables

Table 1. <i>Chapter justification and related courses</i>	7
Table 2. <i>The expanding view of how to strengthen agricultural innovation capacity in agriculture</i>	13
Table 3. <i>Innovation intermediary functions</i>	32
Table 4. <i>Statements on OG functions (summarized) – Level of agreement avg. (1-7)</i>	37
Table 5. <i>Demand articulation (D) – Group differences</i>	39
Table 6. <i>Institutional Support (S) – Group differences</i>	41
Table 7. <i>Network Brokering (N) – Group differences</i>	43
Table 8. <i>Capacity Building (C) – Group differences</i>	44
Table 9. <i>Innovation process management (I) – Group differences</i>	45
Table 10. <i>Knowledge brokering (K) – Group differences</i>	47

List of figures

Figure 1. Sources of growth in global agriculture.....	11
Figure 2. Linear and interactive view on agricultural innovation.....	15
Figure 3. <i>Diagram of an Agricultural Innovation System (AIS)</i>	17
Figure 4. Share of budget expenditures on agriculture R&D as a percentage of agricultural gross value added.....	18
Figure 5. <i>Share of AIS in total producers support</i>	19
Figure 6. Example of a dichotomic question from “Characteristics” section. “Does your OG have collaborators?”	31
Figure 7. Example of a multiple choice question from “Characteristics” section. “What is the number of partners (beneficiary members) in your OG?”.....	31
Figure 8. Data collection process.....	31
Figure 9. <i>Number of partners per number of OGs they belong to</i>	36
Figure 10. <i>No. of respondents belonging to OGs where each autonomous community participates</i>	36
Figure 11. <i>Statements on demand articulation function</i>	38
Figure 12. <i>Statements on institutional support function</i>	40
Figure 13. <i>Statements on network brokering function</i>	42
Figure 14. <i>Statements on capacity building function</i>	43
Figure 15. <i>Statements on innovation process management function</i>	44
Figure 16. <i>Statements on knowledge brokering function</i>	46
Figure 17. “I believe continuity of OGs depends on the maintenance of public subsidies” – Results.....	47

1. Introduction

1.1 Abstract

With a population in constant growth and finite resources, agricultural sector faces the big challenge to generate more efficient, sustainable and socially inclusive production models. For this purpose, experts agree that innovation and its new formulas play essential role.

At present, research has evolved to a systemic vision of agricultural innovation, where multiple actors are part of a more complex network which generates, transfers and implements innovative knowledge and technology. These findings are improved along time through its implementation and feedback from these actors, in a process known as “coevolution”. That allows a more adaptative innovation model which makes easier putting knowledge into practice.

With this in mind, in recent years a great variety of collaborative innovation policies have been created. In them, multi-actor groups are the key tool to potentiate and disseminate innovation. Operational groups of EIP-agri are a good example of this trend and this project carries out a survey where their characteristics and the performance of their functions as innovation intermediaries are observed.

1.1.1 Resumen

Con una población en constante crecimiento y unos recursos finitos, el sector agrícola se enfrenta al gran reto de generar modelos de producción que además de eficientes, sean sostenibles y promuevan la inclusión social. Todos los expertos coinciden en que para ello, la innovación y sus nuevas fórmulas juegan un papel crucial.

En la actualidad, la investigación ha evolucionado hacia una visión sistémica de la innovación agrícola, donde ya no es uno sino múltiples actores, los que forman una compleja red en la que se generan, transfieren y aplican conocimientos y/o tecnologías innovadoras. Estos hallazgos van mejorándose a lo largo del tiempo tras su aplicación y “feedback” de los diferentes actores del sistema, en un proceso que se conoce como “coevolución” y que permite un modelo de innovación más adaptativo al entorno y con una transferencia y posterior adopción más efectivas.

Con esta premisa, nacen en estos últimos años variedad de políticas de innovación de índole colaborativa donde los grupos multi-actor son un instrumento clave en la potenciar y diseminar la innovación. Un claro ejemplo de esta tendencia son los grupos operativos del AEI-agri sobre los que se realiza una encuesta en este trabajo, donde observamos sus características y el desempeño de sus funciones como intermediarios de la innovación.

1.2 Objectives

The aim of this Bachelor Thesis (BT) is to make a first assessment of Spanish Operational Groups' role as innovation intermediaries within EIP-AGRI framework. Thus, complementing information gathered by literature regarding multi-actor platforms and its effectivity brokering innovation in agricultural innovation systems (from now AIS).

To meet this goal, other specific objectives need to be met before:

- To understand the needs and characteristics of the current agricultural innovation framework.
- To examine policy recommendations given for the strengthening of innovation national systems under these new approaches.
- To get to know modern facilitation roles within AIS perspective, and its different functions and forms.
- To learn about concept of innovation platforms and the Operational Groups program which promote them within the European Innovation Partnership on Agricultural Productivity and Sustainability (EIP-AGRI) framework.
- To evaluate intermediary functions carried out by Spanish OGs and analyze characteristic variables which could influence their performance through a survey study.
- To compare lessons learnt from the proposed survey concerning OGs facilitation role with previous theoretical framework.
- To give recommendations and propose future research lines on EIP-AGRI OGs program.

1.3 Methodology

In order to reach these goals, various sources of information have been collected.

Over the length of the study, secondary information sources have been consulted to establish the BT framework. These are:

- Reports and conference proceedings from international agencies (FAO, World Bank, OCDE, etc.) and the European Union.
- OGs database from Spanish National Rural Network.
- Academic articles obtained through search tools such as ResearchGate or Elsevier.

Furthermore, quantitative primary information has been obtained carrying out a survey to members of Spanish OGs about facilitation functions performed by their groups. Statistics has been applied to survey results to draw out relevant lessons.

For the elaboration and collection of the questionnaires, the survey administration app *Google Forms* has been used. And for the subsequent processing of data and graphics generation *Microsoft Excel* spreadsheets.

In chapter 3, the methodology used for the OGs members' survey is further explained.

1.4 BT structure and courses relationship

This BT is divided in 4 chapters plus a final chapter which gathers the conclusions of the project. The conceptual framework is introduced in the first two chapters, then the methodology of the proposed survey will be explained in chapter 3 and lastly chapter 4 presents an analysis of the study's results.

First, the conceptual framework is introduced in two parts. One chapter exploring agri-food innovation systems and another chapter where the situation from multi-actor initiatives and policies for the promotion of agricultural innovation will be exposed including EIP-AGRI which will be explained in more detail.

To carry out the BT, knowledge and skills acquired at various degree courses have been used:

Table 1. *Chapter justification and related courses*

BT Chapter	« Agricultural innovation framework »
Related courses	<ul style="list-style-type: none"> - Spanish Economy - Organization Strategy and Design
Brief justification	<p>This chapter set outs current agricultural innovation framework (its challenges, needs and implications) and gives recommendations on its operationalization in the form of public policies. For this purpose, sources from international agencies and academic literature have been used.</p> <p>Knowledge acquired at Spanish Economy regarding agricultural sector and public sector help to study agricultural context and policy paradigm. Most of the organizational vocabulary such as “actors” or “system” was acquired at Organization Strategy and Design course.</p>

BT Chapter	« Facilitating innovation through OGs »
Related courses	- Organization Strategy and Design
Brief justification	<p>In second chapter role and functions played by innovation facilitators or brokers will be developed Later innovation platforms will be presented as an example together with OGs program of EIP-AGRI.</p> <p>Most of the organizational vocabulary such as “networks” or “stakeholders” was acquired at Organization Strategy and Design course.</p>

BT Chapters	“Survey with OG members” & “Survey analysis”
Related courses	<ul style="list-style-type: none"> - Introduction to Statistics - Marketing Research
Brief justification	<p>In these two chapters methodology used, the proposed survey, will be detailed to later make an analysis of the results and extract the pertinent findings about OGs.</p> <p>Mentioned courses were very useful in acquiring techniques for survey design and results analysis Operational groups (OGs) of EIP-AGRI will be placed as an answer to the new approaches for agricultural innovation.</p>

2. Agricultural innovation framework

Ideas of which constitutes innovation have rapidly evolved in the last decades, as the context of agricultural sector has changed and new challenges have emerged. This has led not only to a re-funding debate of the concept, but also to a re-thinking of agricultural innovation models at the states. This section sets out the grassroots of this new and necessary agricultural innovation framework and its translation into better innovation policies.

2.1 Global challenges and the importance of innovation

The agri-food sector faces a challenging future due to current global trends. During last decades, great successes have been achieved with contribution from agriculture, improving living conditions of people across the world through reduction of malnourishment and improvement of food insecurity among others. However, new goals realization regarding food and agriculture could be put on risk as the result of various factors indicated below.

Increasing demand

According to FAO (2017), within 30 years there will be almost 10 billion people living on earth. Factors like demographic expansion and urbanization will raise agricultural demand substantially which will require an increase of 50% in agricultural output by 2050

This will happen unevenly across the globe. Regions like sub-Saharan Africa and South Asia will need to produce more than double to match the projected demands, whereas the rest of the world will need an increase in output of about one-third. This is perfectly understandable since demographic and urbanization drivers are expected to stay significant for most states belonging to the first group. Among other data, population growth rates will be led by 13 sub-Saharan countries whose populations combined are projected to go from 320 million in 2015 to 1.8 billion people in 2100 (FAO, 2017).

In addition to this, and according to the quoted source, the agricultural demand will be boosted by a change in the dietary patterns from low- and middle-income countries. At these places, products like meat, fruits and vegetables will become more accessible at households as income per capita increases, allowing more nutritious but resource-consuming menus. Dietary transition will also be accelerated by urbanization dynamics due to higher wages at the cities.

Pressure on agricultural resources

In this context of rising demand, pressures on natural resources (land, water, energy...) are expected to grow. First of all, growing constraints on the access to land and water are going to increase competition for them as a result of a mismatch between supply

and demand from these essential agricultural resources. Second, as time passes extreme events caused by climate change such as droughts, heat waves, floods, etc. are projected to be more frequent affecting negatively crop yields, fish stocks and animal health as well as producing great variations on water availability. Moreover, use of agro-chemicals and other extended agricultural techniques continues and will continue causing negative consequences on agriculture's natural resource base. This includes land degradation, loss of biodiversity and overuse of groundwater (FAO, 2017).

Social challenges

Not only productive and environmental challenges are faced on agricultural sector but also social ones. Poverty is still concentrated in rural areas and there agriculture is key for pro-poor growth, when most disadvantaged benefit from investment in agriculture and market integration and thus improve their livelihoods. In this line, strategies success to stop poverty and other social deprivations will not depend only on gains from agricultural activity but also on other factors which allow to escape permanently from those situations. These include access to good quality education, economic diversification, employment generation and social protection (FAO, 2017).

On this front, inequalities hamper zero poverty goal, and great differences in income level, funding capacity and overall opportunities are observed between demographic groups: rural and urban population, women and men, among regions, etc. For instance, female workers in agriculture have much more difficulties in access to agricultural resources, funding, businesses and, ultimately, to develop a productive agricultural activity. Pathway out of poverty appears to be extremely difficult for them.

FAO (2017) also points out that urban food security and access to food from the weakest will also be essential to fight against hunger. Special attention should be paid to low- and middle- income countries from Latin America, Asia, Africa and the Caribbean where most vulnerable and growing populations are concentrated and which have the highest food insecurity levels owing to deficient food systems. Scarcity of resources, climate change effects, conflicts and intensification natural disasters are among the leading causes.

Productive, sustainable and inclusive agriculture

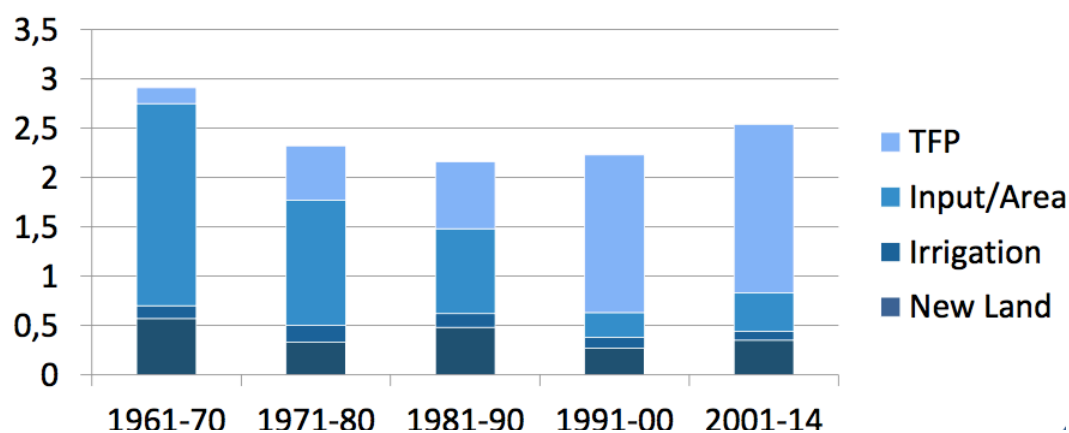
In face of these challenges, international community agrees that a transformative change in agriculture is needed. Some of the goals established within its 2030 Agenda for Sustainable Development are directly related to the solution of the weaknesses identified. In particular, SDG13 addresses climate action, SDG 14 and 15 sustainability of marine and terrestrial ecosystems and SDG 2 targets zero hunger and claims "The food and agriculture sector offers key solutions for development, and is central for hunger and poverty eradication"(UN, 2015).

To achieve this shift, food, agriculture, fisheries and forestry systems will have to produce more with less, in a more sustainable way, resilient to environmental threats and ensuring benefits for everyone. This means not only sector growth must be achieved but also an inclusive and equitable global development. In short, proposal is a more productive, sustainable and inclusive agricultural model (FAO, 2017).

Innovation as an answer

In this transformative process, innovation, and more importantly, how innovation “is done”, appears to play an essential role. Adoption to innovation has been demonstrated as the main booster of productivity, which currently is the major source of growth in agricultural production. As it can be observed in Figure 1, “Total Factor Productivity” (TFP) has been steadily gaining importance in output level increases until having great importance at present thanks in large part to innovation activity. While it is true that there are still some low-income countries whose production growth mainly depends on the incorporation of new land, irrigation and inputs, a change can be intuited in the trend of the sector since the Green Revolution. Now productivity leads the gains in agriculture activity and environmental conservation is taking into much greater consideration (OECD, 2019).

Figure 1. *Sources of growth in global agriculture.*



Source: USDA, Economic Research Service International Agricultural Productivity data product, (2018)

This innovative focus within agriculture can bring many benefits that on one way or the other contribute to the transition to the new model. To begin, as a generating source of growth and competitiveness, innovation allow higher income and more development chances for the producers involved, and more affordable and a wider range of products for consumers (Cahill, 2017). Moreover, innovation brings modernization and job opportunities to help the sector adjust to the new realities like the “bioeconomy” or the digitalization (Moreddu, 2017).

Concerning sustainability, innovation can help to reach a more resource-efficient production model through technological advances, social innovation and new business

models (FAO, 2017). These innovations can be designed for different parts of the production chain and can be from an app which aims to reduce food waste to an irrigation system which disposes water according to evaporation levels, thus alleviating water scarcity (OECD, 2019).

Likewise and closely related, some innovations can improve food security. For instance, improved nutritional attributes of food and climate-resilient plants can be obtained through genetic engineering, ensuring more accessible and nutritious food at food-insecure regions with high malnutrition rates. These technologies for climate adaptation and mitigation, apart from having an enormous social value for food-insecure regions, contribute as well to the reduction of production losses and the conservation of scarce natural resources (Cahill, 2017).

Although being the main driver to achieve sustainable productivity growth, potential of agricultural innovation is not fully exploited in many countries. In most of them, people and organizations lack of capacities and enabling environment which boost agricultural innovation (Tropical Agriculture Platform, 2016). For this reason, new innovation approaches and policy frameworks point out that national innovation systems should not only focus on promoting technological development but social and institutional changes to obtain the maximum benefits (OECD, 2015)

This view about how research and knowledge strengthens innovation capacity has evolved in the academic environment during the last 40 years. Configuration of the different innovation models are exposed in the next section (Anandajayasekera, 2014).

2.2 Evolution on agricultural innovation approach

One of the most basic definition say an innovation system is “a network of organizations, enterprises, and individuals focused on bringing new products, new processes, and new forms of organization into economic use, together with the institutions and policies that affect their behavior and performance” (World Bank, 2006).

In agriculture, like in other industries and disciplines, concept of innovation system has rapidly changed in recent times. Academic literature first presented research organizations and universities as the main actors to foster innovation within National Agricultural Research Systems (NARS) framework. This approach followed linear schemes, being public research centers exclusive providers of knowledge and technology which was adaptable to various contexts but remained alien to most users, specially farmers (Rajalahti, Janssen, & Pehu, 2008).

Second approach arrived in the 1990s due to the lack of efficiency at public research organizations (Rajalahti et al., 2008) and due to the limitations that presented the linear model NARS (Aerni, Nichterlein, Rudgard, & Sonnino, 2015). New model was named Agricultural Knowledge and Innovation Systems (AKIS) and recognized the pluralistic character of knowledge flows which happened not in a linear way but among different

system actors. This focus covers for the first time the heterogeneity of the users and their behaviors as well as their learning and innovation orientations (Chema et al. 2003).

However, like NARS, AKIS presents its shortcomings. Although being concerned about why farmers decide to adopt or pass over agricultural innovations, this model pays little attention to collaboration incentives among research and education, and is centered on research spread which in many cases doesn't fit with end user's needs. In fact, it presents some of the vices of its predecessor and still focuses on research actors as the only source of knowledge for agricultural innovation (Aerni et al., 2015).

Table 2. *The expanding view of how to strengthen agricultural innovation capacity in agriculture.*

Scope	Approach	Focus	Actors
Activity based	National Agricultural Research Systems (NARS)	Technology generation and transfer	Research organizations, universities
Output based	Agricultural Knowledge and Information Systems (AKIS)	Knowledge and Technology dissemination	Research organizations, universities, extension services, nongovernmental organizations
Outcome based	National Agricultural Innovation Systems (NAIS)	Technological and institutional innovation	All economic actors that actively use or generate knowledge

Source: Rajalathi, 2008

By this way, deficiencies on AKIS led to the current concept Agricultural Innovation Systems (AIS). Applying systemic theories in agriculture, AIS acknowledges not only diversity of actors within knowledge systems but also how innovation processes involve interaction (Rajalathi, 2008). Thus, this approach recognizes the existence of much more complex innovation system where agents relationships and particular environment significantly affect generation, dissemination, adoption and use of knowledge (World Bank, 2006). It needs clarifying that European Union calls this broader concept AKIS (Agricultural Knowledge and Innovation Systems) which can be confound with previous AKIS (Agricultural Knowledge and Information Systems) which still doesn't put the emphasis on interactive innovation (EU SCAR, 2013).

Evolution of innovation systems in agriculture have occurred in two different dimensions. One organizational focus explained above and the other related with knowledge use and purpose. Regarding organizational configuration, it started with NARS and finished with AIS analyzing how individuals and organizations coordinate to generate, disseminate and apply knowledge. Regarding innovation target, first research aimed economic and productivity gains and later social and environmental

goals were put on innovation agenda. Some of them have already been mentioned as a global challenge or SDG, for instance poverty reduction, food safety and environmental sustainability.

Both dimensions have converged into the current Agricultural Innovation Systems term: an interactive process that apart from research implies a great variety of activities, agents and relationships -organizational approach- linked with the generation and transfer of knowledge with an economic or social use -functional approach (Anandajayasekeram, 2011)

Apart from this two dimensions, cumulative relationship can also be appreciated among the distinct models. In a simplified manner it can be said that NARS approach centers on the creation of knowledge, AKIS on the creation and dissemination of knowledge, and AIS on the creation, dissemination, and adoption of knowledge (Roseboom 2004). Next section will go in further detail with the latter concept, Agricultural Innovation Systems.

2.3 Agricultural Innovation Systems

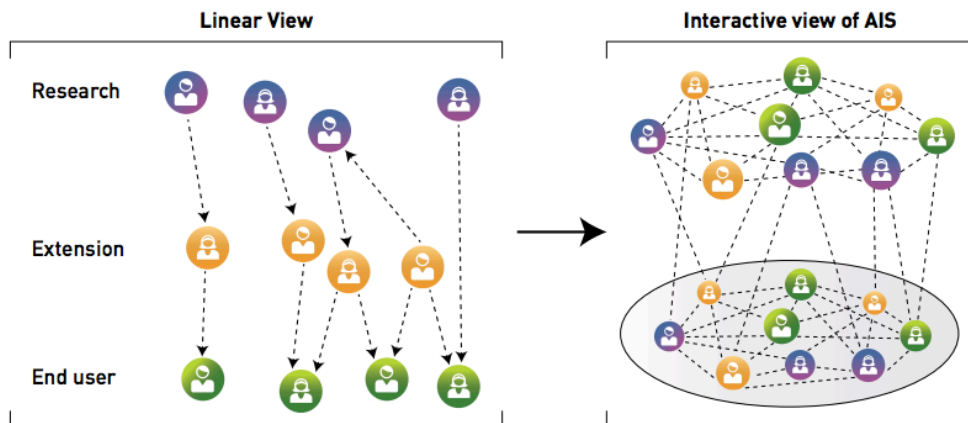
Agricultural innovation systems (AIS) are networks of actors (individuals, organizations and enterprises) which, together with supporting institutions and policies in the agricultural and related sectors, bring existing or new products, processes, and forms of organization into social and economic use. Policies, institutions (formal and informal) and exogenous factors shape the way that these actors interact, generate, share and use knowledge as well as jointly learn (FAO, 2019).

2.3.1 AIS implications

AIS has important implications in the way agricultural innovation is seen. To begin, it breaks with previous linear perspective of technology transfer where knowledge was exclusively generated by research centers, disseminate by extension services and finally adopted by farmers. In place, AIS sees innovation generation as a social process more **bottom-up and synergistic** than top-down from academic world to application (AKIS, 2015).

Aerni (2015) explains that AIS outlook captures how agricultural producers develop their activity, not only assisted by the “research and education” and “bridging institutions” groups, but also inside the agricultural industry. For instance, farmers are supported by suppliers and seed producers concerning technical issues and by retailers regarding quality and safety standards accomplishment. In this way, he underlines any agent from agribusiness sector (firms, farmers, even consumers...) can contribute to the search of innovative solutions and explains that, in most of the cases innovation begins right at the value chain. That is why research activities should be more **demand-oriented** and respond to users’ real needs.

Figure 2. *Linear and interactive view on agricultural innovation*



Source: TAP (2016)

This interactive character of AIS means also innovation is not just created from scratch by its actors, but produced mobilizing existing knowledge. In fact, any successful technological development is naturally immersed in a continuous knowledge-sharing process with customers, experts, etc. Besides this, synergies seem indispensable given the complexity reached by AIS, in order to avoid winner-loser scenarios and ensure benefits of innovation activity arrive to all the agents implied (Tropical Agriculture Platform, 2016). In line with this idea, many cooperative projects have emerged to find shared solutions among various actors from the sector. Thus, **collaboration** is presented as a key element to fulfill innovation potential (EU SCAR, 2015).

Other implication would be AIS **open character**. Scope from an agricultural innovation “regime” is uncertain as different agents visions take part in it and boundaries are defined arbitrarily. For instance, limits considered by a scholar would not be the same as the ones established by a farmer. At the same time, variable extent of the system means actors act in very different settings. It could depend on their role on agricultural innovation (research, binding institutions or industry) their field (political, economic, social, environmental...), geographical scale (regional, national, international...), etc. (Tropical Agriculture Platform, 2016).

Openness and interaction implies also **interdependency**, as any action or change in the system can affect any actor. Thus, apart from studying micro-environment where an innovation is introduced, AIS integral analysis assesses possible impacts across the whole system. For example, before introducing a new grape variety to produce wine in a farm (micro-environment), grapes collection and commercial system where the farm is located must be studied (socio-technical system) (Tropical Agriculture Platform, 2016).

Moreover, AIS is what is known a “complex adaptative system”. Through continuous interaction among its numerous elements, the system and its agents evolve and adapt themselves to incessant new realities in an uncertain process (Tropical Agriculture Platform, 2016) named **coevolution** (Kilelu et al., 2013). In some way the system has memory, a “path dependence”, and regulates itself from its learning reviews, through changes in its structures and flows (De Vicente et. al, 2016). Biggs (1989) claims systemic approach fits perfect to the practice of agricultural R&D as its activities occur in a context of continuous disequilibrium.

Finally, changing environment of AIS also means there is **no** an **equal innovative solution** for the same problem as its design depends on many other factors rather than user’s reality (micro-environment). Developments applied in one place can’t be straight replicated in another. Instead, to successfully introduce an innovation to a different context, innovation process should be recreated to achieve adaptation to local structures (Tropical Agriculture Platform, 2016). This underscores the idea that significant innovation involves institutional and social changes rather than simply implementation of technological developments.

2.3.2 Criticism and proposals

Although seeming the definitive model, Agricultural Innovation Systems model has also generated some reflection among different authors. Concerning inclusive aspirations from innovation, Delvenne and Thoreau (2017) point out that AIS could be designed too far from social and local contexts and exclusively oriented to economic growth. Datta (2018) assumes that AIS concept should evolve to incorporate not only formal knowledge-generation networks but also coexistence from informal social networks like associations and local communities. Pound and Conroi (2017) that perhaps AIS concept has weakness in the lack of integration from social objectives and most vulnerable groups.

Concerning organizational factor, Carayannis et al. (2018) extends analytical framework to the “quadruple” and “quintuple” helix where the government, companies, academy and the civil society participate in an innovation democratic context, the fifth element. It also talks about innovation ecosystems, which explore how this occurs in a social and natural environment that should be favorable to the knowledge “coevolution” by the plurality of actors.

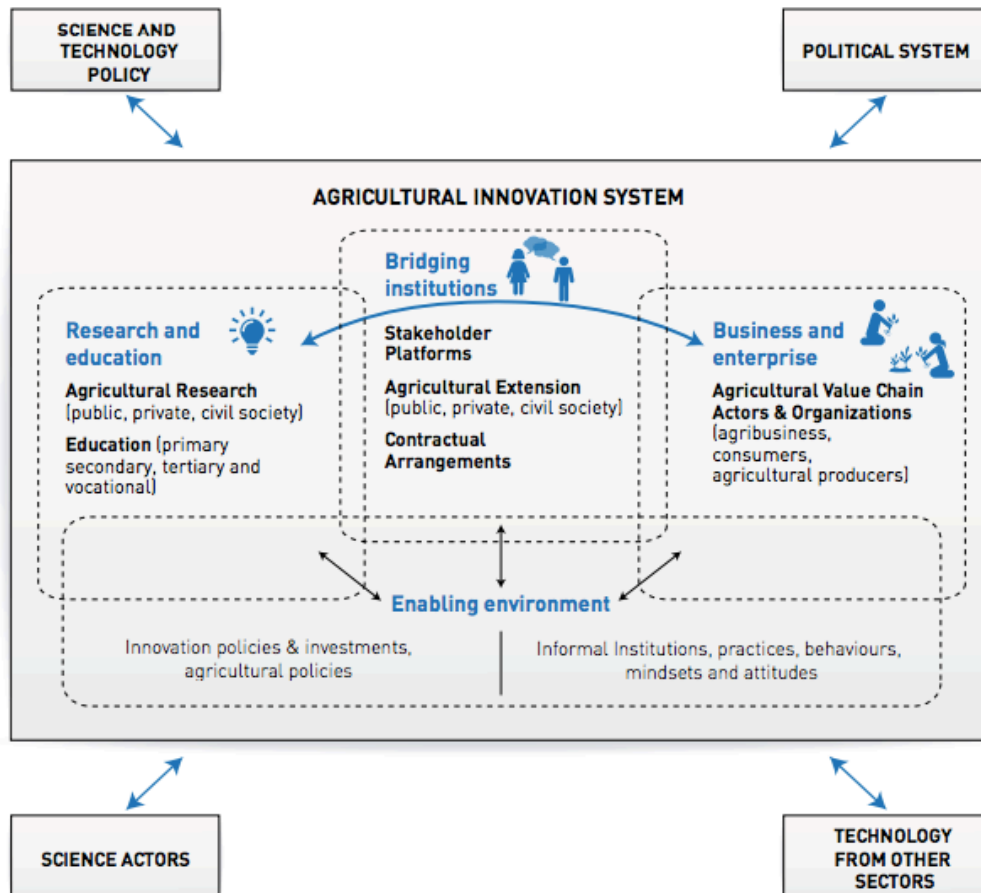
2.3.3 AIS Elements

AIS recognizes the idea that innovation comes from multiple sources, not only from the designated researchers but also from the “practitioners” and that are exactly synergies among them which boost technological development (Anandajayasekeram, 2011). These sources include tacit traditional knowledge and practices, the academic modern actors such as NARS, research institutes and universities; private sector, including agribusiness firms, entrepreneurs and producers at local, national, and multinationals

level; and civil society organizations like farmers and consumer platforms, pressure groups and NGOs (Anandajayasekeram, 2011; FAO, 2019)

FAO (2019) classifies these knowledge agents in three major groups, depending on their role played on agricultural innovation (see Figure 3): (1) Research and education, (2) Bridging institutions and (3) Business and enterprises.

Figure 3. *Diagram of an Agricultural Innovation System (AIS)*



Source: FAO (2019)

In addition to these, AIS considers a fourth element outside the network of actors per se: the “enabling environment”, which is the institutional set-up in which actors are embedded and that conditions their innovation capacity . It is comprised by those formal and informal institutions that affect innovation development processes and delivery, including all innovation and agricultural policies, investments, laws and regulations they implement, as well as their implicit beliefs, customs, norms, etc. (FAO, 2010).

All of these four elements form the agricultural innovation “regime” which at the same time is in contact with and influenced by other socio-technical “regimes” like science

and technology system or other macro-level factors like the changing political and technological landscape (De Vicente et al. 2016).

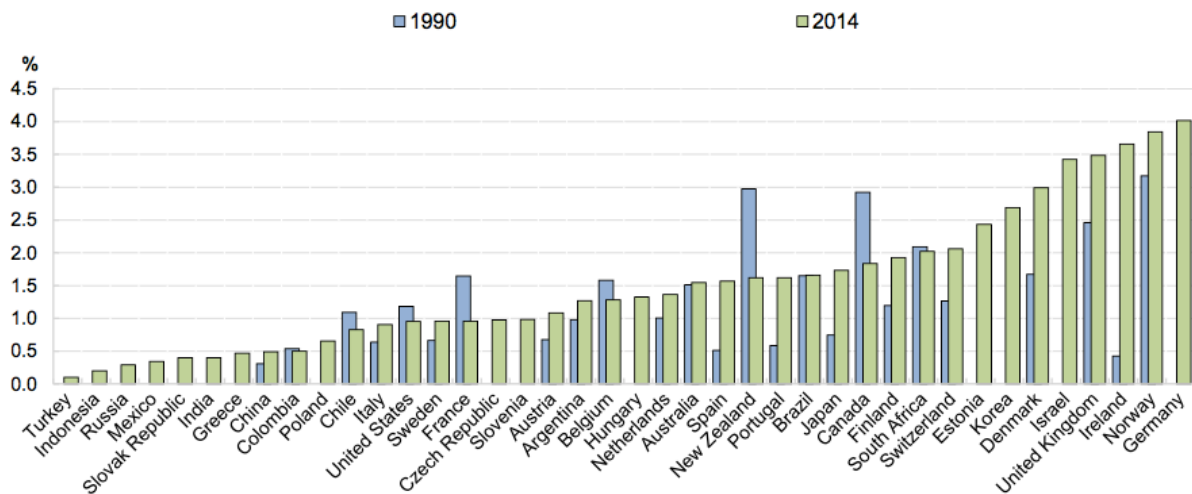
2.4 AIS operationalization

Principles and insights which arise from innovation systems concept on agriculture are clear. Strong AIS are essential for the improvement of the economic, environmental and social performance of agriculture. However, how is this change on innovation perspective being operationalized? Are innovation national strategies aligning with AIS new approach? Which recommendations are given to policy-makers to improve AIS?

2.4.1 Budget reality

Agricultural innovation policies are nowadays deficient in both economical and qualitative terms. While it is true public R&D intensity in agriculture has increased in many developed and emerging countries (Figure 5), there are still many countries which have reduced their budget. Some examples are Canada, New Zealand, France or Chile (OECD, 2016).

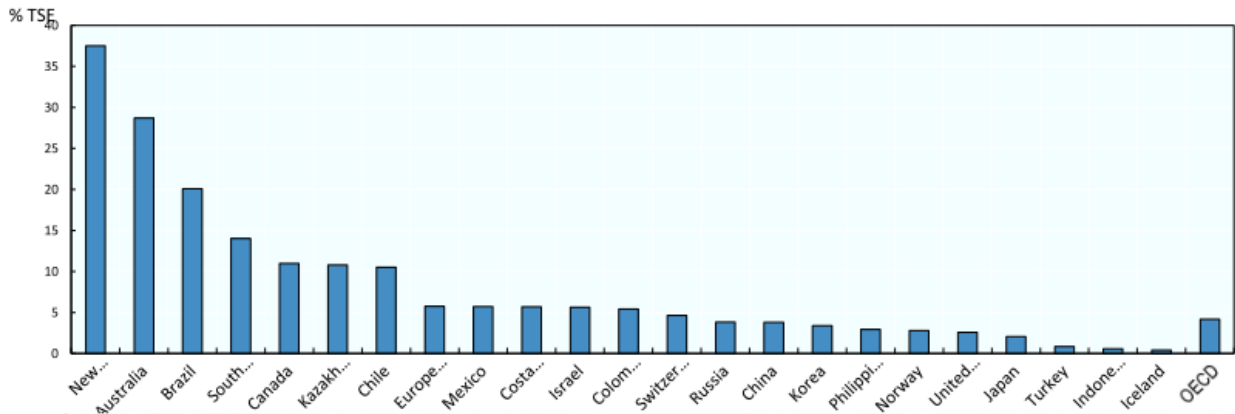
Figure 4. Share of budget expenditures on agriculture R&D as a percentage of agricultural gross value added.



Source: OECD (2016), *Adapting Innovation Systems to New Challenges*. New priorities on research also imply a challenge when introducing policies which strengthening AIS, especially on those countries with limited budgets or weak research networks (OECD, 2016).

At the same time, agricultural policies dedicate very limited funding to innovation systems in a large number of states. From the aid aimed at agricultural producers between 2014 and 2016 in OECD countries, less than 5%, were aimed at AIS (Figure 6). In particular, EU gave a little bit more than 5% of public subsidies for farmers to agricultural innovation (Cahill, 2017).

Figure 5. *Share of AIS in total producers support*



Source: OECD (2017), “Producer and Consumer Support Estimates”.

Public administration continues to be main funder and supporter of agricultural innovation in most countries, although private investment is on the increase. (OECD, 2016). García Álvarez-Coque (2019) talks about the essential role which plays the state in agricultural innovation funding and places value on its social benefits. He also points out the strong dependence of technological transfer from science to practice, with a low speed of transfer compared to other sectors.

2.4.2 *Strengthening AIS policies*

Apart from having limited economic resources, current public policies are misaligned with established goals towards a more efficient and sustainable agricultural model. To converge to this ideal setting, an enabling institutional environment should be set up based on 3 main pillars: a strengthening of agricultural innovation systems, risk and resilience management and support to environmental sustainability, resources protection and fight against climatic emergency (Cahill, 2017).

Hereafter, it is explained which are the main changes which governments and “policy-makers” should prompt in order to improve national AIS where stakeholder platforms are placed:

a) Enhancing AIS governance

One of the big changes which need to take place to strengthen AIS is an enhancing of its governance (OECD, 2016). To this effect, government should build a strategy which tackle long-term issues, co-created with stakeholders and having as final vision an efficient, sustainable and inclusive agricultural model. Aims set out must be accountable and policies for their consecution must be monitored to check the impact in each euro spend. In this line, it would be recommendable eliminating those policies which proven unsustainable, damaging and a brake to innovation (Cahill, 2017).

In addition to this, institutional designs and governance models should be transformed to be more reactive and interactive, and enable a better coordination between agricultural innovation agents. It is also needed to emphasize those policies which promote demand-driven innovation and which provide farmers with necessary resources to increase their productive and overcome emerging challenges (Cahill, 2017).

Lastly, governance at AIS could be improved ensuring a better integration of agriculture within national innovation systems and enhancing cross-sectorial collaborations (ICT, natural resources sector, nanotechnology...) (OECD, 2016). For instance, use of ICT tools have a great potential at stimulating multi-actor innovation as enhancing communication, information storage and knowledge sharing among various agricultural actors (EU SCAR, 2013).

b) Clarifying public & private roles in innovation

Secondly, to boost AIS, it would be recommendable to better determine roles played by public and private sector (OECD, 2016). Evidences regarding competition between public and private sector on R+D+i, indicate in certain cases reducing public innovation, private R+D+i profitability (García Álvarez-Coque, 2019).

To avoid this situation, public-private collaborations should be promoted at European, national and regional level (García Álvarez-Coque, 2019). This implies determining specific areas of these collaborations and improving governance within them (Cahill, 2017).

Concerning the role of public and private spheres separated, big part of literature sees positively public support on agricultural innovation and points out need of increasing public sector contribution. In fact, private sector has shown a low implication in collaboration with research agents such as universities as well as giving a low funding support to innovation initiatives (García Álvarez-Coque, 2019).

To enhance private innovation activity, it is necessary to offer more attractive conditions to businesses to innovate, like improvements on intellectual property rights (IPRs) protection, research infrastructure, funding mechanisms and in general a greater public support to private R+D. In addition to incentives creation, private investment in agricultural innovation, could be stimulated reducing some unnecessary regulatory barriers which discourage it (OECD, 2016).

Moreover, distribution of tasks among both sectors need to change. Private sector should have a minor institutional intervention and boost a greater project-based innovation. For its part, public sector needs to focus its research efforts on issues related with agricultural sustainability in the long-term (Cahill, 2017).

c) Facilitating access to appropriate training and independent advisory services

Boosting innovation processes with a collaborative focus like AIS, requires of a human team with great capacities, which is not always possible due to lack of certain actors education and at the same time lack of incentives for researchers and other professionals participation at operational groups (García Álvarez-Coque, 2015).

Against these flaws, governments should facilitate access to innovation as well as “providing quality advisory services to farms which strengthen support systems for farmers and adoption of new and relevant technologies” (García Álvarez-Coque, 2015). It is necessary to find a balance between innovation research, and training an advisory services which allow farmers to develop and share their solutions in an increasingly complex and changing context (OECD, 2016).

Furthermore, concerning extension services it is responsibility of public sector to directly intervene where private sector doesn't do it (Cahill, 2017). However, where main role on advisory services is played by public sector in many countries, direct advice has been cut off in other states where only access is guaranteed (OECD, 2016).

d) Strengthening co-operation through participation in international, regional and sub-regional research networks

Farmers should have the opportunity to benefit from innovations regardless of their provenance (García Álvarez-Coque, 2015). However, the reality is different. Foreign innovations are shortly adopted at national and local due to great heterogeneity of agrifood systems, and scientific proof shows externalities produced by R+D+i from overseas have much less effect than national ones (García Álvarez-Coque, 2015).

To address this problem and strengthening AIS, research networks at international and regional levels should be reinforced (OECD, 2016). For that matter, some policies have already been created to boost “cooperation for innovation” among regions. A good example of this is our main object of study: operational groups of EIP-AGRI, multi-actor platforms which bring together collaborators from different backgrounds and provenance with the idea of “cooperating to innovate” solutions for agricultural problems (EIP-AGRI, 2019).

3. Facilitating innovation through OGs

3.1 Facilitation role

Cooperation seems one of the main pillars to strengthen AIS. Common goals, a well-connected network of actors and incentives to collaborate are required so that an AIS works properly. However, increasing number of innovation actors and the complexity of their relationships have led to a less direct cooperation (World Bank, 2006). For that reason, is essential to have people who link unknown actors that may be relevant to each other to initiate innovation processes. In other words, people who play facilitation roles (Klerkxx, 2012).

Recently definition by Leeuwis & Aarts (2011) refers to facilitation as “a purposeful intervention that enhances interaction and relationships of individuals, organizations, and their social, cultural and political structures through a process of network building, social learning and negotiation”.

This renewal of the concept, broadens classical facilitation functions such as knowledge dissemination, assembling actors and logistics support facilitated by classical bridging institutions like research centers, agricultural extension organizations or NGOs (Tropical Agriculture Platform, 2016). Agricultural extension is not any more presented as a single linear channel which connects research with farmers and assumes intermediary roles concerning generation and facilitation of plural relationships among innovation agents (Klerkx & Gildemacher, 2012).

To develop this updated role great skills are required. Thus, specialists on facilitating innovation processes have emerged under the name of innovation brokers, facilitators or intermediaries (Tropical Agriculture Platform, 2016).

“Innovation brokers” are persons or organizations that guide joint networks on generating a stimulating and trusting environment where individuals learn to think critically and “out of the box” and can clearly transmit their opinions and experiences. In that task, facilitators act as a relatively impartial third-party position and purposefully catalyze innovation through linking actors and make them interact (Klerkx & Gildemacher, 2012). They also support actors to follow and reflect innovation process (Tropical Agriculture Platform, 2016).

Classification of potential roles played by innovation intermediaries have been established by literature. Batterink et. al (2010) talks about “three network orchestration functions” and split them into three: i) innovation initiation, ii) network composition, iii) and innovation process management. For its part, (Kilelu, Klerkx, & Leeuwis, 2013) classifies actions carried out by facilitators in AIS into 6 main categories or functions. The latter classification will be applied later to assess the role of EIP-AGRI OGs as innovation intermediaries, and include:

- (1) DEMAND ARTICULATION:** Facilitating the process of identifying innovation challenges and opportunities as perceived by the various stakeholders through diagnostic exercises, visioning, needs assessment. The needs could include access to information, technologies, finance or institutional gaps.

Facilitation tasks that fall into this category are (Based on Tropical Agricultural Platform, 2016):

- Showing and envisioning interdependence between actors' activities.
- Generating a space of dialogue and exchange of views, experiences, values through group dynamics.
- Debating influential factors or institutions which enhance current challenges or structures.

- (2) INSTITUTIONAL SUPPORT:** Facilitating and advocating institutional change (e.g. policy change, new business models and stimulating new actor relationships).

Facilitation tasks that fall into this category are (Based on Tropical Agricultural Platform, 2016):

- Carrying out lobbying functions to put stakeholder concerns in the public agenda.
- Exploring public/private funding mechanisms that allow agricultural agents to implement innovative solutions.

- (3) NETWORK BROKERING:** Identifying and linking different actors.

Facilitation tasks that fall into this category are (Based on Tropical Agricultural Platform, 2016):

- Gather present initiatives in a document which includes stakeholders assessment.
- Building partnerships among unrelated networks of actors who could share interests.
- Brokering contact among networks and external advisors or experts.

- (4) CAPACITY BUILDING :** Strengthening and incubating new organizational forms.

Facilitation tasks that fall into this category are:

- Assessing in legal issues and possible advantages for networking platforms and entrepreneurial activities.
- Promoting collaboration with business incubators that could provide developed networks of actors of a stronger management structure.

(5) INNOVATION PROCESS MANAGEMENT: Coordinating interaction and facilitating negotiation and learning among different actors.

Facilitation tasks that fall into this category are (Based on Tropical Agricultural Platform, 2016):

- Finding process enablers supported and reliable for all actors participating.
- Steering collaborative research activities to questions relevant to less resourceful stakeholders.
- Running regular reviews on interaction developments and its results.

(6) KNOWLEDGE BROKERING: Identifying knowledge/technology needs and mobilizing and disseminating the technology and knowledge from different sources.

Facilitation tasks that fall into this category are (Based on Tropical Agricultural Platform, 2016):

- Assisting on the registration and systematization of data and findings collected by stakeholders.
- Supporting the creation of knowledge-sharing spaces to improve access and innovation mobility and thus reduce effects of asymmetric information.

Different types of innovation brokers can be found. The most common example would be an individual innovation consultant who link farmers and agrifood businesses with key partners and service suppliers but also there are other modalities such as farmers network brokers, education brokers and multi-actor innovation networks. Even an online knowledge databases or an information-sharing platform can be also considered an innovation broker, despite constraints which can present (Klerkx & Gildemacher, 2012).

Figure of innovation brokers is not still well recognized. Repercussion of facilitators' task can be hidden more than normal due to its "behind-the scenes" way of working and it is not receiving enough financial and institutional support. Enhancement of innovation brokers to have a more credible position is needed and each state should design and invest in their specific enabling environment to make it possible (Klerkx & Gildemacher, 2012).

3.2 Innovation networks

3.2.1 Concept

AIS view underscores collective character of innovation and highlights that innovation is a co-evolutionary process which implies an adjustment of technical, social, institutional and organizational aspects. This integrated vision have resulted in an increasing creation of multi-actor initiatives, like innovation platforms and networks, as mechanisms for enhancing agricultural innovation. At them, there is not only but many innovation intermediaries which enhance stakeholders connections and other elements in the innovation process (Kilelu et al., 2013).

“An innovation platform is a multi-actor configuration deliberately set up to facilitate and undertake various activities around identified agricultural innovation challenges and opportunities at individual and organization level” (Kilelu et al., 2013).

There are a great variety of innovation networks. Some of them are policy-induced platforms which are exclusively focus on a particular matter where others unique purpose is to exchange knowledge and resources to enhance innovative abilities of farmers without developing an innovation. Concerning innovation, “network” as a term is used for different collective arrangements from instance transdisciplinary research projects to consulting groups (EU SCAR, 2015).

Some case studies have stated the effectivity of innovation platforms to provide advisory services for several reasons. Modern focus offered by them connect actors with innovation processes going a step forward compared to classical “bridging systems”. They include farmers as co-creators of knowledge and cuts geographical and mental separation among farmers and other actors like investigators or professionals (Madureira et al., 2015)

Then, collaborative networks should be considered as a necessary complement to work carried out by conventional advisory services, and thus innovation platforms should be backed by public institutions accordingly (EU SCAR, 2015). On the other hand, it is important to note that although brokers and innovation networks are gaining more and more importance specially at high-income countries, this doesn't imply classic intermediaries should play a minor function. One of the keys of AIS strengthening is the development of capacities of individuals and organizations to carry out innovation processes being extremely important advisory, training, documentation and management services frequently offered by these institutions (Tropical Agriculture Platform, 2016).

3.2.2 Building innovation networks

According to AIS perspective, innovation networks should be open to variety of knowledge and have a bottom-up orientation, from direct users of information. This is why when deciding topics to be dealt by the network is important to choose those with a major significance for farmers (Madureira et al. 2015). By this way, farmers are integrated from the network beginning, making them participants its initial approaches and promoting cooperation among different actors like researchers and farmers. To this effect, it is necessary a receptive attitude, free of prejudices and individual concerns and open to any type of opinions and ideas (EU SCAR, 2015).

Open-mindedness also implies that every source of knowledge needs to be admitted to the network if has something to contribute. This means actors with no relationship to agricultural sector or research but has concern about the platform topics should be able to participate on them. In fact, a study-case from a Scottish farm has shown that including extra actors on network meetings raises farmers interplay confirming the effectivity of this transdisciplinary and inclusive focus (EU SCAR, 2015).

The presence of diverse demographic groups with regard to economic power, resource access, gender roles, etc. can result into power gaps inside the platform that should be avoided. To avoid power symmetries it is important to define innovation networks into concrete terms (concerning composition, governance...) that ensure equal voice and opportunities for its participant actors (EU SCAR, 2015).

If developed properly, multi-actor platforms can be really beneficial to compensate resource imbalances that exist on innovation processes and that especially affect farmers and the poorest. Through these broad partnerships, physical and intangible assets which agents could add or potentially bring are organized in a better way, facilitating “partners” the implementation of innovative ideas and strengthening their businesses (World Bank, 2012).

3.2.3 Collaborative learning

Collaborative learning is essential for strengthening actor innovation abilities and thus achieve innovation networks success. Its aim is to build a collective perspective from contributions and common points of network actors, as a mutual learning and empathy exercise (Tropical Agriculture Platform, 2016).

To this end, social component has demonstrated to be crucial. When actors get together in a shared space is when truly learning occurs for what regular platform meetings are important (Tropical Agriculture Platform, 2016). There, partners have the opportunity to share their experiences, knowledge and concerns as well as build and strengthening relationships among them (EU SCAR, 2015).

Going one step further regarding interpersonal relationships inside a network, generation of a real climate of trust facilitates even more learning and innovation

processes. Trust-building activities such as una trips, meals or overnight stays contribute to create durable connections among network actors which raises cooperation and confidence.

On the creation of this cooperative space, facilitation roles and specialized brokers are needed especially on preparation phase to connect important actors. Using different techniques, part of their task is to support “platform” actors in their effort to create trust, recognize interdependency, identify shared problems and set common project (Tropical Agriculture Platform, 2016). Facilitation roles and their functions will be expanded in the next section.

Also essential for any group embedded in an innovation process is its proper management. “Platform” actors need to constantly re-interpret their context which needs of the adequate support and flexible tools to enable an adaptative learning system. In this sense, actor roles and internal communication are relevant to facilitate social learning, approaches reframing and an effective collective action (Tisenkopfs, Kunda, & Sumane, 2014). Boundary objects can also facilitate these communicative task and to get research into use as demonstrated in recent studies (Krijstianson et al., 2009; Clark et. al, 2011).

3.3 EIP-AGRI Operational Groups

3.3.1 Funding policies

EIP-AGRI is one of the innovation alliances established by EU which intend to address current social challenges by promoting interaction spaces between providers and users of knowledge to drive applicable solutions (Madureira et. al, 2015). All 5 European Innovation Partnerships (EIP) have been launched as a part of the Innovation Union plan which aims to foster economic competitiveness, employment and quality of life in the EU through innovation (EIP-AGRI, 2019).

EIP on agricultural sustainability and productivity, as it name implies, works towards a more efficient and sustainable farming and forestry in Europe which guarantees food, feed and biomaterials supply, and at the same time, protects natural resource base on which agriculture relies (EIP-AGRI, 2019).

This cooperative tool, and the other EIPs, adheres to innovation systems perspective explained before, where innovation occurs through collaborative learning processes where various stakeholders co-create focused solutions to a concrete problem or develop together a specific opportunity (Madureira et. al, 2015). Ultimately, EIP-AGRI believes in a synergistic, bottom-up, demand-oriented, open and co-evolutionary innovation model.

There's not an specific Community budget for EIP-AGRI as it is not a funding policy itself. Regulation specifies the means in which the innovation alliance becomes operational (European Commission, 2014). Two are the main funding programs which European Union offers in order to boost interactive innovation on agriculture: Rural Development Programs (RDPs) and "Horizon 2020" research and innovation policy (EIP-AGRI, 2019).

RDPs fund cooperation in innovation through Operational Groups, multi-actor platforms which look for agricultural developments in line with program goals and normally operate on a regional basis. In this sense, policies are co-funded by EU but specific conditions and implementation are integrally decided by member states or regional governments (EIP-AGRI, 2019).

In Spain, OGs initiative depends on both the rural development program from autonomous communities (RDPs) and the national rural development program (NRDP) run by the Ministry of Agriculture, Fisheries and Food. Information on both programs and Spanish OGs is disseminated by the Rural National Network (RRN), platform composed by the main actors related with rural areas which aims to boost rural development (Red Rural Nacional, 2019)

3.3.2 OGs program

Operational Groups are project-based and involves agents such as scientists, farmers, advisors, NGOs, firms, etc. who could play an important role in the search of innovations for groups' need or opportunity (EU SCAR, 2013).

Creation of these groups should happen on initiative of the innovation agents. There are no special requisites for its formation apart from basic things concerning its size (minimum 2 entities), composition (to ensure the diversity of actors) and the explicit responsibilities of an operational group (EU SCAR, 2013).

Operational Groups are formed by three types of members. First, applicant members who are beneficiaries from the public aid to create or further develop an operational group. One of them is the representant of the group (always a legal entity). Second, subcontracted members which are essential for the future development of the project or drafting it (in the case of innovation agent). Third, collaborators without payment for their participation. They offer their motivation, aptitudes, experiences, etc (EU SCAR, 2013)

Practical character of Operational Groups obliged them to write a plan explaining their project. Furthermore results derived from activity at Operational Groups must be disseminated, specifically in the EIP network (EU SCAR, 2013).

4. Survey with OG members

4.1 Method rationale

An online survey was conducted to interview members of EIP-AGRI OGs from Spain. On this questionnaire, they have been asked about their OGs characteristics and functioning, more specifically to evaluate performance of their OGs on certain innovation brokering activities. Main objective from the quantitative study was first to check the degree of compliance of Spanish OGs on their role as innovation facilitators, and secondly to see which OG variables could reinforce or weaken this role.

Insights of the survey will complement literature and information included on framework section and will allow to get a more complete picture of the study object. Apart from these academical purposes, data collection technique has been chosen for several reasons.

To begin, limited public information about specific subject of study compels to produce information on one own's account. Only a few specific case study reports and a recently European survey to OGs have been carried out concerning EIP-AGRI OGs functioning (Knotter, Kretz, & Zeqo, 2019). No OGs assessment has been made directly asking their members and no study about OGs functioning has been run in Spain.

Second, a web form is presented as an appropriate method to collect data from a heterogeneous and geographically dispersed population like OGs. Some members can come from rural and urban environments and often different regions, and this way makes them comfortable and quick to answer. Therefore, a representative sample from varied backgrounds (farmers, researchers, businesses...) and territories, and a high response can be obtained.

Moreover, it is a handy way for survey conductors to manage and analyze data. An answers database can be automatically generated on *Google Forms* as an Excel spreadsheet and from it obtain survey results.

Finally, the fact that is an online anonymous survey addressing OGs members brings some limitations associated but at the same time, more freedom in giving an honest view about OGs performance. This could reveal a great diversity of hidden opinions, instead of only collecting those from platform leaders or representatives.

4.2 Survey design

4.2.1 Sample

The survey was addressed to people and organizations who participate or have participated as a partner on Spanish OGs. This includes collaborating and beneficiary members from any OG framed within Spanish RDP and RDPs of autonomous

communities. From this population, the greatest possible number of emails was obtained from Spanish National Rural Network (RRN) OGs database dating from 2015, when first pilot group was created in Catalonia (Red Rural Nacional, 2019).

Sample shows some limitations. It is composed by members who voluntarily and anonymously answered the survey which implies no inference can be made from the results as independence condition isn't fulfilled to apply statistical methods. On the other hand, descriptive statistics is perfectly valid and applied to get valuable results.

Other possible constraint for the sample could be the presence of biases in some group of respondents. The greatest bias which can take place in the sample would be due to the heterogeneity of the sample, between participants coming from different environments, either rural or urban, public or private institutions, or with differentiated roles inside agricultural sector, such as farmers, researches, NGOs, agrifood firms, etc. Identity and background of the surveyed partners is unknown and if one of these particular groups share a specific and extreme perspective towards an issue this could skew questionnaire results. However, the sample is big enough to include a balanced composition of members.

Geographical scope could also produce a bias in the sample. EIP-AGRI OGs program is largely developed in Spain by autonomous communities through their RDPs, and depending on the autonomous administration the OGs policy could perform better or worse. This has been prevented through participation in the survey from members which belong to OGs distributed among the 17 Spanish autonomous communities plus the two autonomous cities Ceuta y Melilla.

4.2.2 Questions

As mentioned before, the aim of the survey was to check if EIP-AGRI Spanish OGs are properly accomplishing facilitation role. Questionnaire was divided into three sections, permitting the exploration of the following of OGs:

- i. **Characteristics.** Aspects characterizing OGs of surveyed partners. Respondents were asked to answer dichotomic and multiple questions concerning different aspects of OGs they belong to. As one participant could be part of more than one OG, there was the option to characterize more than one OG in the same answer (OG1, OG2, OG3...). Examples of both dichotomic and multiple questions can be seen in Figures 6 and 7.

Figure 6. Example of a dichotomic question from “Characteristics” section. “Does your OG have collaborators?”.

¿Tiene el GO colaboradores?

	Sí	No
Grupo Operativo 1	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 2	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 3	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 4	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 5	<input type="radio"/>	<input type="radio"/>

Own elaboration

Figure 7. Example of a multiple choice question from “Characteristics” section. “What is the number of partners (beneficiary members) in your OG?”

¿Cuál es el número de socios (miembros solicitantes) de su GO?

	1-5 socios	6-10 socios	Más de 10 socios
Grupo Operativo 1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Own elaboration

Characterization aspects were chosen based on the reading of OGs case studies and sheets facilitated by both, European EIP-AGRI and the Spanish Red Rural Nacional (Red Rural Nacional, 2019). Literature concerning OGs characteristics also helped together with advice given by some university professors. The purpose of these section of the survey was to obtain information about OGs profiles which could be used later to see if these categorical variables have some influence on OGs performance.

- ii. **Functioning.** The fulfillment of innovation brokering roles by Spanish OGs. Members from OGs were asked to express from 1 to 7 their level of agreement with some statements related with their operational groups functioning. Each of the phrased sentences was linked with one of the functions that innovation intermediaries in agricultural innovation can fulfill according to Kilelu et al. (2011). As mentioned in previous chapter, these functions are grouped into 6 main categories: demand articulation, institutional support, network brokering, capacity building, innovation process management and knowledge brokering. The following table summarizes them.

Table 3. Innovation intermediary functions

D: Demand articulation	“Facilitating the process of identifying innovation challenges and opportunities perceived by the various stakeholders through diagnostic exercises, visioning, needs assessment” diagnostic and feasibility studies, visioning, objectives, challenges perceived by the various stakeholders”
S: Institutional Support	“Facilitating and advocating institutional change (e.g. policy change, new business models and stimulating new actor relationships)”.
N: Network brokering	“Identifying and linking different actors”.
C: Capacity building	“Strengthening and incubating new organizational forms”.
I: Innovation process management	“Coordinating interaction and facilitating negotiation and learning among different actors”.
K: Knowledge brokering	“Identifying knowledge/technology needs and mobilizing and disseminating the technology and knowledge from different sources”.

Source: Kilelu et. al, 2011

- iii. **Overall perception.** In the third section, respondents were asked to answer 4 yes/no dichotomic questions to show their satisfaction or dissatisfaction with their OGs and EIP-AGRI Operational Groups program, and opinion about their dependency on public funding.

For a detailed view of the questionnaire see Annex 1.

4.2.3 Data collection

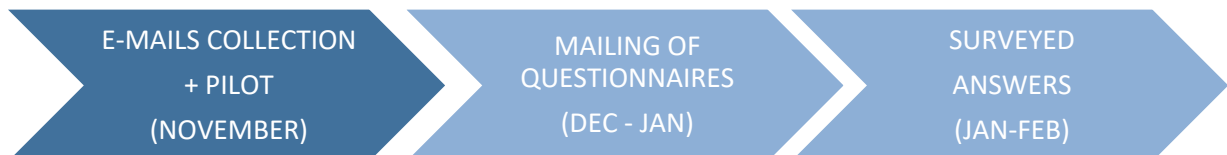
In order to ensure a sample as large and plural as possible, 967 emails were collected during November, from Red Rural Nacional OGs database. Questionnaires were sent to a great variety of actors, including beneficiary and collaborator members, and innovation actors from the three major groups (research and education, bridging institutions and business and enterprise).

Before sending the questionnaires a pilot phase was made and survey was sent to two experts who fulfilled and analyzed the questionnaire. With their feedback possible functioning errors were corrected and statements choice and content were improved.

After that, survey was launched December 2018 through an e-mail with a Google Forms link to the whole database of 967 OGs partners. In the e-mail sent, information about survey content, its purposes and confidential conditions were given as well as thanking them for their participation. Inside the Google Forms questionnaire, these information was more or less again gathered plus instructions were given to properly answer the survey.

E-mail sending was done in various rounds along December and January, always giving approximately one month as maximum time to answer. Survey was definitely closed half February 2019.

Data collection process could be summarized in the following diagram (Figure 8):



Own elaboration

4.3 Further considerations

4.3.1 Clustering exercise

Half of respondents belong to more than one OG, each of them with different features. This is why, to facilitate OGs characterization and further analysis, answers have been grouped into clusters. These cluster categories have been extracted through the creation of binary dummy variables which establish conditions based on characterization answers, on first section of the questionnaire.

The objective of these clustering exercise was to see if some clusters had considerable differences in regard to sample average, and thus giving a deeper interpretation of the findings. For that reason, clusters whose mean didn't have important variations were

eliminated during the clustering exercise and are not shown in the results. Many clusters were tested, measuring possible differences according to the size of the OGs respondents belonged to, if they had private partners and how many, if collaborators participated, which program framework their OGs were involved in and which regions were participated in.

Each of the conditional clusters have a name associated as it is indicated below:

- Size
 - +10 Members: At least one OG of the respondent has more than 10 members.
- Private members
 - +7 Private Members: At least one OG of the respondent has more than 7 private members.
- Collaborators
 - No Collaborators: None of the OGs of the respondent have collaborators
 - All Collaborators: All of the OGs of the respondent have collaborators
 - All Collaborators +1OG: All of the OGs of the respondent have collaborators and she/he is in more than one operational group.
- Program framework
 - All autonomic: All of the OGs of the respondent operate within autonomic rural plans framework, the “Rural Development Programs” (RDPs)
 - All supraautonomic: All of the OGs of the respondent operate within supraautonomic rural plans framework, the “National Rural Development Program” (NRDP).
 - All supraautonomic +1OG: All of the OGs of the respondent operate within supraautonomic rural plans framework, NRDP, and she/he is in more than one operational group.
- Regional participation
 - All 1 Community +1OG: At all of the OGs of the respondent just one autonomous community participates and she/he is in more than one operational group.

- All +2 Communities +1OG: At all of the OGs of the respondent more than 2 autonomous communities are participants and she/he is in more than one operational group.
- Participant regions

Clusters have been created for each autonomous community. To these clusters belong respondents who at least are part of a OG where that autonomous community participates. Despite having answers in the sample from all regional clusters, those with less than 7 answers have been removed as it was considered insufficient response to test their influence on OGs performance.

Autonomous communities participation tested after filtering were: Andalucía, Aragón, Asturias, Castilla-La Mancha, Castilla y León, Cataluña, Valencian Community, Extremadura, Galicia, Madrid, Murcia, Navarra, País Vasco y La Rioja.

4.3.2 Analytical remarks

The measure taken to present OGs “functioning” results has been the mean. Precisely, figures from this section refer to average of the respondents level of agreement with facilitation functions carried out at their OGs. This measure has been chosen to and not the median, after checking data is normally distributed and extreme outliers have a not a substantial effect in study results. Thus, the mean is presented as the best measure to show center of data sample.

To see if any of the clusters had differentiated behavior with the sample, differences with sample average have been calculated. Positive or negative variations under 0.2 have been considered within normal limits and these clusters have been discarded. Clusters with the highest and lowest differences for each statement have been highlighted in results tables on next section.

In any case, it is important to remember that lessons from the survey are based on OGs members subjective opinion and are merely an observative analysis of OGs performance, which in any case can reach statistical conclusions.

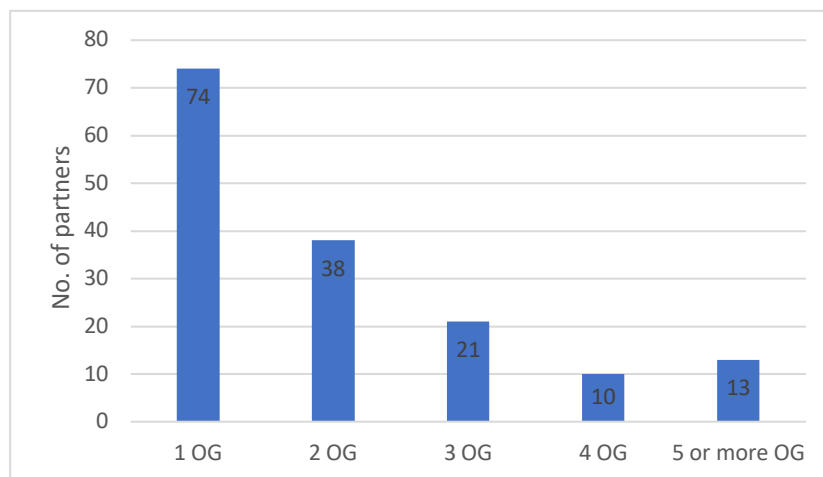
Concerning formal presentation, it should be known that statements on OG functions are expressed in different but similar ways to the original sentence along the survey analysis. In the same way, there are innovation vocabulary which is used indistinctly such as “network” and “platform” or “broker” and “facilitator”.

5. Survey analysis

5.1 Response

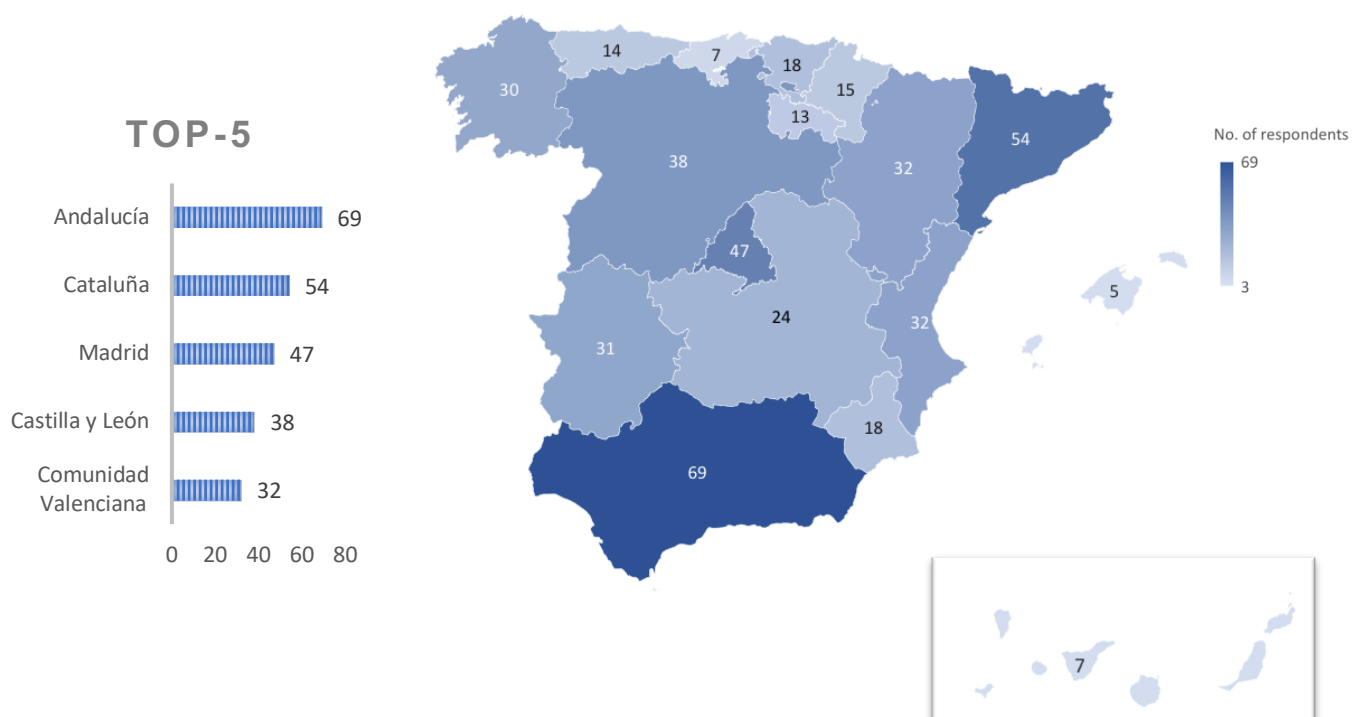
159 partners of OGs responded to the survey, leading to a response rate of 16,4%. Almost half of the surveyed partners belong to just one operational group. This figure decreases then progressively as number of operational groups increase for partners with 2, 3 and 4 OGs. Finally, there are 13 respondents which are active in many OGs and belong at least to 5 of them.

Figure 9. *Number of partners per number of OGs they belong to*



Own elaboration

Figure 10. *No. of respondents belonging to OGs where each autonomous community participates*



Respondents of the survey belong to OGs in all national territory as it can be observed in Figure 10 (including Ceuta and Melilla). Autonomous communities which are the most represented on respondents answers are Andalucía, Catalonia and Madrid. Then, regional diversity is present at OGs of the surveyed partners.

5.2 Survey results

Respondents agreed with all survey statements which described potential actions carried out by OGs. Average of every sentence in the questionnaire received a level of agreement above 4 points out of 7 (Table 4). Thus, according to surveyed partners, Spanish OGs are fulfilling innovation brokers functions established by the literature.

Table 4. *Statements on OG functions (summarized) – Level of agreement avg. (1- 7)*

Statement	Responses	Average
D2. Identification of possible solutions	156	6,08
D1. Identification of actors needs	156	5,94
I3. Updating actors with OG actions and progress	156	5,86
D3. Complementation of actors perspectives	153	5,76
I1. Strengthening collaboration within OG	154	5,53
S2. Obtaining economic & institutional support from public admin.	155	5,51
K1. Transfer of new knowledge and technology	154	5,47
N1. Facilitating research cooperation	156	5,44
D4. Carrying-out of prospective studies	156	5,44
K2. Dissemination of new legislation	155	5,36
N3. Attracting external collaborators	155	5,23
N2. Promotion of experience sharing workshops	156	5,18
S1. Provision of competitiveness formulas	154	5,02
I4. Follow-up and evaluation mechanisms	155	5,00
I2. Publication of OGs guides and reports	153	4,96
S3. Awareness campaigns	155	4,92
C1. Boosting OG projects & goals through new organizations	156	4,51

Own elaboration

5 statements with the greatest level of agreement, refer to OGs functions which could be performed with the unique intervention of their internal actors. This may imply a greater ease for OGs, boosting these roles in their more immediate network in comparison with the rest of functions, most of which require third-party interventions.

Demand articulation is the best assessed out of the six functions. Of its three statements, 3 are placed in the most valued, all of them are part of the dialogue and construction of a joint vision among actors. This coincides with synergistic character of AIS which places value on the participation of multiple voices to obtain a bigger picture of innovation processes.

In contrast, statement regarding capacity building “OG promote new organizations (associations, enterprises, foundations, etc.) as a way to boost projects and goals inside the groups” received the lowest score. Short time of OGs program could be the

reason for the OGs not to try establishing new organizational models or business, which is more characteristic at advanced stages along the innovation process.

In addition to this, these and other actions from the questionnaire require in many occasions of human and economic resources which may not be available for all operational groups. This contrasts with the limited resources allocated on AIS policies like OGs program. Some examples of other actions which could imply a high cost for OGs and receive comparatively low scores are the provision of formulas to improve actors competitiveness, the establishment of follow-up and evaluation mechanisms and the publication of guides and reports towards the unification of processes within OG.

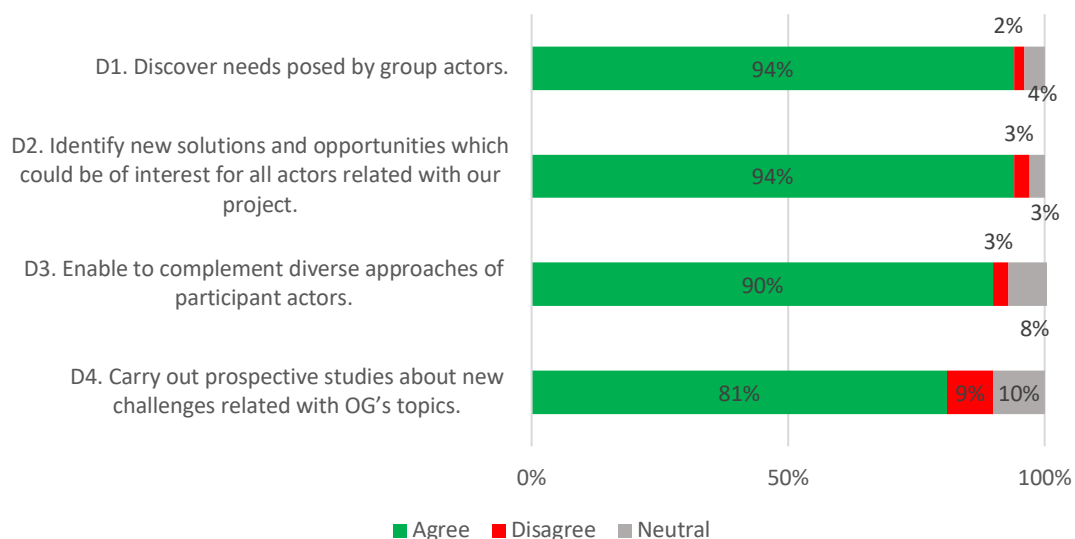
These last two statements, in addition to being present at literature, are found in the policy recommendations given by international agencies to strengthen AIS.

After comparative view of the averages of OGs functions, these are broken down into sections where results are seen in depth by previously established clusters.

5.2.1 Demand articulation

A great majority of respondents agreed with statements related to how their OGs articulate demand around stakeholders. This function received the highest average out of the six of the study.

Figure 11. *Statements on demand articulation function.*



Own elaboration.

Observing results by clusters, members at OGs with more than 7 private partners, assessed their groups above average at this function. They gave best scores to their OGs when “identifying solutions and opportunities for all project actors” and “carrying out prospective studies about new challenges”.

Average score given by respondents at big groups (with more than 10 members) had highest differences at “complementation of actors perspectives” but lowest differences at “identification of possible solutions and opportunities”. It could be that a high number of actors facilitates the inclusion of different voices at a OG debate but hampers the recognition of common solutions.

Complementation of actors perspectives is also rated above average by members belonging exclusively to supra-autonomic groups or to groups with more than two autonomous communities participating. In this case, regional diversity may enhance the embracement of a great variety of views.

It should also be stressed the fact that those respondents who didn’t have collaborator members at their OGs assessed under average their capacity to identify actor needs as well as new solutions and opportunities of their interest. Contrary to previous Scottish farm case, where external collaborators improved participation of farmers at platform meetings, seems lack of collaborators can hamper some functions where demand should be articulated.

Analyzing results by autonomous communities, those respondents who had counted on the presence of Basque Country on their OGs, gave especially high scores at three statements regarding demand articulation. In contrast, those partners on OGs where Madrid participated registered a particularly low level of agreement at two statements.

Table 5. *Demand articulation (D) – Group differences*

St.	Average	Highest Difference Clusters		Highest Difference Regions	
		Below average	Above average	Below avg.	Above average
D1	5,94	No Collaborators	*	Madrid	Basque Country
D2	6,08	+10 Members No Collaborators	+7 Private Members	Madrid	Asturias Basque Country
D3	5,76	*	+10Members All +2 Communities +1OG All suprautonomic +1OG	*	Valencian Community Andalucía
D4	5,44	All 1 Community +1OG	+7 Private Members	Murcia	Andalucía Basque Country

D1. Identification of actors’ needs. D2. Identification of possible solutions and opportunities. D3. Complementation of actors perspectives. D4. Carrying-out of prospective studies.

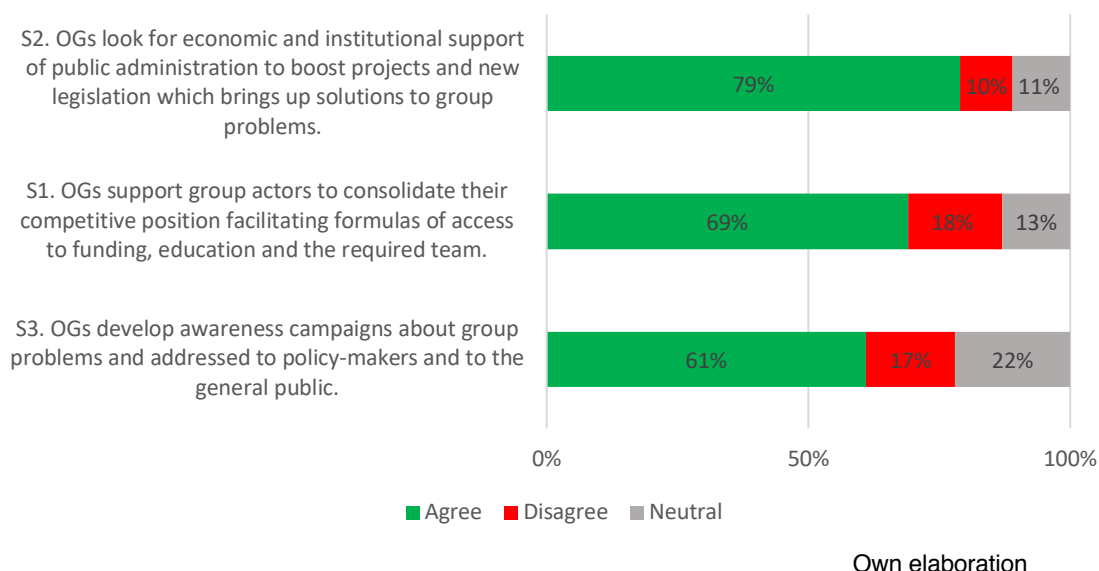
*No important differences under +/-0,2

Own elaboration

5.2.2 Institutional support

Respondents were asked to assess in second place three actions OGs can do to fulfill the institutional support function. Out of the 6 functions this was the second one less rated by participant partners.

Figure 12. *Statements on institutional support function*



By clusters, partners in more than one group, with only one autonomous community, gave low assessments to their groups. From this it can be deduced that scorings are lower as it should be harder for groups where just one region participates to receive institutional support or public attention beyond a regional scope. In the case of OGs program, if actors come from the same autonomous community they only have access to funding provided by the RDP of their community, and not to funding offered by the RDPs of other communities or the national RDP which promote supra-autonomic groups.

By comparison, partners in more than one group, all of them supra-autonomic, observed a greater OGs performance on awareness campaigns directed at “policy-makers”, quite above average and one point above, compared to members on all autonomic groups. This shows clear potential of plurirregional and supraautonomic OGs to mobilize public support and resources for innovation compared to uni-regional groups and at autonomic programs.

Members of OGs with more than 7 private members, gave particularly positive scores, when talking about their groups providing formulas to improve actors’ competitive position. However, they rated them specially low at obtaining economic and institutional support from public administration. This may be due to the weak ties of private actors with innovation public sector, which as mentioned is an area to improve at AIS.

In contrast, partners at large groups (above 10 members) rated above average OGs task on finding public support. Perhaps, contrary effect to groups with private actors, as with a larger number of actors OG networking expands.

By autonomous regions, partners at OGs with La Rioja assessed above average all institutional support tasks (specially two). Members with Extremadura and Andalucía participating at their groups, gave relatively higher scores to their OGs carrying-out awareness campaigns directed at policy makers, and relatively low supporting to consolidate actors' competitive position.

Table 6. *Institutional Support (S) – Group differences*

St.	Average	Highest Difference Clusters		Highest Difference Regions	
		Below average	Above average	Below avg.	Above average
S1	5,02	All 1 Community +1OG	+7 Private Members	Extremadura Andalucía	La Rioja
S2	5,51	+7 Private Members All 1 Community +1OG	+10 Members	Madrid Navarra	La Rioja Castilla-La Mancha
S3	4,92	All autonomic All 1 Community +1OG No Collaborators	All +2 Communities +1OG (+0,87) All supraautonomic +1OG (1 point above autonomic)	Cataluña	Extremadura Andalucía

S1: Provision of competitiveness formulas. S2: Obtaining economic & institutional support from public admin.
S3: Awareness campaigns.

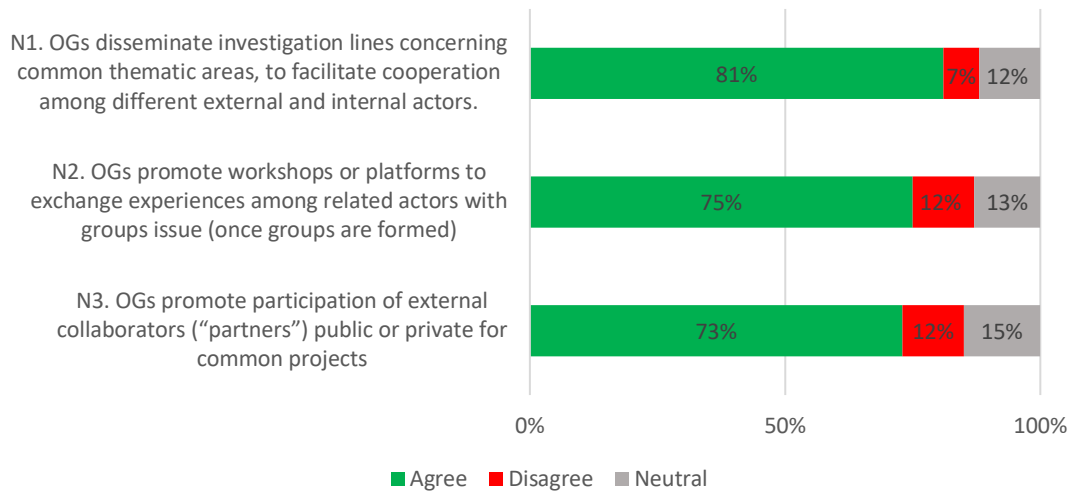
*No important differences under +/-0,2

Own elaboration

5.2.3 Network brokering

“Network brokering” function was assessed by asking respondents their level of agreement with three statements. In general terms, OGs capacity to identify and linking actors was good rated by surveyed partners as it can be observed in

Figure 13. *Statements on network brokering function*



Own elaboration

In some cases, particular clusters showed important differences compared to sample average. Partners who belonged to OGs with more than 7 private partners, assessed below average all network brokering statements. As indicated, private actors have little implication collaborating with research agents like universities and a lack of incentives regarding innovation activity. Thus, it may be not strange that groups with a high number of private actors find more difficulties to broker their innovation network compared to public actors which are more used to it.

Members at more than one group, all of them supra-autonomic or plurirregional (more than 2 regions), gave highest scores compared to average to their OGs task on promoting exchange platforms and attracting external collaborators. Here, regional distribution of the members of these groups could have a positive concerning actions which involve attracting varied people from different provenances and probably backgrounds, etc.

If differences by Spanish regions are observed, members of OGs where La Rioja participates issue positive ratings above or well above average at three statements. Stand out negatively assessments from partners at groups with Asturias incentivizing cooperation at research.

Table 7. *Network Brokering (N) – Group differences*

St.	Average	Highest Difference Clusters		Highest Difference Regions	
		Below average	Above average	Below avg.	Above average
N1	5,44	+7 Private Members	+10 Members	Asturias (-0,72)	La Rioja (+0,61)
N2	5,18	+7 Private Members	All +2 Communities +1OG	Navarra Cataluña	Andalucía Castilla-La Mancha
N3	5,23	+7 Private Members	All supraautonomic +1OG All +2 Communities +1OG All Collaborators +1OG	Madrid	La Rioja (+0,85) Valencian Community (+0,66)

N1: Facilitating research cooperation N2: Promotion of experience sharing workshops. N3: Attracting external collaborators.

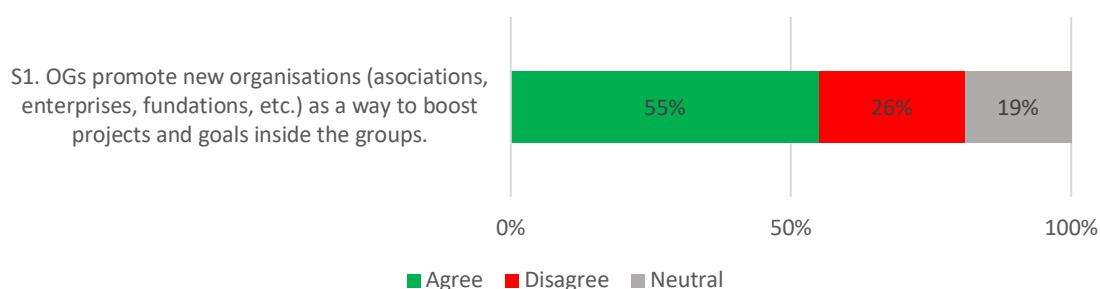
*No important differences under +/-0,2

Own elaboration

5.2.4 Capacity building

Capacity building was the worst assessed function. Only half of the respondents agreed promotion of new organizations happens in their operative groups and 26% of them disagreed (Figure X).

Figure 14. *Statements on capacity building function*



Own elaboration

Partners in groups with supra-autonomic character and in more than one plurirregional group had a higher degree of agreement than sample average. In contrast, surveyed members of large groups (more than 10 members) or a great number of private actors (more than 7) assessed this statement half point below average.

Again first result could be related with the capacity of plurirregional and supra-autonomic OGs to mobilize public support and resources for innovation, thus promoting

new organisations or business opportunities. In contrast, private actors may not have the resources (many of them are little farmers) or the incentives to boost that initiatives.

Concerning autonomous communities, partners belonging to groups were Catalonia participated had the lowest level of agreement on this statement where those with La Rioja participating on their groups rated “capacity building” almost 1 point above average.

Table 8. *Capacity Building (C) – Group differences*

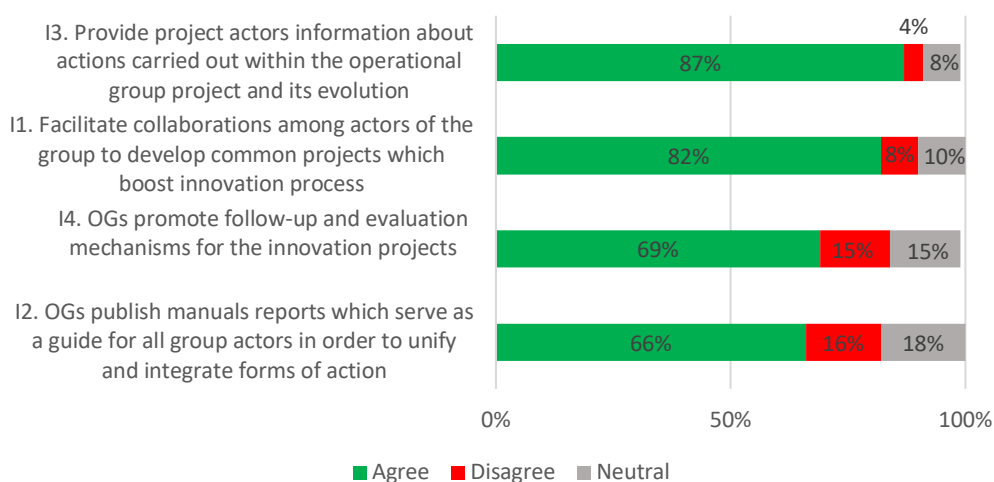
St.	Average	Highest Difference Clusters		Highest Difference Regions	
		Below average	Above average	Below avg.	Above average
C1	4,51	+7 Private Members (-0,51) +10 Members (-0,51)	All supraautonomic All supraautonomic +1OG All +2 Communities +1OG	Cataluña	La Rioja
C1: Boosting OG projects and goals through new organizations.					
*No important differences under +/-0,2					

Own elaboration

5.2.5 Innovation process management

Partners were asked to show their level of agreement with 4 statements which gather those actions that should be done to properly manage innovation processes at OGs. Overall assessment of this function in Spanish OGs is good, although some individual statements had a lower evaluation such as reports publication to unify courses of action whose level of agreement was just 66%.

Figure 15. *Statements on innovation process management function*



Attending to differences between clusters, it should be emphasized good assessment provided by members only in supra-autonomic groups. Again, a distributed and diverse network with access to resources like the one supra-autonomic groups could have, may be an advantage carrying out actions to better manage the innovation process. Someone could think distance may be a handicap but as mentioned before, new ICT a driving change and filling gaps at innovation platforms.

On the other hand, members of groups with many private agents provided the worst assessments for each statement, despite not presenting important differences at updating actors with OG actions and progress. As mentioned at institutional support analysis, this may be related with the lack of experience of private actors in these innovation processes.

Concerning autonomous communities, partners belonging to groups with Castilla y León and Madrid as one of the participants, evaluated below average every statement of “innovation process management” function with some important differences on specific statements. Highest positive differences are registered for those respondents belonging to groups where La Rioja participates, even surpassing the one point difference in one specific action. Likewise, País Vasco presence raises members evaluations on “innovation process management”.

Table 9. *Innovation process management (I) – Group differences*

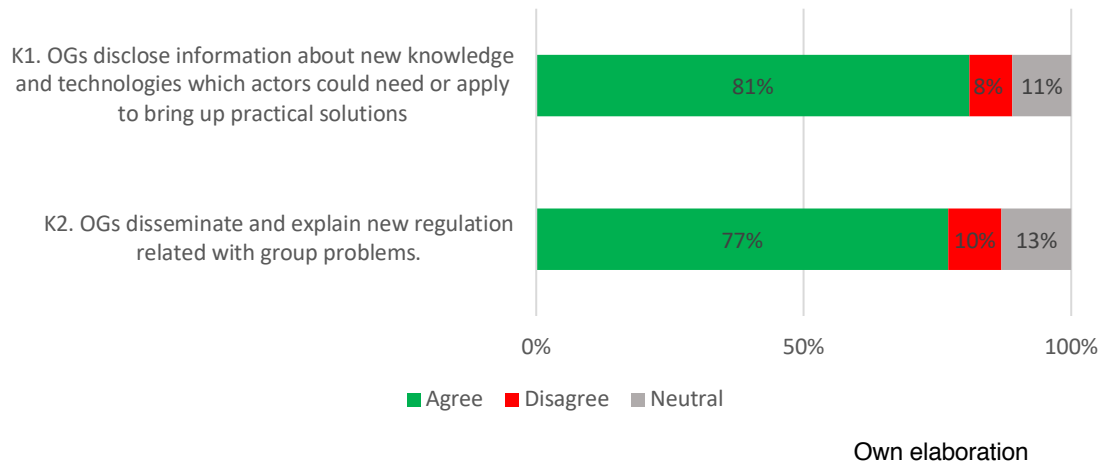
St.	Average	Highest Difference Clusters		Highest Difference Regions	
		Below average	Above average	Below avg.	Above average
I1	5,53	+7 Private Members	All supraautonomic All supraautonomic +1OG	Madrid Castilla y León	La Rioja Basque Country
I2	4,96	+7 Private Members	All Collaborators +1OG All 1 Community +1OG All supraautonomic +1OG	Madrid Navarra Castilla y León	La Rioja (+1,05) Basque Country
I3	5,86	*	*	Asturias Murcia	Valencian Community Cataluña
I4	5,00	+7 Private Members	+10 Members All supraautonomic All supraautonomic +1OG	Navarra Castilla y León	La Rioja (+0,84)
I1: Strengthening collaboration within OG. I2: Publication of OGs guides and reports. I3: Upkeep actors with OG actions and progress. I4. Follow-up and evaluation mechanisms.					
*No important differences under +/-0,2					

Own elaboration

5.2.6 Knowledge brokering

Ultimately, knowledge brokering at OGs was assessed by surveyed partners. Both statements of this category had a quite high level of agreement with 81% and 77% of respondents agreeing to a greater or lesser extent.

Figure 16. *Statements on knowledge brokering function*



Some clusters has shown important differences in “knowledge brokering” statements. Dissemination of new legislation linked with group needs was assessed particularly low by partners on OGs with more than 7 private actors (P+7), for those in groups with just one region involved and by partners whose group(s) had no collaborators.

On the other hand members in various plurirregional groups and various groups only with supraautonomic character, had levels of agreement above average. Positive results could be associated to a better link of these groups with the different regional research networks, thus better access to divulgative material to benefit the innovation process within their groups.

Per regions, respondents from groups where Aragón and La Rioja were participating had a notably higher average than sample average at both statements. Partners of Asturias groups assessed higher also for new regulation dissemination and the ones of Castilla y León and Murcia groups lower for technological updates outreach.

Table 10. Knowledge brokering (K) – Group differences

St.	Average	Highest Difference Clusters		Highest Difference Regions	
		Below average	Above average	Below avg.	Above average
K1	5,47	*	All supraautonomic +1OG All +2 Communities +1OG	Extremadura Andalucía	La Rioja
K2	5,36	+7 Private Members All 1 Community +1OG All No Collaborators	+10 Members All +2 Communities +1OG All supraautonomic +1OG	Madrid Navarra	La Rioja Castilla-La Mancha

K1: Transfer of new knowledge and technology. K2: Dissemination of new legislation.

*No important differences under +/-0,2

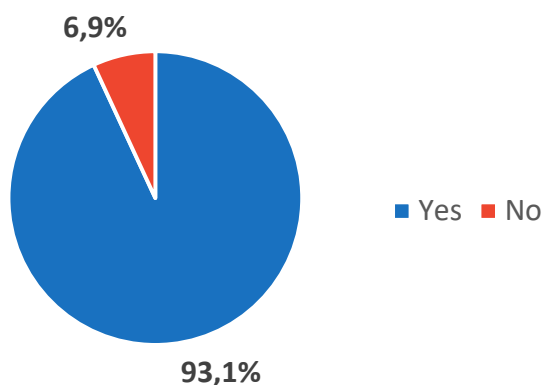
Own elaboration

5.3 EIP-AGRI Perception

The last group of questions concerned asked respondents about their general perception towards their Operational Groups and OGs program in general. Almost all the surveyed partners, showed satisfaction with at least one of their OGs (98,1%) and 9 out of 10 (89,1%) did it with all of them.

Regarding the program, practically 100% of the survey participants think OGs has been a good decision of EIP-AGRI” and at the same time 93,1% “believe its continuity depends on the maintenance of public subsidies”. This result reinforces experts recommendations about essential role of public investment to boost collaborative mechanisms in AIS.

Figure 17. “I believe continuity of OGs depends on the maintenance of public subsidies” – Results.



Own elaboration

5.3 Lessons

After analyzing the results, the most pertinent lessons from the survey are compiled here. It is important to remember that these findings are based on OGs' members subjective opinion and in any case are not conclusive.

- Spanish OGs are fulfilling innovation brokers' functions established by the literature according to surveyed partners evaluation.
- OGs may better fulfill those "internal" functions which only require the participation of their members such as the identification of actors needs and updating actors with OG actions and progress. This could also be the reason why "demand articulation" is the best assessed function out of the six of the study, as many of its statements are "internal".
- On the other hand, OGs may worse accomplish those roles which require human and economic resources which in many cases are not available for them such as the provision of formulas to improve actors competitiveness and the establishment of follow-up and evaluation mechanisms.
- The worst evaluated function is capacity building. Probably because this function is more characteristic of advanced phases of innovation process and many of the operational groups have still a short life.
- Monitoring mechanisms and guides/reports publication were functions in the group of lowest scores, coinciding with literature and policy recommendations that state they should be enhanced to strengthen innovation platforms and AIS in general.
- Bigger groups may be good for complementing actors perspectives due to its likely diversity but seem worse when identifying possible solutions and opportunities to OGs needs.
- Supra-autonomic and pluriregional groups could have better conditions to fulfill most of the functions of innovation intermediaries. Regional diversity focus could allow them to better complement different actors' views. Their wider national network may benefit them when it comes to mobilize public support and resources, and manage innovation processes. Having the power to convene people from all the provenances and backgrounds could also ease their work on linking key actor to enable innovation. Finally, being well-connected to various regional research networks give them advantages when transferring to their OG new knowledge and technology
- OGs composed by a high number of private actors could have more difficulties than average groups to fulfill some functions of innovation intermediaries. Their weak ties with the innovation public sector could hamper their efforts in

obtaining economic and institutional support from public administration. Likewise, their little involvement in the collaboration with research agents like universities could make it more difficult to broker beneficial innovation networks for their OGs and to access meaningful dissemination materials. Finally, the comparatively weak performance of OGs with the presence of private actors at managing innovation processes could be due to a poor performance and experience of the private sector on innovation.

- Respondents who didn't have collaborator members at their OGs assessed under average their capacity to identify actor needs as well as new solutions and opportunities of their interest. It seems that the lack of collaborators can hamper some functions where demand should be articulated.
- OGs where La Rioja and Basque Country take part are the best performers when observing regional clusters. This indicates the good carrying-out of the OGs program by these two communities.

Conclusions

Current agricultural innovation framework is the result of emerging challenges for contemporary agriculture and the introduction of innovation systems theory in agricultural innovation debate.

On the one hand, the increasing demand on agricultural production, pressure on natural resources and social challenges, like poverty eradication or food security, require a transition, to a more productive, sustainable and inclusive agricultural model. On this front, innovation appears to play an essential role.

Rethinking the agricultural model must be accompanied by a change in agricultural innovation concept. This has evolved from a lineal perspective of innovation where it was exclusively generated and transferred by research centers to the interactive view of agricultural innovation systems (AIS) where innovation is produced by mobilizing knowledge from different actors of the system.

Apart from being interactive and synergistic, this new agricultural innovation model is demand-oriented and aims to find applicable solutions to user's needs; is collaborative and tries to avoid winner-loser scenarios and ensure innovation benefits arrive to everyone; is open thus has no real boundaries, no limits to find a solution elsewhere and everything is interdependent; and co-evolves, regulates itself from its learning reviews, through changes in its structures and flows. From AIS perspective, innovation processes are not only a technological but a social and institutional change if maximum potential of innovation wants to be reached.

Innovation agents in AIS are mainly research and education actors, bridging institutions (stakeholder platforms and agricultural extension services) and all actors all the agri-food chain (farmers, agribusiness, consumers...). Fourth element would be the institutional set-up or "enabling environment" with its laws, policies, beliefs, etc., and the fifth element other systems or macro-level factors which will complete the innovation ecosystem.

Agricultural innovation policies have a limited budget and are misaligned with established goals to fully boost innovation towards a more efficient and sustainable agricultural model. Main recommendations from international agencies and researchers to strengthen AIS are the enhancement of its governance by establishing long-term, co-created and monitored goals, transforming institutional designs to better coordinate actors and attend user's demands and benefit from cross-sectorial collaborations such as ICT area to stimulate multi-actor innovation; the clarification of public & private roles which also involves promoting public-private collaborations and a more important role of private sector in innovation sector; the facilitation of access to appropriate training and independent advisory services; and the strengthening of international, regional and subregional research "cooperation for innovation". In this last recommendation multi-actor platforms such as operational groups of EIP-AGRI are included.

In this new collaborative scenario, qualitative facilitation roles offered by innovation brokers or networks are presented as crucial to solve innovation-system failures derivate from the complexity of AIS and its actors relationships. Modern facilitation roles imply also the operationalization of all AIS philosophy on a small scale. Innovation brokers are guides in these joint networks and offer a wide variety of functions to ensure an effective innovation process. Facilitators act as a relatively impartial third-party position to build a trusting environment and purposefully catalyze innovation through linking actors and make them interact.

Innovation intermediary functions provided by innovation brokers or facilitators have largely been studied by the literature. One of the most important classifications of their functions is the one explained by Kilelu et. al (2011) which divides their roles on facilitating demand articulation, institutional support, network brokering, capacity building, innovation process management and knowledge brokering.

This facilitation role is currently played by a growing number of multi-actor initiatives behind the idea of innovation as a co-evolutionary process where there is not only one but several sources and intermediaries for innovation. Thus, innovation platforms or networks would represent a joint facilitation which enhances stakeholders connections and other elements in the innovation process.

Innovation platforms go one step further to classical “bridging systems” as make farmers as co-creators of knowledge bringing science close to the farm and compensating resource imbalances that exist on innovation systems. They should be a space free of prejudices and individual concerns and open to any type of opinions and ideas, variety of knowledge, etc. being collaborative learning its most powerful tool.

Operational Groups is a program funded by Rural Development Programs from European Union which boosts the creation of multi-actor platforms which brings together scientists, farmers, advisors, NGOs, firms, etc. to find practical solutions to agricultural challenges or exploit emerging opportunities. It is part of EIP-AGRI, the European alliance which promotes a new efficient, sustainable and social agricultural model with a systemic perspective.

To observe the performing of these OGs in Spain on their role as innovation intermediaries a survey was conducted. For that, a questionnaire was sent to their members so that they evaluated their level of agreement with a series of statements which contained potential functions fulfilled by their OGs.

Findings of the survey suggest that Spanish OGs are fulfilling innovation brokers functions established by the literature according to surveyed partners evaluation. This reinforces legitimacy of multi-actor initiatives under AIS perspective which understands innovation as a co-evolutionary process involving multiple innovation agents.

Spanish OGs are better evaluated on those functions which can be carried-out in a close environment only with its internal members. Most of these functions are included

in “demand articulation” group, the best assessed function out of the six of the study. In contrast, OGs are worse with those roles which require access to human and economic resources like “boosting OG projects and goals through new organizations”, which is also characteristic of more advanced stages of innovation platforms.

Functions such as providing monitoring mechanisms and creating boundary objects (guides, reports...) have room for improvement as registered one of the lowest scores. Apart from academic researchers who coincide these two functions are necessary to improve innovation processes, enhancement of them is included on experts recommendations to strengthen AIS and any of its policies.

Supra-autonomic and pluriregional groups may perform better at most of the functions of innovation intermediaries as positive evaluation of their members reflect. Regional diversity could be factor a success as allows a richer network of actors which eases complementation of perspectives, disseminating activities and finding key actors. And at the same time, enables a better access to public support and resources which help in any task regarding innovation process management. These confirms the positive impact of interregional alliances advised to strengthen AIS background.

By comparison, private actors seem to bring disadvantages to OGs. Their weak ties with the innovation public sector and universities, could negatively influence their OG on their efforts to achieve support from public administration or brokering beneficial innovation networks for their projects and goals. Moreover, lack of experience of private actors at innovation activity could imply a comparatively bad performance of their OGs in managing innovation processes.

In any case, just the involvement of private actors in these collective arrangements and with quite good rates in some functions is a positive new. Encouraging participation of private actors in innovation activities and in partnerships with public sector is fundamental for improving the agricultural model behind AIS perspective, and not only to depend on the innovation carried out by the public sector.

Respondents think continuity of OG program depend on the maintenance of public subsidies, which reinforces experts recommendations about essential role of public investment to boost innovation cooperative mechanisms.

In short, from an innovation process perspective, the proposed study gives us a first approximation about the OGs performance in a European country like Spain. Its positive result together with the exposed theoretical framework, confirms us the important role played by these multi-actor platforms or any other cooperation initiative in the strengthening of European AIS and the overcome of agricultural challenges.

It is thus essential to allocate greater economic and institutional resources at this type of facilitation policies which, unfortunately, currently don't receive enough support. Moreover, value must be placed on the task of innovation brokers in all its forms (individual professionals, stakeholder platforms...).

Concerning OGs program, it would be recommended to enhance the participation of actors at supra-autonomic programs with greater variety of autonomous communities, given the positive results. As well as this, a greater support should be provided to encourage private actors to deliver innovation and participate in these initiatives.

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Annex 1

Encuesta miembros GOs

El objetivo de esta encuesta es obtener una mayor idea del papel de Grupos Operativos (GO) de la "Asociación Europea de la Innovación para la productividad agraria y la sostenibilidad" (EIP-AGRI) como herramientas de innovación dentro del marco de los Programas de Desarrollo Rural (PDR). A continuación se le realizarán una serie de preguntas sobre la caracterización y el funcionamiento de los GOs, independientemente del número de GOs al que su organización pertenezca. Toda la información recopilada es totalmente confidencial y se utilizará únicamente con fines académicos, en el marco del subproyecto "Sistemas intensivos en conocimiento y sector agroalimentario. Redes de innovación y transferencia", financiado por el Ministerio de Ciencia, Innovación y Universidades", desarrollado por la Universitat Politècnica de València, en colaboración con la Universidad Pública de Navarra y la Universidad Politécnica de Madrid". Pedimos por favor responda con total sinceridad a la encuesta. Muchas gracias por su colaboración.

Pasa a la pregunta 1.

Información básica

Respecto a sus Grupo Operativos, responda por favor a las siguientes preguntas.

1. ¿A cuántos Grupos Operativos pertenece?

Marca solo un óvalo.

- Uno
 Más de uno

2. ¿Cuál es el número de socios (miembros solicitantes) de su GO?

Marca solo un óvalo por fila.

	1-5 socios	6-10 socios	Más de 10 socios
Grupo Operativo 1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. De estos, ¿cuántos son de carácter privado?

Marca solo un óvalo por fila.

	1-3 socios	4-7 socios	Más de 7 socios
Grupo Operativo 1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. ¿Tiene el GO colaboradores?

Marca solo un óvalo por fila.

	Sí	No
Grupo Operativo 1	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 2	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 3	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 4	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 5	<input type="radio"/>	<input type="radio"/>

5. ¿Tiene su GO carácter autonómico o supraautonómico?

Marca solo un óvalo por fila.

	Autonómico	Supraautonómico
Grupo Operativo 1	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 2	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 3	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 4	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 5	<input type="radio"/>	<input type="radio"/>

6. En ambos casos ¿cuántas CCAA están involucradas?

Marca solo un óvalo por fila.

	Una	Dos	Más de dos
Grupo Operativo 1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grupo Operativo 5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. ¿Cuáles son estas CCAA?

Selecciona todos los que correspondan.

	Andalucía	Aragón	Asturias	Baleares	Canarias	Cantabria	Castilla-La Mancha	Castilla y León	Cataluña	Ceuta	Extremadura	Galicia	La Rioja	Madrid	Mé
Grupo Operativo 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Grupo Operativo 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Grupo Operativo 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Grupo Operativo 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Grupo Operativo 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Pasa a la pregunta 8.

Funcionamiento de los GOs

Como miembro de un GO nos interesa conocer su opinión general sobre el funcionamiento de éstos en España. Respecto a los Grupo Operativos, valore del 1 al 7 según su grado de conformidad con las siguientes afirmaciones. "Los Grupos Operativos..."

8. Realizan estudios de prospectiva sobre los nuevos retos relacionados con la temática del GO.

Marca solo un óvalo.

	1	2	3	4	5	6	7	
Totalmente en desacuerdo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totalmente de acuerdo

9. Descubren aquellas necesidades que los actores de los Grupos plantean.

Marca solo un óvalo.

	1	2	3	4	5	6	7	
Totalmente en desacuerdo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totalmente de acuerdo

10. Identifican nuevas soluciones y oportunidades que sean de interés para todos los actores relacionados con un proyecto.

Marca solo un óvalo.

	1	2	3	4	5	6	7	
Totalmente en desacuerdo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totalmente de acuerdo

11. Ayudan a los actores de los Grupos a consolidar su posición competitiva facilitando fórmulas de acceso a capital, formación y el equipo necesario.

Marca solo un óvalo.

	1	2	3	4	5	6	7	
Totalmente en desacuerdo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totalmente de acuerdo

12. Buscan apoyo tanto económico como institucional en las administraciones públicas para impulsar proyectos y nueva normativa que aporte soluciones a la problemática de los Grupos.

Marca solo un óvalo.

	1	2	3	4	5	6	7	
Totalmente en desacuerdo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totalmente de acuerdo

13. Divulgan y explican la normativa relacionada con la problemática de los Grupos.

Marca solo un óvalo.

	1	2	3	4	5	6	7	
Totalmente en desacuerdo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totalmente de acuerdo

14. Realizan campañas de sensibilización de la problemática de los Grupos Operativos dirigida a "policy-makers" y al público en general.

Marca solo un óvalo.

	1	2	3	4	5	6	7	
Totalmente en desacuerdo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totalmente de acuerdo

15. **Suministran información a todos los actores de los proyectos implicados acerca de las acciones que se llevan a cabo y la evolución de los mismos.**

Marca solo un óvalo.

	1	2	3	4	5	6	7	
Totalmente en desacuerdo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totalmente de acuerdo

16. **Difunden líneas de investigación para facilitar la cooperación entre diferentes actores externos e internos a los proyectos implicados sobre temáticas comunes.**

Marca solo un óvalo.

	1	2	3	4	5	6	7	
Totalmente en desacuerdo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totalmente de acuerdo

17. **Promueven talleres o plataformas de intercambio de experiencias entre los actores relacionados con la problemática de los Grupos.**

Marca solo un óvalo.

	1	2	3	4	5	6	7	
Totalmente en desacuerdo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totalmente de acuerdo

18. **Promueven nuevas organizaciones (asociaciones, empresas, fundaciones, etc.) como una manera de impulsar los proyectos y objetivos de los Grupos.**

Marca solo un óvalo.

	1	2	3	4	5	6	7	
Totalmente en desacuerdo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totalmente de acuerdo

19. **Facilitan colaboraciones entre actores de los propios Grupos Operativos para proyectos comunes que impulsen el proceso de innovación.**

Marca solo un óvalo.

	1	2	3	4	5	6	7	
Totalmente en desacuerdo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totalmente de acuerdo

20. **Promueven la participación de colaboradores externos ("partners") públicos y privados para proyectos comunes.**

Marca solo un óvalo.

	1	2	3	4	5	6	7	
Totalmente en desacuerdo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totalmente de acuerdo

21. **Publican manuales/informes que sirvan de guía para todos los actores con el fin de unificar y/o integrar formas de actuación.**

Marca solo un óvalo.

	1	2	3	4	5	6	7	
Totalmente en desacuerdo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totalmente de acuerdo

22. **Promueven mecanismos de seguimiento y evaluación de los proyectos de innovación.**

Marca solo un óvalo.

	1	2	3	4	5	6	7	
Totalmente en desacuerdo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totalmente de acuerdo

23. **Divulgan información sobre nuevos conocimientos y tecnologías que los actores necesitan o pudieran aplicar para aportar soluciones prácticas.**

Marca solo un óvalo.

	1	2	3	4	5	6	7	
Totalmente en desacuerdo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totalmente de acuerdo

24. Los Grupos Operativos permiten complementar enfoques diversos de los actores participantes.

Marca solo un óvalo.

	1	2	3	4	5	6	7	
Totalmente en desacuerdo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totalmente de acuerdo

25. Estoy satisfecho con al menos uno de los Grupos Operativos en los que participo.

Marca solo un óvalo.

- Sí
 No

26. Estoy satisfecho con todos los Grupos Operativos en los que participo.

Marca solo un óvalo.

- Sí
 No

27. Creo que el programa de Grupos Operativos ha sido una acierto de la Asociación Europea de Innovación para la productividad y sostenibilidad agrícolas.

Marca solo un óvalo.

- Sí
 No

28. Cree que la continuidad de los GOs depende del mantenimiento de subvenciones públicas.

Marca solo un óvalo.

- Sí
 No

Pasa a "¡Gracias por su colaboración!".

¡Gracias por su colaboración!

Una vez finalizado este proyecto de investigación, se le reportará el feedback correspondiente sobre la efectividad de los Grupos Operativos EIP-AGRI.