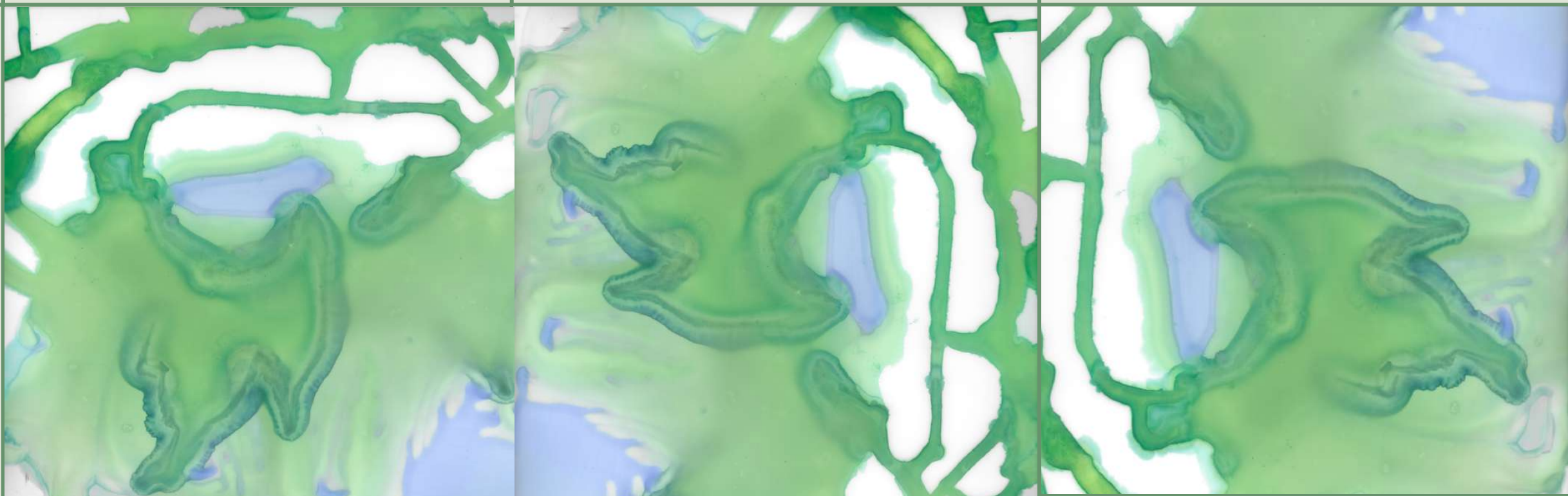


DOCTORAL THESIS: VERONICA PIÑEIRO

INNOVATIVE COLLABORATION IN AGRI-FOOD SYSTEMS



SUPERVISORS:
JOSE MARIA GARCIA-ALVAREZ-COQUE
ELENA MELIÁ-MARTÍ

May 2022



UNIVERSITAT
POLITÈCNICA
DE VALÈNCIA



Department of Economics and Social Sciences
Doctoral Program in Agri-Food Economics

Innovative collaboration in agri-food systems

Doctoral Thesis

Verónica Piñeiro

Supervisors

José María García-Alvarez-Coque

Elena Meliá-Martí

València, May of 2022

Agradecimientos

“Mucha gente pequeña, en lugares pequeños, haciendo cosas pequeñas, puede cambiar al mundo”.

Eduardo Galeano

El tema central de esta tesis es la colaboración. Esta es una tesis colaborativa porque surge de la suma de acciones y trabajo de distintos actores que colaboraron para lograr un objetivo en común. No sé cómo habrá sido el proceso de otros doctorandos, pero el mío, lo puedo resumir en la suma del apoyo, de la confianza, de la generosidad, del esfuerzo y colaboración de muchas personas.

La lista de quienes me acompañaron en esta etapa es muy extensa. Tengo demasiado para agradecer. Este trabajo y la aventura que supuso venir a otro país durante casi dos años es fruto de su sostén y compañía. Les agradezco infinitamente a todos. Sin embargo, hay algunas personas que quiero destacar. Quiero darles especial agradecimiento a mis directores José María y Elena, gracias por su dedicación, su estímulo constante, y la confianza que depositaron en mí.

Gracias a todos los que forman parte de Go_Innoland, por ser tan generosos, por abrirme todas las puertas y brindarme toda la información necesaria. Gracias a Joan Ramón y toda la comunidad de IVIFA. Gracias al Proyecto “Strengthening innovation policy in the agri-food sector” (RTI2018-093791-B-C22) financed by MCIN/AEI/10.13039/501100011033/ and “ERDF A way to build Europe” y todos sus participantes. A Edu, Chelo, Gloria, Amparo, Victor, Norat, Paco, y Nuria que me hicieron sentir bienvenida y parte de la comunidad de la UPV, que me brindaron lugar, me

compartieron su conocimiento, me ayudaron incondicionalmente siempre. A Francesc, por acompañarme, escucharme, por enseñarme y por hacerme reír tanto. A Paula, quién me abrió su corazón desde el primer día, gracias por tanto amor, generosidad, dulzura y amistad.

A todo el Dpto. de Agronomía, especialmente a Roberto Rodríguez y a mis compañeros del área socioeconómica. La colaboración, el apoyo, la confianza y la solidaridad de toda la comunidad del departamento de Agronomía han sido fundamentales para lograr este objetivo. A Patricia Chimeno, por su apoyo y por haber sido nexo para contactarme con toda esta comunidad maravillosa. A Ceci Saldungaray, gracias por acompañarme todos los días, por ser incondicional, por escucharme y apoyarme siempre. A Vivi, te llevo en mi corazón, te extraño y sé que siempre estas a mi lado.

A mis amigas, amigos y familia que extrañé tanto. Gracias porque los sentimos siempre cerca, apoyándonos y enviándonos mucho amor. A nuestra familia valenciana, Marce, Dami, Luli y Dante, gracias por su compañía, su sostén, el amor y la amistad. Gracias por sus brazos siempre abiertos. Gracias por ser nuestro hogar.

Un gracias muy especial es para quien logró cada día sacar lo mejor de mí, me ayudó a ampliar la mirada, me acompañó cada día con una charla o mensaje. Para quien además de referente y tutor se convirtió en amigo y guía. Una de la personas más generosas y comprometidas que conozco. Gracias Chema.

Finalmente, esta tesis está dedicada a las tres personas más importantes de mi vida, a mis compañeros de aventura, a quien rema a mi lado todos los días y a quienes le dan impulso a nuestra vida. Gracias Emma, Sara y Pablo, este logro es por y para ustedes. Sin su amor, su paciencia y su valentía nada de esto hubiese sido posible.

Gracias por ser mi equipo y enseñarme tanto.

Abstract/ Resumen/Resum

Abstract

The overall aim of this thesis is to identify the determinants of or characteristics that can lead to successful collaboration between actors in the agri-food system. To this end, an analysis is conducted of the cooperation activities developed by farms, agribusiness companies, institutions, and agri-food organisations, which undertake innovative actions in Spain and Latin America and the Caribbean (LAC).

The research addresses different domains where innovative collaborations occur; namely, the scientific domain, the multi-actor platform domain, and the domain of farmers and their institutions. The resulting thesis is structured in three chapters, corresponding to three scientific articles published in international journals. Each of them deals with a specific aspect, which together fulfil the aforementioned research objective.

The first article is entitled "Collaboration for social innovation in the agri-food system in Latin America and the Caribbean." Using bibliometric techniques, this study aims to review the state of the knowledge on innovative collaboration in LAC's food and rural systems. Specifically, it analyses the cooperation by farms and agribusiness firms to undertake innovative activities.

The second article is entitled "Collaboration through EIP-AGRI Operational Groups and their role as innovation intermediaries." A survey to operational groups (OG) and a factor analysis are carried out to identify these groups' perspective on their roles as innovation intermediaries. This type of analysis makes it possible to address the collaboration between actors from different fields and sectors aimed at cooperating and providing innovative solutions to agricultural problems.

The third article, "Drivers of joint cropland management strategies in agri-food cooperatives," studies collaboration through an innovative strategy coordinated by cooperatives. The main objective is to advance the knowledge of the characteristics of the cooperatives that head up this type of initiative. The study is mainly based on data from a survey of cooperative managers about their views on the main advantages and drivers of joint land management strategies, and the methodology applied is Fuzzy Set Qualitative Comparative Analysis (fsQCA).

Findings confirm that progress has been made in the study of innovative collaboration in the LAC agri-food sector. The main drivers of collaboration include social innovation, knowledge, sustainable management, and social capital. In the scientific domain, growing academic interest in collaborative systems in LAC can be seen. Studies have been produced by researchers from different countries, which has generated and enhanced collaboration among international researchers.

Results from the second article focus on the collaborative actions developed by multi-actor platforms. These actions can be framed as functions of innovation intermediaries. Three of the most common functions identified are innovation process management, demand articulation, and institutional support and innovation brokering.

Finally, in the domain of farmers and their institutions, the research focuses on the drivers of successful collaboration. Social and economic innovation, size, and propensity for cooperation characterise the cooperatives that successfully take on a joint cropland initiative.

From the results, we can conclude that collaboration for social innovation in the rural sector can be a way to address structural problems in different domains. Knowledge of the main determinants of collaboration in the rural and agri-food environment in Spain and LAC will help public and private organisations to make better decisions aimed at promoting innovative cooperation actions in rural territories. Future research can build on these results and focus on other characteristics that determine successful innovative collaboration in the agri-food sector.

Resumen

El objetivo general de esta Tesis ha sido avanzar en el estudio de los determinantes o características que pueden conducir a una colaboración exitosa entre los actores del sistema agroalimentario. Para ello, se analizaron las actividades de cooperación desarrolladas por explotaciones agrícolas, empresas agroalimentarias, instituciones y organizaciones vinculadas a la agroalimentación, que realizan actividades innovadoras en España y América Latina y el Caribe (ALC).

La investigación aborda diferentes ámbitos en los que se producen colaboraciones innovadoras. Se trata del ámbito científico, del ámbito de las plataformas multiactores y del ámbito de los agricultores y sus instituciones. Se ha estructurado en tres capítulos, correspondientes cada uno a un artículo científico publicado en una revista internacional. Cada uno de ellos aborda un aspecto específico para cumplir el objetivo general que se acaba de señalar.

El primer artículo se titula “Collaboration for social innovation in the agri-food system in Latin America and the Caribbean”. Este estudio tiene por objeto realizar una revisión del estado del conocimiento, utilizando técnicas bibliométricas, de la colaboración innovadora en los sistemas alimentarios y rurales de América Latina y el Caribe (ALC). Concretamente se analizan las actividades de cooperación desarrolladas por explotaciones agrícolas y empresas agroindustriales para emprender actividades innovadoras.

El segundo artículo tiene como título “Collaboration through EIP-AGRI Operational Groups and their role as innovation intermediaries”. A través de una encuesta a los grupos operativos y mediante un análisis factorial fue posible identificar las funciones que estos grupos desarrollan como intermediarios de innovación desde su propia perspectiva.

Este tipo de análisis permite abordar la colaboración entre actores de diferentes ámbitos y sectores para cooperar y aportar soluciones innovadoras a los problemas agrícolas.

El tercer artículo, “Drivers of joint cropland management strategies in agri-food cooperatives”, estudia la colaboración a través de una estrategia innovadora coordinada por las cooperativas. El objetivo principal es avanzar en el conocimiento de las características que presentan las cooperativas que lideran este tipo de iniciativas. El estudio se basa principalmente en los datos de una encuesta a cooperativas, y se ha utilizado una metodología de Análisis Cualitativo Comparativo (fsQCA). El análisis se ha completado encuestando a los directores de las cooperativas acerca de sus opiniones sobre las principales ventajas y los factores que impulsarían las estrategias de gestión conjunta de tierras.

Los resultados confirman el avance en el estudio de la colaboración innovadora en el sector agroalimentario de ALC. Los principales motores de la colaboración en este ámbito son la innovación social, el conocimiento, la gestión sostenible y el capital social. También se observa un creciente interés en el ámbito científico por estudiar los sistemas de colaboración en ALC. Este interés proviene de científicos de diferentes países, lo que ha generado y potenciado la colaboración internacional de los investigadores.

Los resultados del segundo artículo se centran en las acciones de colaboración desarrolladas por plataformas multiactor, como lo son los Grupos Operativos. Las acciones desarrolladas por estos grupos pueden enmarcarse en las funciones de los intermediarios de la innovación. Tres funciones emergieron como las más realizadas: la gestión del proceso de innovación, la articulación de la demanda, y el apoyo institucional y la intermediación de la innovación.

Por último, en el ámbito de los agricultores y sus instituciones, la investigación se centra en los impulsores del éxito de la colaboración. La innovación social y económica, el tamaño y la propensión a la cooperación son condiciones presentes en las cooperativas que tienen éxito al abordar iniciativas de gestión conjunta de cultivos.

A partir de los resultados expuestos, podemos concluir que la colaboración para la innovación social en el sector rural puede ser una forma de abordar problemas estructurales en diferentes ámbitos. El conocimiento de los principales determinantes de la colaboración en el medio rural y agroalimentario en España y ALC permitirá tomar mejores decisiones en las organizaciones públicas y privadas para promover acciones innovadoras de cooperación en los territorios rurales. Futuras investigaciones pueden basarse en estos resultados y avanzar en otras características que determinan el éxito de la colaboración innovadora en el sector agroalimentario.

Resum

L'objectiu general d'aquesta Tesi ha estat avançar en l'estudi dels determinants o característiques que poden conduir a una col·laboració exitosa entre els actors del sistema agroalimentari. Per a això, s'analitzaren les activitats de cooperació desenvolupades per explotacions agrícoles, empreses agroalimentàries, institucions i organitzacions vinculades a la agroalimentació, que realitzen activitats innovadores a Espanya i Amèrica Llatina i el Carib (ALC).

La investigació aborda diferents àmbits en els que es produïxen col·laboracions innovadores. Es tracta de l'àmbit científic, de l'àmbit de les plataformes multiactors i de l'àmbit dels agricultors i les seues institucions. S'ha estructurat en tres capítols, corresponents cadascun a un article científic publicat en una revista internacional. Cadascun d'ells aborda un aspecte específic per a acomplir l'objectiu general que s'acaba d'assenyalar.

El primer article es titula "Collaboration for social innovation in the agri-food system in Latin America and the Caribbean". Aquest estudi té com a objectiu realitzar una revisió de l'estat del coneixement, utilitzant tècniques bibliomètriques, de la col·laboració innovadora en els sistemes alimentaris i rurals d'Amèrica Llatina i el Carib (ALC). Concretament, s'analitzen les activitats de cooperació desenvolupades per explotacions agrícoles i empreses agroindustrials per a emprendre activitats innovadores.

El segon article té com a títol "Collaboration through EIP-AGRI Operational Groups and their role as innovation intermediaries". A través d'una enquesta als grups operatius i mitjançant un anàlisi factorial va ser possible identificar les funcions que aquests grups desenvolupen com a intermediaris d'innovació des de la seua pròpia perspectiva. Aquest

tipus d'anàlisi permet abordar la col·laboració entre actors de diferents àmbits i sectors per a cooperar i aportar solucions innovadores als problemes agrícoles.

El tercer article, "Drivers of joint cropland management strategies in agri-food cooperatives", estudia la col·laboració a través d'una estratègia innovadora coordinada per les cooperatives. L'objectiu principal és avançar en el coneixement de les característiques que presenten les cooperatives que lideren aquest tipus d'iniciatives. L'estudi es basa principalment en les dades d'una enquesta a cooperatives, i s'ha utilitzat una metodologia d'Anàlisi Qualitatiu Comparatiu (fsQCA). L'anàlisi s'ha completat enquestant als directors de les cooperatives sobre les seues opinions sobre els principals avantatges i els factors que impulsarien les estratègies de gestió conjunta de terres.

Els resultats confirmen l'avançament en l'estudi de la col·laboració innovadora en el sector agroalimentari de ALC. Els principals motors de col·laboració en aquest àmbit són la innovació social, el coneixement, la gestió sostenible i el capital social. També s'observa un creixent interès en l'àmbit científic per estudiar els sistemes de col·laboració en ALC. Aquest interès prové de científics de diferents països, el que ha generat i potenciat la col·laboració internacional dels investigadors.

Els resultats del segon article es centren en les accions de col·laboració desenvolupades per plataformes multiactor, com ho són els Grups Operatius. Les accions desenvolupades per aquests grups poden enmarcar-se en les funcions dels intermediaris de la innovació. Tres funcions emergeren com les més realitzades: la gestió del procés d'innovació, l'articulació de la demanda, i el suport institucional i la intermediació de la innovació.

Per últim, en l'àmbit dels agricultors i les seues institucions, la investigació es centra en els impulsors de l'èxit de la col·laboració. La innovació social i econòmica, el tamany i la propensió a la cooperació són condicionants presents en les cooperatives que tenen èxit a l'abordar iniciatives de gestió conjunta de cultius.

A partir dels resultats exposats, podem concloure que la col·laboració per a la innovació social en el sector rural pot ser una forma d'abordar els problemes estructurals en diferents àmbits. El coneixement dels principals determinants de col·laboració en el medi rural i agroalimentari a Espanya i ALC permetrà prendre millors decisions en les organitzacions públiques i privades per a promoure accions innovadores de cooperació en els territoris rurals. Futures investigacions poden basar-se en aquests resultats i avançar en altres característiques que determinen l'èxit de la col·laboració innovadora en el sector agroalimentari.

Index

Index

| | |
|--|----|
| Chapter 1. Introduction | 19 |
| 1.1. Introduction..... | 19 |
| 1.2. Objectives and Propositions..... | 23 |
| 1.3. Structure..... | 26 |
| 1.4. Data and Methods | 27 |
| 1.5. Other related contributions..... | 28 |
| 1.6. References..... | 31 |
| Chapter 2. Collaboration for social innovation in the agri-food system in Latin America and the Caribbean..... | 39 |
| Abstract..... | 40 |
| 2.1 Introduction..... | 40 |
| 2.2 Conceptual framework..... | 41 |

| | |
|--|-----|
| 2.3 Methodology and Data..... | 42 |
| 2.4 Results..... | 45 |
| 2.5 Discussion..... | 54 |
| 2.6 Final remarks..... | 55 |
| 2.7 References..... | 56 |
| | |
| Chapter 3. Collaboration through EIP-AGRI Operational Groups and their role as innovation intermediaries´..... | 65 |
| Abstract..... | 66 |
| 3.1. Introduction..... | 66 |
| 3.2. Conceptual framework..... | 68 |
| 3.3. Data and Methods..... | 73 |
| 3.4. Results..... | 75 |
| 3.5. Discussion..... | 81 |
| 3.6. Conclusions..... | 82 |
| 3.7. References..... | 83 |
| | |
| Chapter 4. Drivers of joint cropland management strategies in agri-food co-operatives..... | 91 |
| Abstract..... | 92 |
| 4.1. Introduction..... | 92 |
| 4.2. Conceptual framework..... | 94 |
| 4.3. Data and Methodology..... | 102 |
| 4.4 Results and Discussion..... | 108 |
| 4.5 Conclusions..... | 112 |
| 4.6 References..... | 120 |
| | |
| Chapter 5. Conclusions..... | 127 |
| 5.1. Results and Discussion..... | 127 |

| | |
|---------------------------------------|-----|
| 5.2. Implications..... | 131 |
| 5.3. Conclusions..... | 132 |
| 5.4. Limitations and Future work..... | 133 |
| 5.5. References..... | 133 |

Chapter 1. Introduction.

Chapter 1

Introduction

“Life did not take over the globe by combat, but by networking.”

Margulis, L., & Sagan, D. (1986). *Microcosmos*

1.1. Introduction

Collaboration

The present thesis underlines the opportunities brought by collaboration for innovation activities. Since collaboration is the core of this work, before setting out the research objectives, let us consider the meaning of this concept.

We can define collaboration as the action and effect of working together to carry out an activity or achieve an objective. The word collaboration derives from the Latin verb *collabōrāre*. The prefix *col-* is a variant of *com-*, meaning “together.” The root of the word is *laborare*, meaning “to work.”

Collaboration is therefore a process by which people come together to do work or an activity, distributing tasks and roles, helping each other, and coordinating efforts to achieve an objective. Cooperation, solidarity, and co-responsibility to accomplish the work undertaken are essential bases for collaboration. Synonyms of collaboration include partnership, contribution, participation, and assistance.

Different circumstances lead to collaboration. These include problems that cannot be addressed by a single person or institution, or the search for new ways to solve problems.

One of the fundamental reasons for social partnerships is to tackle social or macroenvironmental problems. Also, organisations may gain an adaptive advantage through collaboration (Savage et al., 2010).

In this sense, Mariana Mazzucatto's work (Mazzucato, 2021; Mazzucato et al., 2020; Mazzucato, 2016) emphasised that diverse forms of collaboration are needed to achieve grand societal challenges, such as the Sustainable Development Goals (SDGs). Actions that require collaboration to reach a common goal include collective value creation, co-shaping of markets, organisations with dynamic capabilities, partnerships goals, and open systems to co-design the future through participation.

Gray (1985) proposed a domain approach to the study of collaboration. A domain is a level where needs and interests are shared and defined by the interdependence between stakeholders. Collaboration could be the most viable response to coordinate actions to deal with a common problem at the domain level.

Collaboration is initiated through stakeholders' appreciation of the nature and substance of their interdependence (Gray, 1985). At this point, they identify and recognise that the problem is a joint issue. Having acknowledged their interdependence, stakeholders agree on their vision for the future of the domain and their individual objectives become part of a common purpose. From this point on, it is necessary to develop a structure and identify goals and tasks based on organisational arrangements. Soosay et al. (2008), in a multiple case study, found that collaboration can generate better and more efficient processes because it enables companies to develop and improve their continuous innovation capabilities.

What drives collaboration

Several factors lead to effective collaboration. Trust, leadership, and goals/planning have been identified as the primary success factors for collaboration (Bond-Barnard, 2018; Bjerke & Johansson, 2015; McNamara et al., 2020).

Regarding the potential causes of collaboration failure, some authors (Scoconi et al., 2021; Hyll & Pippel, 2016; Wegner & Padula, 2012) identified characteristics relating to network formation and network structure. Notable among the former are the pre-existing social capital and the rivalry of the participants. On the other hand, organisational links and actors' position in the joint work are more related to the network structure.

In the rural sector, cooperation involving innovative activities facilitates small producers' access to local and global value chains, with the associated benefits in terms of income and wellbeing (Cook & Plunkett, 2006; Corsi et al., 2017; Lazzarini, 2017; Mutonyi, 2019; Okonkwo et al., 2019; Tregear & Cooper, 2016). Moreover, collaboration in rural sectors can improve sustainability entrepreneurship (Dhewanto et al. 2020).

According to Soosay et al. (2008), collaboration can appear when the skills and expertise of each partner are leveraged. Said authors claimed that the benefits of cooperation in

the supply chain are related to improving quality, reducing costs, more efficient time delivery and operations, and more effective coordination of activities. They found that working with partners has enabled firms to integrate and link processes for increased effectiveness.

Social Factors

The literature on innovative cooperation in rural areas features some notable interrelated dimensions of analysis. For example, some studies emphasise the relevance of social capital as an explanatory factor for endogenous regional development and, consequently, for the companies that emerge in these areas (King et al., 2019; Tregear & Cooper, 2016; McElroy, 2002), while others confirm the importance of social capital in the process of regional and business innovation (Bakaikoa et al., 2004). According to Steenwerth et al. (2014), social capital is crucial for encouraging farmers to adopt innovations. Social capital based on trust facilitates cooperation and helps to solve collective-action problems (Ostrom & Ahn, 2003). Viewed from that perspective, social capital is a resource that enables groups to work actively in a coordinated way (Wildman, 2005).

The literature distinguishes between different forms of social capital categorised by the type of relationships or connections. These types of social capital are bonding (group of neighbours, family, friends), bridging (network colleagues and associates), and linking (connections to people in a position of authority) (Malecki, 2012; Woolcock, 2004). Bonding social capital is good for sustaining specific reciprocity and mobilising solidarity (Wildman, 2005). By contrast, bridging networks are better for linking with external assets and disseminating information (King et al., 2019).

Jakobsen and Lorentzen (2015) use the term ‘bonding linkages’ to describe innovation collaboration between similar companies that help to strengthen and develop the participants’ established knowledge. Conversely, the term ‘bridging linkages’ refers to innovation collaboration between actors who are quite different from one another and who have largely non-overlapping types of expertise, thereby adding new knowledge and new perspectives.

Some authors address the third form of social capital, named ‘linking’ (Cofré Bravo et al., 2019; King et al., 2019; Ruiu et al., 2017; Titeca et al., 2008). According to Claridge (2018), it can be seen as a form of bridging capital but takes a more vertical perspective. Linking social capital refers to hierarchical links among institutional actors. This kind of social capital could help provide access to resources or power. The collaboration between companies for innovative activities could also be framed within social innovation processes. One of the definitions of social innovation is the collective ability to innovate, learn and adapt (Mc Elroy, 2002). Social innovation could be considered the result of knowledge diffusion and sharing (Phillips et al., 2015) and mobilising agents’ resources through legitimisation activities (Kluvankova et al., 2021). Moreover, as it is a social construct, individuals collectively commit to purposeful actions and monitor their outcomes reflexively (Cajaiba-Santana, 2014). Social innovation is underpinned by substantial

social capital because it is the stakeholders themselves, associated with a particular community, who can best specify and help conceptualise the precise nature of the problem to be addressed collectively (Mulgan, 2006; Spear, 2011). Social innovation is also related to governance in multilevel and collaborative governance models, where people's participation/collaboration forms the basis for decision-making and local governance processes (Alcântara et al., 2016; Spear, 2011).

Networking and innovation

The analysis of cooperation for innovative activities requires a systemic perspective of innovation, wherein cooperation between several actors is considered the key to individual and collective success. The role of intermediaries in networking is to facilitate the connectivity of a heterogeneous group of actors by strengthening ties and reducing structural differences (Klerkx & Leeuwis, 2009). Networking as a form of business cooperation is mainly due to the search for reduced transaction costs, economies of scale, and economies of opportunity (Burress et al., 2010; Cano Lopez, 2002; Papadimitri et al., 2020). Through these networks, companies manage to share resources, reduce risks, and carry out joint projects, while maintaining their competitive advantages (Bakaikoa et al., 2004). However, in general, entrepreneurs' participation in networks leaves something to be desired: although most entrepreneurs agree that cooperation is fundamental for the organisation of their company, the percentage of participation in collaboration networks is low (Benito Hernández, 2009).

The introduction of innovations requires the prior development of learning capabilities and processes (Ernst, 2002; Lema et al., 2018; Nelson & Winter, 1982). In the agricultural sector, innovation efforts vary due to different conditions. Innovative behaviour is facilitated by available land area, access to credit, education, and being part of an organisation in the sector. In contrast, the farmer's age and part-time farming can present obstacles to innovation (García Álvarez-Coque et al., 2014; Läßle et al., 2015). An innovative entrepreneurial orientation positively influences firm performance, especially in small firms in less developed countries (Bjerke & Johansson, 2015; Gellynck et al., 2007).

Finally, we have referred to collaboration mainly as it is used to define a new business model. However, this type of initiative can also be applied to achieve social and environmental goals (Grimm et al., 2013; Mazzucato, 2020; Vilké, 2020). Meeting the goals of sustainable growth in food production and reducing rural poverty requires helping family farmers to develop more productive, profitable, resource-efficient, and environmentally-friendly products (Dogliotti et al., 2014).

We selected the agri-food sector to explore collaboration in innovative activities as an entry point. First of all, this selection was justified by the tradition of cooperation with social objectives observed in the rural and food systems (Bakaikoa et al., 2004; Cook & Plunkett, 2006; Tregear & Cooper, 2016). Secondly, it was chosen because of the character of a public good and externalities related to innovation in agri-food economies

(Läpple et al., 2015; Pound & Conroy, 2017; Spielman, 2005). Thirdly, cooperation has traditionally been a strategy to assist the entry of small and medium farmers into the market. Cooperative actions allow farmers to provide food and ecosystem services and add value to their products (Cofré-Bravo et al., 2019; Corsi et al., 2017; Dhewanto et al., 2020; Tregear & Cooper, 2016; Vilké et al., 2020).

Justification of the study

The primary motivation for conducting this study is to analyse the characteristics of collaboration in the agri-food and rural sectors. Its importance lies in highlighting the experiences of innovative cooperation of farms and agro-industrial enterprises, recognising the roles of innovation intermediaries in collaborative groups, and the conditions that must be in place to achieve an innovative joint initiative.

Little research has been done on collaboration arrangements in the rural sector aimed at undertaking innovative activities. Therefore, the first purpose of this study is to provide an in-depth analysis of the state of the knowledge on collaboration for innovation in food and rural systems and the types of entrepreneurship developed in this area.

Second, although the literature has advanced the understanding of the roles played by innovation intermediaries, studies that detail specific experiences are lacking. To meet the need for a structured empirical analysis of the functions of innovation intermediaries, OGs from the European Innovation Partnership on Agricultural Productivity and Sustainability (EIP-AGRI) were selected as the unit of analysis. This study thus makes a relevant contribution as it represents the first time OGs have been evaluated by directly soliciting data from their members and asking them to identify the functions they perform.

The third purpose is to advance the knowledge on the drivers of collaboration, by studying a specific form of joint activity, such as joint land management. The study thus contributes to the literature by examining the relevance of some drivers of this type of collaborative social innovation. In addition, it proposes a framework for determining which aspects need to be strengthened to achieve a joint management initiative.

The study adds to the existing knowledge about collaborative innovations in the rural sector and offers an understanding of the aspects and functions that need to be strengthened to develop innovative joint actions. In addition, this thesis can contribute to improving decision-making in policies related to the agri-food sector.

1.2. Objectives and Propositions

The overall aim of the work is to identify the determinants of or characteristics that can lead to successful collaboration in the innovation field between actors in the agri-food system. To this end, an analysis is conducted of the cooperation activities developed by farms, agro-industrial companies, institutions, and agri-food organisations, which

undertake innovative activities in Spain and Latin America and the Caribbean (LAC) (Table 1.1).

To achieve this general goal, the following specific objectives are proposed:

- **O1.** Review the state of the art of collaboration for social innovation in food and rural systems.
- **O2.** Explore the main authors, countries and the dynamics of research networks in relation to collaboration for social innovation.
- **O3.** Identify the functions carried out by multi-actor groups as innovation intermediaries.
- **O4.** Determine the characteristics that can lead to a successful collaboration to achieve social innovation.

The propositions, which are directly related to the objectives set, are as follows:

- **P1.** Progress has been made in LAC in the study of innovative collaboration in the agri-food sector.
- **P2.** There is a network of authors and international institutions that have made progress in the study of innovative collaboration in LAC.
- **P3.** The collaborative actions developed by the EIP-AGRI OGs, to promote innovation in the agri-food sector, can be framed as functions of innovation intermediaries.
- **P4.** The collaborating groups share certain characteristics that lead to the implementation of social innovations in agri-food and land use activities.

Table 1.1- Specific objectives and propositions of each article that is part of the thesis.

| Specific objectives | Specific propositions | Article | Main aims |
|---|---|---|--|
| O1- Review the state of the art of collaboration for social innovation in food and rural systems. | P1- Progress has been made in LAC in the study of innovative collaboration in the agri-food sector. | “Collaboration for social innovation in the agri-food system in Latin America and the Caribbean.” | Identify the state of the art of collaboration for social innovation in food and rural systems in Latin America and the Caribbean |
| O2- Explore the main authors, countries and the dynamics of research networks in relation to collaboration for social innovation. | P2. There is a network of authors and international institutions that have made progress in the study of innovative collaboration in LAC. | | Identify the main authors, the countries where these studies are conducted, and the dynamics of research networks in relation to these topics |
| O3- Identify the functions carried out by multi-actor groups as innovation intermediaries. | P3. The collaborative actions developed by the EIP-AGRI Gs, leading to promote innovation in the agri-food sector, can be framed as functions of innovation intermediaries. | “Collaboration through EIP-AGRI Operational Groups and their role as innovation intermediaries’.” | Identify the innovation intermediary functions of Spanish OGs by soliciting members’ opinions. |
| O4- Determine the characteristics that can lead to a successful collaboration to achieve social innovation. | P4. The collaborating groups share certain characteristics that lead to the implementation of social innovations in agri-food and land use activities. | “Drivers of joint cropland management strategies in agri-food cooperatives.” | Identify the economic and social attributes, or combinations thereof, that characterise a cooperative profile capable of undertaking a joint cropland management strategy. |

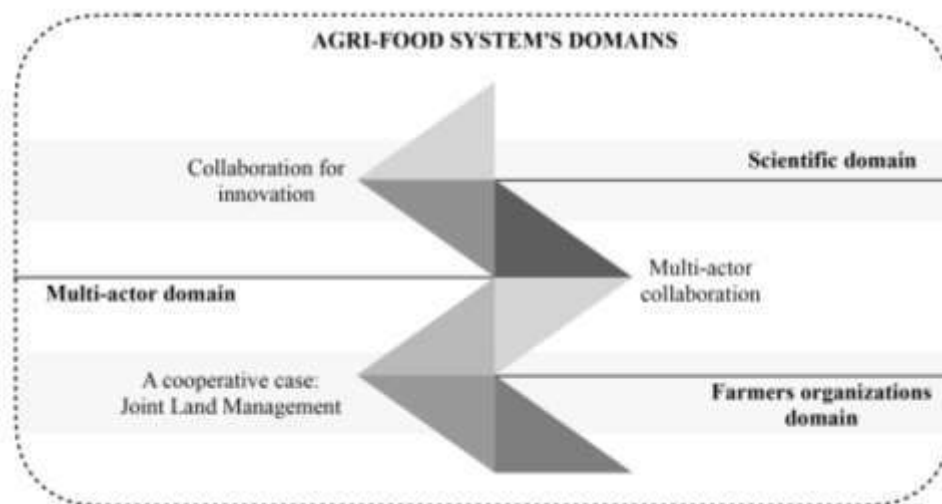
1.3. Structure

This thesis consists of five chapters. The present chapter, Chapter 1, serves as an introduction to the study and describes the structure. The following chapters (2, 3, and 4) present three studies that have been published in international journals, all of which are indexed in the Journal Citations Report. Lastly, Chapter 5 sets out the main conclusions of the thesis.

In each of the studies, the theoretical framework—including the main theoretical contributions and the theoretical model—is presented first, along with the objectives. Then, there is a description of the sample, the instruments used, and the analysis conducted. Finally, the results, discussion, limitations, and future directions are detailed.

For this analysis, following Gray (1985), three different domains were selected to study collaboration in the agri-food sector. Each article corresponds to one domain of study (Figure 1.1): the scientific domain, the multi-actor platform domain, and the domain of farmers and their institutions. It seems logical to start with the general framework of collaboration needed to undertake innovation (first contribution, Chapter 2), before moving on to two forms of collaboration currently taking place in the food system: multi-actor collaboration of innovation networks (second contribution, Chapter 3) and cooperative collaboration among small farm holders to carry out joint land management (third contribution, Chapter 4).

Figure 1.1. Specific Structure of the thesis.



The first article included is “Collaboration for social innovation in the agri-food system in Latin America and the Caribbean.” This article focuses on how collaborative innovation research provides an understanding of the dynamics of complex systems change and governance related to major societal challenges. This chapter has two principal objectives. One is to explore the existing research on collaborative social innovations in rural areas of LAC. This bibliographic analysis illustrates the current state of this topic, highlighting different cases and examples. Through a content analysis, the chapter delves into the main conclusions and future research topics proposed by the authors.

The second objective is to evaluate the collaboration between researchers through a research network analysis. For this purpose, the collaboration between researchers, institutions, and countries is studied. The results reveal that researchers from Latin America and other regions, especially Europe and the English-speaking world, are growing interested in LAC’s collaborative development and social innovation systems.

The second article (Chapter 3) is “Collaboration through EIP-AGRI Operational Groups and their role as innovation intermediaries.” It seeks to advance the understanding of innovation intermediaries’ functions. For this purpose, the analysis focuses on collaborative networks such as the EIP-AGRI OGs. These groups can be seen as an example of collaboration and social innovation in pursuit of innovative solutions to a common problem through the participation of a group of agents. This chapter aims to determine what functions Spanish EIP-AGRI OGs are performing as innovation intermediaries.

The third article (Chapter 4) is “Drivers of joint cropland management strategies in agri-food cooperatives.” This chapter studies collaboration achieved through an innovative strategy coordinated by cooperatives. The main objective is to gain a better understanding of the features characterising the cooperatives that lead this type of initiative. The study is mainly based on data from a survey of cooperative managers about their opinion on the main advantages and drivers of joint cropland management strategies, and the methodology used is fuzzy set Qualitative Comparative Analysis (fsQCA).

1.4. Data and Methods

For the article “Collaboration for social innovation in the agri-food system in Latin America and the Caribbean,” the primary data source was the Web of Science (WoS) Core Collection database. The data set was made by searching for terms related to ‘cooperation,’ ‘networks,’ ‘innovation,’ ‘social,’ ‘rural,’ and ‘LAC,’ and variations thereof. Data collection was carried out in April 2020. The search covered the title, keywords, and abstract fields (the subject area) for all available years in the WoS database at the time of the study.

For the article “Collaboration through EIP-AGRI Operational Groups and their role as innovation intermediaries,” a survey of members of regional and supra-regional Spanish OGs was conducted. The survey was sent by email. Replies were received between

December 2018 and February 2019. Of the 967 surveys sent out, 159 responses were returned, resulting in a response rate of 16.4%.

Finally, in the article “Drivers of joint cropland management strategies in agri-food cooperatives.” the primary source used to collect the data was a survey of managers of agri-food marketing cooperatives. It was sent online and was answered anonymously by cooperative managers during January 2019. A total of 49 responses were obtained, of which 35 were selected because respondents had filled out all the questions necessary for the analysis.

Analytical techniques

In the research carried out for this thesis, different techniques have been used to analyse collaboration most notably the following:

- For analysing the collaboration between researchers, bibliometric techniques were used. The bibliometric study developed included citations, co-citations, co-authorship, and keywords co-occurrence.
- An exploratory factor analysis (EFA) was carried out to define the smallest number of dimensions (variables) capable of explaining the innovation intermediation functions performed by the Spanish OGs.
- Some attributes were analysed using the fsQCA methodology (Ragin, 2008) to identify the conditions that characterise a cooperative profile capable of undertaking a joint cropland management strategy.
- Descriptive statistics were used to describe or summarise the characteristics of the data sets.

1.5. Other related contributions

Through the research carried out for this thesis, other contributions have been made that are not presented in this document. These are working papers; new surveys to cooperatives and GOs focused on collaboration and the achievement of innovation; publication of data bases in open data repositories and specialised journals; presentations in congresses, workshops, seminars, and scientific meetings; dissemination in non-academic media; among others. The preliminary results of the thesis and other research advances presented are detailed below.

Conferences

- Keynote speaker:

Piñeiro, V. (2021) Workshop "Social Innovation and Collective Entrepreneurship" ICEM21. International Conference on Entrepreneurial Motivation global trends on

Entrepreneurship: Social, Digital, Women and Corporate. Valencia, Spain. October 20th and 21st, 2021. <https://www.resocem.com/icem-conference/>

- Full articles and lectures in the following events

Piñeiro, V., Martínez-Gomez, V.; Meliá-Martí, E., & García-Alvarez-Coque, J. M. (2021) Crop land management in rural Spain. A study of social innovations in agricultural cooperatives. XLVI Reunión de Estudios Regionales / International Conference on Regional Science held in Madrid (Spain) on November 24th-26th, 2021. <https://reunionesdeestudiosregionales.org/madrid2021/en/conference-proceedings/>

García-Alvarez-Coque, J. M & Piñeiro, V. (2021) A taxonomy of joint land management in agri-food cooperatives. In online International Conference: Cooperatives as an employment policy instrument in the face of new challenges in the world of work. Organised by CIPERMT research team from Institute of Cooperative Studies at the University of DEUSTO. 4,5,6 and 7th October 2021. Bilbao, Spain. Publication in press.

Piñeiro, V.; Nieto-Alemán, P.; Marín-Corbí, Jaime, & García-Alvarez-Coque, JM. (2021) Funciones de los grupos operativos españoles como intermediarios de la innovación. 1-3 de septiembre 2021. Cartagena: Universidad Politécnica de Cartagena, 2021. Pp. 341-344. ISBN: 978-84-17853-43-3 <https://repositorio.upct.es/handle/10317/10517>

Piñeiro, V., Martínez-Gomez, V.; Meliá-Martí, E., & García-Alvarez-Coque, J. M. (2021) Cooperatives' drivers of joint cropland management. International conference of Agricultural Conference (ICAE) August 17-31. file:///C:/Users/pablo/Downloads/0-0_Paper_18296_handout_524_0%20(1).pdf

Piñeiro, V., Martínez-Gomez, V.; Meliá-Martí, E., & García-Alvarez-Coque, J. M. (2021) Common cropland management as a social innovation in agri-food cooperatives. 37th EGOS Colloquium, hosted by Vrije Universiteit Amsterdam, The Netherlands, from July 8 to 10, 2021. https://www.egos.org/jart/prj3/egos/main.jart?rel=de&reserve-mode=active&content-id=1613647482632&sub-theme_id=1574543970544&show_prog=yes

Piñeiro, V., Martínez-Gomez, V.; Meliá-Martí, E., & García-Alvarez-Coque, J. M. (2020) Rutas para la mejora de estructuras agrarias a partir de las cooperativas. 98-101. V Workshop D'economía Valenciana. València, 16 d'octubre del 2020. <https://fundacionexe.org/publicacions/actes-del-v-workshop-deconomia-valenciana/>

Piñeiro, V., Meliá-Martí, E., & García-Alvarez-Coque, J. M. (2020) Colaboración para la Innovación en el Sistema Agroalimentario y Rural de los Países de América Latina y El Caribe. Una Aproximación Bibliométrica. XVIII Congreso Internacional de Investigadores en Economía Social y Cooperativa. Mataró, 17 y 18 de septiembre de 2020. ISBN: 978-84-121210-1-8. <http://ciriec.es/wp-content/uploads/2020/09/COMUN-104-T11-PINEIRO-MELIA-GARCIA-2-ok.pdf>

Piñeiro, V., Martínez-Gomez, V.; Meliá-Martí, E., & Garcia-Alvarez-Coque, J. M. (2020) Innovación Social Y Emprendimiento Colectivo. Condiciones Para La Gestión Común De Tierras Desde Las Cooperativas. XVIII Congreso Internacional de Investigadores en Economía Social y Cooperativa. Mataró, 17 and 18th september 2020. ISBN: 978-84-121210-1-8. <http://ciriec.es/wp-content/uploads/2020/09/COMUN-103-T6-PINEIRO-MARTINEZ-et-al-ok.pdf>

- Poster presentation

Piñeiro, V., Martínez-Gomez, V.; Meliá-Martí, E., & Garcia-Alvarez-Coque, J. M (2021) Are Cooperatives Ready to Manage Their Members' Cropland? Conditions for Collective Entrepreneurship. XVI EAAE Virtual Congress. July 20-23, Prague, Czech Republic. <http://www.eaae2021.org/>

Grant

Piñeiro, V. (2021). ICAE Grant Application for free IAAE membership and ICAE registration in 2021.

Knowledge diffusion

Piñeiro, V., Garcia-Alvarez-Coque, J. M & Meliá-Martí, E (2021). La gestión en común de tierras: distintos modelos en respuesta a las necesidades del sector agroalimentario. Noticias de la Economía Pública, Social y Cooperativa N°67, septiembre 2021. http://ciriec.es/wp-content/uploads/2021/11/Revista_CIDEC_67.pdf

Letters for GO-Innoland

Piñeiro, V., Martínez-Gomez, V., Meliá-Martí, E., Garcia-Alvarez-Coque, J.M. (2020). ¿Qué condiciones deben darse en las cooperativas para el éxito en la Gestión Común de Tierras? GO_INNOLAND Letters N° 9. Zenodo.

<https://doi.org/10.5281/zenodo.4926486>

Piñeiro, V., & Grupo Operativo GOINNOLAND. (2021). ¿Es "común" la Gestión Común de Tierras? GO_INNOLAND Letters N° 26. Zenodo.

<https://doi.org/10.5281/zenodo.5494508>

Research stays

In Estación Experimental Agropecuaria Hilario Ascasubi - Instituto Nacional de tecnología Agropecuaria (INTA), under supervisión of PhD Miguel Angel Cantamutto. from 01/12/2021 to 04/03/2022

Papers

Scoponi, L. M., Fernandes Pacheco Dias, M., & Piñeiro, V. (2021). Fallas en la consolidación de redes inter organizacionales. Análisis de experiencias en la cadena de carne vacuna Argentina. *Ciencias administrativas*, (17), 23-33. <http://dx.doi.org/https://doi.org/10.24215/23143738e072>

Calafat-Marzal, C., Cervera, F. J., Piñeiro, V., & Nieto-Alemán, P. A. (2022). Survey data on joint cropland management among agri-food cooperatives in Mediterranean Spanish Regions. *Data in Brief*, 107885. <https://doi.org/10.1016/j.dib.2022.107885>

Participation in webinar as speaker

Piñeiro, V. (2021) III Webinar: “Feminist perspectives on the Valencian economy”, focusing on the primary sector and the agri-food economy as axes for transformation. Part of the series of Webinars: Transformative axes and change of economic model. Dialogues from the Feminist Economy. Organised by the Chair of Feminist Economy of the University of Valencia, 10th November 2021. <https://www.uv.es/catedra-economia-feminista/ca/documents/audiovisuals.html>

Piñeiro, V. (2021) GO-Innoland Webinar: Innovación en la gestión de tierras: Herramientas en la toma de decisiones. May 12th 2021. <https://goinnoland.wordpress.com/2021/05/03/webinar-innovacion-en-la-gestion-de-tierras-herramientas-en-la-toma-de-decisiones/>

Piñeiro, V. (2021) Ciclo de seminarios Ellas lideran. Innovación social en tiempos de la Covid. Presentación de un caso. 2nd and 3th december. <https://catedratierraciudadana.blogs.upv.es/gobernanza-alimentaria/>

Courses taken outside the transversal training of the doctoral programme

DaLiCo Summer School 2020 on Open (Governmental) Data. Coordinated by University of Applied Sciences Hamburg (HAW Hamburg), from 28/09/2020 until 01/10/2020. www.dalico.info

1.6. Reference.

Alcantara, L., Mitsuhashi, H., & Hoshino, Y. (2006). Legitimacy in international joint ventures: It is still needed. *Journal of International Management*, 12(4): 389-407. <https://doi.org/10.1016/j.intman.2006.08.002>

Alcantara, C., Broschek, J., & Nelles, J. (2016). Rethinking multilevel governance as an instance of multilevel politics: A conceptual strategy. *Territory, politics, governance*, 4(1): 33-51. <https://doi.org/10.1080/21622671.2015.1047897>

- Bakaikoa, B., Begiristain, A., Errasti, A., & Goikoetxea, G. (2004). Redes e innovación cooperativa. *CIRIEC - España. Revista de Economía Pública, Social y Cooperativa*, 49: 263–294.
- Benito Hernández, S. (2009). Las redes de cooperación de microempresas en España y la utilización de las TIC's. *CIRIEC-España, Revista de Economía Pública, Social y Cooperativa*, 64: 59–84.
- Bjerke, L., & Johansson, S. (2015). Patterns of innovation and collaboration in small and large firms. *The Annals of Regional Science*, 55(1): 221-247. <https://doi.org/10.1007/s00168-015-0712-y>
- Bond-Barnard, T. J., Fletcher, L., & Steyn, H. (2018). Linking trust and collaboration in project teams to project management success. *International Journal of Managing Projects in Business* 11 (2): 432-457 <https://doi.org/10.1108/IJMPB-06-2017-0068>
- Burress, M.J., Cook, M.L., (2010). A Primer on Collective Entrepreneurship: A Preliminary Taxonomy. Columbia. University of Missouri, Department of Agricultural Economics, *Working Paper. AEWP 2009-4*
- Cajaiba-Santana, G., (2014). Social Innovation: moving the field forward. A conceptual framework. *Technological Forecasting and Social Change* 82 (1): 42–51. <https://doi.org/10.1016/j.techfore.2013.05.008>.
- Cano López, A. (2002). Las redes de sociedades laborales: Un modelo de vinculación entre empresas de economía social en el marco de la cooperación empresarial. *CIRIEC - España. Revista de Economía Pública, Social y Cooperativa*, 42: 81–100.
- Claridge, T. (2018). Functions of social capital—bonding, bridging, linking. *Social capital research: 20*, 1-7.
- Cofré-Bravo, G., Klerkx, L., & Engler, A. (2019). Combinations of bonding, bridging, and linking social capital for farm innovation: How farmers configure different support networks. *Journal of Rural Studies*, 69: 53-64. <https://doi.org/10.1016/j.jrurstud.2019.04.004>
- Cook, M.L., Plunkett, B., (2006). Collective Entrepreneurship: An Emerging Phenomenon in Producer-Owned Organisations. *J. Agric. Appl. Econ.* 38: 421–428. <https://doi.org/10.1017/s1074070800022458>
- Corsi, S., Marchisio, L. V., & Orsi, L. (2017). Connecting smallholder farmers to local markets: Drivers of collective action, land tenure and food security in East Chad. *Land Use Policy*, 68: 39–47. <https://doi.org/10.1016/j.landusepol.2017.07.025>
- Dhewanto, W.; Ratnaningtyas, S.; Permatasari, A.; Anggadwita, G.; Prasetyo, E. A. (2020). Rural entrepreneurship: towards collaborative participative models for

- economic sustainability, *Entrepreneurship and Sustainability Issues* 8(1): 705-724. [https://doi.org/10.9770/jesi.2020.8.1\(48\)](https://doi.org/10.9770/jesi.2020.8.1(48))
- Dogliotti, S., M. C. García, S. Peluffo, J. P., et al., (2014). Co-Innovation of Family Farm Systems: A Systems Approach to Sustainable Agriculture. *Agricultural Systems* 126: 76–86. <https://doi.org/10.1016/j.agsy.2013.02.009>.
- Ernst, D., (2002). Global Production Networks and the Changing Geography of Innovation Systems. Implications for Developing Countries. *Economics of Innovation and New Technology* 11 (6): 497–523. <https://doi.org/10.1080/10438590214341>.
- García Alvarez-Coque, JM.; Pérez Ledo, P.; Santarremigia Casañ, E. (2014). Perfiles innovadores en la agricultura valenciana. *Cuadernos de Estudios Agroalimentarios (CEA)*. 6:153-169. <http://hdl.handle.net/10251/53592>
- Gellynck, X., Vermeire, B., & Viaene, J. (2007). Innovation in food firms: contribution of regional networks within the international business context. *Entrepreneurship & Regional Development*, 19(3), 209-226. <https://doi.org/10.1080/08985620701218395>
- Gray B. (1985) Conditions Facilitating Interorganizational Collaboration. *Human Relations*. 38 (10): 911-936. <https://doi.org/10.1177/001872678503801001>
- Grimm, N. B., Chapin, F. S., Bierwagen, B., ... & Williamson, C. E. (2013). The impacts of climate change on ecosystem structure and function. *Frontiers in Ecology and the Environment* 11, (9): 474–482. <https://doi.org/10.1890/120282>
- Hyll, W., & Pippel, G. (2016). Types of cooperation partners as determinants of innovation failures. *Technology Analysis & Strategic Management*, 28(4): 462-476. <https://doi.org/10.1080/09537325.2015.1100292>
- Jakobsen, S. E., & Lorentzen, T. (2015). Between bonding and bridging: Regional differences in innovative collaboration in Norway. *Norsk Geografisk Tidsskrift-Norwegian Journal of Geography*, 69(2): 80-89 <https://doi.org/10.1080/00291951.2015.1016550>
- Klerkx, Laurens, and Leeuwis, C. (2009). Establishment and embedding of innovation brokers at different innovation system levels: Insights from the Dutch agricultural sector. *Technological Forecasting and Social Change*, 76(6): 849–860. <https://doi.org/10.1016/j.techfore.2008.10.001>
- King, B., Fielke, S., Bayne, K., Klerkx, L., & Nettle, R. (2019). Navigating shades of social capital and trust to leverage opportunities for rural innovation. *Journal of Rural Studies*, 68: 123-134. <https://doi.org/10.1016/j.jrurstud.2019.02.003>
- Kluvankova, T., Nijnik, M., Spacek, M., Sarkki, S., Perlik, M., Lukesch, R., ... & Brnkalakova, S. (2021). Social innovation for sustainability transformation and its

- diverging development paths in marginalised rural areas. *Sociologia ruralis*, 61(2): 344-371. <https://doi.org/10.1111/soru.12337>
- Läpple, D.; Renwick, A.; & Thorne, F. (2015). Measuring and Understanding the Drivers of Agricultural Innovation: Evidence from Ireland. *Food Policy* 51 (February): 1–8 <https://doi.org/10.1016/j.foodpol.2014.11.003>.
- Lazzarini, L. (2017). Soft Cooperation and Rural Development in Aso Valley in Italy. *Agriculture & Food*, 5. ISSN 1314-8591
- Lema, R.; Rbellotti, R. & Sampath, P. G., (2018). Innovation Trajectories in Developing Countries: Co-Evolution of Global Value Chains and Innovation Systems. *The European Journal of Development Research* 30 (3): 345–363. <https://doi.org/10.1057/s41287-018-0149-0>.
- Malecki, E. J. (2012). Regional social capital: Why it matters. *Regional Studies*, 46(8): 1023-1039. <https://doi.org/10.1080/00343404.2011.607806>
- Mazzucato, M. (2021). Mission economy: A moonshot guide to changing capitalism. Penguin UK.
- Mazzucato, M., Kattel, R., & Ryan-Collins, J. (2020). Challenge-driven innovation policy: towards a new policy toolkit. *Journal of Industry, Competition and Trade*, 20(2): 421-437.
- Mazzucato, M. (2016). From market fixing to market-creating: a new framework for innovation policy. *Industry and Innovation*, 23(2): 140-156.
- McElroy, M.W. (2002), Social innovation capital. *Journal of Intellectual Capital*, 3 (1): 30-39. <https://doi.org/10.1108/14691930210412827>
- McNamara, M., Miller-Stevens, K., & Morris, J. (2020). Exploring the Determinants of Collaboration Failure. *International Journal of Public Administration*, 43 (1): 49-59 <https://doi.org/10.1080/01900692.2019.1627552>
- Mulgan, G., 2006. The process of social innovation. *Innov. Technol. governance, Glob. I*: 145–162
- Mutonyi, S. (2019). The effect of collective action on smallholder income and asset holdings in Kenya. *World Development Perspectives*, 14, 100099. <https://doi.org/10.1016/j.wdp.2019.02.010>
- Nelson, R. & Winter, S. (1982). Introduction. In an Evolutionary *Theory of Economic Change*, 3–23. <https://doi.org/10.2307/2232409>.
- Okonkwo, P. C., Onyeze, C. N., & Ochiaka, D. I. (2019). Improving Employment Opportunities in The Rural Areas Through Cooperative Business Enterprises in Enugu State. Nigeria. *International Journal of Academic Research in Business and Social Sciences*, 9(8): 237–257. <https://doi.org/10.6007/IJARBSS/v9-i8/6348>

- Ostrom, E., Ahn, TK, (2003). Foundations of Social Capital. Edward Elgar Publishing, 590 p.
- Papadimitri, P., Pasiouras, F., & Tasiou, M. (2020). Do National Differences in Social Capital and Corporate Ethical Behaviour Perceptions Influence the Use of Collateral? Cross-Country Evidence. *Journal of Business Ethics*. 172, 765–784 <https://doi.org/10.1007/s10551-019-04412-4>
- Phillips, W., Lee, H., Ghobadian, A., O’regan, N., & James, P. (2015). Social innovation and social entrepreneurship: A systematic review. *Group & Organization Management*, 40(3), 428-461. <https://doi.org/10.1177/1059601114560063>
- Pound, B., & Conroy, C., (2017). The innovation systems approach to agricultural research and development. *Agricultural systems*. Agroecology and rural innovation for development; Snapp S, Pound B (eds). Academic Press, Elsevier, London: 371-405. <https://doi.org/10.1016/B978-0-12-802070-8.00011-6>
- Ragin, C., (2008). Redesigning Social Inquiry: Fuzzy Sets and Beyond. University of Chicago Press: Chicago and London. 224 p.
- Ruiu, M. L., Seddaiu, G., & Roggero, P. P. (2017). Developing adaptive responses to contextual changes for sustainable agricultural management: The role of social capital in the Arborea district (Sardinia, Italy). *Journal of Rural Studies*, 49: 162-170. <https://doi.org/10.1016/j.jrurstud.2016.11.017>
- Savage, G., Bunn, M., Gray, B., Xiao, Q., Wang, S., Wilson, E., & Williams, E. (2010) Stakeholder Collaboration: Implications for Stakeholder. *Theory and Practice J Bus Ethics* 96: 21–26 <https://doi.org/10.1007/s10551-011-0939-1>
- Scoponi, L. M., Fernandes Pacheco Dias, M., & Piñeiro, V. (2021). Fallas en la consolidación de redes inter organizacionales. Análisis de experiencias en la cadena de carne vacuna Argentina. *Ciencias administrativas*, (17): 23-33. <http://dx.doi.org/https://doi.org/10.24215/23143738e072>
- Soosay, C. A., Hyland, P. W., & Ferrer, M. (2008). Supply chain collaboration: capabilities for continuous innovation. *Supply chain management: An international journal*. 13 (2): 160–169 <https://doi.org/10.1108/13598540810860994>
- Spear, R., 2011. Working Paper Innovation and Collective Entrepreneurship. International forum on the social and solidarity economy. <https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/10625/47357/133708.pdf>
- Spielman, D. J., (2005). Innovation systems perspectives on developing-country agriculture: A critical review. *IS-NAR Discussion paper No. 591-2016-39898*. Int Policy Res Inst, Washington DC.

- Steenwerth, K. L., Hodson, A. K., Bloom, A. J., ... Jackson, L. E. (2014). Climate-smart agriculture global research agenda: Scientific basis for action. *Agriculture and Food Security*, 3 (1). BioMed Central Ltd. <https://doi.org/10.1186/2048-7010-3-11>
- Titeca, K., & Vervisch, T. (2008). The dynamics of social capital and community associations in Uganda: linking capital and its consequences. *World Development*, 36(11), 2205-2222. <https://doi.org/10.1016/j.worlddev.2007.10.021>
- Tregear, A., & Cooper, S. (2016). Embeddedness, social capital and learning in rural areas: The case of producer cooperatives. *Journal of Rural Studies*, 44: 101–110. <https://doi.org/10.1016/j.jrurstud.2016.01.011>
- Vilkė, R., Gedminaitė-Raudonė, Ž., & Vidickienė, D. (2020). Collaboration for the socially responsible development of rural regions: biogas production in Lithuanian farms. *Social Responsibility Journal* 16 (6): 877-898. <https://doi.org/10.1108/SRJ-07-2019-0235>
- Wegner, D. & Padula, A. D. (2012). Quando a cooperação falha: um estudo de caso sobre o fracasso de uma rede interorganizacional. *Revista de Administração Mackenzie*, 13(1): 145-171. <https://doi.org/10.1590/S1678-69712012000100007>
- Widmalm, S. (2005). The utility of bonding social capital. *Journal of Civil Society*, 1(1): 75-95. <https://doi.org/10.1080/17448680500210680>
- Woolcock, M. (2004). Why and how planners should take social capital seriously. *Journal of the American Planning Association*, 70(2): 183-189.

Chapter 2. Collaboration for social innovation in the agri-food system in Latin America and the Caribbean.

Chapter 2

Collaboration for social innovation in the agri-food system in Latin America and the Caribbean

“Science is a collaborative effort.”

John Bardeen

Authors: Verónica Piñeiro, Elena Meliá-Martí, Jose-Maria Garcia-Alvarez-Coque

Published in: Spanish Journal of Agricultural Research, 19(4)

Published online: 15 December 2021

JCR: Q3 – SJR: Q3

DOI: 10.5424/sjar/2021194-18474



Abstract

This study reviews the state of the art of collaboration for social innovation in food and rural systems. The analysis focuses on cooperation by farms and agro-industry companies in Latin America and the Caribbean (LAC). The purpose is to identify the state of the art of this research topic and the main authors, the countries where these studies are conducted, and the dynamics of research networks in relation to these topics. The Web of Science database was used to search for articles containing the terms cooperation, networks, innovation, social, rural, and LAC. Using VOSviewer network creation and analysis software, maps of citations, co-authorship, co-citations and co-occurrence of keywords were created and analysed. Content analysis was then performed. Finally, the research areas that the authors of the analysed articles consider to be of interest for future research were identified. The results reveal that researchers from Latin America and other regions, especially Europe and the English-speaking world, are showing a growing interest in collaborative systems for development and social innovation in LAC. The analysis enables further progress to be made in identifying the main drivers of collaboration in the LAC rural sector. These main drivers include social innovation, knowledge, sustainable management, and social capital.

Keywords: Rural studies, developing countries, collective actions, agri-food.

Abbreviations used: Latin America and the Caribbean (LAC).

2.1 Introduction

Cooperation through innovative actions aids small producers' access to local and global value chains, thus improving their income and well-being (Mutonyi, 2019; Okonkwo et al., 2019; Lazzarini, 2017; Orsi et al., 2017; Tregear & Cooper, 2016; Cook & Plunkett, 2006). These collaborative actions between actors within the food value chain have been examined as part of analysis of the formal and informal relationships within knowledge and innovation systems (Garcia-Alvarez-Coque et al., 2020). Innovation intermediaries (Kilelu et al., 2011) have been cited as the organisations that are officially committed to coordinating and facilitating these innovation processes between parties.

Research on innovation systems in Latin America and the Caribbean (LAC) in recent years has highlighted the crucial role of the private sector in promoting innovation (Devaux et al., 2018; Hartwich et al., 2007). However, there has been little research on the forms of cooperation used by farms and agro-industry companies to engage in innovative activities. The purpose of this study is to offer an in-depth bibliometric analysis of the state of the art of innovation collaboration in food and rural systems in LAC countries and the types of entrepreneurship employed in this area. This study aims to describe not only the development of this research topic in LAC but also the key authors, the countries where this research is conducted, the organisations involved and the dynamics of the research networks in relation to these topics. The paper also provides content analysis based on the keywords of the selected documents.

2.2 Conceptual framework

Social innovation is a social construct in which individuals participate in actions to achieve a certain purpose and carefully monitor the results (Cajaiba-Santana, 2014). Collaboration, learning, and adaptation are central elements in this connective process of innovation (McElroy, 2002). This type of innovation is supported by strong social capital, which is central in explaining the endogenous development of regions and thus the companies that emerge in these areas. Several authors have reported its influence on regional and business innovation processes (Bakaikoa et al., 2004). Steenwerth et al., (2014) emphasised the idea that social capital is crucial to encourage the adoption of innovations by farmers, particularly regarding the evaluation of costs and profits. This idea is reasonable given that it is the actors associated with a particular community who are best positioned to specify and solve specific problems that must be addressed collectively (Mulgan, 2006).

Social capital is also an essential part of collaborative initiatives, as reported by Cook & Plunkett (2006) in their analysis of new forms of producer-owned organisations. These initiatives, which include elements of group innovation, are oriented to the search for opportunities and new markets and can be considered collective business processes.

Cooperation in innovative activities must be analysed systemically, considering cooperation between several types of actors as a key part of individual and collective success. This cooperation between businesses in search of innovation often appears in the form of networks. Through these networks, companies pursue joint projects, share resources, reduce transaction costs, achieve economies of scale and economies of opportunity, and reduce risks. Moreover, they are able to do all of this and more whilst maintaining their competitive advantages (Papadimitri et al., 2020; Burrell & Cook, 2009; Bakaikoa et al., 2004; Cano López, 2002;). Various agents, known as innovation intermediaries, enable access to knowledge, skills, services, and goods from a wide range of organisations (Kilelu et al., 2011). In the creation of networks, intermediaries enhance the connectivity of a varied group of actors by strengthening ties and reducing structural differences (Klerkx & Leeuwis, 2009).

The creation of inter-organisational networks enables the pursuit of strategies that go beyond defining new business models or achieving specific business objectives. In fact, business innovation networks can influence their environment, and the unforeseen effects of their actions and random external events outside the control of actors have the potential to reinforce or counteract their efforts (Klerkx et al., 2010). Thus, collaborative innovation networks offer a way of achieving social and environmental objectives (Grimm et al., 2013) through the search for solutions to meet a local need (Dufays & Huybrechts, 2014), the use of existing resources, the creation of new resources and the establishment of institutional agreements that support these changes (Montgomery et al., 2012). Examples of such networks include the collaboration of family farmers to develop more profitable, resource-efficient and environmentally friendly products, which

contributes to achieving sustainable growth in food production and reducing rural poverty (García-Flores & Palma Martos, 2019; Dogliotti et al., 2014).

The introduction of innovations first requires the development of capabilities and learning processes (Lema et al., 2018; Ernst, 2002; Nelson & Winter, 1982). In fact, innovation efforts in the agricultural sector differ according to their varying conditions. Studies have shown that innovative behaviour is positively influenced by the amount of available land, access to credit, education and membership to an organisation within this sector. In contrast, older farmers and part-time agriculture do not favour innovation (Läpple et al., 2015; García Álvarez-Coque et al., 2014).

2.3 Methodology and data

The study was organised by following the phases displayed in Table 2.1. The first phase of the study was the selection of database and software tools. The main source of data for this study was the Web of Science (WoS) Core Collection database. This database was used because it offers one of the most comprehensive collections of scientific journals in the world. Thus, the relative importance of documents, authors, journals, and references could be objectively quantified. Two main software programs, Microsoft Excel and VOSviewer 1.6.14, were selected for data management. Afterwards, data collection was carried out in April 2020. The search covered the title, keywords, and abstract fields (the subject area) for all available years in the WoS database at the time of the study.

The search string contained terms related to ‘cooperation’, ‘networks’, ‘innovation’, ‘social’, ‘rural’ and ‘LAC’. Combining these terms helped limit the scope of the field of study. However, variations were used to include different terms to refer to cooperation, to cover the private sector and to account for all relevant agents within the food or rural system (Table 2.2). The WoS search engine returned 135 documents that matched the search string up to the year 2020. The categories unrelated to the topic under analysis were excluded. The abstracts of these papers were examined to eliminate those that did not refer to LAC countries or a rural context and those that did not include collaborative innovation. Finally, the search returned 104 documents published up to April 2020.

The data collected were imported into Microsoft Excel to analyze the top publishing journals, cited references, cited authors, organizations, and countries. The VOSviewer software allowed to build bibliometric networks and maps.

Table 2.1. Phases of the study carried out and description.

| Study phases | | Description | |
|--------------|-----------------------------------|--|---|
| I | <i>Study design</i> | Selection of databases with bibliometric data | Web of Science |
| | | Selection of software tools for analysis | VOSviewer and Microsoft Excel |
| | | Selection of query wording and boolean operators | Presented in Table 2.2 |
| | | Selection of timespan | 1900- April 2020 |
| II | <i>Data collection</i> | Dataset selection n=104 | Presented in Table 2.2 |
| III | <i>Data processing</i> | Microsoft Excel | Statistical Analysis Documents sort by top publishing journals, most cited references, most cited authors, organizations, and countries |
| | | VOSviewer | Bibliometric network analysis and visualization Bibliometrics maps of citations, co-authorship, co-citations, and co-occurrence of key-words |
| IV | <i>Data analysis</i> | Descriptive and content analysis Evaluation of bibliometric networks, contents, and proposals for future research | |
| | <i>Discussion and conclusions</i> | | |

We completed the study with: (i) Descriptive and content analysis of the most relevant published articles, (ii) evaluation of the bibliometric networks and (iii) proposals from the authors for future research. The bibliometric analysis developed included citations, co-citations, co-authorship, and key-words co-occurrence. Citation analysis is a way of analysing performance by measuring the number of times an article, author, organization, or country was cited. Citations are used as a rate of importance and relative influence. As an indicator of the collaboration between researchers, institutions, and countries, a co-authorship analysis was made. This assessment provides information on relationships based on joint participation in one or more articles.

Co-citation analysis counts the number of times an author, article, or journal is cited together. This tool is helpful for constructing similarity measures based on the assumption that the more two articles are cited together, the more likely it is that their content is related (Zupic & Cater, 2015). Finally, through a key-word co-occurrence analysis, the articles were grouped into clusters according to their keywords. This allowed us to perform a content analysis of the most cited documents based on their clustering.

Table 2.2. Steps taken in the search for the selected documents.

| Step | Topic | Results |
|------|--|-----------|
| #1 | (SOCIAL) | 1,477,782 |
| #2 | (COLLABORATION OR LINKAGES OR NETWORK* OR COOP* OR ALLIANCE OR ASSOCI* OR PARTNERS OR ORGANIZ* OR COLLECTIVE) | 9,288,649 |
| #3 | (ENTREPRENEUR* OR INNOVAT*) | 557,635 |
| #4 | (RURAL OR AGRI* OR FARM OR 'FOOD SYSTEM*' OR PEASANT OR SMALLHOLDERS) | 810,565 |
| #5 | ('LATIN AMERICA' OR IBEROAMERICA OR 'SOUTH AMERICA' OR 'ANTIGUA AND BARBUDA' OR ARGENTINA OR BAHAMAS OR BARBADOS OR BELIZE OR BOLIVIA OR BRAZIL OR CHILE OR COLOMBIA OR 'COSTA RICA' OR CUBA OR 'DOMINICAN REPUBLIC' OR DOMINICA OR ECUADOR OR 'EL SALVADOR' OR GRENADA OR GUATEMALA OR 'COOPERATIVE REPUBLIC OF GUYANA' OR HAITI OR HONDURAS OR JAMAICA OR MEXICO OR NICARAGUA OR PANAMA OR PARAGUAY OR PERU OR 'SANTA LUCIA' OR 'FEDERATION OF SAINT KITTS AND NEVIS' OR 'SAINT VINCENT AND THE GRENADINES' OR SURINAME OR 'TRINIDAD AND TOBAGO' OR URUGUAY OR VENEZUELA) | 726,694 |
| #6 | (PRODUCERS OR BUSINESS OR FIRM OR ENTITIES OR ENTERPRISE OR ORGANIZATION OR ORGANISATION OR COMPANY OR VENTURE OR JOINT OR PROJECT OR ACTIVITY) | 7,211,744 |
| #7 | #6 AND #4 AND #3 AND #2 AND #1 | 1,718 |
| #8 | #7 AND #5 | 186 |
| #9 | refined by: [excluding] WEB of SCIENCE categories: (NUTRITION DIETETICS OR ENGINEERING CIVIL OR FISHERIES OR HEALTH CARE SCIENCES SERVICES OR HEALTH POLICY SERVICES OR HISTORY OR HOSPITALITY LEISURE SPORT TOURISM OR INDUSTRIAL RELATIONS LABOR OR LANGUAGE LINGUISTICS OR PHARMACOLOGY PHARMACY OR LAW OR TROPICAL MEDICINE OR LINGUISTICS OR WATER RESOURCES OR MARINE FRESHWATER BIOLOGY OR ARCHAEOLOGY OR MEDICINE GENERAL INTERNAL OR ARCHITECTURE OR METEOROLOGY ATMOSPHERIC SCIENCES OR PUBLIC ENVIRONMENTAL OCCUPATIONAL HEALTH OR ONCOLOGY OR REGIONAL URBAN PLANNING OR PARASITOLOGY OR PRIMARY HEALTH CARE OR PSYCHOLOGY MULTIDISCIPLINARY OR REHABILITATION OR ENDOCRINOLOGY METABOLISM OR ENGINEERING INDUSTRIAL OR SOIL SCIENCE OR URBAN STUDIES) AND document type: (ARTICLE OR EARLY ACCESS OR PROCEEDINGS PAPER OR BOOK CHAPTER OR BOOK) AND [excluding] organization-consolidated: (UNIVERSITY OF CALIFORNIA SYSTEM) | 135 |
| #10 | [manually excluded] NOT LATIN AMERICA, NOT RURAL, NOT INNOVATIVE COOPERATIVE ACTIVITIES IN RURAL AREAS IN LATIN AMERICAN COUNTRIES | 104 |

Period = annual; indices = SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC.

2.4 Results

Although collaboration in innovation activities is a topic of current interest, its growth is relatively recent in terms of research on LAC. As indicated earlier, the search returned 104 articles corresponding to the area of ‘innovative cooperation in rural areas of Latin American countries. Although the WoS database contains publications since 1900, the first Latin American study on the topic appearing in the database was not published until 1998. There has been a significant increase in the number of articles published in recent years. There has also been steady growth in citations year on year.

Below, analysis of the metrics and relationships between articles is presented. This analysis sheds light on the degree of development of the topics of interest in the present study.

Impact in terms of citations: Most cited authors, organisations, and countries.

The total number of citations of all selected articles was 740. Table 2.3 presents the 20 most cited articles of those considered in this study. The total number of authors of the analysed articles is 323. Of these authors, 70 have received at least 10 citations of the selected articles. The co-authorship network shows that most of the nodes, which in this case represent the authors, are not connected. However, there are six clusters of authors connected to each other through co-authorship or citations. There are 209 connections or links in the network. These links indicate co-authorship or citation relationships. The analysis of the network implies that the authors collaborate little in this subject area.

Of the 10 most cited organisations where research on innovative cooperation in rural areas of LAC countries has been conducted, only four are in Latin America (two in Chile and two in Brazil).

The network depicted in Figure 2.1 shows the 37 countries where the authors of the articles have their affiliations. There are 75 links between 13 clusters. The size of each node indicates the productivity of each country. There is collaboration amongst researchers in LAC countries and between these researchers and scholars from the rest of the world.

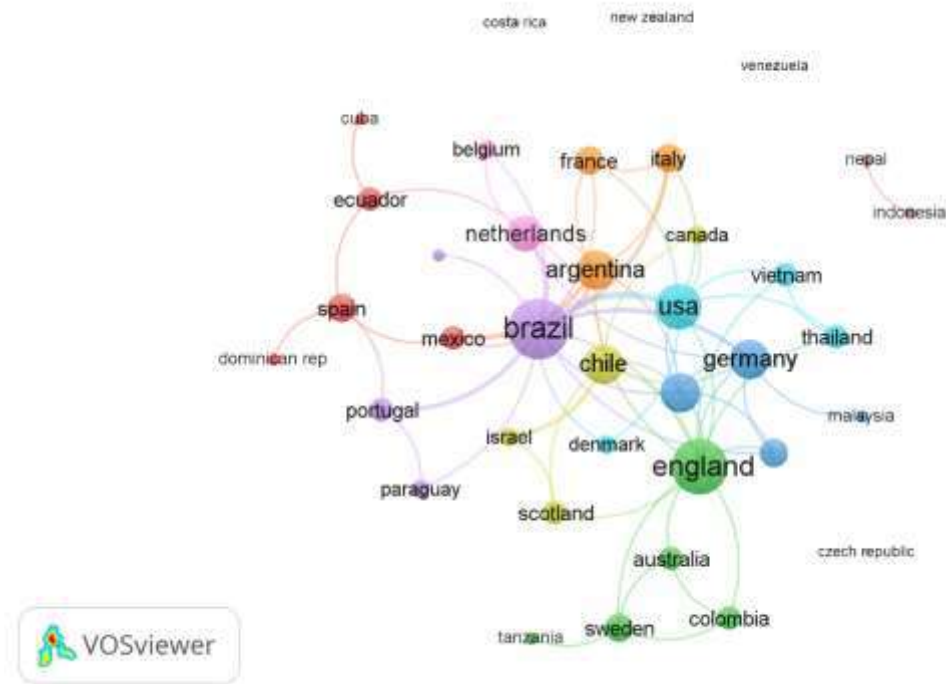
The country with most citations is the United States, with 208 citations and 10 documents. The United States is followed by Chile, with 10 articles and 147 total citations, and then Canada, with 4 articles and 144 citations. The most productive country is Brazil, with 24 articles. However, in terms of citations, it is in fourth place (116 citations). Other productive countries that have received few citations are Mexico (15 documents and 15 citations) and Argentina (12 documents and 14 citations).

Table 2.3. The 20 most cited articles on innovative cooperation in rural areas of Latin American countries

| Title | Author(s) | Journal | Year | Cites |
|---|-------------------------------|---|------|-------|
| Incorporating impoverished communities in sustainable supply chains | Hall <i>et al.</i> , | Int. J. Phys. Distrib. Logist. Manag. | 2010 | 91 |
| Changing Places Through Women's Entrepreneurship | Susan Hanson | Economic Geography | 2009 | 62 |
| The compatibility of agricultural intensification in a global hotspot of smallholder agrobiodiversity (Bolivia) | Karl Zimmerer | Proceedings of the National Academy of Sciences of USA (PNAS) | 2013 | 51 |
| The Marketization of Poverty | Anke Schmittay | Current Anthropology | 2011 | 47 |
| Geographical Co-Location, Social Networks, and Inter-firm Marketing Co-operation: the Case of the Salmon Industry | Felzensztein <i>et al.</i> , | Long Range Planning | 2010 | 47 |
| Diversifying Incomes and Losing Landscape Complexity in Quilombola Shifting Cultivation Communities of the Atlantic Rainforest (Brazil) | Adams <i>et al.</i> , | Human Ecology | 2013 | 42 |
| How does proximity affect interfirm marketing cooperation? A study of an agribusiness cluster | Geldes <i>et al.</i> , | Journal of Business Research | 2015 | 40 |
| Education for credit - Development as citizenship project in Bolivia | S. Lazar | Critique of Anthropology | 2004 | 40 |
| Understanding the role of social capital in adoption decisions: An application to irrigation technology | Huneecke <i>et al.</i> , | Agricultural Systems | 2017 | 20 |
| Proximity as determinant of business cooperation for technological and non-technological innovations: a study of an agribusiness cluster | Geldes <i>et al.</i> , | Journal of Business & Industrial Marketing | 2017 | 19 |
| Social Innovation and Sustainable Rural Development: The Case of a Brazilian Agroecology Network | Rover <i>et al.</i> , | Sustainability | 2017 | 16 |
| Social and commercial profile of the sheep and goat cattle systems in the Northwestern region of the Dominican Republic | Valerio <i>et al.</i> , | Interciencia | 2009 | 16 |
| Transitioning entrepreneurs from informal to formal markets | Sutter <i>et al.</i> , | Journal of Business Venturing | 2017 | 15 |
| Family farmers and biodiesel production: Systems thinking and multi-level decisions in Northern Minas Gerais, Brazil | Florin <i>et al.</i> , | Agricultural Systems | 2013 | 14 |
| Camponeses Brazil's Peasant Movement in Historical Perspective (1946-2004) | Cliff Welch | Latin American Perspectives | 2009 | 14 |
| Knowledge and innovation relationships in the shrimp industry in Thailand and Mexico | Lebel <i>et al.</i> , | PNAS | 2016 | 12 |
| Brazilian Chicken Meat Production Chain: a 10-year Overview | Naas <i>et al.</i> , | Brazilian Journal of Poultry Science | 2015 | 12 |
| Organizational learning through participatory research: CIP and CARE in Peru | Ortiz <i>et al.</i> , | Agriculture And Human Values | 2008 | 12 |
| Sustainability of Rural Development Projects within the Working With People Model: Application to Aymara Women Communities in the Puno Region, Peru | Sastre-Merino <i>et al.</i> , | Cuadernos de Desarrollo Rural | 2013 | 11 |
| The political economy of agriculture for development today: the small versus large scale debate revisited | Jochen Duerr | Agricultural Economics | 2016 | 10 |

Source: Compiled by the authors based on data from Web of Science.

Figure 2.1. Network of countries where the authors of the selected documents are affiliated.



Source: Map in VOSviewer of links by country based on Web of Science data. Nodes = 37 countries; minimum articles per country = 1; minimum citations = 0.

Co-citations: Most cited references

Co-citations indicate which references are cited the most often in the documents considered in this study. The analysed articles cite 5,005 documents, of which 188 appear in at least two articles.

The most cited article is that of Porter (1998), who discusses the competitive advantages embedded in local knowledge, relationships and motivation. The second most cited article is that of Coleman (1988), who describes the concept of social capital. The third most cited article is that of Eisenhardt (1989), who proposes and discusses the case study method. Following this is the study by van Dijk & Sverrisson (2003), who discuss the dynamics of the progress of business clusters in developing countries. This article also has strong linkages. The fifth most cited article is that of Granovetter (1973), who suggests that the analysis of social networks can contribute to the discussion of relationships

between groups. The author emphasises the cohesive power of weak ties in terms of the study of social structures.

Although the most frequently cited article is that of Porter (1998), which contributes to the analysis of clusters, the article with the most links to others (in terms of total links) is the study by Brown & Bell (2001), who also contribute to the study of industrial clusters and the internationalisation of small businesses.

Top publishing journals

The articles analysed were published in 82 sources. The most used sources are detailed in Table 2.4. However, the most used sources are not necessarily the most cited. The three most cited journals are the international Journal of Physical Distribution & Logistics Management, with 91 cites, Proceedings of the National Academy of Sciences of The United States, with 63 cites; and Economic Geography, with 62 cites.

Table 2.4. The top ten journals publishing on innovative cooperation in rural areas of Latin American countries.

| Journal | Documents | Cites |
|--|------------------|--------------|
| Sustainability | 5 | 21 |
| Ciriec-Espana Revista de Economia Publica Social y Cooperativa | 5 | 0 |
| Journal of Cleaner Production | 4 | 22 |
| Proceedings of the National Academy of Sciences of the United States of Agricultural Systems | 2 | 63 |
| Cuadernos de Desarrollo Rural | 2 | 34 |
| Interciencia | 2 | 19 |
| Ecosystem Services | 2 | 18 |
| Entrepreneurship and Regional Development | 2 | 10 |
| Academia-Revista Latinoamericana de Administracion | 2 | 9 |
| | 2 | 8 |

Source: Compiled by the authors based on data from Web of Science.

Key-word co-occurrence

The co-occurrence network is made up of the keywords repeated in at least five articles. There are 613 keywords overall. The following 15 appear in at least five articles: 'innovation', 'management', 'systems', 'networks', 'governance', 'agriculture', 'Brazil', 'impact', 'Mexico', 'social innovation', 'sustainability', 'knowledge', 'conservation', 'development' and 'social capital'.

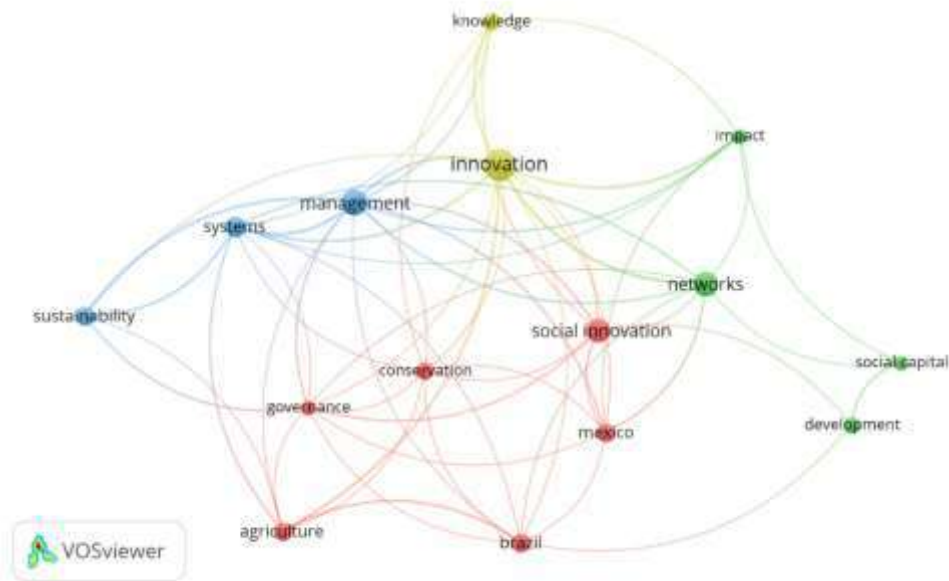
These words can be grouped into four clusters, each shown by a different colour in Figure 2.2. The size of the circles corresponds to the number of articles where the key-word

appears. These four clusters show the groups of words that relate most strongly to each other and enable the identification of possible relationships between articles.

Cluster 1: Innovation and knowledge

The keyword that has the most occurrences and the strongest linkages and that links the most articles to one another is 'innovation'. This keyword forms a cluster with the keyword 'knowledge'. Amongst the most cited articles that include these words is the study by Geldes et al., (2017). They found that the interorganisational cooperation of companies is positively related to cognitive and organisational proximity but negatively related to social and institutional proximity, perhaps due to previous negative experiences amongst members. The results show that cooperative innovation in non-developed countries with low levels of social capital differs from that in developed economies.

Figure 2.2. Network formed by the main key-words in the selected articles.



Source: Map of co-occurrence of keywords in VOSviewer based on Web of Science data. Nodes = 15 keywords; minimum keyword occurrence = 5; links = 59; clusters = 4.

Within this cluster, the article by Lebel et al., (2016) also has a high number of citations. They found that the social networks that producers belong to are crucial for filtering out misinformation and multiplying insights from personal experience in learning by doing. They report that government and industry initiatives to improve the links between knowledge and practice for sustainability have succeeded when the incentives are

aligned with those of producers (i.e. sustainable production and the rational use of resources).

Ortiz et al., (2008) argue that for interactive or mutual learning between organisations to take place, participative learning environments for individuals or groups must be encouraged. Moreover, public relations help create knowledge and collaboration when formalised in the form of inter-institutional mechanisms. They conclude that individuals, groups or organisations innovate when they are exposed to and actively participate in a learning process that involves producing, testing, evaluating and making sense of a certain innovation, especially new methods.

In another article in this cluster, Schröter et al., (2015) use a technical innovation to analyse the intermediaries of this kind of sustainable land management innovation. The innovation intermediary in this case is a group originating from a university. This innovation intermediary influences the acceptance and application of the innovation by providing access to resources and reducing uncertainty in the early stages of the process through the creation of trust and a network. Another key role of this intermediary in the overall innovation process relates to overcoming uncertainty and convincing farmers and institutions that the system can function effectively. The group performs this role not only by distributing knowledge but also by showing a commitment to and interest in social change.

The search for sustainability and the evaluation of both scientific and empirical knowledge can lead to new forms of collaboration. This idea is developed in a study of agro-ecological producers in Brazil (Teixeira et al., 2018). The authors of that study found that farmers who identified themselves most as agro-ecological farmers usually had stronger commitments to the network of farmers' organisations, universities and non-governmental organisations (NGOs). These farms also revealed great potential to provide a wide range of ecosystem services. Another conclusion of the study is that the recognition of farmers' knowledge and know-how is essential for the development of agro-ecology.

In summary, the leading articles in the cluster corresponding to the key-words of 'innovation' and 'knowledge' cite individual and group experiences as drivers of knowledge and innovation. Moreover, they highlight the role of institutions as not only innovation and knowledge intermediaries but also generators of trust and cohesion. The analysed documents point to the knowledge and organisational similarities shared by the key drivers of collaboration in LAC.

Cluster 2: Management, systems, and sustainability

The second cluster links the keywords 'management', 'systems' and 'sustainability'. The word management has the second highest occurrence and total strength of linkages amongst the 15 keywords in the network.

The most cited article in this cluster is the study by Hall & Matos (2010), who describe the incorporation of impoverished communities into sustainable value chains. The authors report that new development opportunities can come from sectors at the base of the pyramid. However, there is a need to develop new business models that are more inclusive, trustworthy and environmentally friendly.

Another article in this group focuses on the conservation of maize agro-diversity in Bolivia versus the rise of other crops. Zimmerer (2013) concludes that various factors have contributed to the preservation of this crop. These factors include agricultural intensification, the management of the available productive resources, social and ecological links, and extensive knowledge systems (combining indigenous and non-indigenous elements).

Along these lines, Florin et al., (2013) analysed the decision making of Brazilian family producers in the production of biomass for biofuels. The authors conclude that to achieve family farmers' engagement and thus move towards a 'sustainable programme that promotes social inclusion and regional development', the following elements are simultaneously required: improvements in technical crop management, reductions in farm-level financial constraints and innovations in the production chain such that family farmers' engagement extends beyond the cultivation of a low-value crop at the expense of current agricultural activity.

Also in relation to the management of agricultural businesses and sustainable production systems, Urquiza & Billi (2020) studied how local systems cope with and adapt to present and future water stress, also analysing whether different types of water management structures influence this situation positively or negatively.

The analysis of the articles in this cluster (management, systems and sustainability) shows that to ensure that the sustainable management of productive resources leads to sustainable development in LAC, these actions must aim to strengthen social capital and develop more affordable crop management systems from a technical and financial point of view.

Cluster 3: Networks, development, impact, and social capital

Cluster 3 consists of the key-words networks (the third most important in terms of mentions and number of links), 'development', 'impact' and 'social capital'.

The most cited article combines these concepts by analysing female entrepreneurship through the economic geography of different countries. The article presents a case in Peru as an example for Latin America (Hanson, 2009). The author highlights the fact that women use entrepreneurship to change their lives and the lives of others. In the process, they change the places where they live. Crucial aspects for this purpose are developing skills, building trust and establishing business networks.

Another widely cited article in this cluster is the study by Schwittay (2011), who analysed the potential of social networks from a gender perspective by focusing on the Costa Rican coffee sector. Using participant observation, the author found that although the initial goals of the company were not met, the intervention in the programme's region led to social and technological changes and the inclusion of female labour. This intervention had a positive social impact that led to a new development path in this highly traditional sector and the inclusion of women entrepreneurs.

The relationship between networks and social capital in local development has been analysed by Geldes et al., (2017), Felzensztein et al., (2010) and Felzensztein & Gimmon (2009). These analyses suggest that informal social networks help explain the relationship between geographical proximity and cooperation between firms, especially for those located in peripheral rural communities in Chile.

Along these lines, Hunecke et al., (2017) examined the impact of social capital on the adoption of irrigation technologies amongst wine producers in central Chile. The authors identified seven components of social capital: general trust, trust in institutions, trust in water communities, norms, formal networks, informal networks and size of networks. They found that trust in institutions, formal networks and informal networks positively influence technology adoption. The authors conclude that, as expected, physical and human capital have a significant positive relationship with technology adoption. The authors also cite networks as the main catalysts for social capital.

Social networks with greater density, size and links are positively related to the adoption of innovations and greater social capital. This conclusion was reached by Zarazúa et al., (2012), who evaluated the indicators of social capital and the innovation dynamics of two groups of producers in the Mexican maize social network. Following this line of network analysis, scholars have studied the collaborative processes that support the development of rural tourism in rural communities in Argentina and Italy. Chiodo et al., (2019) provide a framework for the study of these collaborative processes. These processes start with the integration of local agricultural, environmental and heritage resources through commitment from private and public actors. They are then strengthened by integration and collaboration with extra-local networks. The results of the study reveal the need for the co-evolution of two factors: first, the integration or unification of initiatives (resources and actors), and second, the coordination of these initiatives, many of which are individual and isolated, with agents and institutions at different levels of interconnection.

Enriquez-Sanchez et al., (2017) used social network analysis to assess the pre-existing social capital and thereby examine the activation of a localised agri-food system (LAFS). They analysed the case of cream cheese from Chiapas, concluding that the process of creating value from traditional know-how requires collective action by the cheese makers in the region. This process requires a certain amount of social capital based on trust, solidarity, reciprocity and shared values.

The articles in this cluster (networks, development, impact and social capital) reveal a positive relationship between social capital and social networks and their impact on regional development. Social capital based on trust and networks, which can be developed in rural environments, lays the foundations for collective action.

Cluster 4: Social innovation, agriculture, Brazil, Mexico, conservation, and governance

The leading keyword in this cluster is ‘social innovation’. This keyword is the fourth most important keyword in terms of occurrence and links. The keywords ‘Brazil’ and ‘Mexico’ suggests that these are the LAC countries with the strongest links between these concepts.

The most cited article in this cluster analyses the results of policies on the environment and livelihoods in Quilombola communities (Adams et al., 2013). The authors conclude that future interventions in the region should build on the new, functional links between sustainable livelihoods and biodiversity, where less restrictive state policies leave room for new opportunities in self-organisation and innovation.

Another article with the key-words ‘social innovation’ and ‘Brazil’ discusses the evolution of the Brazilian Ecovida network. Rover et al., (2016) present the main components of the network’s social innovation and collaborative dynamics. The combination of diversification through agro-ecology and social innovation are the key factors that have enabled the growth and development of the network.

Doroteu et al., (2018) studied the disparity between Brazilian state promotion and investment in social technology and the promotion and investment in conventional technologies. They define social technology as products, techniques and methodologies that can be applied and developed through interaction with the community and that offer effective solutions for social transformation. Unlike conventional technologies, these technologies are developed in collaborative environments, promote social and human development through popular knowledge, social organisation, and technical and scientific knowledge, and generate social innovation.

Within the evolutionary theoretical framework of social innovation, Gallego-Bono & Tapia-Baranda (2019) analysed the dynamics of the sugar cane cluster in Veracruz (Mexico). The aim of the study was to show that in LAC clusters, social innovation is a precondition for extracting value from local knowledge. The authors emphasise the idea that transparent and participative governance and values and principles such as those embraced by entities in the social economy are necessary to enable the functioning of mechanisms that promote change and the modernisation of clusters.

Tolentino Martínez & del Valle Rivera (2018) also focused on Mexico, using the theoretical approach of the localised agri-food system (LAFS) and the operational concepts of governance and social innovation to analyse new organisational and socio-productive dynamics in communities. These dynamics cover food diversity, heritage and cultural

conditions in rural areas. The results of this analysis reveal that social innovation and governance contribute to empowering productive groups, providing communities with the opportunity to continue their learning processes to contribute to rural development.

The results of research in this cluster (social innovation, agriculture, Brazil, Mexico, conservation, and governance) reveal the importance of concepts such as social innovation and governance in LAC agri-food systems. The analysis of these articles once again shows that collaboration, linkages, and local knowledge are the pillars of rural development in this region.

2.5 Discussion

Key characteristics of collaboration for social innovation

The previous analysis, based on the assessment of bibliometric networks and contents, suggests the following characteristics of collaborative social innovation in LAC agricultural and rural system:

- Teixeira et al., (2018), Geldes et al., (2017) and Schröter et al., (2015) found that knowledge and organizational similarity are the greatest determinants of cooperative innovation in Latin American countries with low levels of social capital. This finding differs from those for developed economies reported by Cook & Plunkett (2006) and Bakaikoa et al., (2004), who observed that social capital and the search for joint actions form the basis for social innovation and collaborative ventures.
- As reported by Granovetter (1973), some authors have found that the social networks with the greatest impact are not necessarily the closest networks. Weak links between individuals who are further away from each other in a given network can also lead to collaboration and innovation (Hanson, 2009).
- In rural areas, social innovation can help transform the organisation of the food system, creating the right conditions for small farmers to improve their access to the market and receive differentiated treatment from public policies. Examples include the institutionalisation of participatory certification schemes and structural support for the organisation of local and networked markets (Enriquez-Sanchez et al., 2017; Rover et al., 2016).
- Social innovation in LAC occurs through participation, integration, local knowledge, trust, and sustainable production (Gallego-Bono & Tapia-Baranda, 2019; Teixeira et al., 2018; Rover et al., 2016;).
- Some prospects and guidelines for research on innovative collaboration in the region are also indicated:

- In relation to economic geography, Felzensztein & Gimmon (2009), Felzensztein et al., (2010) and Geldes et al., (2017) consider that future research should study how various types of economic activity shape a location in terms of quality of life and opportunities to empower those with the least influence.
- As for smallholder intensification strategies, studies should focus on sustainability and agro-diversity, new forms of self-organisation, regional culture, innovation, linkages and land use planning (Teixeira et al., 2018; Zimmerer, 2013; Adams et al., 2013). This focus would create possibilities to define policies or at least broad knowledge-inclusive and comprehensive strategies.
- Many of the assessed research is exploratory or based on case studies. Therefore, some of the findings cannot be extrapolated to larger populations. To provide more general results, it would be useful to expand samples and conduct research to compare countries and regions (Gallego-Bono & Tapia-Baranda, 2019; Chiodo et al., 2019; Felzensztein et al., 2010). There is still some way for agricultural social science to implement control trials oriented to assess the impact of public policies in rural economies (Banerjee & Duflo, 2012).
- A large number of the authors report that their findings can contribute to creating public policies that promote different types of innovation and the quality of life of a region's inhabitants. Specifically, the emphasis should be on studying the possible networks and stimulus policies aimed at inclusion, trust and participation. Gallego-Bono & Tapia-Baranda (2019) suggest that these policies to promote participatory and inclusive governance should be based on the transparency of institutions. Likewise, Hall & Matos (2010) report that collaborative approaches can be conducive to such policies. However, they must be combined with further research on business dynamics in poor communities.
- In addition to the above lines of research, specific questions arise about the supply chain and horizontal collaboration. There are also question marks over the role of regional organisations in improving cooperation, including various types of institutional or facilitating mechanisms such as social linkages and information technology. A more in-depth analysis of specific regional culture is also required.

2.6 Final remarks

In recent years, interest in learning about innovative collaborative systems in LAC has increased substantially. The results show that the study of collaboration in innovation is a subject of current interest. The development of research in connection with Latin America has been relatively recent, with a substantial increase in the number of published articles and citations in recent years. Certain universities and research centres in the region play a prominent role in this field, although they often collaborate with others

located in the United States, Europe and other advanced countries. The bibliometric analysis leads to the following conclusions:

- The subject of collaborative systems for development and social innovation in LAC has attracted the interest of researchers from other regions, especially Europe and the English-speaking world.
- There is notable collaboration between authors from different countries, especially between those from Latin American countries and those from outside the region.
- The majority of the most cited authors, organisations and countries are not associated with Latin American institutions.
- Collaborating with authors from other countries may offer a way for Latin American researchers to publish in the top journals.
- Chile, Brazil, Mexico and to a lesser extent Argentina are the Latin American countries responsible for the most research on collaborative innovation systems.

Along with studies that exclusively address innovation and collaboration in rural areas of LAC, the articles with the most citations present analysis from various perspectives. Examples include the environment, gender equity, inequality and poverty. The most popular methodological approach is the case study. The latest articles reflect a growing interest in the cases and experiences of social innovations.

Databases are becoming more and more relevant for the analysis of scientific relevance and research collaboration. Our review of these articles reveals the most widely used conceptual frameworks and results on these issues in LAC. Two main limitations emerge. The first is the study's sole focus on WoS database. Being the most widely used database, it cannot be expected to cover all publications and research on innovation systems in the agri-food and rural system in LAC. Despite this limitation, most bibliometric studies use this database as a data source. A second limitation is that the analysis should be completed with the consideration of grey literature which would contribute to assessing the state of research in the policy dimension. Future research could consider the monitoring of results related to societal missions or to the Sustainable Development Goals (Klerkx & Begemann, 2020; Mazucatto, 2018;).

2.7 References

Adams, C., Chamlian Munari, L., Van Vliet, N. et al., (2013). "Diversifying Incomes and Losing Landscape Complexity in Quilombola Shifting Cultivation Communities of the Atlantic Rainforest (Brazil)." *Human Ecology* 41 (1): 119–37. <https://doi.org/10.1007/s10745-012-9529-9>.

- Bakaikoa, B., Begiristain, A., Errasti, A., & Goikoetxea, G., (2004). “Redes e Innovación Cooperativa.” *CIRIEC-España, Revista de Economía Pública, Social y Cooperativa* 49 (agosto): 263-294
- Banerjee, A., & Duflo, E. (2012). *Poor economics: A radical rethinking of the way to fight global poverty*. New York: PublicAffairs.
- Brown, P., & Bell J., 2001. “Industrial Clusters and Small Firm Internationalisation (Best Paper).” *Multinationals in a New Era*, 10–26. Palgrave Macmillan UK. https://doi.org/10.1057/9781403907622_2.
- Burress, M.J., & Cook M.L., (2009). “A Primer on Collective Entrepreneurship: A Preliminary Taxonomy”. Working paper Vol. 4:32 p
- Cajaiba-Santana, G., (2014). “Social Innovation: moving the field forward. A conceptual framework.” *Technological Forecasting and Social Change* 82 (1): 42–51. <https://doi.org/10.1016/j.techfore.2013.05.008>.
- Cano López A. (2002). Las redes de sociedades laborales. Un modelo de vinculación entre empresas de economía social en el marco de la cooperación empresarial. *CIRIEC-España* (42): 81-99.
- Chiodo, E.; Adriani, H.; Navarro, F. & Salvatore, R., (2019). “Collaborative Processes and Collective Impact in Tourist Rural Villages-Insights from a Comparative Analysis between Argentinian and Italian Cases.” *Sustainability (Switzerland)* 11 (2): 432. <https://doi.org/10.3390/su11020432>.
- Coleman, J., (1988). “Sociological Analysis of Economic Institutions: Social Capital in the Creation of Human Capital.” *The American Journal of Sociology* 94: 95–120.
- Cook, M. & Plunkett, B., (2006). “Collective Entrepreneurship: An Emerging Phenomenon in Producer-Owned Organizations.” *Journal of Agricultural and Applied Economics* 38 (2): 421–428. <https://doi.org/10.1017/s1074070800022458>.
- Devaux, A., Torero, M.; Donovan, J. & Horton, D., (2018). “Agricultural Innovation and Inclusive Value-Chain Development: A Review.” *Journal of Agribusiness in Developing and Emerging Economies*. 8 (1): 99-123 <https://doi.org/10.1108/JADEE-06-2017-0065>.
- Dogliotti, S., M. C. García, S. Peluffo, J. P., et al., (2014). “Co-Innovation of Family Farm Systems: A Systems Approach to Sustainable Agriculture.” *Agricultural Systems* 126: 76–86. <https://doi.org/10.1016/j.agsy.2013.02.009>.
- Doroteu, L. R., Carvalho, S. M. S.; & Santos, L., (2018). “Comparative of the development devoted to science, technology and innovation in brazil in 2016, by two agencies, the proportionality between traditional and social technologies.” *Revista Gestão Inovação e Tecnologias* 8 (2): 4403–18. <https://doi.org/10.7198/geintec.v8i2.1222>.

- Dufays, F., & Huybrechts, B., (2014). “Connecting the Dots for Social Value: A Review on Social Networks and Social Entrepreneurship.” *Journal of Social Entrepreneurship* 5 (2): 214–237. <https://doi.org/10.1080/19420676.2014.918052>.
- Düerr J, (2016). The political economy of agriculture for development today: the “small versus large” scale debate revisited. *Agricultural Economics* 47(6): 671-681.
- Egghe, L. & Rousseau, R., (2002). “Co-Citation, Bibliographic Coupling and a Characterization of Lattice Citation Networks.” *Scientometrics* 55 (3): 349–361. <https://doi.org/10.1023/A:1020458612014>.
- Eisenhardt, K. M., (1989). “Building Theories from Case Study Research.” *The Academy of Management Review*. Vol. 14.
- Enriquez-Sanchez, J., Munoz-Rodriguez, M.; Reyes Altamirano-Cardenas, J. & Villegas-De Gante, A., (2017). “Activation Process Analysis of the Localized Agri-Food System Using Social Networks.” *Agricultural Economics* 63 (2017) (No. 3): 121–135. <https://doi.org/10.17221/254/2015-AGRICECON>.
- Ernst, D., (2002). “Global Production Networks and the Changing Geography of Innovation Systems. Implications for Developing Countries.” *Economics of Innovation and New Technology* 11 (6): 497–523. <https://doi.org/10.1080/10438590214341>.
- Felzensztein, Ch., & Gimmon, E., (2009). “Managing Marketing Externalities in Innovative Natural Resources-Based Clusters.” *Innovation: Management, Policy and Practice* 11 (1): 74. <https://doi.org/10.5172/impp.453.11.1.74>.
- Felzensztein, Ch., Gimmon, E. & Carter, S., (2010). “Geographical Co-Location, Social Networks and Inter-Firm Marketing Co-Operation: The Case of the Salmon Industry.” *Long Range Planning* 43 (5–6): 675–90. <https://doi.org/10.1016/j.lrp.2010.02.006>.
- Florin, M., van Ittersum, M.; & van de Ven, G., (2013). “Family Farmers and Biodiesel Production: Systems Thinking and Multi-Level Decisions in Northern Minas Gerais, Brazil.” *Agricultural Systems* 121 (October): 81–95. <https://doi.org/10.1016/j.agsy.2013.07.002>.
- Gallego-Bono, J. R., & Tapia-Baranda, M. R., (2019). “The Values of the Social Economy as Drivers of Change in Clusters with a Strong Fragmentation of Knowledge: The Case of Sugar Cane in Veracruz (Mexico).” *CIRIEC-España Revista de Economía Pública, Social y Cooperativa*, 97: 75–109. <https://doi.org/10.7203/CIRIEC-E.97.14108>.
- Garcia-Alvarez-Coque, JM., Saini, E.; Esteban-Rodrigo, E.; & Mas-Verdu, F., (2020). “Governance of knowledge and innovation in the Ibero-American agri-food system” *Spanish Journal of Agricultural Research* 18 (4): e0112

- García-Flores, V. & Palma Martos, L., (2019). “Innovación social: Factores claves para su desarrollo en los territorios” *CIRIEC-España, Revista de Economía Pública, Social y Cooperativa*, 97: 245-278. <https://doi.org/10.7203/CIRIEC-E.97.14148>
- Geldes C, Felzensztein C, Turkina E, Durand A, (2015). How does proximity affect interfirm marketing cooperation? A study of an agribusiness cluster. *Journal of Business Research* 68(2): 263-272.
- Geldes, C.; Heredia, J.; Felzensztein, Ch.; & Mora, M., (2017). “Proximity as Determinant of Business Cooperation for Technological and Non-Technological Innovations: A Study of an Agribusiness Cluster.” *Journal of Business and Industrial Marketing* 32 (1): 167–78. <https://doi.org/10.1108/JBIM-01-2016-0003>.
- Granovetter, M. S., (1973). “The Strength of Weak Ties.” *American Journal of Sociology* 78 (6): 1360–1380. <https://doi.org/10.1086/225469>.
- Grimm, N.B., Chapin, F.S., III, Bierwagen, B., Gonzalez, P., Groffman, P.M., Luo, Y., Melton, F., Nadelhoffer, K., Pairis, A., Raymond, P.A., Schimel, J. and Williamson, C.E., (2013). “The Impacts of Climate Change on Ecosystem Structure and Function.” *Frontiers in Ecology and the Environment* 11 (9): 474:482 <https://doi.org/10.1890/120282>
- Hall, J., & Matos, S., (2010). “Incorporating Impoverished Communities in Sustainable Supply Chains.” *International Journal of Physical Distribution and Logistics Management* 40 (1–2): 124–47. <https://doi.org/10.1108/09600031011020368>.
- Hanson, Susan, (2009). “Changing Places Through Women’s Entrepreneurship.” *Economic Geography* 85 (3): 245–67. <https://doi.org/10.1111/j.1944-8287.2009.01033.x>.
- Hartwich, F.; Alexaki, A, & Baptista, R., (2007). “Innovation Systems Governance in Bolivia Lessons for Agricultural Innovation Policies.” IFPRI Discussion Paper 00732. 80 p <https://ageconsearch.umn.edu/record/42367/>
- Hunecke, C., Engler, A.; Jara-Rojas, R. & Poortvliet, M., (2017). “Understanding the Role of Social Capital in Adoption Decisions: an Application to Irrigation Technology.” *Agricultural Systems* 153 (May): 221–31. <https://doi.org/10.1016/j.agsy.2017.02.002>.
- Kilelu, C. W, Klerkx, L.; Leeuwis, C.; & Hall, A., (2011). “Beyond Knowledge Brokering: An Exploratory Study on Innovation Intermediaries in an Evolving Smallholder Agricultural System in Kenya.” *Knowledge Management for Development Journal* 7 (1): 84–108. <https://doi.org/10.1080/19474199.2011.593859>.
- Klerkx, L.; Aarts, N.; & Leeuwis, C., (2010). “Adaptive Management in Agricultural Innovation Systems: The Interactions between Innovation Networks and Their Environment.” *Agricultural Systems* 103 (6): 390-400 <https://doi.org/10.1016/j.agsy.2010.03.012>.

- Klerkx, L. & Leeuwis, C., (2009). “Establishment and Embedding of Innovation Brokers at Different Innovation System Levels: Insights from the Dutch Agricultural Sector.” *Technological Forecasting and Social Change* 76 (6): 849–60. <https://doi.org/10.1016/j.techfore.2008.10.001>
- Klerkx, L., & Begemann, S. (2020). “Supporting food systems transformation: The what, why, who, where and how of mission-oriented agricultural innovation systems”. *Agricultural Systems*, 184, 102901. <https://doi.org/10.1016/j.agry.2020.102901>.
- Läpple, D.; Renwick, A.; & Thorne, F. (2015). “Measuring and Understanding the Drivers of Agricultural Innovation: Evidence from Ireland.” *Food Policy* 51 (February): 1–8 <https://doi.org/10.1016/j.foodpol.2014.11.003>.
- Lazar S, (2004). Education for credit: development as citizenship project in Bolivia. *Critique of Anthropology* 24(3): 301-319.
- Lazzarini, L., (2017). “Soft cooperation and rural development in Aso valley in Italy.” *Journal of International Scientific Publications: Agriculture & Food* 5: 238-251
- Lebel, L.; Garden, P.; Luers, A.; Manuel-Navarrete, D.; & Giap, D., (2016). “Knowledge and Innovation Relationships in the Shrimp Industry in Thailand and Mexico.” *Proceedings of the National Academy of Sciences of the United States of America* 113 (17): 4585–90. <https://doi.org/10.1073/pnas.0900555106>.
- Lema, R.; Rabellotti, R. & Sampath, P. G., (2018). “Innovation Trajectories in Developing Countries: Co-Evolution of Global Value Chains and Innovation Systems.” *The European Journal of Development Research* 30 (3): 345–363. <https://doi.org/10.1057/s41287-018-0149-0>.
- Mazzucato, M. (2018). “Mission oriented research and innovation in the European Union. A problem solving approach to fuel innovation-led growth”. European Commission. Directorate-General for Research and Innovation. <https://euagenda.eu/upload/publications/untitled-137188-ea.pdf>
- Mc Elroy, M. W., (2002). “Social Innovation Capital.” *Journal of Intellectual Capital* 3 (1): 30–39. <https://doi.org/10.1108/14691930210412827>
- Montgomery, A W., Dacin, P.; & Dacin, T. (2012). “Collective Social Entrepreneurship: Collaboratively Shaping Social Good.” *Journal of Business Ethics* 111 (3): 375–388. <https://doi.org/10.1007/s10551-012-1501-5>
- Mulgan, G., (2006). “The Process of Social Innovation.” *Innovations: Technology, Governance, Globalization* 1 (2): 145–162.
- Mutonyi, S., (2019). “The Effect of Collective Action on Smallholder Income and Asset Holdings in Kenya.” *World Development Perspectives* 14 (June): 100099. <https://doi.org/10.1016/j.wdp.2019.02.010>.

- Nääs IA, Mollo M, Canuto SA, Waker R, Oliveira DR, Vendrametto O, (2015). Brazilian chicken meat production chain: a 10-year overview. *Brazilian Journal of Poultry Science* 17: 87-94.
- Nelson, R.& Winter, S. (1982). "Introduction" In an *Evolutionary Theory of Economic Change*, 3–23. <https://doi.org/10.2307/2232409>
- Okonkwo, P C, Onyeze, C N; & Ochiaka, D I., (2019). "Improving Employment Opportunities in the rural areas through Cooperative Business Enterprises in Enugu State." Nigeria. *International Journal of Academic Research in Business and Social Sciences* 9 (8): 237–257. <https://doi.org/10.6007/IJARBSS/v9-i8/6348>.
- Orsi, L.; De Noni, I.; Corsi, S. & Marchisio, L., (2017). "The Role of Collective Action in Leveraging Farmers' Performances: Lessons from Sesame Seed Farmers' Collaboration in Eastern Chad." *Journal of Rural Studies* 51 (April): 93–104. <https://doi.org/10.1016/j.jrurstud.2017.02.011>.
- Ortiz, O., Frias, G., Ho, R. et al., (2008). "Organizational Learning through Participatory Research: CIP and CARE in Peru." *Agriculture and Human Values* 25 (3): 419–431. <https://doi.org/10.1007/s10460-007-9108-7>
- Papadimitri, P.; Pasiouras, F. & Tasiou, M., (2020). "Do National Differences in Social Capital and Corporate Ethical Behaviour Perceptions Influence the Use of Collateral? Cross-Country Evidence." *Journal of Business Ethics*. <https://doi.org/10.1007/s10551-019-04412-4>
- Porter, M. E., (1998). "Clusters and the New Economics of Competition." *Harvard Business Review* 76 (6): 77–90.
- Rover, O.; de Gennaro, B.; & Roselli, L., (2016). "Social Innovation and Sustainable Rural Development: The Case of a Brazilian Agroecology Network." *Sustainability* 9 (1): 1–14.
- Sastre-Merino S, Negrillo X, Hernández-Castellano D, (2013). Sustainability of rural development projects within the working with people model: Application to Aymara Women Communities in the Puno Region, Peru. *Cuadernos de Desarrollo Rural* 10 (S70): 219-243.
- Schröter, B.; Matzdorf, B.; Sattler, C. & Garcia Alarcon, G., (2015). "Intermediaries to Foster the Implementation of Innovative Land Management Practice for Ecosystem Service Provision - A New Role for Researchers." *Ecosystem Services* 16 (December): 192–200. <https://doi.org/10.1016/j.ecoser.2015.10.007>.
- Schwittay, Anke, (2011). "The Marketization of Poverty." *Current Anthropology* 52. <https://doi.org/10.1086/656472>

- Steenwerth, K.L., Hodson, A.K., Bloom, A.J. et al., (2014). "Climate-smart agriculture global research agenda: scientific basis for action". *Agric & Food Secur* 3, 11: 39 p <https://doi.org/10.1186/2048-7010-3-11>
- Sutter C, Webb J, Kistruck G, Ketchen Jr D J, Ireland R. D, (2017). Transitioning entrepreneurs from informal to formal markets. *Journal of Business Venturing* 32(4): 420-442.
- Teixeira, H.M.; Van den Berg, L.; Cardoso, I.M.; Vermue, A.J.; Bianchi, F.J.J.A.; Peña-Claros, M.; Tiftonell, P., (2018). "Understanding Farm Diversity to Promote Agroecological Transitions." *Sustainability* 10 (12): 4337. <https://doi.org/10.3390/su10124337>
- Tolentino Martinez.; M., J.; & del Valle Rivera, M. C., (2018). "Territorial Governance and Social Innovation: The Cases of San Pedro Capula's Artisanal Cheese and the Rice (*Oryza Sativa*) of Morelos, Mexico." *Agriculture (Switzerland)* 8 (2): 23. <https://doi.org/10.3390/agriculture8020023>
- Tregear, A.; & Cooper, S., (2016). "Embeddedness, Social Capital and Learning in Rural Areas: The Case of Producer Cooperatives." *Journal of Rural Studies* 44 (April): 101–110. <https://doi.org/10.1016/j.jrurstud.2016.01.011>.
- Urquiza, A. & Billi, M., (2020). "Water Markets and Social–Ecological Resilience to Water Stress in the Context of Climate Change: An Analysis of the Limarí Basin, Chile." *Environment, Development and Sustainability* 22 (3): 1929–51. <https://doi.org/10.1007/s10668-018-0271-3>.
- Valerio D, Garcia A, Perea J, Acero R, Gomez G, (2009). Social and commercial profile of the sheep and goat cattle systems in the Northwestern region of the Dominican Republic. *Interciencia* 34(9): 637-644.
- van Dijk P. & Sverrisson, A., (2003). "Enterprise clusters in developing countries: mechanisms of transition and stagnation". *Entrepreneurship & Regional Development*, 15(3): 183-206. <https://doi.org/10.1080/08985620210159239>.
- Welch C, (2009). Camponeses: Brazil's Peasant Movement in Historical Perspective (1946—2004). *Latin American Perspectives* 36(4): 126-155.
- Zarazúa, J.; Almaguer-Vargas, G.; & Rendón-Medel, R., (2012). "Social Capital: A Network Case of Innovation around Corn in Zamora, Michoacán, Mexico." *Cuadernos de Desarrollo Rural* 9 (68): 105–124.
- Zimmerer, K. S., (2013). "The Compatibility of Agricultural Intensification in a Global Hotspot of Smallholder Agrobiodiversity (Bolivia)." *Proceedings of the National Academy of Sciences of the United States of America* 110 (8): 2769–2774. <https://doi.org/10.1073/pnas.1216294110>.

Zupic, I. & Cater, T., (2015). "Bibliometric methods in management and organization."
Organizational Research Methods, 18(3),: 429-472. ISSN 1094-4281

**Chapter 3. Collaboration through EIP-
AGRI Operational Groups and their role
as innovation intermediaries.**

Chapter 3

Collaboration through EIP-AGRI Operational Groups and their role as innovation intermediaries

“When you need to innovate, you need collaboration”

Marissa Mayer

Authors. Piñeiro, Verónica, Nieto Aleman, Paula, Marín-Corbí, Jaime, Garcia-Alvarez-Coque, Jose-Maria

Published in: New Medit, A Mediterranean Journal of Economics, Agriculture and Environment, 2021 n. 3 Special Issue: Innovation and Sustainability of agri-food system in the Mediterranean area

Published online: 28 September 2021

JCR: Q3 – SJR: Q3

DOI: 10.30682/nm2103b



Abstract

In the context of EU rural development policy, one of the proposed actions is the formation of Operational Groups (OGs). These OGs are part of the framework of the European Innovation Partnership on Agricultural Productivity and Sustainability (EIP-AGRI). The objective of this policy is to promote sustainable and applicable solutions to agricultural problems. OGs can be thought of as innovation intermediaries. Their functions have been addressed in the literature on agricultural innovation systems. To advance the research in this area, the objective of this study is to identify the innovation intermediary functions of Spanish OGs by drawing upon the opinions of their members. An online survey was conducted to collect data from members of Spanish EIP-AGRI OGs. The questionnaire asked members about the characteristics and functions of their OGs. More specifically, it also collected evaluations of the performance of OGs in certain innovation activities. The results of an exploratory factor analysis reveal that Spanish OGs perform three main functions: innovation process management, demand articulation, and institutional support and innovation brokering.

Keywords: collaboration - Agricultural innovation systems - knowledge brokering - innovation networks.

JEL: O35 – O13 – Q16.

3.1 Introduction

To achieve the United Nations (UN) Sustainable Development Goals¹, actions aimed at technological and social innovation through collaboration are fundamental (Kanda et al., 2019; Kivimaa et al., 2019; Polzin et al., 2016; van Lente et al., 2003). Under the systemic view of agricultural innovation, complex networks of multiple actors develop, transfer and implement innovative knowledge and technology (Tropical Agriculture Platform, 2016; Klerkx & Leeuwis, 2008a).

Innovation policy contributes to putting into practice adaptive innovation models through collaborative actions. As is the case of the European Innovation Partnership for agricultural productivity and sustainability (EIP-AGRI), which is linked to the Rural Development Programmes (2014-2020). The EIP-AGRI launched an innovation partnership established by the European Commission to address current social challenges by promoting interaction between providers and users of knowledge, and creating sustainable and applicable solutions (EU SCAR, 2016). The EIP-AGRI works towards more efficient and sustainable farming and forestry in Europe to guarantee food, feed and bio-materials supply, while protecting the natural resource base on which agriculture relies. Under this perspective, innovation takes place through collaborative learning processes

¹17 Sustainable Developments Goals proposed by UN Agenda for Sustainable Development, to stimulate action in areas of critical importance for humanity and the planet. Available at: <https://sdgs.un.org/>

where diverse groups of stakeholders co-create focused solutions to a specific problem or jointly develop a specific opportunity (Costantini et al., 2020; Cristiano and Proietti, 2018; Oliveira et al., 2019). Ultimately, the EIP-AGRI draws on a synergistic, bottom-up, demand-oriented, open and co-evolutionary innovation model. A good example is provided by the focus of this study, namely Operational Groups (OGs) within the European Innovation Partnership on Agricultural Productivity and Sustainability (EIP-AGRI). These multi-actor platforms bring together collaborators from different backgrounds and sectors for cooperation to provide innovative solutions to agricultural problems.

OGs bring together agents such as scientists, farmers, advisors, NGOs and firms, who can play an important role in the search for innovations to meet needs or exploit opportunities. The creation of OGs should be an initiative of the innovation agents. There are no prerequisites for OG formation, apart from basic requirements concerning size (minimum of two entities), composition (to ensure the diversity of actors) and explicit responsibilities. To be formally recognised, OGs are required to write a plan for an innovation project. The results derived from OGs' activities must be disseminated through the EIP network (EU SCAR, 2016). OGs receive incentives from Measure 16 of Rural Development Programmes (RDs) to finance cooperation in innovation. Some OGs operate on a regional basis, while others have a nationwide scope. Groups and projects are co-funded by the European Commission, but member states or regional governments may decide on the specific conditions and implementation. In Spain, the initiative depends on both the regional RDs (Comunidades Autónomas, NUTS2 level) and the national rural development programme (NRDP) of the Ministry of Agriculture, Fisheries and Food (Ministerio de Agricultura, Pesca y Alimentación). The Rural National Network (Red Rural Nacional) is a platform for the main actors related to rural areas.² It disseminates information on both programmes and Spanish OGs. Since 2014, several Spanish regions have launched calls for proposals for the creation of OGs. More than 500 OG projects have been supported since then. In 2016, the first call for innovative supra-regional OGs resulted in the creation of 60 OGs. The second call took place in 2018, giving rise to 117 supra-regional groups, while 46 new groups were created in 2019.

The literature contains studies of EIP-AGRI OGs (Costantini et al., 2020; Cristiano & Proietti, 2018; Haering, 2013; Oliveira et al., 2019; Sutherland et al., 2017), and a European survey of their characteristics and the themes they cover was recently conducted (Knotter et al., 2019). However, OGs have never been assessed by soliciting data directly from their individual members and asking these members to identify their OGs' functions.

² <http://www.redruralnacional.es/grupos-operativos>

For this reason, the aim of the study is to identify the functions that Spanish GOs have developed as innovation intermediaries, thereby contributing to satisfy the need for a structured empirical analysis of these functions. Several authors have made progress in the study of the functions of innovation intermediaries (Batterink et al., 2010; Howells, 2006; Jacobsson & Johnson, 2000; Kilelu et al., 2011; Klerkx & Leeuwis, 2008b; Kristjanson et al., 2009; Smits & Kuhlmann, 2004). The role of these intermediaries has been shown to be useful in Mediterranean rural regions where business collaboration for innovation activities has proved to enhance rural development (Piñeiro, et al, 2021; Miranda García, et al., 2020; Garcia-Alvarez-Coque, et al., 2020a; 2013; Maghni & Oukaci, 2018;).

We can therefore build on this basis by asking which of the functions set out in the literature have been performed by Spanish OGs.

We first present the state of the art, reviewing the concepts of agricultural innovation systems, collaboration, and innovation intermediaries. We provide a chronology of the key articles on the functions of innovation intermediaries. Next, we describe the method employed for the survey of the members of Spanish OGs and explain the data collection process. Drawing on the results of the survey, we identify the functions carried out by these OGs using exploratory factor analysis. The paper concludes with a discussion and a summary of the conclusions of this research.

3.2 Conceptual framework

Innovation studies have shifted from a linear view of innovation to what is currently known as an innovation system (IS) (Klerkx & Leeuwis, 2008b; Carlsson, 2006). An IS requires actors to connect, transfer and facilitate knowledge flows (van Lente et al., 2003). This concept has been applied to the agri-food sector, leading some authors to introduce the agricultural innovation system (AIS) perspective (Klerkx, et al., 2012). Aerni et al. (2015) explained that any agent from an AIS can cooperate to contribute to innovative solutions. AIS openness, together with interaction among actors, also means that there is interdependence because any action or change within the system can affect any actor (Hermans et al., 2019).

An AIS is a complex adaptative system. Any successful technological development is naturally immersed in a continuous knowledge-sharing process (Knickel et al., 2009), which is frequently demand-oriented and responds to users' real needs (Aerni et al., 2015). Solutions are improved over time through feedback from these actors in a process known as coevolution (Lema et al., 2018; Kilelu et al., 2013; Mulgan, 2006; Geels, 2004). In some sense, the system displays memory, path dependence and self-regulation from its learning reviews (Hermans et al., 2019; Turner et al., 2017).

Finally, the changing environment of an AIS also means that innovation processes should adapt to local contexts. This notion underscores the idea that significant

innovation involves institutional and social changes rather than simply implementation of technological developments (Kuokkanen et al., 2016).

The AIS model has generated debate among authors. Delvenne and Thoreau (2017) noted that AISs are usually formulated too far from social and local contexts and are usually too biased towards economic growth. Pound & Conroy (2017) suggested some weaknesses in the lack of integration of AISs with social goals and the most vulnerable groups. Turner et al. (2017) reported that the concept of an AIS spans not only formal knowledge-generation networks but also informal social networks such as associations and local communities. The AIS analytical framework has recently been extended to the quadruple and quintuple helix approaches, where government, companies, academia and civil society participate in an open democratic ecosystem (Carayannis et al., 2018). Innovation ecosystems offer the social and natural environment for knowledge coevolution and plurality (Pigford et al., 2018).

Synergies among agents avoid winner-loser scenarios and ensure that the benefits of innovation activities are shared (Tropical Agriculture Platform, 2016). Accordingly, many cooperative projects seek joint solutions involving various sectors (Dolinska and d'Aquino, 2016). Thus, collaboration can be thought of as a key element to exploit innovation potential (Germundsson et al., 2020; De Silva et al., 2018; Despoudi et al., 2018; Laursen & Salter, 2014).

While a well-connected network of actors is required for AISs to work properly, the complexity of the relationships in such networks has led to less direct cooperation. Hence, it is essential to encourage links between unknown actors. In other words, people who play intermediary roles are needed (Klerkx, et al., 2012). This integrated vision has resulted in the increasingly prominent role of multi-actor initiatives, innovation platforms, intermediaries and networks. Innovation networks are open to bottom-up processes stemming from the direct users of information.

Networking requires a receptive attitude that is free of prejudices and individual concerns and is open to any type of opinion or idea (Kivimaa et al., 2019). Collaborative learning is essential to strengthen actors' abilities, building a collective perspective of mutual learning and empathy (Hermans et al., 2015; Smits & Kuhlmann, 2004) and generating a climate of trust (Klerkx, et al., 2012).

Leeuwis & Aarts (2010) described facilitation as actions focused on networking, social learning and negotiation that aim to improve society. Although brokers and innovation networks are gaining increasing importance, this greater importance does not undermine the functions of classic intermediaries, including advisory services, training, documentation and management services (Klerkx, et al., 2012). However, innovation intermediaries go beyond these classical functions, acting as facilitators or innovation brokers (Klerkx & Leeuwis, 2008b).

Then, we can consider an OGs as a type of innovation intermediaries that is capable to fulfil a series of features listed above: adopting a continuous knowledge-sharing process,

being demand oriented, adapting to local contexts, seeking synergies among agents, promoting multi-actor initiatives, and creating a collaborative learning environment.

The systemic role of innovation intermediaries in terms of innovation system policies has been discussed in a host of studies (Kilelu et al., 2011; Klerkx & Leeuwis, 2009; Howells, 2006). Most identify multiple functions associated with innovation intermediaries. These functions cover a wide range of forms of intermediation from defined and formal activities to more informal and undercover activities (Kivimaa et al., 2019). Table 3.1 shows innovation intermediaries' functions proposed by different authors, grouped by feature.

Jacobsson & Johnson (2000) highlighted the importance of so-called prime movers, who perform four important tasks to promote innovation: raising awareness, making the first investment, providing legitimacy, and making use of the new technology.

Some two decades ago, van Lente et al. (2003) summarised the challenges posed by changing innovation systems across three key functions: articulation, alignment and learning. The articulation function is about managing options and scenarios that are coordinated with demand. Stakeholder alignment should focus on strengthening linkages and creating networks. Finally, the act of supporting and facilitating learning processes is oriented to enhancing feedback mechanisms and encouraging a variety of outcomes.

One year later, Smits & Kuhlmann (2004) identified five functions that play a crucial role in managing today's innovation processes. These functions are managing interfaces, cutting across subsystem borders and stimulating the debate; (de-) constructing and organising (innovation) systems; providing a platform for learning and experimenting; providing an infrastructure for strategic intelligence; and stimulating demand articulation, strategy and vision development.

From a set of case studies of collaboration in the UK, Howells (2006) found that these organisations were performing 10 innovation functions: foresight and diagnostics; scanning and information processing; knowledge processing and combination/recombination; gatekeeping and brokering; testing and validation; accreditation; validation and regulation; protecting results; commercialisation; and evaluation of outcomes.

Table 3.1. Features of innovation intermediaries' functions proposed by different authors.

| Feature | Feature's Highlight | Authors |
|---|--|---|
| Continuous knowledge-sharing process | Innovation process management; learning orientation; cutting across subsystem borders and stimulating the debate | van Lente et al. (2003); Smits & Kuhlmann (2004); Klerkx & Leeuwis (2008a, 2009); Kristjanson et al. (2009); Batterink et al. (2010); Kilelu et al. (2011) (2013) |
| Demand oriented | Making the first investment, demand articulation, strategy and vision development; foresight and diagnostics; problem definition | Jacobsson & Johnson (2000); van Lente et al. (2003); Smits & Kuhlmann (2004); Howells (2006); Klerkx & Leeuwis (2008a, 2009); Kristjanson et al. (2009); Kilelu et al. (2011) (2013) |
| Adaptable to local contexts | Institutional support; providing an infrastructure for strategic intelligence; systems integration | Smits & Kuhlmann (2004); Howells (2006); Kristjanson et al. (2009); Kilelu et al. (2011) (2013) |
| Synergies among agents | Network brokering; managing interfaces; alignment; providing legitimacy | Jacobsson & Johnson (2000); van Lente et al. (2003); Smits & Kuhlmann (2004); Howells (2006); Klerkx & Leeuwis (2008a, 2009); Kristjanson et al. (2009); Batterink et al. (2010); Kilelu et al. (2011) (2013) |
| Promote multi-actor initiatives | Capacity building, organising systems, raising awareness, alignment | Jacobsson & Johnson (2000); van Lente et al. (2003); Smits & Kuhlmann (2004); Howells (2006); Batterink et al. (2010); Kilelu et al. (2011) (2013) |
| Collaborative learning | Knowledge brokering; providing a platform for learning and experimenting; knowledge processing and combination/recombination | Jacobsson & Johnson (2000); van Lente et al. (2003); Smits & Kuhlmann (2004); Howells (2006); Kristjanson et al. (2009); Kilelu et al. (2011) (2013) |

More recently, in the context of supporting the different sectors involved in agricultural development and innovation Klerkx & Leeuwis (2008a) found that the main functions of innovation intermediaries can be summarised as demand articulation, networking brokerage and management of the innovation process. Klerkx and Leeuwis defined these functions as follows (Klerkx & Leeuwis, 2009):

1. Demand articulation means articulating innovation needs and the corresponding demands in terms of technology, knowledge, funding and policy.

2. Network formation means facilitating linkages between relevant actors (scanning, scoping, filtering and matchmaking of possible cooperation partners).
3. Innovation process management means enhancing alignment and learning of the multi-actor network, which involves facilitating learning and cooperation in the innovation process.

Kristjanson et al. (2009, p. 851) proposed seven propositions for agriculture and natural resources researchers and professionals to pursue strategies that link knowledge to action. These propositions relate to problem definition, programme management, boundary spanning, systems integration, learning orientation, continuity with flexibility and management of asymmetries of power. Batterink et al. (2010) cited three main functions of innovation brokers: innovation initiation, network composition and innovation process management.

Based on most of the cited authors, Kilelu et al. (2011) proposed six broad functions of innovation intermediaries in a study of the Kenyan agricultural sector. In a later study, Kilelu et al. (2013, p. 67) extended the scope of these functions by defining them as follows:

1. Demand articulation means facilitating the process of identifying innovation challenges and opportunities as perceived by the various stakeholders through diagnostic exercises, visioning and needs assessment. The needs could include access to information, technologies, finance or institutional gaps.
2. Institutional support means facilitating and advocating institutional change (e.g., policy change, new business models and stimulating new actor relationships).
3. Network brokering means identifying and linking different actors.
4. Capacity building means strengthening and incubating new organisational forms.
5. Innovation process management means coordinating interaction, facilitating negotiation and learning among different actors.
6. Knowledge brokering means identifying knowledge/technology needs, mobilising, and disseminating the technology and knowledge from different sources.

We consider that the categorization of functions of innovation intermediaries provided by Kilelu et al. (2013) can be easily extended to the potential functions of OGs. Our study's empirical work initially draws on this categorisation of innovation functions. However, we use factor analysis to identify the groupings of functions that are consistent with the opinions of OG members.

3.3 Data and methods

A survey of members of regional and supra-regional Spanish OGs was conducted³. They were asked to evaluate the performance of their OGs in different actions related to the functions of innovation intermediaries. Members' contact details were collected from the Rural National Network's OG database, which publishes the list of OGs and their members. The survey was sent by email. Replies were received between December 2018 and February 2019. Of the 967 surveys sent out, 159 responses were returned, resulting in a response rate of 16.4%. The sample includes 159 OG members with a sample errors of $\pm 6,5\%$ at confidence level of 90% ($Z=1.645$; $p=q=0.5$) and it was determinates toward finite formula⁴. We consider that the sample is sufficiently informative of the underlying factors that characterise OG member's in Spain.

The aim of the survey was to gather OG members' opinions on the intermediation functions performed by the EIP-AGRI Spanish OGs. This aim was achieved using 17 variables that express different actions to fulfil the functions. The questionnaire was divided into three sections to explore the following groups of variables:

1. **Characteristics of the surveyed OG partners.** Respondents were asked to answer multiple dichotomous questions concerning different aspects of their OGs (location, number of partners, public-private participation and the regional versus supra-regional nature of the OG). Because participants might have belonged to more than one OG, they had the option of responding in relation to more than one OG in the same answer.
2. **Functions.** These were reflected by the individual members' views of whether the Spanish OGs fulfilled their innovation brokering roles. Members were asked to express their level of agreement with statements related to the functions of their OGs. Each statement was linked to one of the functions that agricultural innovation intermediaries should perform, according to Kilelu et al. (2011). As mentioned earlier, these functions correspond to six main categories: demand articulation, institutional support, network brokering, capacity building, innovation process management and knowledge brokering. However, for each function, different questions were asked to respond to specific activities to perform these functions. The number of items vary among functions, given that some reviewed functions seem to present a wider definition and we aimed at achieving an accurate picture of the members' assessment of OGs. The statements were assessed on a seven-point Likert scale ranging from 1 (completely disagree) to 7 (completely agree). Table 3.2 specifies the 17 statements that best reflect the diversity of functions performed by OGs.

³ The survey is shown in Appendix 1. Data are available at the author request.

⁴ $n = \frac{Z^2 \frac{\alpha}{2} * N * pq}{e^2 (N - 1) + Z^2 \frac{\alpha}{2} * N * pq}$

3. **Overall perception.** In the third section, respondents were asked to answer four dichotomous questions to express their satisfaction or dissatisfaction with their OGs and the EIP-AGRI programme.

Table 3.2. Description of items for functions of innovation intermediaries.

| Functions of innovation intermediaries | Variable item/description | |
|---|----------------------------------|--|
| Demand articulation | D1 | Carry out prospective studies about new challenges related to OG topics |
| | D2 | Discover needs raised by group actors |
| | D3 | Identify new solutions and opportunities that could be of interest for all actors related to the project |
| | D4 | Complement diverse approaches of participant actors |
| Institutional support | S1 | OGs help group actors consolidate their competitive position by offering ways to access funding, education and the required team. |
| | S2 | OGs look for economic and institutional support from public administrations to support projects and new legislation that provides solutions to group problems. |
| | S3 | OGs run awareness campaigns about group problems that are addressed to policymakers and the public. |
| Network brokering | N1 | OGs disseminate lines of investigation concerning common thematic areas to facilitate cooperation among external and internal actors. |
| | N2 | OGs promote workshops or platforms to exchange experiences among related actors in terms of group issues (once groups have been formed). |
| | N3 | OGs promote participation of public or private external collaborators (partners) for common projects. |
| Capacity building | C1 | OGs promote new organisations (associations, enterprises, foundations, etc.) to support projects and goals inside the groups. |
| Innovation process management | I1 | Facilitate collaborations among actors of the group to develop common projects that support innovation processes |
| | I2 | Provide project actors with information on actions within the OG project and its evolution |
| | I3 | Publish manuals that serve as guides for all group actors to unify and integrate forms of action |
| | I4 | Promote follow-up and evaluation mechanisms for innovation projects |
| Knowledge brokering | K1 | OGs disclose information about new knowledge and technologies that actors may need to apply to provide practical solutions. |
| | K2 | OGs disseminate and explain new regulations related to group problems. |

The analysis was carried out in two stages. First, descriptive statistics of the results of the survey were calculated. Second, exploratory factor analysis (EFA) was performed to define the smallest number of dimensions (variables) capable of explaining the maximum amount of information contained in the data. Table 3.3 shows the adequacy of the polychoric correlation matrix. The determinant of the correlation matrix test for

multicollinearity or singularity should be greater than .00001; the Bartlett's test of sphericity is used to verify the strength and validity of the Factor Analysis and must be significant at 5% significance level or any appropriate level of significance; and the Kaiser-Meyer-Olkin (KMO) is required to have a value not less than .70 for a valid and strong result (Gibson et al., 2020; Lloret-Segura et al., 2014). The coefficients and results of several tests shown in Table 3.2 indicate that the data were suitable to perform the factor analysis. All subfunctions or variables shown in Table 3.3 were included in the factor analysis so that we could explore possible commonalities between variables. For this analysis, FACTOR software was used (Ferrando & Lorenzo-Seva, 2014).

Following the recommendations in the EFA literature (Hoffmann et al., 2013), a polychoric matrix was used. For factor extraction, the robust unweighted least squares method was used. The rotation to achieve factor simplicity was raw quartimax (Lloret-Segura et al., 2014; Mavrou, 2015). After applying the method for the 17 variables, those with factor loadings lower than 0.5 were discarded. The analysis was conducted again with 13 variables.

Table 3.3. Adequacy of the polychoric correlation matrix.

| | |
|---|-----------------------------------|
| Determinant of the matrix | 0.000428973742122 |
| Bartlett's statistic | 1161.8 (df = 78; $p = 0.000010$) |
| Kaiser-Meyer-Olkin (KMO) test | 0.83755 (good) |
| BC Bootstrap 95% confidence interval of KMO | [0.818, 0.886] |

3.4 Results

Descriptive analysis

According to the full set of responses, the most well-represented regions were Andalucía, Catalonia, and Madrid. In total, 53% of respondents belonged to more than one OG. Of all the OGs in the sample, 63% had between one and five partners, 35% had between six and 10 partners, and 2% had more than 10 partners. Regarding private participation (enterprises, associations and NGOs), 62% of all OGs had between one and three private members, 35% had between four and seven private members, and 3% had more than seven private members. Other types of OG members are collaborators, which are not direct beneficiaries of EU funding but support OGs. In total, 71% of respondents declared that they had at least one collaborator in their OGs. Regarding the regions involved in the OG, 52% of OGs covered only one region, and 48% covered two or more regions' (Table 3.4). These latter OGs are supra-regional OGs (*grupos supra-autonómicos*).

Table 3.4 Characterization of Operatives Groups surveyed

| Levels | Counts | % of Total | Cumulative % |
|--|--------|------------|--------------|
| Number of solicitant members of OG | | | |
| 1-5 members | 200 | 62.9 % | 62.9 % |
| 6-10 members | 112 | 35.2 % | 98.1 % |
| More than 10 members | 6 | 1.9 % | 100.0 % |
| Number of members from private sector | | | |
| 1-3 members | 197 | 62.1 % | 62.1 % |
| 4-7 members | 112 | 35.3 % | 97.5 % |
| More than 7 members | 8 | 2.5 % | 100.0 % |
| OG collaborators | | | |
| No | 92 | 29.0 % | 29.0 % |
| Yes | 225 | 71.0 % | 100.0 % |
| OG regional or supra-regional | | | |
| Autonomic | 167 | 52.4 % | 52.4 % |
| Supra-autonomic | 152 | 47.6 % | 100.0 % |

One group of questions dealt with members' satisfaction with respect to their OGs and the EIP-AGRI's OG programme in general (Table 3.5). Almost all (98%) respondents were satisfied with the achievements of at least one of their OGs, and 89% were satisfied with the achievements of all the OGs in which they were involved.

In addition, 98% of respondents considered that the EIP-AGRI policy has been a success. However, 93% reported that OGs can continue only if public subsidies are maintained. This result reinforces experts' recommendations about the essential role of public expenditure to boost collaborative mechanisms in the Spanish AIS. However, it raises questions about whether the private sector could become involved in innovation without the need for subsidies.

Table 3.5 Operational Groups members' satisfaction.

| Assesments | Counts | % of Total | Cumulative % |
|--|--------|------------|--------------|
| Frequencies of "I'm satisfied with the achievements of at least one of their OGs where I'm member of." | | | |
| No | 3 | 1.9 % | 1.9 % |
| Sí | 153 | 98.1 % | 100.0 % |
| Frequencies of "I'm satisfied with the achievements of all their OGs where I'm member of." | | | |
| No | 16 | 10.5 % | 10.5 % |
| Sí | 136 | 89.5 % | 100.0 % |
| Frequencies of "I believe that OGs program has been a success police of the EIP-AGRI." | | | |
| No | 3 | 1.9 % | 1.9 % |
| Sí | 151 | 98.1 % | 100.0 % |
| Frequencies of "I believe that the continuity of OGs depends on the maintenance of public subsidies." | | | |
| No | 11 | 7.1 % | 7.1 % |
| Sí | 145 | 92.9 % | 100.0 % |

Respondents generally agreed with all the statements that described the functions of OGs. These responses are shown in Table 3.6. All suggested functions received a score of more than 4 out of 7. Thus, according to the respondents, the members of Spanish OGs believe that they are performing the functions of innovation brokers established by Kilelu et al. (2011, 2013).

The statements with the highest scores concerned identifying possible solutions and OGs actors' needs. Actions promoting cooperation with external actors to produce research and regulations were also highly scored. Actions leading to promoting collaboration among groups (I1) were highly scored, although responses to this item had a higher standard deviation. The variable with the lowest score and greatest variation in responses referred to the promotion of new organisations to encourage projects and objectives within the groups.

Table 3.6. Average score and standard deviation of responses for variables linked to innovation functions *

| Variable | Statement | Mean | Standard deviation |
|-----------------|--|-------------|---------------------------|
| D3 | Identifying possible solutions | 6.08 | 1.01 |
| D2 | Identifying actors' needs | 5.94 | 0.97 |
| I2 | Updating actors with OG actions and progress | 5.86 | 1.17 |
| D4 | Complementing actors' perspectives | 5.76 | 1.05 |
| I1 | Strengthening collaboration within OGs | 5.53 | 1.32 |
| S2 | Obtaining economic and institutional support | 5.51 | 1.30 |
| K1 | Transferring new knowledge and technology | 5.47 | 1.26 |
| N1 | Facilitating research cooperation | 5.44 | 1.26 |
| D1 | Carrying out prospective studies | 5.44 | 1.40 |
| K2 | Disseminating new legislation | 5.36 | 1.39 |
| N3 | Attracting external collaborators | 5.23 | 1.43 |
| N2 | Promoting experience-sharing workshops | 5.18 | 1.37 |
| S1 | Providing paths to competitiveness | 5.02 | 1.55 |
| I4 | Promoting follow-up and evaluation mechanisms | 5.00 | 1.42 |
| I3 | Publishing OG guides and reports | 4.96 | 1.47 |
| S3 | Running awareness campaigns | 4.92 | 1.54 |
| C1 | Supporting OG projects and goals through new organisations | 4.51 | 1.63 |

* The statements were assessed on a seven-point Likert scale ranging from 1 (*completely disagree*) to 7 (*completely agree*).

Functions of Operational Groups as innovation intermediaries

The results of the EFA are shown in Table 3.7. The specific actions of innovation intermediaries can be placed into factors based on their factor loadings'. Three factors explain 66% of the total variance. These factors are composed of 11 variables or actions carried out by these intermediaries.

Table 3.7. Matrix of rotated loadings (loadings less than absolute 0.500 have been omitted)

| Variable | Statement | F 1 | F 2 | F 3 |
|----------|--|-------|-------|-------|
| D1 | Carrying out prospective studies | | | 0.611 |
| D2 | Identifying actors' needs | | | 0.946 |
| D3 | Identifying possible solutions | | | 0.772 |
| S2 | Obtaining economic and institutional support | | 0.709 | |
| S3 | Running awareness campaigns | | 0.738 | |
| N3 | Attracting external collaborators | | 0.546 | |
| C1 | Supporting OG projects and goals through new organisations | 0.591 | | |
| I1 | Strengthening collaboration within OGs | 0.789 | | |
| I2 | Updating actors with OG actions and progress | 0.714 | | |
| I4 | Promoting follow-up and evaluation mechanisms | 0.621 | | |
| K1 | Transferring new knowledge and technology | | 0.557 | |

The quality of the factor scores was estimated using the factor determinacy index (FDI) (values >0.80 indicates good quality), and Overall Reliability of fully-Informative prior Oblique N-EAP scores (ORION), also known as marginal reliability, where values > 0.80 indicate precise measure of reliability of the factor score estimates (Gibson *et al.*, 2020). Table 3.8 shows that both the factor determinacy index and the reliability of factor score (ORION) estimates are adequate, indicating high-quality factor estimates.

Table 3.8. Explained variance of rotated factors and reliability of phi-information oblique expected a posteriori (EAP) score⁵

| Factor | Variance | ORION | Factor determinacy index |
|--------|----------|-------|--------------------------|
| 1 | 2.694 | 0.791 | 0.890 |
| 2 | 2.491 | 0.769 | 0.877 |
| 3 | 2.417 | 0.925 | 0.962 |

Based on these results, Table 3.9 presents a model of the innovation functions identified by the members of the Spanish OGs themselves. The 17 initial variables can be grouped

⁵The implementation of EAP score estimation in a factor model involves calculating point estimates that use all prior information (particularly the inter-factor correlation matrix) and complementing the point estimates with measures of the reliability of these estimates. FACTOR computes (1) the EAP score estimation for 'Fully-Informative Prior Oblique EAP scores' and the ORION reliability estimates (Overall Reliability of fully Informative prior Oblique N-EAP scores). Please see Ferrando *et al.* (2016) for further details.

into three broad functions that have been developed by Spanish OGs. These three functions are innovation process management, demand articulation, and institutional support and innovation brokering. These functions are highly consistent with several functions proposed by Klerkx & Leeuwis (2009) and with the preliminary classification based on that of Kilelu et al. (2011, 2013) and shown in Table 3.1.

Variables C1 and N3 were repositioned within the three obtained factors. Unsurprisingly, supporting new organisations and projects for OGs (C1) can be mixed with innovation process management. Attracting external collaboration (N3) is understood as OGs' demand for further institutional support. There are two advantages of the new classification resulting from the present study. First, it results from an empirical evaluation of the way innovation agents perceive a specific type of innovation intermediary. Second, it reflects the actual perceived functions performed by Spanish OGs. Interestingly, some of the core theoretical variables of demand articulation (D4), institutional support (S1 and S3), network brokering (N1 and N2), and innovation process management (I3 and I4) and knowledge brokering (K2) are not relevant to the first three factors. This finding suggests that OG members' perceive their functions as addressing early stages of the innovation process where the relevant actions are based on internal collaboration and management (F1), prospective and demand articulation (F2), and institutional support (F3). They therefore follow less formal and smaller-scale strategies to undertake innovation, funding and lobbying than those that perhaps correspond more closely to European innovation platforms such as Food for Life and TP Organics (Blazquez et al., 2018).

Table 3.9. Model of functions of innovation intermediaries

| Innovation function | Variable item/description | |
|---|----------------------------------|--|
| Factor 1: Innovation process management | C1 | Supporting OG projects and goals through new organisations |
| | I1 | Strengthening collaboration within OGs |
| | I2 | Updating actors with OG actions and progress |
| | I4 | Promoting follow-up and evaluation mechanisms |
| Factor 2: Demand articulation | D1 | Carrying out prospective studies |
| | D2 | Identifying actors' needs |
| | D3 | Identifying possible solutions |
| Factor 3: Institutional support and innovation brokering | S2 | Obtaining economic and institutional support |
| | S3 | Running awareness campaigns |
| | N3 | Attracting external collaborators |
| | K1 | Transferring new knowledge and technology |

3.5 Discussion

This discussion is divided into three subsections, each covering one of the functions in the innovation model that emerged from the analysis.

Innovation process management

Encouraging collaboration, sharing information and developing joint projects are core activities for an innovation intermediary. The first factor emerging from our analysis is strongly related to capacity building (C1), which is understood as actions that promote new organisations to support projects and goals within OGs. Only half of the respondents agreed that promoting new organisations already happened in their OGs⁶. However, many OGs have associations, federations and professional organisations among their partners. Members of supra-regional OGs gave an above-average score to capacity building as a function of OGs. In contrast, members with a high number of private actors (more than seven) gave this function a below-average score. Supra-regional OGs are typically more able to mobilise public support and resources for innovation, as well as promoting new organisations. In contrast, private actors may have insufficient resources (many are small farmers) or, if formed by larger holdings, have fewer incentives to form new organisations⁷.

Improving management is essential to provide adequate support and flexible tools to enable an adaptative learning system. Thus, internal communication is important to facilitate social learning, reframed approaches and effective collective action (Tisenkopfs et al., 2015). Comparing members of specific groupings of OGs (i.e. regional vs. supra-regional OGs), members of supra-regional OGs gave higher scores to strengthening collaboration within OGs (I1) and promoting follow-up and evaluation mechanisms (I4). This result reflects the stronger position of these OGs in managing collaborative functions. Geographical distance is not a handicap for collaboration in Spain, with new information technologies filling communication gaps. However, members of OGs with many private agents gave lower scores to the previous two items (I1 and I4). This result may be related to the lack of experience of private actors in collaborative innovation processes and monitoring and evaluation tools. The European Innovation Scoreboard indicates that, in general, Southern European regions have low rates of business collaboration for innovative activities (Garcia-Alvarez-Coque, et al., 2020a).

Demand articulation

This factor combines actions aimed at identifying opportunities, developing studies and seeking solutions that are of interest to and meet the needs of OGs and their members. These actions of innovation intermediaries have been cited by several authors (Kilelu et al., 2011, 2013; Klerkx & Leeuwis 2008c, 2009; van Lente et al., 2003; Smits &

⁶ OG members' responses for the evaluations of the three factors found can be consulted in Appendix 2.

⁷ The private sector includes agribusiness firms, entrepreneurs and producers at the local, national and multinationals levels.

Kuhlmann 2004; Aerni, 2015). A key dimension for research and development institutions is demand articulation (Garcia-Alvarez-Coque, et al., 2020b). The question is whether or not demand articulation is also a goal of multi-actor groupings, which the survey seems to confirm. The results by specific clusters show that members of OGs with more than seven private members gave above-average scores to identifying solutions and opportunities for all project actors (D2). By contrast, members of the largest OGs (with more than 10 members) gave below-average scores to identifying possible solutions (D3). These results raise the question of whether having a larger number of partners creates too many voices and reduces the ability to identify common solutions. Furthermore, respondents who did not have collaborators among their OG members gave below-average scores to their capacity to identify actors' needs (D2), as well as new solutions and opportunities of interest (D3). This finding suggests that the willingness of partner institutions to support OGs may be relevant to identify demands needs and technology-based solutions.

Institutional support and innovation brokering

This factor combines variables referring to institutional support, network brokering and knowledge brokering, which help build links among innovation actors. Innovation intermediaries search for economic and institutional support, including visibility of the group's demands and results. Network brokering refers to encouraging external collaboration, which enhances the capacity to secure resources and disseminate knowledge and solutions (Turner et al., 2017).

Institutional support and public policies may be relevant in bringing together the knowledge and technology required by group members. In a case study of small farms in different European countries, Sutherland et al. (2017) found that while small farmers initially approached networks for subsidies, this created the opportunity to form knowledge transfer and collaboration linkages. Other studies have shown that the institutional environment is not crucial for the internal cohesion of agricultural organisations (Gómez et al., 2020). However, the literature on technology transfer emphasises the role of boundary organisations in building bridges between the research community and users (Kristjanson et al., 2009).

Respondents that were members of regional OGs tended to give below-average scores to these functions, perhaps because OG partners from a single region find it more difficult to receive institutional support or public attention beyond the regional or local level. Some of these actors only have access to the funding offered by the region's RDP.

Partners belonging to supra-regional OGs gave higher scores to running awareness campaigns directed at policymakers (S3). This result shows the potential of multi-regional OGs to lobby in favour of public support and resources for innovation.

3.6 Conclusions

Like other Southern European economies, Spain lacks a culture of business collaboration for innovation initiatives (Garcia-Alvarez-Coque et al., 2020b). Innovation policy for sustainability within the EIP-AGRI framework supports collaboration for the resolution of specific problems. Our findings show that the functions of Spanish OGs, which can be thought of as innovation intermediaries, can be grouped into three main groups of functions. This finding is consistent with the previous theoretical literature. These three groups of functions are innovation process management, demand articulation, and institutional support and innovation brokering. The primary contribution of this study is to provide results of empirical testing of the theory of the functions of intermediaries through a direct survey of OG members. These results can offer a starting point for studies to continue to investigate the actual outcomes of the functions of innovation intermediaries. Such findings could help innovation intermediaries improve and strengthen. We acknowledge certain limitations of the present approach, which is primarily based on self-reported data from the opinions of OG members, not their actual performance. Another limitation is that OGs form a relatively recent innovation tool, which means that some further time is needed to have a better perspective of their potential outcome. This limitation creates an opportunity for future studies once the EIP-AGRI has developed further in Spain and other EU countries. The methodology can be extended to the evaluation of different types of innovation intermediaries and collaborative networks, in national and regional contexts other than the EU.

3.7 References

- Aerni, P., Nichterlein, K., Rudgard, S., and Sonnino, A. (2015). Making agricultural innovation systems (AIS) work for development in tropical countries. *Sustainability*, 2015(7), 831–850. <https://doi.org/10.5167/uzh-105491>
- Batterink, M. H., Wubben, E. F. M., Klerkx, L., and Omta, S. W. F. (2010). Orchestrating innovation networks: The case of innovation brokers in the agri-food sector. *Entrepreneurship and Regional Development*, 22(1), 47–76. <https://doi.org/10.1080/08985620903220512>
- Blazquez, D., Domenech, J., and Garcia-Alvarez-Coque, J. M. (2018). Assessing technology platforms for sustainability with web data mining techniques. *Sustainability (Switzerland)*, 10(12), 4497. <https://doi.org/10.3390/su10124497>
- Carayannis, E. G., Grigoroudis, E., Campbell, D. F. J., Meissner, D., and Stamati, D. (2018). The ecosystem as helix: an exploratory theory-building study of regional co-opetitive entrepreneurial ecosystems as Quadruple/Quintuple Helix Innovation Models. *RandD Management*, 48(1), 148–162. <https://doi.org/10.1111/radm.12300>
- Carlsson, B. (2006). Internationalization of innovation systems: A survey of the

- literature. *Research Policy*, 35(1), 56–67. <https://doi.org/10.1016/j.respol.2005.08.003>
- Costantini, E. A. C., Antichi, D., Almagro, M., Hedlund, K., Sarno, G., and Virto, I. (2020). Local adaptation strategies to increase or maintain soil organic carbon content under arable farming in Europe: Inspirational ideas for setting operational groups within the European innovation partnership. *Journal of Rural Studies*, 79, 102–115. <https://doi.org/10.1016/j.jrurstud.2020.08.005>
- Cristiano, S., and Proietti, P. (2018). Do EIP interactive innovation approaches interact each other? *International Journal of Agricultural Extension, 13th European International Farming Systems Association (IFSA) Symposium, Greece*, 53–63. <https://doi.org/10.1787/9789264167445-19-en>
- De Silva, M., Howells, J., and Meyer, M. (2018). Innovation intermediaries and collaboration: Knowledge-based practices and internal value creation. *Research Policy*, 47(1), 70–87. <https://doi.org/10.1016/j.respol.2017.09.011>
- Delvenne, P., and Thoreau, F. (2017). Learning from some NIS failures in Latin America. In *Research handbook on innovation governance for emerging economies*. Edward Elgar Publishing.
- Despoudi, S., Papaioannou, G., Saridakis, G., and Dani, S. (2018). Does collaboration pay in agricultural supply chain? An empirical approach. *International Journal of Production Research*, 56(13), 4396–4417. <https://doi.org/10.1080/00207543.2018.1440654>
- Dolinska, A., and d’Aquino, P. (2016). Farmers as agents in innovation systems. Empowering farmers for innovation through communities of practice. *Agricultural Systems*, 142, 122–130. <https://doi.org/10.1016/j.agsy.2015.11.009>
- EU SCAR. (2016). Agricultural Knowledge and Innovation Systems Towards the Future – a Foresight Paper. In *European Commission - Research and Innovation*. https://ec.europa.eu/research/scar/pdf/akis-3_end_report.pdf
- Ferrando, Pere J., and Lorenzo-Seva, U. (2014). El análisis factorial exploratorio de los ítems: Algunas consideraciones adicionales. *Anales de Psicología*, 30(3), 1170–1175. <https://doi.org/10.6018/analesps.30.3.199991>
- Ferrando, Pere Joan, Morales-Vives, F., and Lorenzo-Seva, U. (2016). Assessing and Controlling Acquiescent Responding When Acquiescence and Content Are Related: A Comprehensive Factor-Analytic Approach. *Structural Equation Modeling*, 23(5), 713–725. <https://doi.org/10.1080/10705511.2016.1185723>
- García-Alvarez-Coque, J.-M., Sánchez García M., López-García Usach T. (2013). Territory and innovation behaviour in agri-food firms: does rurality matter? *New Medit*, vol 12, n.3, pp. 2-10

- Garcia-Alvarez-Coque, J.-M., Roig-Tierno, N., Sanchez-Garcia, M., and Mas-Verdu, F. (2020a). Knowledge Drivers, Business Collaboration and Competitiveness in Rural and Urban Regions. *Social Indicators Research*, 1–19. <https://doi.org/10.1007/s11205-020-02478-6>
- Garcia-Alvarez-Coque, J.-M., Saini, E., Esteban-Rodrigo, E., and Mas-Verdu, F. (2020b). Governance of knowledge and innovation in the Ibero-American agri-food system. *Spanish Journal of Agricultural Research*, 18(4), e0112. <https://doi.org/10.5424/sjar/2020184-16883>
- Geels, F. W. (2004). From sectoral systems of innovation to socio-technical systems Insights about dynamics and change from sociology and institutional theory. *Research Policy*, 33, 897–920. <https://doi.org/10.1016/j.respol.2004.01.015>
- Germundsson, L. B., Augustinsson, S., and Lidén, A. (2020). Collaboration in the making-towards a practice-based approach to university innovation intermediary organisations. *Sustainability (Switzerland)*, 12(12). <https://doi.org/10.3390/su12125142>
- Gibson, T. O., Morrow, J. A., and Rocconi, L. M. (2020). A Modernized Heuristic Approach to Robust Exploratory Factor Analysis. *The Quantitative Methods for Psychology*, 16(4), 295–307. <https://doi.org/10.20982/tqmp.16.4.p295>
- Gómez, W. A., Aranda-Camacho, Y., and Fuentes, J. C. B. (2020). Analytical model to assess the functionality of small farmers' organizations. *Economia Agraria y Recursos Naturales*, 20(1), 7–35. <https://doi.org/10.7201/earn.2020.01.01>
- Haering, A. M. (2013). Implementation of the “European Innovation Partnership-Agricultural Productivity and Sustainability (EIP)” on the regional level-an example from North-Eastern Germany. OSIRIS-Optimierung von Multi-Akteurs-Projekten sowie EIP-Agri-Gruppen und-Netzwerken. B. In *Rural Development*. <https://www.researchgate.net/publication/265301017>
- Hermans, F., Geerling-Eiff, F., Potters, J., and Klerkx, L. (2019). Public-private partnerships as systemic agricultural innovation policy instruments – Assessing their contribution to innovation system function dynamics. *NJAS - Wageningen Journal of Life Sciences*, 88, 76–95. <https://doi.org/10.1016/j.njas.2018.10.001>
- Hermans, F., Klerkx, L., and Roep, D. (2015). Structural Conditions for Collaboration and Learning in Innovation Networks: Using an Innovation System Performance Lens to Analyse Agricultural Knowledge Systems. *Journal of Agricultural Education and Extension*, 21(1), 35–54. <https://doi.org/10.1080/1389224X.2014.991113>
- Hoffmann, F., Beatriz, J., Iglesia, G., and Liporace, M. F. (2013). Polychoric and tetrachoric correlations in exploratory and confirmatory factorial studies. *Ciencias Psicológicas*, 7(2), 151–164.

- Howells, J. (2006). Intermediation and the role of intermediaries in innovation. *Research Policy*, 35(5), 715–728. <https://doi.org/10.1016/j.respol.2006.03.005>
- Jacobsson, S., and Johnson, A. (2000). The diffusion of renewable energy technology: An analytical framework and key issues for research. *Energy Policy*, 28(9), 625–640. [https://doi.org/10.1016/S0301-4215\(00\)00041-0](https://doi.org/10.1016/S0301-4215(00)00041-0)
- Kanda, W., Río, P. del, Hjelm, O., and Bienkowska, D. (2019). A technological innovation systems approach to analyse the roles of intermediaries in eco-innovation. *Journal of Cleaner Production*, 227, 1136–1148. <https://doi.org/10.1016/j.jclepro.2019.04.230>
- Kilelu, C. W., Klerkx, L., and Leeuwis, C. (2013). Unravelling the role of innovation platforms in supporting co-evolution of innovation: Contributions and tensions in a smallholder dairy development programme. *Agricultural Systems*, 118, 65–77. <https://doi.org/10.1016/j.agsy.2013.03.003>
- Kilelu, C. W., Klerkx, L., Leeuwis, C., and Hall, A. (2011). Beyond knowledge brokering: an exploratory study on innovation intermediaries in an evolving smallholder agricultural system in Kenya. *Knowledge Management for Development Journal*, 7(1), 84–108. <https://doi.org/10.1080/19474199.2011.593859>
- Kivimaa, P., Boon, W., Hyysalo, S., and Klerkx, L. (2019). Towards a typology of intermediaries in sustainability transitions: A systematic review and a research agenda. *Research Policy*, 48(4), 1062–1075. <https://doi.org/10.1016/j.respol.2018.10.006>
- Klerkx, L., and Gildemacher, P. (2012). The role of innovation brokers in the agricultural innovation system. In *Improving Agricultural Knowledge and Innovation Systems* (pp. 237–245). OECD. <https://doi.org/10.1787/9789264167445-19-en>
- Klerkx, Laurens, and Leeuwis, C. (2008a). Balancing multiple interests: Embedding innovation intermediation in the agricultural knowledge infrastructure. *Technovation*, 28, 364–378. <https://doi.org/10.1016/j.technovation.2007.05.005>
- Klerkx, Laurens, and Leeuwis, C. (2008b). Matching demand and supply in the agricultural knowledge infrastructure: Experiences with innovation intermediaries. *Food Policy*, 33(3), 260–276. <https://doi.org/10.1016/j.foodpol.2007.10.001>
- Klerkx, Laurens, and Leeuwis, C. (2009). Establishment and embedding of innovation brokers at different innovation system levels: Insights from the Dutch agricultural sector. *Technological Forecasting and Social Change*, 76(6), 849–860. <https://doi.org/10.1016/j.techfore.2008.10.001>
- Klerkx, Laurens, Schut, M., Leeuwis, C., and Kilelu, C. (2012). Advances in knowledge brokering in the agricultural sector: Towards innovation system facilitation. *IDS Bulletin*, 43(5), 53–60. <https://doi.org/10.1111/j.1759-5436.2012.00363.x>

- Klerkx, Laurens, van Mierlo, B., and Leeuwis, C. (2012). Evolution of systems approaches to agricultural innovation: Concepts, analysis and interventions. In *Farming Systems Research into the 21st Century: The New Dynamic* (pp. 457–483). Springer Netherlands. https://doi.org/10.1007/978-94-007-4503-2_20
- Knickel, K., Brunori, G., Rand, S., and Proost, J. (2009). Towards a Better Conceptual Framework for Innovation Processes in Agriculture and Rural Development: From Linear Models to Systemic Approaches. *The Journal of Agricultural Education and Extension*, 15(2), 131–146. <https://doi.org/10.1080/13892240902909064>
- Knotter, S., Kretz, D., and Zeqo, K. (2019). *Operational Groups Assessment 2018*. https://ec.europa.eu/eip/agriculture/sites/agri-eip/files/eip-agri_operational_groups_assessment_report_2018.pdf
- Kristjanson, P., Reid, R. S., Dickson, N., Clark, W. C., Romney, D., Puskur, R., MacMillan, S., and Grace, D. (2009). Linking international agricultural research knowledge with action for sustainable development. In *Proceedings of the National Academy of Sciences of the United States of America* (Vol. 106, Issue 13). <https://doi.org/10.1073/pnas.0807414106>
- Kuokkanen, A., Mikkilä, M., Kahiluoto, H., Kuisma, M., and Linnanen, L. (2016). Not only peasants' issue: Stakeholders' perceptions of failures inhibiting system innovation in nutrient economy. *Environmental Innovation and Societal Transitions*, 20, 75–85. <https://doi.org/10.1016/j.eist.2015.11.001>
- Laursen, K., and Salter, A. J. (2014). The paradox of openness: Appropriability, external search and collaboration. *Research Policy*, 43(5), 867–878. <https://doi.org/10.1016/j.respol.2013.10.004>
- Leeuwis, C., and Aarts, N. (2010). *Rethinking communication in innovation processes: creating space for change in complex systems*.
- Lema, R., Rabellotti, R., and Gehl Sampath, P. (2018). Innovation Trajectories in Developing Countries: Co-evolution of Global Value Chains and Innovation Systems. *The European Journal of Development Research*, 30(3), 345–363. <https://doi.org/10.1057/s41287-018-0149-0>
- Lloret-Segura, S., Ferreres-Traver, A., Hernández-Baeza, A., and Tomás-Marco, I. (2014). El análisis factorial exploratorio de los ítems: Una guía práctica, revisada y actualizada. *Anales de Psicología*, 30(3), 1151–1169. <https://doi.org/10.6018/analesps.30.3.199361>
- Maghni B., Oukaci K. (2018). Sources of Innovation in Family Olive Farms: The Case of Bejaia Province in Algeria. *New Medit n. 1*, pp.23-35
- Mavrou, I. (2015). Análisis factorial exploratorio: Cuestiones conceptuales y metodológicas Exploratory factor analysis: Conceptual and methodological issues. *Revista Nebrija de Lingüística Aplicada*, 19. <https://revistas.nebrija.com/revista->

linguistica/issue/view/25

- Miranda García, M., Gallardo-Cobos, R., & Sánchez-Zamora, P. (2020). The Leader Methodology and rural depopulation: The case of the Sierra Grande-Tierra de Barros county (Badajoz). *Economía Agraria y Recursos Naturales - Agricultural and Resource Economics*, 19(2), 09-28. doi:<https://doi.org/10.7201/earn.2019.02.01>
- Mulgan, G. (2006). The process of social innovation. *Innovations: Technology, Governance, Globalization*, 1(2), 145–162.
- Oliveira, M. de F., da Silva, F. G., Ferreira, S., Teixeira, M., Damásio, H., Ferreira, A. D., and Gonçalves, J. M. (2019). Innovations in sustainable agriculture: Case study of Lis Valley Irrigation District, Portugal. *Sustainability (Switzerland)*, 11(2). <https://doi.org/10.3390/su11020331>
- Pigford, A. A. E., Hickey, G. M., and Klerkx, L. (2018). Beyond agricultural innovation systems? Exploring an agricultural innovation ecosystems approach for niche design and development in sustainability transitions. *Agricultural Systems*, 164, 116–121. <https://doi.org/10.1016/j.agsy.2018.04.007>
- Piñeiro, V., Martínez-Gómez, V., Meliá-Martí, E., García-Alvarez-Coque, J. M. (2021). Drivers of joint cropland management strategies in agri-food cooperatives. *Journal of Rural Studies*, 84, 162-173. <https://doi.org/10.1016/j.jrurstud.2021.04.003>
- Polzin, F., von Flotow, P., and Klerkx, L. (2016). Addressing barriers to eco-innovation: Exploring the finance mobilisation functions of institutional innovation intermediaries. *Technological Forecasting and Social Change*, 103, 34–46. <https://doi.org/10.1016/j.techfore.2015.10.001>
- Pound, B., and Conroy, C. (2017). The Innovation Systems Approach to Agricultural Research and Development. In *Agricultural Systems: Agroecology and Rural Innovation for Development: Second Edition* (pp. 371–405). Elsevier Inc. <https://doi.org/10.1016/B978-0-12-802070-8.00011-6>
- Smits, R., and Kuhlmann, S. (2004). The rise of systemic instruments in innovation policy. *International Journal of Foresight and Innovation Policy*, 1(1–2), 4–32. <https://doi.org/10.1504/ijfip.2004.004621>
- Sutherland, L. A., Madureira, L., Dirimanova, V., Bogusz, M., Kania, J., Vinogradnik, K., Creaney, R., Duckett, D., Koehnen, T., and Knierim, A. (2017). New knowledge networks of small-scale farmers in Europe's periphery. *Land Use Policy*, 63, 428–439. <https://doi.org/10.1016/j.landusepol.2017.01.028>
- Tisenkopfs, T., Kunda, I., šūmane, S., Brunori, G., Klerkx, L., and Moschitz, H. (2015). Learning and Innovation in Agriculture and Rural Development: The Use of the Concepts of Boundary Work and Boundary Objects. *Journal of Agricultural Education and Extension*, 21(1), 13–33.

<https://doi.org/10.1080/1389224X.2014.991115>

Tropical Agriculture Platform. (2016). *Common Framework on Capacity Development for Agricultural Innovation Systems: Conceptual Background* (Issue January). CAB International.

Turner, J. A., Klerkx, L., White, T., Nelson, T., Everett-Hincks, J., Mackay, A., and Botha, N. (2017). Unpacking systemic innovation capacity as strategic ambidexterity: How projects dynamically configure capabilities for agricultural innovation. *Land Use Policy*, 68, 503–523. <https://doi.org/10.1016/j.landusepol.2017.07.054>

van Lente, H., Hekkert, M., Smits, R., and van Waveren, B. (2003). Roles of Systemic Intermediaries in Transition Processes. *International Journal of Innovation Management*, 07(03), 247–279. <https://doi.org/10.1142/s1363919603000817>

**Chapter 4. Drivers of joint
cropland management strategies in agri-
food cooperatives**

Chapter 4

Drivers of joint cropland management strategies in agri-food cooperatives

“Cooperation is the thorough conviction that nobody can get there unless everybody gets there.”

Virginia Burden Tower

Authors: Piñeiro, Verónica; Martinez-Gomez, Victor; Meliá-Martí, Elena; Garcia-Alvarez-Coque, Jose-Maria

Published in: Journal of Rural Studies, Volume 84, May 2021,
Pages 162-173

Published online: 28 September 2021

JCR: Q1 – SJR: Q1

DOI: 10.1016/j.jrurstud.2021.04.003



Abstract

In several Spanish regions, collective action through production and marketing cooperatives has traditionally concentrated the food supply of small and medium-sized farms. However, many cooperatives are threatened by the risk of abandonment of members' cropland, which reduces their sourcing capacity. In this context, joint cropland management initiatives have become a useful form of social and organizational innovation. This research's contribution is twofold: it examines the relevance of some drivers of this organizational innovation, and it determines the cooperative characteristics or combinations of characteristics that can sufficiently explain the adoption of a joint cropland management strategy. Some cooperatives' features have been a priori identified as related to the achievement of joint cropland initiatives: economic size, social innovation, innovative behavior, and collaborative orientation. The study is mainly based on data from a cooperatives survey, and fuzzy set Qualitative Comparative Analysis (fsQCA) methodology has been used. The analysis has been completed by surveying cooperatives' managers about their opinions on a joint cropland management strategy's main advantages and drivers. Results indicate that social and economic innovation, size, and propensity to cooperate with other cooperatives are key factors that help create a cooperative profile capable of tackling the challenge of land abandonment and the consequent loss of production.

Keywords: social innovation - land abandonment - fsQCA - agri-food cooperatives – joint cropland management

4.1 Introduction

Previous research has underlined the role of agricultural cooperatives as key agents in rural development, especially useful when farmers face high transaction costs for marketing products, gaining economies of scale, and achieving bargaining power (Ortega et al., 2019; Kumar et al., 2018; Ma et al., 2018b, 2018a; Arnalte et al., 2013; Bijman et al., 2012; Valentinov, 2007; Hendrikse & Bijman, 2002). Some authors report how certain cooperatives are also engaged in innovative strategies to strengthen rural economies together with other local actors (Manda et al., 2020; Fonte and Cucco, 2017; Tregear & Cooper, 2016; Altman, 2015; Ortiz-Miranda et al., 2010;). Our research explores the drivers of one strategy that agri-food cooperatives can follow to face the risk of land abandonment: joint cropland management.

Land abandonment is currently a challenge in Europe (Lasanta et al., 2017). In Spain, for example, 2.4 million hectares of land ceased to be cultivated in the period between the last two agricultural censuses (1999 and 2009). This area corresponds to more than 9% of Spain's utilized agricultural area (UAA), according to the Spanish National Institute of Statistics (INE). While several interrelated reasons are underlying this phenomenon, land abandonment is a concern in certain regions with a large proportion of

smallholdings and where land fragmentation is an issue (Terres et al., 2015; Keenleyside and Tucker, 2010).

According to data from the survey on the structure of agricultural holdings carried out by the INE (Instituto Nacional de Estadística, 2016), 50% of the holdings have an area of 5 hectares or less, with the most common size of holding in Spain (mode) being 1.48 hectares UAA. These data reveal the prominent small-scale nature of Spanish farms. Smallholders are especially sensitive to market pressures on cropland profitability. The problem is particularly acute in the case of permanent crops acting as fixed assets, such as is the case with citrus orchards, vineyards, and other fruits, which are primarily cultivated in the Mediterranean areas of Spain. Reduced land mobility is also part of this backdrop. Many older landowners are reluctant to sell or lease their farmland and rarely find anyone in their own family to continue farming. Traditional structural policies have attempted to consolidate farmland through the aggregation of scattered production units. However, transaction costs related to farmland exchanges are significant.

Literature has suggested different strategies to reduce farmland/cropland abandonment, such as establishing cooperatives in rural villages (Ma and Zhu, 2020), improving Internet use of farmers (Deng et al., 2019), and reducing land fragmentation (Sikor et al., 2009). In the present paper, we address an emerging strategy, which refers to existing agri-food cooperatives that take charge of managing land plots at risk to be abandoned, often due to the lack of generational renewal.

In the Spanish Mediterranean region, collective action through production and marketing cooperatives has traditionally helped concentrate the supply of small and medium-scaled farms (Ajates Gonzalez, 2017; Meliá-Martí et al., 2015; Montegut et al., 2011). Spain is one of the European countries with the highest number of agri-food cooperatives (over 3,500 in 2019), many of them with structural problems due to their small size. The generational renewal challenge in Spanish agri-food cooperatives is consistent with the one observed in many farm holders in Spain, where the proportion of holders below 40 years is 8.6%, (10.7% in the EU) according to the European Commission (2020). As farms disappear without generational renewal and their land is no longer cultivated, many marketing cooperatives find themselves in an awkward position. The lost production volume hinders cooperatives' role as aggregators of supply and makes it difficult for them to meet market requirements. As volumes fall, the average fixed costs of marketing cooperatives rise, undermining their competitive position, especially for small-scale cooperatives. As a result, some cooperatives enter a vicious circle of production and membership losses that eventually force them to close.

The grouping of plots for joint cultivation is a recent strategy adopted by marketing cooperatives to deal with this reality, especially useful for small-scale farming, and can be considered a form of social innovation and collective entrepreneurship (Cook & Plunkett, 2006). One significant advantage of such strategy lies in the fact that it does not necessarily change cooperatives members' land ownership, which lowers the transaction costs of the improvement in farm structures.

Through this strategy, collaboration between smallholders can make it possible to efficiently address the production and management of some crops, as shown by studies in the regions of Andalusia, Catalonia and Valencia carried out by Colombo & Perujo-Villanueva (2017), Tudela-Marco & Garcia-Alvarez-Coque (2017), and Parcerisas (2015). Joint cropland management by marketing cooperatives enables an increase in farmers' incomes through cost reductions achieved via economies of scale and more professional management.

In this paper, the main research aims to identify the economic and social attributes, or combinations thereof, that characterize a cooperative profile capable of undertaking a joint cropland management strategy. The contribution of this research is twofold. First, based on a survey administered to cooperatives in Spanish rural areas, it examines the relevance of specific drivers of this type of social innovation; and second, it proposes a framework to determine which aspects, largely related to the cooperatives' social capital, need to be strengthened in farming cooperatives interested in carrying out a joint cropland management strategy.

This paper is structured as follows: Section 2 introduces the conceptual framework of joint cropland management and social innovation, and we describe the main drivers of joint cropland management strategies. Section 3 introduces the data collection and methods used in our study. The analysis is mainly based on a cooperatives survey, and the methodology used is a fuzzy set Qualitative Comparative Analysis (fsQCA). Section 4 presents the fsQCA findings and possible pathways for joint cropland management, considering the relevance of certain characteristics, such as the membership's age, the existence of open and pluralistic governance, the cooperative's innovative behavior, the cooperation among cooperatives, and the cooperative's size. The analysis is completed by consulting the surveyed cooperatives' managers for their opinion on joint cropland management's main advantages and limitations. Finally, the main conclusions, implications, limitations, and areas of further research are presented.

4.2 Conceptual framework

The present study focuses on agri-food marketing cooperatives. They sell members' production and provide common supplies and services that improve cooperative members' production and marketing, who usually own the cultivated land. Tudela-Marco & Garcia-Alvarez-Coque (2017) described a noteworthy example of a marketing cooperative in Spain that has attempted consolidation through joint cropland management, though there is a lack of research identifying this practice's key social drivers. We start the conceptual discussion by considering a joint cropland management strategy as a kind of social innovation because cultivating their members' land has not been, until recently, a service provided by marketing cooperatives in Spain.

New models of land governance, through formal and informal agreements based on trust, can be considered a form of social innovation (Newell & Swan, 2000). As we focus on

cooperatives as a kind of business, we consider social innovation as the collective capacity of a firm to innovate, learn, and adapt (Mc Elroy, 2002), to share knowledge (Phillips et al., 2015), and to collectively engage in purposeful actions and reflexively monitor their outcomes (Cajaiba-Santana, 2014). Unlike product and process innovations, social innovation is not only about introducing new types of production or exploiting a new market space; it also concerns new ways of fulfilling needs in terms of giving people a role in production (Spear, 2011) and, as in our case, to conceptualize the precise nature of the problem that needs to be addressed collectively (Spear, 2011; Mulgan, 2006). This characteristic implies that social innovation is supported by a significant social capital level, highly relevant for cooperative organizational formulas, such as joint cropland management.

Social capital, entrepreneurship, and the search for efficiency are concepts that help to understand why some cooperatives may undertake innovation strategies. Nilsson et al. (2012) highlight that social capital is enhanced by the cooperative model itself, with its principles, values, ownership, and corporate purpose (Ruostesaari & Troberg, 2016). More specifically, Takahashi et al. (2018) underline the relevance of social capital in rural communities for successful coordination leading to cropland consolidation projects. In this context, social capital (Tregear & Cooper, 2016; Ostrom & Ahn, 2003) is a useful concept to reflect landowners' and farmers' confidence about investing in collective actions. The literature presents three types of social capital: bonding, which describes the development of local relationship structures within a territory or organization; bridging, which is the social capital that is established between territories, groups, or organizations; and finally, linking, which refers to hierarchical links among institutional actors (Cofré-Bravo et al., 2019; King et al., 2019; Löwe et al., 2019; Ruiu et al., 2017; Jakobsen and Lorentzen, 2015; Titeca and Vervisch, 2008; Widmalm, 2005; Putnam, 2000). All three types are relevant for building trust in joint cropland management schemes, as the governance of such schemes may rely on the organization itself or its relations with other organizations, i.e., other cooperatives, local councils, and rural administration. Land management operations require collective action, which is sometimes limited by moral hazards as well as agency problems (Álvarez-Pérez et al., 2000). Cooperatives often fail to attract landowners to lease their land for joint cultivation, mostly due to what Rothstein (2005) calls a 'social trap' caused by a lack of mutual trust. Once a group suffers from persistent mistrust, it becomes difficult to overturn the situation until some event or organizational innovation re-establishes trust or improves the organization's social capital. In these situations, social capital is crucial to encourage the adoption of innovations by farmers, particularly in terms of assessing their costs and benefits (Steenwerth et al., 2014). Strengthening social capital in the network of landowners and land users is one of the motivations for undertaking collective initiatives aimed at land consolidation (Burrell & Cook, 2010).

Developing social innovations as local solutions require the cooperatives to behave as social entrepreneurs. The term describes different kinds of community ventures, voluntary, public, or private, that address social issues (Dufays & Huybrechts, 2014; Phillips,

2011; Cook and Plunkett, 2006). These ventures can arise through the pooling of resources by similar actors or organizations with different but complementary capacities or knowledge (Montgomery et al., 2012). Through a collective social enterprise, it is possible to take advantage of existing resources, create new ones, and generate institutional arrangements that support these changes. Social enterprises obtain their resources through social engagement, in which resources are exchanged through a collaborative process that supports the development and growth of individuals and communities (Meyskens et al., 2010). Therefore, social capital is favoring social entrepreneurship. A cooperative that adopts a joint cropland management strategy can be considered a form of collective (intra-organizational) entrepreneurship, as multiple individuals are collaborating to establish organizations operated for mutual benefit.

The search for efficiency is also moving cooperatives to undertake farmland consolidation projects. Farmland mobility is slow in many rural areas, partly because of farmland exchanges' transaction costs. Joint cropland management does not change the land's ownership but allows the cooperatives to control the cultivation process. Letting or leasing the land to the cooperative can minimize transaction costs that avoid a shift in the land ownership, so parties involved can find an efficient combination of contracting and ownership, in the sense of Hansmann (1996). We have considered joint cropland management as a "collective use of land" because the cooperative is not an external agent, but instead, it belongs to its members -among them, the landowners leasing the land- and the ultimate coordination corresponds to them, according to the cooperative governance rules. Joint cropland management offers a way to consolidate land plots into larger agricultural units, facilitating their efficient management (Takahashi et al., 2018). This, in regions or countries with a high fragmentation of the land property and smallholding, such as Spain, represents an opportunity to revitalize the economy of rural areas. As a form of collective entrepreneurship, joint cropland management increases intra-firm efficiency (Papadimitri et al., 2020). A joint management project can be successful if it can reduce transaction, agency, and collective decision-making costs. In some cases, this can be partly achieved through multi-stakeholder initiatives, involving several cooperatives or other actors such as local councils, linked to forms of bonding and bridging social capital.

Our interest is about understanding the characteristics of the agri-food cooperatives that undertake joint cropland management strategies. As we do not have sufficient published knowledge on drivers of such strategies, we need to build a priori propositions. To do so, we have combined the experts' consultation with the analysis of similarities found in the literature. Thus, a multi-actor focus group was created in 2018 with representatives of one marketing cooperative (Rural San Vicent); a federated cooperative, Anecoop, which integrates 69 marketing cooperatives as members; and Cooperativas Agroalimentarias, the representative organization of Spanish agricultural cooperatives. The intention was to identify drivers associated with those cooperatives that start joint land management initiatives, that could be subsequently used in a direct survey. The drivers identified in the focus group are summarized in Table 1 that describes the drivers, their underlying

advantages for undertaking joint cropland strategies, and their relationship with the three main concepts discussed before. The drivers are further described in this section. Some of these identified drivers were related to the need for generational renewal in the cooperative membership, the firm's degree of innovativeness, and the pluralistic governance. Firm's dimension and willingness to collaborate with other cooperatives were also identified due to their influence on transaction costs, trust, and the delegation of land management planning capacity. The focus group also acknowledged that new legislation supporting flexible ways of land consolidation could also favor joint cropland initiatives¹. As a complementary step, references to these drivers in the literature were searched, and a priori propositions were established.

Table 4.1. Underlying advantages of drivers of joint land management strategies emerging from the focus group

| Related advantages for each social and economic dimension | | | |
|---|--|------------------------------|--|
| Drivers | Social Capital | Social entrepreneurship | Search for efficiency |
| Innovative orientation | Innovation capacity enhanced by social capital | Willingness to undertake | Increase productivity, competitive advantage, and returns |
| Pluralistic governance | Open to participation | Open to new projects | Improve decision-making and performance |
| Generational renewal | | Need to innovate | Need to reduce transaction costs of structural improvement |
| Cooperation with other organizations | Institutional support | Collaboration for innovation | Flexibility to gain dimension |
| Size | | | Resource availability decision-making costs |

- **Size**

In general terms, size in agricultural cooperatives has generally been signaled as a facilitator of competitive advantage, bringing both cost reductions associated with economies of scale and differentiation through innovation (Arcas et al.,2011; Bijman & Iliopoulos,

¹ The existing farm structure regulations in Spain do not support joint cropland cultivation cooperative initiatives, with the exception of the recently passed Farm Structures' Law in Valencia Region (Law 5/2019).

2014). In the case of agri-food marketing cooperatives, securing product supply can be a crucial motivation for joint cropland management projects in order to achieve profitability thresholds. In this sense, land abandonment of the activity by members generates a supply problem that can undoubtedly trigger these processes². There is no consensus about the size effect on members' attitudes towards cooperatives. Burt & Wirth (1990) argue state that size does not explain members' behavior towards cooperatives. On the other hand, Ruef (2010) and Montegut et al. (2011) state that size can be a crucial feature of entrepreneurial groups because it affects their internal cohesion and also the level of entrepreneurial effort by participants. Size, referred to the number of members, is perceived by some authors as a dimension of member heterogeneity that affects the costs and effectiveness of collective governance (Banerjee et al., 2001; Bijman, 2005; Hansmann, 1996; Hanf and Schweickert, 2007; Iliopoulos and Cook, 1999; Iliopoulos and Valentinov, 2018; Nilsson, 2018). Moreover, it can be more difficult for members to understand some operations in some very large cooperatives, leading to them becoming dissatisfied and uninvolved and mistrustful of the board's guidelines. This can be reflected in less face-to-face interaction between members and leaders, implying less involvement among members and more difficulties in solving collective action problems (Nilsson et al., 2012). Furthermore, small and medium-sized cooperatives may be more flexible, which could facilitate more entrepreneurial behavior even when they have limited resources. Besides, some of these small and medium-sized cooperatives have lower bureaucracy levels and learn continuously in the competitive market (Real et al., 2014).

Nevertheless, joint land management requires an organizational capacity that is not always available in small cooperatives, enjoying larger cooperatives a crucial advantage in that they have more human and financial resources and are therefore more likely to be pioneering, innovative, and risk-tolerant than their smaller counterparts (Real et al., 2014). Consequently, we hypothesize that in larger cooperatives, the benefits of greater managerial capacities, innovation, efficiency, and other economies of size outweigh potential losses in the decision-making processes. We thus raise the following:

Proposition 1: *Larger size cooperatives have advantages for carrying out joint land management strategies.*

▪ **Pluralistic governance**

For cooperatives, the Board of Directors (BD) is the most important means that members have of monitoring managerial behavior (Österberg & Nilsson, 2009). Several scholars have studied the governance of cooperatives from different perspectives: through their ownership rights and organizational models (Grashius, 2019; Meliá Martí et al., 2018; Nilsson, 2018; Chaddad & Iliopoulos, 2013; van Bakkum & Bijman, 2006; Chaddad & Cook, 2004); innovations in the internal governance (Bijman et al., 2014); members

² Other solutions such as cooperatives purchasing from non-members are also implemented but their discussion and limitations is out of the scope of this paper.

participation and trust (Barraud-Didier et al., 2012; Öesterberg & Nilsson, 2009). The composition of the BD and particularly its diversity influences the decision-making and performance of the firms. Following decision-making theory, diversity increases firm-level production as diversity brings more perspectives and knowledge, ensuring that no single perspective or set of knowledge is privileged to the exclusion of others (Bae & Skaggs, 2019; Marcel et al., 2010). Firms can integrate specialized knowledge of multiple individuals through socialization, and a more pluralistic participation of social groups that view a multi-stakeholder alliance as a way of pursuing social and environmental goals can be a motivation for collective entrepreneurship (Ruostesaari & Troberg, 2016; Burrell & Cook, 2010;).

It is not easy to find indicators of pluralistic governance in cooperatives. A pluralistic BD should be one in which a variety of categories of members are represented. For years there has been concern about low levels of member participation and the lack of involvement of certain groups in BD of cooperatives —such as women and young people— to bring in different stakeholder perspectives (Cornforth, 2004). In this study, we have opted to consider that a BD open to young and women's participation would indicate an open perspective and higher propensity for change. The age of board members influences decision-making. Older, male, and specialized farmers are more likely to participate in decision-making processes than farmers with few resources and those dissimilar in terms of age, gender, and location (Mwambi et al., 2020). It would be expected that a BD with older members and members approaching retirement age would influence the decision-making towards less risky choices (Fulton & Giannakas, 2013). The inclusion of young members on the board of directors offers a broader perspective and may encourage board development and learning, which may in turn foster creative, innovative ideas and enrich strategic decision-making (Song et al., 2020; Galia et al., 2015).

Regarding gender diversity, the need for organizations that incorporate the advantages of a plurality of human resources should be an objective in itself that would enrich the way of managing companies (Berenguer Contrí et al., 2005). According to International Labour Organization (ILO) and the International Cooperative Alliance (ICA), in every region of the world, women's participation in both membership and leadership in cooperatives is significantly below average (Schincariol & Mcmurtry, 2005). In Spanish agri-food cooperatives, although 26% of cooperative members are women, only 7.4% of them are on the board, and only 3.6% serve as a chair of the board (Cooperativas Agroalimentarias de España, 2020). Consequently, opening up the board of directors to incorporating young people and women brings complementary new approaches to management.

Proposition 2: *Cooperatives that promote diversity on their boards, especially involving women and young people, have advantages for carrying out joint cropland projects.*

- **Age of the membership**

There are two contradictory processes involved in influencing the average age of the membership on the likelihood of a cooperative undertaking joint cropland management initiatives. The first process concerns the more innovative or entrepreneurial character of young membership. The second is the relationship between the landowners' age and the probability of abandoning farming, and therefore, their willingness to supply land to the joint initiative.

As for the first type of influence, in a study of Spanish olive oil cooperatives (Montegut et al., 2011), generational conflicts were found between younger and older members who had different views on the cooperative activity. Such differences can be found in educational level, farm size, technology, geographical location, and social networks (Cofré-Bravo et al., 2019; Montegut et al., 2011; Hakelius, 1999). Hakelius (1999) indicates that young farmers can be less committed to the cooperative and more open to trade with other customers, avoiding cooperative exclusivity. On the contrary, other studies in Hungary (Baranyai et al., 2018) and in Kosovo (Muriqi et al., 2019) showed that younger and more educated members have a more positive attitude towards cooperation.

As for young cooperative members' propensity to adopt innovative formulas such as the one understudy, previous research is inconclusive. While young farmers are considered to be more innovative, entrepreneurial, and resilient (Hamilton et al., 2015), other works come to different conclusions. In a study of 110 young farmers in a rural area of northern Greece, Koutsou et al. (2014) found that most of them remained trapped in the old structures and were reluctant to adopt innovations, establish collective actions and receive training. Ciburiene (2015), in a study developed in Lithuania, concluded that young farmers having a lower level of education can cause problems when implementing innovations or new organizational forms.

Besides, a more senior membership means that members face the generational renewal problem. This leads to the second type of influence, which depends on older landholders' propensity to abandon farming. This influence may be critical, as senior landowners can easily delegate the land plots to the cooperative.

Proposition 3: *Cooperatives with a higher proportion of senior farmers or a lower proportion of young farmers in their membership may be more willing to adopt joint land management strategies.*

- **Innovative orientation**

Cooperatives act "entrepreneurially" when the business activity (innovation, new products, new markets, among others) is seen as a collective strategy (Groot Kormelinck et al., 2019; Foreman et al., 2013; Cook & Plunkett, 2006; van Dijk & Sverrisson, 2003). In these organizations, the learning and financial capabilities and skills of involved members can have a multiplier effect and promote productive efficiency, strengthening the organization's production base (Gómez et al., 2020; Burrell & Cook, 2010).

Cooperatives can also be seen as innovation intermediaries, whose function is to coordinate and facilitate innovation processes among their members and, possibly, provide various other functions related to different aspects of innovation. Kilelu et al. (2011) found that some established organizations which initially provided more traditional extension support to smallholders have shifted their mandates and scope and have taken on a more facilitative role. Within this framework, cooperatives as innovation intermediaries can provide the necessary services to enable innovation, create ties, and secure institutional support.

Regarding land consolidation projects, they can be helpful to test or implement product or process innovations that would be difficult to develop with the current fragmentation of farms' structure. Thus, in order to scale up and commercially implement valuable product innovations (e.g., new varieties) or process innovations (e.g., organic or zero-waste farming), landholders can be encouraged to consolidate agricultural plots under centralized management

In this case, we expect that cooperatives with skills to launch innovative processes can show similar innovative behavior when promoting and managing joint management projects.

Proposition 4: *Cooperatives with a more innovative orientation have advantages for carrying out joint land management strategies.*

▪ **Cooperation among cooperatives**

A collective enterprise's success is sometimes related to the collaboration between groups of actors and organizations (Montgomery et al., 2012; Hardy & Maguire, 2008). This possibility relates to the bridging and linking aspects of social capital mentioned above. Through interactions in collaborative networks and interactive learning processes, companies can access various types of knowledge and information (Miozzo et al., 2016; Bjerke & Johansson, 2015; Baldwin & von Hippel, 2011). Interactions with research institutes, universities, and other innovation intermediaries (Tobiassen & Petersen, 2018; Lasagni, 2012) may also be favorable for business performance. Multiple actors' actions are based on inter-institutional networks, which can be thought of as strategies to define new business models (Mourdoukoutas & Papademetriou, 2002) or as ways to achieve social and environmental objectives (Grimm et al., 2013). Agricultural cooperatives can form the first envelope of collective business activity or shared cultivation (Foreman et al., 2013) that involves the consolidation of farmland, while the multi-stakeholder networks can act as a second envelope of supporting institutions.

Cooperation among cooperatives is the sixth cooperative principle of the International Cooperative Alliance (ACI, 1995), and states that cooperatives serve their members more effectively and strengthen the cooperative movement by working together through local, national, regional, and international structures. Inter-cooperative cooperation makes it possible to create networks and horizontal links between cooperatives, which

endows them with flexibility and responsiveness in dealing with change and makes it easier to achieve economies of scale (Marcuello Servós & Saz Gil, 2008).

Cooperation among cooperatives has been widely implemented in Spain (mainly through inter-cooperative agreements of different scope and federative cooperatives) as a way of responding to one of their major weaknesses, which is their small size (Arcas et al., 2019). These arrangements have allowed overcoming some of the structural and economic limitations of small cooperatives without abandoning their business model (Sánchez Pachón, 2018). Cooperation among cooperatives is also a reflection of the collaborative attitude of individual cooperatives' members.

It can be expected that more collaborative nature of both spheres (cooperative and members) can be helpful when it comes to tackling problems such as the lack of generational renewal, the exit of members, and the consequent loss of production by adopting joint land management strategies.

Proposition 5: *Cooperatives that carry out collaborative or integration actions with other cooperatives have advantages for carrying out joint land management strategies.*

4.3 Data and methodology

The primary source used to collect the data is a survey of agri-food marketing cooperatives' managers. It was sent online and was answered anonymously by cooperative managers during January 2019. A total of 49 responses were obtained, of which 35 were selected because they had filled out all the questions necessary for our analysis.

The survey was conducted with the collaboration of the leading regional cooperative associations in Spain (Cooperativas Agroalimentarias and regional federations) who were supportive to select agri-food cooperatives with a primary orientation to marketing. In terms of their geographical coverage, the study mainly focused on Spanish rural areas where the problem of land abandonment is common: 71% of the responses were from the Region of Valencia and 14% from Catalonia. Regarding the portfolio of the marketed products, all the surveyed cooperatives share a specialization on Mediterranean tree crops with about two thirds including citrus fruits and one third including other fruit and tree crops. The sample reflects a balance of sizes, with 51% having more than 500 members. Although the sample size is not representative of the entire agri-food cooperative sector in the study area (there are around 800 cooperatives specialized in fruit and vegetables in Spain), the analysis may provide useful information on the scope, motivations and characteristics of marketing cooperatives that implement joint land management schemes, in particular in Mediterranean areas where permanent crops are dominant.

Based on this survey, two analyses were performed. In the first one, some attributes were analyzed by using the fuzzy set Qualitative Comparative Analysis (fsQCA) methodology (Ragin, 2008). This methodology, used mainly in the social sciences, makes it possible

to identify a series of conditions for a given outcome to take place (Schneider & Wagemann, 2012), and it is suitable for exploratory analysis of conditions that lead an outcome in small samples. As such, it is a theory-building approach stemming from a joint analysis of cases. This methodology suits our study well as we are aiming to understand a social phenomenon. The starting point of the QCA is to assume that the phenomena that occurs has a complex causality³. Different combinations of characteristics—called routes or recipes—can give rise to the same outcome, and specific characteristics can have different effects, depending on which other characteristics they combine with (Legewie, 2013). QCA techniques and their applications are generally employed for a small or intermediate number of cases (between 10 and 50); however, QCA techniques have also been fruitfully applied in research designs with a large number of cases (Berg-Schlosser et al., 2012).

Different modalities of the QCA approach have been applied in other studies focused on the agricultural sector, aiming at shedding light on socio-economic phenomena where prior evidence is scarce or leads to inconclusive results. A common feature of these studies is the limited number of cases from which information is taken, suitable for social studies with relatively small samples (Garcia-Alvarez-Coque et al., 2020; Alama-Sabater et al., 2019; Nieto-Aleman et al., 2019). For example, Qin and Liao (2016) conducted a systematic review of 20 recent case studies on the relationships between migration and agricultural change in China. Lankoski & Thiem (2020) examined the impact of agricultural support policies on sustainable productivity in OECD countries. Florea et al. (2019) assess the conditions required for the sustainability of 20 Romanian agricultural cooperatives. Turning to collective land management, Arts & de Koning (2017) conduct a systematic cross-case comparison on community forest management to explain their performance.

The first step for the fsQCA analysis is selecting relevant recipes of conditions that lead to the expected outcome. This selection of recipes must be guided by theoretical criteria and for a relatively low number of cases (Berg-Schlosser & Meur, 2012; Schneider & Wagemann, 2010). In this study, the mix of possible causal configurations that lead to the outcome is formed by the following conditions:

- **SIZE:** has been measured by a combination of turnover and the average number of employees.
- **PLURALISTIC GOVERNANCE:** the proportion of women and young people on the board of directors,

³ fsQCA is a particular modality of the general QCA. It considers that phenomena may vary by level or degree in a continuous way, and allows simultaneously for qualitative and quantitative assessment. See Ragin (2008) for a thorough discussion.

- **YOUTH IN THE SOCIAL BASE:** the proportion of cooperative members under 40 years of age.
- **INNOVATIVE ORIENTATION:** related to the promotion of new crops (varieties or species), organic or processed products, and sustainable products and processes; and,
- **COOPERATION+:** participation of the cooperative in federative cooperatives or in other partnership formulas.

With these conditions, 32 possible recipes can be formed (25). The presence or absence of the individual cooperatives in the sets showing these conditions was determined through the fsQCA method from survey data and thresholds established by calibration. The calibration was carried out by defining fuzzy sets through criteria based on data from Cooperativas Agroalimentarias (2020). This process was performed based on the calibration and good practice procedure proposed by Basurto and Speer (2012). The outcome variable is a fuzzy one named JOINT CROPLAND MANAGEMENT, and it is based on defining the set of surveyed cooperatives that claim to engage in this practice. In summary, we are defining a set of cooperatives showing certain attributes and the outcome.

The calibration of the SIZE (Table 4.2) condition is based on a combination of the number of members and turnover, which is in line with previous research (Meliá-Martí et al., 2020; Liang & Hendrikse, 2013; Arcas et al., 2011; Hudson & Herndon, 2002). The size, in terms of average number of members and turnover, was used for the point of total ambiguity, with those who were above this average inside the set and those who were below outside the set. The average number of members in Spanish agri-food cooperatives is 316, and the average turnover is 8 million euros (Cooperativas Agroalimentarias de España, 2020). To obtain the fuzzy size value, the number of members variable was classified into three values and combined with five values of the turnover variable. From these two numerical and monetary criteria of size, we derived five classes of size fuzzy values.

Table 4.2- Calibration for Size condition

| Members variable value | Turnover variable value | Size fuzzy value | Interpretation |
|------------------------|-------------------------|------------------|--------------------------|
| 0 | 0; 0.25; 0.5; 0.75; 1 | 0 | Very small (Fully out) |
| | 0.25 | 0.25 | Small (More out than in) |
| 0.5 | 0.5 | 0.5 | Medium size (Cross-over) |
| | 0.75 or 1 | 0.75 | Big (More in than out) |
| 1 | 0.25 or 0.5 | 0.75 | Big (More in than out) |
| | 0.75 or 1 | 1 | Very big (Fully in) |

Members variable value: 0 = fewer than 100 associates, 0.5= between 101 and 500 associates; 1 = more than 501 associates. Turnover variable value: 0 = €0 a €300 thousand, 0.25 = € 301 thousand to €1 million, 0.5 = €1 million to €10 million, 0.75= €10 million to €50 million, 1 = more than €50 million.

The PLURALISTIC GOVERNANCE condition refers to whether the inclusion of women and young people on the board of directors has been promoted. The answers were YES or NO, so it is translated into a binary variable where yes=1 and no=0.

The YOUTH IN THE SOCIAL BASE (Table 4.3) condition measures the proportion of young people among the total number of members. In Spanish agri-food cooperatives, the average percentage of members under 45 years is 30% (Cooperativas Agroalimentarias de España, 2005).

Table 4.3- Calibration for youth in the social base condition.

| Percentage of members under 40 years old | Fuzzy value | Interpretation |
|--|-------------|--|
| 0-5 | 0 | Almost no members under 40 years old (fully out) |
| 5-10 | 0.166 | Very few members under the age of 40 (mostly but not fully out) |
| 10-15 | 0.333 | (More or less out) |
| 15-20 | 0.5 | Maximum ambiguity (Cross-over) |
| 20-25 | 0.666 | (More or less in) |
| 25-30 | 0.833 | Almost at the average for Spanish agri-food cooperatives (mostly but not fully in) |
| 30 or more | 1 | An average number of young members or more (fully in) |

The INNOVATIVE ORIENTATION (Table 4.4) condition arises from three possible innovations promoted by agri-food cooperatives that can be considered relevant in agricultural production: i) incorporation of new species or varieties to be marketed; ii) organic or processed products, and iii) new techniques to minimize chemical residues and excess of nutrients in the field. Each possible innovation was evaluated separately in the survey through a Likert scale where 1 represented the absence of activity linked to the field and 7 when the activity is fully incorporated in the cooperative. Of the three innovations, the one with the highest value was taken as indicative of the overall innovative orientation of the cooperative (given the comments raised in the focus group and our knowledge of the cooperatives' behavior, we consider it sufficient to have innovated in one of the three possible activities).

Table 4.4- Calibration for innovative orientation condition

| Likert scale response | Fuzzy value |
|---|--------------------------------|
| 1 (absence of innovative activities) | 0 (fully out) |
| 2 | 0.2 (mostly but not fully out) |
| 3 | 0.2 (mostly but not fully out) |
| 4 | 0.4 (More or less out) |
| 5 | 0.6 (More or less in) |
| 6 | 0.8 (mostly but not fully in) |
| 7 (one or more innovative activity fully developed) | 1 (fully in) |

The COOPERATION+ (Table 4.5) is a fuzzy variable that measures the participation of the cooperative in federative cooperatives or in other cooperatives integration formulas. The data were the survey responses to a set of questions about forms of integration or association with other cooperatives.

Table 4.5- Calibration for cooperation among cooperatives condition

| Item | Fuzzy value | Interpretation |
|--|--------------------|---|
| Has participated in fusion processes | 1 | Cooperation |
| Has entered into binding agreements in the form of commercial collaboration | 1 | Cooperation |
| Has participated in flexible collaboration formulas with other organizations | 0.67 | Some actions for cooperation |
| Has explored integration formulas that have not materialized | 0.33 | Tried but failed to achieve cooperation actions |
| Nothing at all | 0 | Did not try |

The outcome variable is a fuzzy one named JOINT CROPLAND MANAGEMENT (Table 4.6), and it is based on the actual joint land management carried out by cooperatives. For the calibration, following a fuzzy approach, "presence" was defined as indicating cases that carry out cropland grouping and "absence" those that do not perform any agronomic service for cooperative members, with intermediate cases allowed by the fuzzy definition.

Table 4.6- Calibration for the outcome condition Joint cropland management

| Item | Fuzzy value | Interpretation |
|---|-------------|--------------------------|
| direct land management plus partnership agreements with farmers | 1 | Grouping (fully in) |
| direct land management | 0.75 | One step before grouping |
| one or more agricultural services to members | 0.25 | (more out than in) |
| no specific services offered | 0 | (fully out) |

In summary, membership of the group of cooperatives that carry out joint cropland management was evaluated as follows:

$$F_s \text{ JOINT CROPLAND MANAGEMENT} = F_s [\text{SIZE, PLURALISTIC GOVERNMENT, YOUTH IN THE SOCIAL BASE, INNOVATIVE ORIENTATION, COOPERATION+}]$$

where F_s indicates the degree of membership in the fuzzy sets. It is not the coefficients of a linear function that are evaluated, but the extent to which the degree of belonging to the resulting group is associated with recipes or patterns of belonging to the groups established with the aforementioned calibration thresholds.

The recipes for joint land management strategies are selected based on consistency and coverage measures. Consistency measures the proportion of real cases that have the condition—or combination of conditions—identified as sufficient or necessary and present the outcome. According to Legewie (2013), it is equivalent to the idea of significance in statistical models. Coverage indicates the percentage of the cases presenting the desired outcome and the combination of conditions identified as necessary or sufficient. This parameter can be equated to the coefficient of determination R^2 of statistical models (the percentage of the variance that is explained by the variables). Both parameters vary between 0 and 1, with 1 being the maximum value. For practical purposes, the consistency should generally be above 0.8, with a value not less than 0.75 in any case.

The second type of analysis carried out is a qualitative study based on managers' motivation for and difficulties involved in undertaking joint cropland management. Indeed, QCA is particularly useful for combination with conventional qualitative studies

(Schneider & Wagemann, 2010). The opinions of cooperative managers were evaluated in the survey through Likert-type scales (ratings from 1 to 7). The survey asked managers about the main advantages of a cooperative when it comes to grouping and directly managing cropland plots. Empirical findings derived from the surveys broaden the theoretical analysis and the subsequent data interpretation.

4.4 Results and discussion

Of the cooperatives surveyed, 66% have a relatively large concerning their turnover and number of members (more than 500 members and more than €300 thousands of turnover). Regarding the plural governance condition, 77% of the cooperatives promote the inclusion of women and young people in the BD. All of the sample's cooperatives have less than 30% of members under 40 years of age, and 75% have less than 15% of members under 40 years of age. As regards to innovativeness, 51% of the surveyed cooperatives indicate an innovative orientation. 74% of the cooperatives have participated in different forms of inter-cooperative collaboration. 57% of the cooperatives surveyed are carrying out joint cropland management, which is implemented in different ways; 50% of them with partnership agreements with farmers, and 50% managed directly by the cooperatives. As for the rest of the cooperatives, 26% offer one or more agricultural services to their members, and 17% do not offer specific agricultural services.

Table 4.7 shows the results of fsQCA, with the retained routes expressed through logical operators: "~" means the logical operator "absence," and "*" means "and." In the present case, after running the program, the results of the complex solution and the intermediate solution had the same configurations, so we only present the intermediate solution in the Table.⁴

There are two possible routes with recipes or combinations of conditions that may be "sufficient" to achieve the grouping of plots for cultivation, with a significant consistency score—the model as a whole has a consistency score of 0.834. The logical equation indicates that the configurations that explain JOINT CROPLAND MANAGEMENT (Figure 4.1) are usually associated with the combination SIZE and PLURALISTIC GOVERNANCE as part of any recipe that exceeds the consistency threshold. Simultaneously, the absence of YOUTH IN THE SOCIAL BASE or the combination COOPERATION+ and INNOVATIVE ORIENTATION are interchangeable as routes for joint management, a finding that merits future research.

⁴The complex, parsimonious, and intermediate solutions of QCA treat "remainders" (logical causal patterns with no observed cases) differently, either excluding them (complex solution), including those which simplify the solution (parsimonious solution), or including those which simplify the solution and which are consistent with researcher-specified causal assumptions (intermediate solution). See Garson (2016).

Table 4.7- fsQCA intermediate solution for Joint Cropland Management

| Model | | |
|--|------------------------------------|----------|
| Joint Cropland Management = Fs (Size, Innovative Orientation, Pluralistic Governance, Youth in the Social Base, Inter-cooperation) | | |
| solution consistency | 0.834071 | |
| solution coverage | 0.636287 | |
| Conditions | Recipes (over consistency cut-off) | |
| | i | ii |
| Size | ● | ● |
| Pluralistic Governance | ● | ● |
| Youth in the Social Base | ○ | |
| Innovative Orientation | | ● |
| Cooperation+ | | ● |
| consistency | 0.849398 | 0.844262 |
| raw coverage | 0.594937 | 0.521519 |
| unique coverage | 0.114768 | 0.041350 |

Note: Frequency cut-off = 1; Consistency cut-off = 0.807692. Black circles '●' indicate the presence of conditions, white circles '○' indicate the absence or negation of conditions, and blank cells indicate irrelevant conditions.

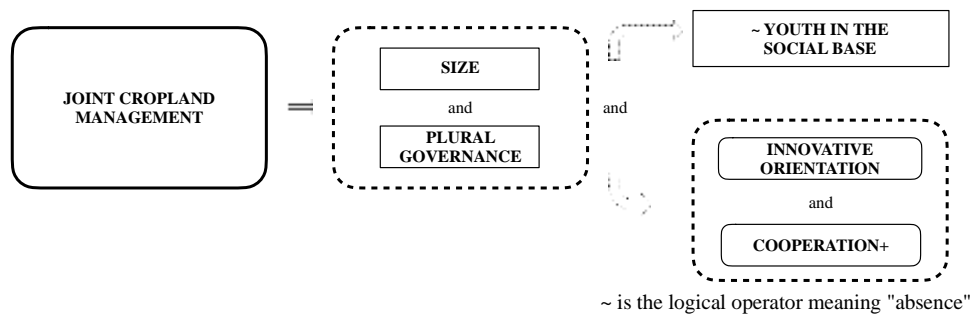
Out of the sample of 35 cooperatives studied, 20 present the outcome and, of those 20, 17 present the retained configurations. Therefore, the two selected recipes in Table 4.6 are considered a good basis for achieving the outcome. These pathways are summarized in Figure 4.1. The core part of the suggested recipes combines size with pluralistic governance. It suggests that larger cooperatives with pluralistic governance are in a favorable position to make inroads into collective cropland initiatives. This finding confirms Propositions 1 and 2. Besides, joint land management initiatives are an outcome of recipes that, in addition to the core attributes, feature one of the two following pathways (or both at the same time):

- i. the share of young members of the social base is relatively low. This result supports Proposition 3. It would suggest that one pathway to joint cropland management strategy is having an older social base. This in turn implies that the

motivation for entrepreneurship results not from the innovative nature of the social base but rather as a potential solution to abandoned plots by senior members. These farmers seem more willing to hand their plots over to the cooperative than to abandon the land. Even if younger members may be more likely to undertake new projects like this, the possible effect is masked by the large proportion of senior members.

- ii. the cooperatives are more innovative and cooperate with other cooperatives. This part of the recipe confirms Proposition 4 and 5. The condition that innovative cooperatives have advantages for carrying out joint land management underlines the remarks by Kilelu et al. (2011) on the role of cooperatives as intermediaries of innovation, with appropriate internal leadership. In turn, the pathways including cooperation among cooperatives confirm that cooperatives that overcome structural and economic limitations through cooperation with other entities are more likely to be able to face up to the current problem of land abandonment and the consequent loss of production (Arcas et al., 2019).

Figure 4.1 Logical pathways of conditions that explain joint cropland management strategies



The fsQCA allows the researcher to evaluate the necessary conditions, which are considered critical in the sense that their absence means the outcome is not achieved (Table 4.8). Our findings suggest that none of the analyzed attributes is individually necessary for the cooperatives that carry out joint cropland management strategies, as they show consistency ratios below the 0.9 consistency threshold proposed by Schneider & Wagemann (2012). The presence or absence of any of these conditions alone is not crucial for the outcome. Despite this, the presence of PLURALISTIC GOVERNANCE and the absence of YOUTH IN THE SOCIAL BASE show a higher consistency value than the other conditions and closer to the threshold.

Table 4.8 – Necessary conditions analysis.**Outcome variable: Joint Cropland Management**

| Conditions proposed | Consistency | Coverage |
|---------------------------|-----------------|----------|
| Size | 0.78481 | 0.688889 |
| ~Size | 0.405063 | 0.64 |
| Innovative Orientation | 0.759494 | 0.694445 |
| ~ Innovative Orientation | 0.407595 | 0.600746 |
| Pluralistic Governance | 0.848101 | 0.644231 |
| ~Pluralistic Governance | 0.151899 | 0.333333 |
| Youth in the Social Base | 0.278481 | 0.507692 |
| ~Youth in the Social Base | 0.835443 | 0.682759 |
| Cooperation+ | 0.780591 | 0.642361 |
| ~Cooperation+ | 0.308017 | 0.55303 |

~ is the logical operator meaning "absence."

An analysis of the cooperatives managers' opinions, included in the survey, was carried out to complement the results obtained with the fsQCA methodology. Respondents assessed, through Likert scales, the advantages of plot groupings (Figure 4.2) and were divided into two groups of cooperatives, according to whether or not they choose joint land management strategies. For both groups, recovering abandoned cropland is a significant advantage of collective action, which is consistent with the problem that many farmers lack incentives to continue cultivation. Nevertheless, it is striking that one of the least valued advantages by cooperatives that carry out joint land management is the incorporation of young professionals, which suggests that many cooperatives do not identify this as a goal. This is not entirely surprising as the social base is normally made up of senior farmers who do not see a clear future for new generations in agriculture. On the critical accompanying factors for plot grouping (Figure 4.3), managers of cooperatives that have already embarked on these joint activities attach more value to government support and the need to provide advice to cooperative members and landowners. Most interviewees are in favor of undertaking actions to promote joint land management initiatives among their members.

Figure 4.2 – Advantages of plot grouping and management by cooperatives

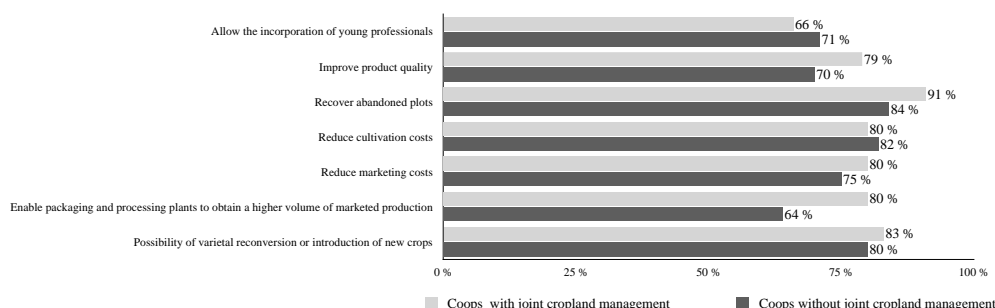
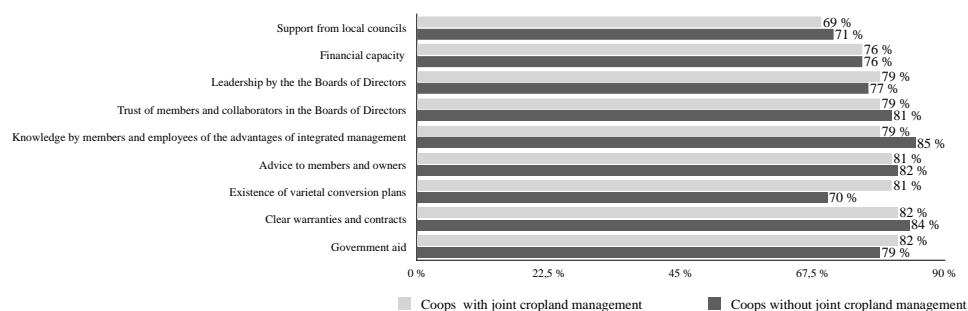


Figure 4.3 - Assessment of accompanying characteristics needed for plot grouping to be feasible



4.5 Conclusions

Although this research is exploratory given the limited size of the sample, it reveals that characteristics of the studied cooperatives, some of which are related to their social capital, define two possible pathways to make inroads into the grouping of plots: a) Larger cooperatives, with pluralistic governance and an older social base made up of senior members willing to provide their plots; b) Larger cooperatives, with pluralistic governance, which promote innovative activities and have a culture of cooperation with other cooperatives.

Social and economic innovation, size, and propensity for cooperation among cooperatives are key conditions that help create a cooperative profile capable of tackling the challenge of members' land abandonment and the consequent loss of production through cooperative management.

The size of the organization emerges as a crucial factor in enabling this form of innovation, insofar as the grouping of land requires a capacity and management ability that are less commonly found in small cooperatives. This result is in line with the innovation-enhancing effect of size found in literature. Furthermore, given that this practice has only

recently been incorporated in many cooperatives, it is more likely to be successfully implemented in large cooperatives, given their greater social base. It should be borne in mind that in cooperatives, the flow of information among members is vital; as such, the success of some projects depends on a few members' commitment to them, which prompts other members to follow their lead. Once again, the fact that large cooperatives have more members makes this option more feasible.

Similarly, diversity in the board of directors appears as another key element in all recipes. This finding consolidates postulates already proposed in the literature, such as the idea that board diversity improves companies' strategic decision-making (in this case, the decision concerning how to handle land abandonment to prevent the consequent loss of production for the cooperative). Pluralistic governance enriches the perspectives and alternatives discussed when addressing problems and challenges (Tyson, 2003), and improves the connection with the organization's relevant stakeholders (Lückerath-Rovers, 2013).

Regarding the presence of an older social base as a key factor for joint land management, it raises the debate on young membership. To our understanding from the findings of this research, young membership is not a necessary attribute of cooperatives that develop joint land management, which is consistent with the need for generational renewal.

However, in the long term, the survival of agri-food marketing cooperatives depends on their capacity to attract young people to the farming activity. Joint land management can then be understood as a temporary solution to the lack of generational renewal of cooperatives. It allows increasing farms' size, constituting then profitable operative units. Cooperatives that can keep providing their marketing services and in addition offer the possibility of cultivating profitable farms can be an excellent entry point for new entrants in the activity, as a longer-term outcome of joint cropland strategies.

This article provides some guidelines to identify the conditions observed in cooperatives that implement joint cropland management initiatives. This result can be helpful for cooperatives aiming at reorienting their organizational structure in order to adopt these strategies or have already made progress in this direction.

By the same vein, policymakers in regions with substantial abandoned lands can find allies in cooperatives. They are established firms and actors of rural development that can support domestic policies aiming at improving farm structures, preserving soil conditions and preventing exodus from rural areas while pursuing their own goals.

This article has several limitations. The first is the small size of the sample, which makes it difficult to extrapolate the results to the whole of Spain, although it forms an interesting set of firms with productive orientation to permanent crops. Nevertheless, we can underline the theory-building feature of the methodology chosen to explore a limited number of cases. The fsQCA approach followed in the present study could be complemented by a case study approach that allows to understand those cooperatives that apparently show the recipes for the outcome and don't meet it, or those cooperatives that meet the outcome

without meeting all the identified conditions. Second, some conditions such as cooperation among cooperatives and size should be studied in more depth. Concerning cooperation among cooperatives, it would be interesting to look more closely at its origin, differentiating between whether the cooperation entails informal alliances or more formal types of partnership. While the size condition presents ambiguities, small and medium-sized cooperatives have advantages in terms of social capital—according to authors such as Mwambi et al. (2020), He et al. (2016), Real et al. (2014), Nilsson et al. (2009)—for joint land management and could achieve a more substantial size by cooperating with other cooperatives. Future research should be directed at a more in-depth exploration of the drivers of this particular form of social innovation, and should also seek to distinguish between the influence of younger and more senior farmers in the social base. Third, adding this information would be a task for future work, including other characteristics such as the specific size and past profitability of the land plots, although we captured some characteristics of the social membership such as their age and, indirectly, of their innovative orientation through cooperatives' boards choices. All these possibilities would enrich the understanding of this phenomenon of joint land management in Spain and other countries where the abandonment of small plots can hamper the economic feasibility of cooperatives.

4.6 References

- ACI, (1995). Los principios cooperativos del siglo XXI. *CIRIEC-España, Rev. Econ. Pública, Soc. y Coop.* 19, 38–39.
- Ajates Gonzalez, R., (2017). Going back to go forwards? From multi-stakeholder cooperatives to Open Cooperatives in food and farming. *J. Rural Stud.* 53, 278–290. <https://doi.org/10.1016/j.jrurstud.2017.02.018>
- Alamá Sabater, L., Budí Orduña, V., García Álvarez-Coque, J. M., Roig-Tierno, N. (2019). Using mixed research approaches to understand rural depopulation. *Economía Agraria y Recursos Naturales.* 19 (1), 99-120 <https://doi.org/10.7201/earn.2019.01.06>
- Altman, M., (2015). Cooperative organizations as an engine of equitable rural economic development. *Journal of Co-operative Organization and Management*, 3(1), 14-23. <https://doi.org/10.1016/j.jcom.2015.02.001>
- Pérez, M. B. Á., López, P. A., & Cantó, C. F. (2000). Las cooperativas en el marco de la teoría de la agencia. *CIRIEC-España, revista de economía pública, social y cooperativa*, (34), 169-188.
- Arcas, N., García, D., Guzmán, I., (2011). Effect of size on performance of Spanish agricultural cooperatives. *Outlook on Agriculture*, 40(3), 201-206. <https://doi.org/10.5367/oa.2011.0051>

- Arcas, N., García, D., Sánchez, J., (2019). *Diagnóstico económico-financiero de las cooperativas agroalimentarias en España (2015-2017)*. Cartagena: Cajamar.60 p
- Arnalte, E., Moreno, O., Ortiz, D., (2013). *La dimensión social del proceso de ajuste estructural en la agricultura española.*, in: Gómez-Limón, J.A., Reig Martínez, E. (Eds.), *La Sostenibilidad de la Agricultura Española*. Cajamar Caja Rural, Almería, pp. 117–154.
- Arts, B., de Koning, J., (2017). Community Forest Management: An Assessment and Explanation of its Performance Through QCA. *World Dev.* 96, 315-325. <https://doi.org/10.1016/j.worlddev.2017.03.014>
- Bae, K. B., and Skaggs, S., (2019). The impact of gender diversity on performance: The moderating role of industry, alliance network, and family-friendly policies—Evidence from Korea. *Journal of Management & Organization*, 25(6), 896-913. <https://doi.org/10.1017/jmo.2017.45>
- Baldwin, C.Y., von Hippel, E.A., (2011). Modeling a Paradigm Shift: From Producer Innovation to User and Open Collaborative Innovation. *Organization science*, 22(6), 1399-1417. <https://doi.org/10.2139/ssrn.1502864>
- Banerjee A., Mookherjee D., Munshi K. and Ray D., (2001), ‘Inequality, control rights, and rent seeking. Sugar cooperatives in Maharashtra’, *Journal of Political Economy*, 109, 138–190
- Baranyai, Z., Kiraly, Z., Elam, A., Muriqi, S., Papp-Vary, A., (2018). Drivers of Cooperation Activity in Hungarian Agriculture. *Ann. Polish Assoc. Agric. Agribus. Econ.* XX, 9–15. <https://doi.org/10.5604/01.3001.0012.1476>
- Barraud-Didier, Valérie; Henninger, Marie-Christine; El Akremi, Asâad. (2012). The Relationship Between Members’ Trust and Participation in Governance of Cooperatives: The Role of Organizational Commitment. *International Food and Agribusiness Management Review*, 15 (1), 1-24.
- Basurto, X., and Speer, J., (2012). Structuring the Calibration of Qualitative Data as Sets for Qualitative Comparative Analysis (QCA). *Field methods* 24, 155–174. <https://doi.org/10.1177/1525822X11433998>
- Berenguer Contrí, G., Torcali Tomás, V., Torre Fernández, A., Cerver Romero, E., (2005). El estilo directivo de las mujeres y su influencia sobre la gestión del equipo de trabajo en las cooperativas valencianas. *CIRIEC - España. Rev. Econ. pública, Soc. y Coop.* 50, 123–150.
- Berg-Schlosser, D., De Meur, G., Rihoux, B., Ragin, C., (2012). *Qualitative Comparative Analysis (QCA) as an Approach*, in: Rihoux, B., Ragin, C. (Eds.), *Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and Related Techniques*. SAGE Publications Inc., London, 1–18. <https://doi.org/10.4135/9781452226569.n1>

- Berg-Schlosser, D., Meur, G. de, (2012). *Comparative Research Design: Case and Variable Selection*, in: Rihoux, B., Ragin, C. (Eds.), *Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and Related Techniques*. SAGE Publications, Inc., London, 19–32. <https://doi.org/10.4135/9781452226569.n2>
- Bijman J., (2005), *Cooperatives and heterogeneous membership: Eight propositions for improving organizational efficiency*, in M. Dobak, A. Hofmeister, E. Kocsis and J. Windsperger (eds.), *Conference Proceedings, Franchising Networks, Alliances, Joint Ventures and Cooperatives*. EMNet.
- Bijman, J., Pykkönen, P., Petri, O., (2012). *Support for Farmers' Cooperatives. EU Synthesis and Comparative Analysis Report on Transnational Cooperatives*. Wageningen UR. <https://library.wur.nl/WebQuery/wurpubs/fulltext/244826>
- Bijman, J., Hanisch, M., van der Sangen, G. (2014). Shifting control? The changes of internal governance in agricultural cooperatives in the EU. *Annals of Public and Cooperative Economics*, 85(4), 641-661.
- Bijman, J., and Iliopoulos, C. (2014). Farmers' cooperatives in the EU: policies, strategies, and organization. *Annals of Public and Cooperative Economics*, 85(4), 497-508.
- Bjerke, L., Johansson, S. (2015). Patterns of innovation and collaboration in small and large firms. *The Annals of Regional Science*, 55(1), 221-247.
- Burress, M.J., Cook, M.L., (2010). *A Primer On Collective Entrepreneurship: A Preliminary Taxonomy*. Columbia. University of Missouri, Department of Agricultural Economics, Working Paper. AEWP 2009-4
- Burt, L. A., and Wirth, M. E. (1990). Assessing the effectiveness of farm supply cooperatives: a comparison of farmer and manager viewpoints. *Journal of Agricultural Cooperation*, 5 (1141-2016-92506), 17-26.
- Cajaiba-Santana, G., (2014). Social innovation: Moving the field forward. A conceptual framework. *Technol. Forecast. Soc. Change* 82, 42-51. <https://doi.org/10.1016/j.techfore.2013.05.008>
- Chaddad, F.R., Cook, M.L., (2004). Understanding new cooperative models: An ownership-control rights typology. *Rev. Agric. Econ.* 26, 348–360. <https://doi.org/10.1111/j.1467-9353.2004.00184.x>
- Chaddad, F., and Iliopoulos, C. (2013). Control rights, governance, and the costs of ownership in agricultural cooperatives. *Agribusiness*, 29(1), 3-22.
- Ciburieni, J., (2015). *Farmers' cooperative in the context of economic transformations in Lithuania*. Proceedings of the 2015 International Conference “Economic

- Science for Rural Development” N° 39 Jelgava, LLU ESAF, 23-24 April 2015, pp.134-141.
- Cofré-Bravo, G., Klerkx, L., Engler, A., (2019). Combinations of bonding, bridging, and linking social capital for farm innovation: How farmers configure different support networks. *J. Rural Stud.* 69, 53–64. <https://doi.org/10.1016/j.jrurstud.2019.04.004>
- Colombo, S., Perujo-Villanueva, M., (2017). Analysis of the spatial relationship between small olive farms to increase their competitiveness through cooperation. *Land use policy* 63, 226–235. <https://doi.org/10.1016/j.landusepol.2017.01.032>
- Cook, M.L., Plunkett, B., (2006). Collective Entrepreneurship: An Emerging Phenomenon in Producer-Owned Organizations. *J. Agric. Appl. Econ.* 38, 421–428. <https://doi.org/10.1017/s1074070800022458>
- Cooperativas Agroalimentarias de España, (2020). El cooperativismo agroalimentario español Informe socioeconómico 2018. <http://www.agro-alimentarias.coop/ficheros/doc/06213.pdf> (accessed 6.23.20)
- Cooperativas Agroalimentarias de España, (2005). Observatorio socioeconómico del cooperativismo agrario español (OSCAE). <http://www.agro-alimentarias.coop/ficheros/doc/01867.pdf> (accessed 6.23.20)
- Cornforth, C., (2004). The Governance of cooperatives and mutual associations: a paradox perspective. *Ann. Public Coop. Econ.* 75, 11–32. <https://doi.org/10.1111/j.1467-8292.2004.00241.x>
- Deng, X., Xu, D., Zeng, M., Qi, Y., (2019). Does Internet use help reduce rural cropland abandonment? Evidence from China. *Land use policy* 89, 104243. <https://doi.org/10.1016/j.landusepol.2019.104243>
- Dufays, F., Huybrechts, B., (2014). Connecting the Dots for Social Value: A Review on Social Networks and Social Entrepreneurship. *J. Soc. Entrep.* 5, 214–237. <https://doi.org/10.1080/19420676.2014.918052>
- European Commission, (2020). Common context indicators for rural development programs (2014-2020). https://ec.europa.eu/info/food-farming-fisheries/farming/facts-and-figures/performance-agricultural-policy/cap-indicators/context-indicators_en (accessed 11.01.21)
- Florea, A.M., Bercu, F., Radu, R.I., Stanciu, S. (2019). A Fuzzy Set Qualitative Comparative Analysis (fsQCA) of the Agricultural Cooperatives from South East Region of Romania. *Sust.* 11(21), 5927; <https://doi.org/10.3390/su11215927>
- Fonte, M., Cucco, I., (2017). Cooperatives and alternative food networks in Italy. The long road towards a social economy in agriculture. *J. Rural Stud.* 53, 291–302. <https://doi.org/10.1016/j.jrurstud.2017.01.019>

- Foreman, P.O., Westgren, R.E., Whetten, D.A., (2013). The Process of Identity Construction in Emergent Organizational Collectives. *Acad. Manag. Proc.* 2013 (1): 13310. <https://doi.org/10.5465/ambpp.2013.13310abstract>
- Fulton, M., and Giannakas, K. (2013). The future of agricultural cooperatives. *Annu. Rev. Resour. Econ.*, 5(1), 61-91.
- Galia, F., Zenou, E., Ingham, M., (2015). Board composition and environmental innovation: Does gender diversity matter? *Int. J. Entrep. Small Bus.* 24, 117–141. <https://doi.org/10.1504/IJESB.2015.066152>
- Garcia-Alvarez-Coque, J. M., Roig-Tierno, N., Sanchez-Garcia, M., Mas-Verdu, F. (2020). Knowledge Drivers, Business Collaboration and Competitiveness in Rural and Urban Regions. *Social Indicators Research*, 1-19. <https://doi.org/10.1007/s11205-020-02478-6>
- Garson, G.D., (2016). *Case Study Analysis & QCA*. NC: Statistical Associates Publishers, Asheboro. 164 p
- Gómez, W.A., Aranda-Camacho, Y., Barrientos Fuentes, J.C., (2020). Analytical model to assess the functionality of small farmers' organizations. *Agricultural and Resource Economics*, 20(1), 7-35. <https://doi.org/10.7201/earn.2020.01.01>
- Grashuis, J. (2019). The agency cost of ownership and governance adaptations in farm producer organizations. *Agricultural Finance Review*. 80 (2), 200-211
- Grimm, N.B., Chapin, F.S., Bierwagen, B., Gonzalez, P., Groffman, P.M., Luo, Y., Melton, F., Nadelhoffer, K., Pairis, A., Raymond, P.A., Schimel, J., Williamson, C.E., (2013). The impacts of climate change on ecosystem structure and function. *Frontiers in Ecology and the Environment*, 11(9), 474-482. <https://doi.org/10.1890/120282>
- Groot Kormelinck, A., Bijman, J., Trienekens, J., (2019). Characterizing Producer Organizations: The case of organic versus conventional vegetables in Uruguay. *J. Rural Stud.* 69, 65–75. <https://doi.org/10.1016/j.jrurstud.2019.04.012>
- Hakelius, K., (1999). Farmer Cooperatives in the 21st Century: Young and Old Farmers in Sweden. *J. Rural Coop.* 27, 31–54. <https://doi.org/10.22004/AG.ECON.61946>
- Hamilton, W., Bosworth, G., Ruto, E., (2015). Entrepreneurial Younger Farmers and the Young Farmer Problem in England. *Agriculture and Forestry*, 61(4), 61-69 <https://doi.org/10.17707/agricultforest.61.4.05>
- Hansmann, H., (1996). *The ownership of enterprise*. Harvard University Press. London.372 p.
- Hanf J. and Schweickert E., (2007), 'How to deal with member heterogeneity – management implications', *International Journal of Co-operative Management*, 3, 40–48.

- Hardy, C., Maguire, S., (2008). The SAGE Handbook of Organizational Institutionalism, in: *The SAGE Handbook of Organizational Institutionalism*. 198–217. <https://doi.org/10.4135/9781526415066>
- He, K., Zhang, J., Feng, J., Hu, T., Zhang, L., (2016). The Impact of Social Capital on farmers' Willingness to Reuse Agricultural Waste for Sustainable Development. *Sustain. Dev.* 24, 101–108. <https://doi.org/10.1002/sd.1611>
- Hendrikse, G., Bijman, J., (2002). Ownership Structure in Agrifood Chains: The Marketing Cooperative. *Am. J. Agric. Econ.* 84, 104–119. <https://doi.org/10.1111/1467-8276.00246>
- Hudson, D., & Herndon, C. W. (2002). Factors influencing probability and frequency of participation in merger and partnership activity in agricultural cooperatives. *Agribusiness: An International Journal*, 18(2), 231–246. <https://doi.org/10.1002/agr.10017>
- Iliopoulos, C., & Valentinov, V. (2018). Member heterogeneity in agricultural cooperatives: A systems-theoretic perspective. *Sustainability*, 10(4), 1271. <https://doi.org/10.3390/su10041271>
- Iliopoulos C. & Cook M. L., (1999). *The efficiency of internal resource allocation decisions in customer-owned firms: The influence costs problem*. 3rd Annual Conference of the International Society for New Institutional Economics. Washington
- Instituto Nacional de Estadística, (2016). Encuesta sobre la estructura de las explotaciones agrícolas. Resultados. https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736176854&menu=resultados&idp=1254735727106#!tabs-1254736194989 (accessed 6.23.20).
- Jakobsen, S.E., Lorentzen, T., (2015). Between bonding and bridging: Regional differences in innovative collaboration in Norway. *Nor. Geogr. Tidsskr.* 69, 80–89. <https://doi.org/10.1080/00291951.2015.1016550>
- Keenleyside, C., Tucker, G.M., (2010). Farmland abandonment in the EU: an assessment of trends and prospects. Report prepared for WWF. London: Institute for European Environmental Policy (IEEP). <https://ieep.eu/publications/farmland-abandonment-in-the-eu-an-assessment-of-trends-and-prospects>
- Kilelu, C.W., Klerkx, L., Leeuwis, C., Hall, A., (2011). Beyond knowledge brokering: an exploratory study on innovation intermediaries in an evolving smallholder agricultural system in Kenya. *Knowl. Manag. Dev. J.* 7, 84–108. <https://doi.org/10.1080/19474199.2011.593859>
- King, B., Fielke, S., Bayne, K., Klerkx, L., Nettle, R., (2019). Navigating shades of social capital and trust to leverage opportunities for rural innovation. *J. Rural Stud.* 68, 123–134. <https://doi.org/10.1016/j.jrurstud.2019.02.003>

- Koutsou, S., Partalidou, M., Ragkos, A., (2014). Young farmers' social capital in Greece: Trust levels and collective actions. *J. Rural Stud.* 34, 204–211. <https://doi.org/10.1016/j.jrurstud.2014.02.002>
- Kumar, A., Saroj, S., Joshi, P.K., Takeshima, H., (2018). Does cooperative membership improve household welfare? Evidence from a panel data analysis of smallholder dairy farmers in Bihar, India. *Food Policy* 75, 24–36.
- Lankoski, J., Thiem, A., (2020). Linkages between agricultural policies, productivity and environmental sustainability. *Ecol. Econ.* 178, 106809. <https://doi.org/10.1016/j.ecolecon.2020.106809>
- Lasagni, A., (2012). How Can External Relationships Enhance Innovation in SMEs? New Evidence for Europe. *J. Small Bus. Manag.* 50, 310–339. <https://doi.org/10.1111/j.1540-627X.2012.00355.x>
- Lasanta, T., Arnáez, J., Pascual, N., Ruiz-Flaño, P., Errea, M.P., Lana-Renault, N., (2017). Space–time process and drivers of land abandonment in Europe. *Catena* 149, 810–823. <https://doi.org/10.1016/j.catena.2016.02.024>
- Legewie, N., (2013). An introduction to applied data analysis with qualitative comparative analysis. In Forum: *Qualitative Social Research* 14 (3) <https://doi.org/10.17169/fqs-14.3.1961>
- Liang, Q., and Hendrikse, G. (2013). Core and common members in the genesis of farmer cooperatives in China. *Managerial and Decision Economics*, 34(3-5), 244–257. <https://doi.org/10.1002/mde.2587>
- Löwe, A., Njambi-Szlapka, S., Phiona, S. (2019). Youth associations and cooperatives: getting young people into work. ODI Report. London. https://www.odi.org/sites/odi.org.uk/files/resource-documents/odi-drt-youth_associations_report.pdf
- Lückerath-Rovers, M., (2013). Women on boards and firm performance. *J. Manag. Gov.* 17, 491–509. <https://doi.org/10.1007/s10997-011-9186-1>
- Ma, W., Abdulai, A., Goetz, R., (2018a). Agricultural Cooperatives and Investment in Organic Soil Amendments and Chemical Fertilizer in China. *Am. J. Agric. Econ.* 100, 502–520. <https://doi.org/10.1093/ajae/aax079>
- Ma, W., Renwick, A., Yuan, P., Ratna, N., (2018b). Agricultural cooperative membership and technical efficiency of apple farmers in China: An analysis accounting for selectivity bias. *Food Policy* 81, 122–132. <https://doi.org/10.1016/j.foodpol.2018.10.009>
- Ma, W., and Zhu, Z., (2020). A Note: Reducing Cropland Abandonment in China – Do Agricultural Cooperatives Play a Role? *J. Agric. Econ.* 1477-9552.12375. <https://doi.org/10.1111/1477-9552.12375>

- Manda, J., Khonje, M.G., Alene, A.D., Tufa, A.H., Abdoulaye, T., Mutenje, M., Setimela, P., Manyong, V., (2020). Does cooperative membership increase and accelerate agricultural technology adoption? Empirical evidence from Zambia. *Technol. Forecast. Soc. Chang.* 158, 120160. <https://doi.org/10.1016/j.techfore.2020.120160>
- Marcel, J., Barr, P. and I. Duhaime, (2010). The Influence of Executive Cognition on Competitive Dynamics, *Strategic Management Journal*, 32: 115–138. <https://doi.org/10.1002/smj.870>
- Marcuello Servós, C. M., Saz Gil, M. I. S. (2008). Los principios cooperativos facilitadores de la innovación: un modelo teórico. *REVESCO. Revista de Estudios Cooperativos*, (94), 59-79.
- Mc Elroy, M.W., (2002). Social innovation capital. *J. Intellect. Cap.* 3, 1469–1930. <https://doi.org/10.1108/14691930210412827>
- Meliá-Martí, E., Server-Izquierdo, R.J., Lajara-Camilleri, N., (2015). Spanish Citrus Cooperatives: Keys to Success and Challenges for the Future, in: *Acta Horticulturae*. 1871–1876. <https://doi.org/10.17660/ActaHortic.2015.1065.240>
- Meliá Martí, E., Carnicer Andrés, M.P., Juliá Igual, J.F., (2018). *El gobierno de las sociedades cooperativas agroalimentarias españolas. Modelos de referencia y casos empresariales.*, Valencia: Cajamar.272 p
- Meliá-Martí, E., Tormo-Carbó, G., Juliá-Igual, J. F. (2020). Does Gender Diversity Affect Performance in Agri-Food Cooperatives? A Moderated Model. *Sustainability*, 12(16), 6575. <https://doi.org/10.3390/su12166575>
- Meyskens, M., Carsrud, A.L., Cardozo, R.N., (2010). The symbiosis of entities in the social engagement network: The role of social ventures. *Entrep. Reg. Dev.* 22, 425–455. <https://doi.org/10.1080/08985620903168299>
- Miozzo, M., Desyllas, P., Lee, H.F., Miles, I., (2016). Innovation collaboration and appropriability by knowledge-intensive business services firms. *Res. Policy* 45, 1337–1351. <https://doi.org/10.1016/j.respol.2016.03.018>
- Montegut, Y., Cristóbal, E., Marimon, F., (2011). The Singularity of Agrarian Cooperatives Management: Cooperatives Positioning in the Olive Oil Sector in Spain. *Int. J. Bus. Manag.* 6. <https://doi.org/10.5539/ijbm.v6n6p16>
- Montgomery, A.W., Dacin, P.A., Dacin, M.T., (2012). Collective Social Entrepreneurship: Collaboratively Shaping Social Good. *J. Bus. Ethics* 111, 375–388. <https://doi.org/10.1007/s10551-012-1501-5>
- Mourdoukoutas, P., Papademetriou, S., (2002). *Nurturing Entrepreneurship: Institutions and Policies*. Quorum Books, Westport, C. 188 p

- Mulgan, G., (2006). The process of social innovation. *Innov. Technol. governance, Glob. I*, 145–162
- Muriqi, S., Fekete-Farkas, M., Baranyai, Z., (2019). Drivers of cooperation activity in Kosovo's agriculture. *Agric. 9*, 96. <https://doi.org/10.3390/agriculture9050096>
- Mwambi, M., Bijman, J., Mshenga, P., (2020). Which type of producer organization is (more) inclusive? Dynamics of farmers' membership and participation in the decision-making process. *Annals of Public and Cooperative Economics, 91(2)*, 213-236 <https://doi.org/10.1111/apce.12269>
- Newell, S., Swan, J., (2000). Trust and inter-organizational networking. *Hum. Relations 53*, 1287–1328. <https://doi.org/10.1177/a014106>
- Nieto-Aleman, P. A., Garcia-Alvarez-Coque, J. M., Roig-Tierno, N., Mas-Verdú, F. (2019). Factors of regional poverty reduction in Colombia: Do institutional conditions matter? *Social Policy & Administration, 53(7)*, 1045-1063.
- Nilsson, J., (2018). Governance costs and the problems of large traditional co-operatives. *Outlook Agric. 47*, 87–92. <https://doi.org/10.1177/0030727018761175>
- Nilsson, J., Kihlén, A., Norell, L., (2009). Are traditional cooperatives an endangered species? About shrinking satisfaction, involvement and trust. *Int. Food Agribus. Manag. Rev. 12*, 101–122. <https://doi.org/10.22004/AG.ECON.92574>
- Nilsson, J., Svendsen, G.L.H., Svendsen, G.T., (2012). Are Large and Complex Agricultural Cooperatives Losing Their Social Capital? *Agribusiness 28*, 187–204. <https://doi.org/10.1002/agr.21285>
- Ortega, D.L., Bro, A.S., Clay, D.C., Lopez, M.C., Tuyisenge, E., Church, R.A., Bizoza, A.R., (2019). Cooperative membership and coffee productivity in Rwanda's specialty coffee sector. *Food Secur. 11*, 967–979. <https://doi.org/10.1007/s12571-019-00952-9>
- Ortiz-Miranda, D., Moreno-Perez, Olga M., Moragues-Faus, A.M., (2010). Innovative strategies of agricultural cooperatives in the framework of the new rural development paradigms: the case of the Region of Valencia (Spain). *Environ. Plan. A 42*, 661–677. <https://doi.org/10.1068/a42168>
- Österberg, P., Nilsson, J., (2009). Members' perception of their participation in the governance of cooperatives: The key to trust and commitment in agricultural cooperatives. *Agribusiness 25*, 181–197. <https://doi.org/10.1002/agr.20200>
- Ostrom, E., Ahn, T.K., (2003). *Foundations of Social Capital*, Books, Edward Elgar Publishing, 590 p.
- Papadimitri, P., Pasiouras, F., Tasiou, M., (2020). Do National Differences in Social Capital and Corporate Ethical Behaviour Perceptions Influence the Use of

- Collateral? Cross-Country Evidence. *J. Bus. Ethics.* 1-20
<https://doi.org/10.1007/s10551-019-04412-4>
- Parcerisas, L., (2015). Landownership distribution, socio-economic precariousness and empowerment: The role of small peasants in Maresme County (Catalonia, Spain) from 1850 to the 1950s. *J. Agrar. Chang.* 15, 261–285.
<https://doi.org/10.1111/joac.12058>
- Phillips, F., (2011). The state of technological and social change: Impressions. *Technol. Forecast. Soc. Change* 78, 1072–1078. <https://doi.org/10.1016/j.techfore.2011.03.020>
- Phillips, W., Lee, H., Ghobadian, A., O'Regan, N., James, P., (2015). Social Innovation and Social Entrepreneurship: A Systematic Review. *Gr. Organ. Manag.* 40, 428-461. <https://doi.org/10.1177/1059601114560063>
- Putnam, R., (2000). *Bowling Alone: The Collapse and Revival of American Community*. New York: Simon and Schuster. <https://doi.org/10.4324/9781912282319>
- Qin, H., Liao, T., (2016). Labor out-migration and agricultural change in rural China: A systematic review and meta-analysis. *J. Rur. Stud.*, 47-part B, 533-541.
<https://doi.org/10.1016/j.jrurstud.2016.06.020>
- Ragin, C., (2008). *Redesigning Social Inquiry: Fuzzy Sets and Beyond*. University of Chicago Press: Chicago and London. 224 p.
- Real, J.C., Roldán, J.L., Leal, A., (2014). From Entrepreneurial Orientation and Learning Orientation to Business Performance: Analysing the Mediating Role of Organizational Learning and the Moderating Effects of Organizational Size. *Br. J. Manag.* 25, 186–208. <https://doi.org/10.1111/j.1467-8551.2012.00848.x>
- Rothstein, B., (2005). *Social traps and the problem of trust*, Social Traps and the Problem of Trust. Cambridge University Press.
<https://doi.org/10.1017/CBO9780511490323>
- Ruef, M., (2010). *Entrepreneurial groups*, in: Historical Foundations of Entrepreneurship Research. pp. 205–228. <https://doi.org/10.4337/9781849806947.00020>
- Ruiu, M.L., Seddaiu, G., Roggero, P.P., (2017). Developing adaptive responses to contextual changes for sustainable agricultural management: The role of social capital in the Arborea district (Sardinia, Italy). *J. Rural Stud.* 49, 162–170.
<https://doi.org/10.1016/j.jrurstud.2016.11.017>
- Ruostesaari, M.L., Troberg, E., (2016). Differences in social responsibility toward youth-A case study based comparison of cooperatives and corporations. *J. Co-op. Organ. Manag.* 4, 42–51. <https://doi.org/10.1016/j.jcom.2016.03.001>

- Sánchez Pachón, L. Á. (2018). Los acuerdos de intercooperación como mecanismo jurídico de integración de cooperativas. *REVESCO. Revista de Estudios Cooperativos*, 126, 154-176 <https://doi.org/10.5209/REVE.58616>
- Schincariol McMurtry, L and McMurtry, J J (2015). *Advancing Gender Equality: The Co-operative Way*. Geneva: ILO available at www.ilo.org
- Schneider, C.Q., Wagemann, C., (2012). *Set-theoretic methods for the social sciences: A guide to qualitative comparative analysis*. (Strategies for Social Inquiry). Cambridge: Cambridge University Press. doi:10.1017/CBO9781139004244
- Schneider, C.Q., Wagemann, C., (2010). Standards of good practice in qualitative comparative analysis (QCA) and fuzzy-sets. *Comp. Sociol.* 9, 397–418. <https://doi.org/10.1163/156913210X12493538729793>
- Sikor, T., Müller, D., Stahl, J., (2009). Land Fragmentation and Cropland Abandonment in Albania: Implications for the Roles of State and Community in Post-Socialist Land Consolidation. *World Dev.* 37, 1411–1423. <https://doi.org/10.1016/j.worlddev.2008.08.013>
- Song, H.J., Yoon, Y.N., Kang, K.H., (2020). The relationship between board diversity and firm performance in the lodging industry: The moderating role of internationalization. *Int. J. Hosp. Manag.* 86, 102461. <https://doi.org/10.1016/j.ijhm.2020.102461>
- Spear, R., (2011). Working Paper Innovation and Collective Entrepreneurship. International forum on the social and solidarity economy. <https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/10625/47357/133708.pdf>
- Steenwerth, K.L., Hodson, A.K., Bloom, A.J., Carter, M.R., Cattaneo, A., Chartres, C.J., Hatfield, J.L., Henry, K., Hopmans, J.W., Horwath, W.R., Jenkins, B.M., Kebreab, E., Leemans, R., Lipper, L., Lubell, M.N., Msangi, S., Prabhu, R., Reynolds, M.P., Sandoval Solis, S., Sisco, W.M., Springborn, M., Tittonell, P., Wheeler, S.M., Vermeulen, S.J., Wollenberg, E.K., Jarvis, L.S., Jackson, L.E., (2014). Climate-smart agriculture global research agenda: Scientific basis for action. *Agriculture & Food Security*, 3(1), 1-39. <https://doi.org/10.1186/2048-7010-3-11>
- Takahashi, D., Chang, T., Shobayashi, M., (2018). The role of formal and informal institutions in farmland consolidation: The case of Shiga Prefecture, Japan. *Int. J. Commons* 12, 80–107. <https://doi.org/10.18352/ijc.829>
- Terres, J.M., Scacchiafichi, L.N., Wania, A., Ambar, M., Anguiano, E., Buckwell, A., Coppola, A., Gocht, A., Källström, H.N., Pointereau, P., Strijker, D., Visek, L., Vranken, L., Zobena, A., (2015). Farmland abandonment in Europe: Identification of drivers and indicators, and development of a composite indicator of risk. *Land use policy* 49, 20–34. <https://doi.org/10.1016/j.landusepol.2015.06.009>

-
- Titeca, K., Vervisch, T., (2008). The Dynamics of Social Capital and Community Associations in Uganda: Linking Capital and its Consequences. *World Dev.* 36, 2205–2222. <https://doi.org/10.1016/j.worlddev.2007.10.021>
- Tobiassen, A.E., Pettersen, I.B., (2018). Exploring open innovation collaboration between SMEs and larger customers: The case of high-technology firms. *Balt. J. Manag.* 13, 65–83. <https://doi.org/10.1108/BJM-01-2017-0018>
- Tregear, A., Cooper, S., (2016). Embeddedness, social capital and learning in rural areas: The case of producer cooperatives. *J. Rural Stud.* 44, 101–110. <https://doi.org/10.1016/j.jrurstud.2016.01.011>
- Tudela-Marco, L., Garcia-Alvarez-Coque, J.M., (2017). Innovación en la gestión de tierras bajo la fórmula cooperativa, in: XI Congreso de la Asociación Española de Economía Agraria Sistemas Alimentarios y Cambio Global Desde el Mediterráneo Orihuela-Elche, 13-15 Septiembre de 2017. pp. 365–367.
- Tyson, L., (2003). *The Tyson report on the recruitment and development of non-executive directors*. London Bus. Sch
- van Bekkum, O.F., Bijman, J., (2006). Innovations in cooperative ownership: Converted and hybrid listed cooperatives. In Business paper presented at the 7th International Conference on Management in AgriFood Chains and Networks, Ede, The Netherlands (Vol. 31, pp. 1-15).
- van Dijk, M.P., Sverrisson, A., (2003). Enterprise clusters in developing countries: Mechanisms of transition and stagnation. *Entrep. Reg. Dev.* 15, 183–206. <https://doi.org/10.1080/08985620210159239>
- Valentinov, V., (2007). Why are cooperatives important in agriculture? An organizational economics perspective. *Journal of institutional Economics*, 3(1), 55-69. <https://doi.org/10.1017/S1744137406000555>
- Widmalm, S., (2005). The utility of bonding social capital. *J. Civ. Soc.* 1, 75–95. <https://doi.org/10.1080/17448680500210680>

Chapter 5. Conclusions.

Chapter 5

Conclusions

"The whole is something else than the sum of its parts."

Kurt Koffka

5.1 Results and discussion

The main aim of this thesis was to study the determinants of collaboration in the rural sector, focusing on Spain and Latin America and the Caribbean (LAC). To this end, through three articles, collaboration was studied at different levels or domains.

Although all the results have been discussed in the previous chapters, the most significant results of the thesis are highlighted below. The main findings are summarised in Table 5.1.

Table 5.1- Main findings of the thesis

| Overall aim | Specific objectives | Propositions | Article | Results |
|--|---|--|---|--|
| Identify the determinants of or characteristics that can lead to successful collaboration in the innovation field between actors in the agri-food system | O1- Review the state of the art of collaboration for social innovation in food and rural systems. | P1- Progress has been made in LAC in studying innovative collaboration in the agri-food sector. | “Collaboration for social innovation in the agri-food system in Latin America and the Caribbean.” | <ul style="list-style-type: none"> ·Increase in research on collaboration in innovation activities in LAC. ·Findings support P1. ·Collaboration, linkages, and local knowledge are the pillars of rural development in LAC. ·Collaboration between authors from different countries in research about collaboration and social innovation in LAC rural systems. ·Findings confirm P2. |
| | O2- Explore the main authors, countries and the dynamics of research networks in relation to collaboration for social innovation. | P2. There is a network of authors and international institutions that have made progress in the study of innovative collaboration in LAC. | | |
| | O3- Identify the functions carried out by multi-actor groups as innovation intermediaries. | P3. The collaborative actions developed by the EIP-AGRI OGs to promote innovation in the agri-food sector can be framed as functions of innovation intermediaries. | “Collaboration through EIP-AGRI Operational Groups and their role as innovation intermediaries.” | <ul style="list-style-type: none"> ·Innovation process management, demand articulation, institutional support, and innovation brokering are most commonly carried out by Spanish OGs. ·Findings confirm P3. |
| | O4- Determine the characteristics that can help ensure a successful collaboration to achieve social innovation. | P4. The collaborating groups share certain characteristics that lead to the implementation of social innovations in agri-food and land use activities. | “Drivers of joint cropland management strategies in agri-food cooperatives.” | <ul style="list-style-type: none"> ·Social and economic innovation, size, and cooperation among cooperatives are needed to undertake joint management initiatives. ·Findings confirm P4. |

LAC: Latin America and the Caribbean; OG: EIP-AGRI Operational Groups

State of the art of collaboration for social innovation in food and rural systems

The first article (Chapter 2) studied collaboration in LAC's rural sector. The article aimed to fulfil two of the specific objectives of the thesis (O1 and O2)¹.

Concerning O1, results show an increasing interest in learning about LAC's social innovation and collaborative systems. These findings lead us to accept P1. They confirm that progress has been made in the study of innovative collaboration in the LAC agri-food sector.

Other results that emerge from the article point to certain characteristics of collaborative social innovation in the LAC agricultural and rural system. These main drivers include social innovation, knowledge, sustainable management, and social capital. Knowledge and organisational similarities are found to play the greatest role in promoting collaboration in LAC, especially with low social capital levels (Schröter et al., 2015, Geldes et al., 2017, Teixeira et al., 2018). In this context, institutions play a central role as innovation and knowledge intermediaries and generators of trust and cohesion.

However, to ensure that the sustainable management of productive resources leads to sustainable development in LAC it is necessary to strengthen social capital. A positive relationship between social capital and social networks impacts regional development (Chiodo et al., 2019, Zarazúa et al., 20212). Accordingly, the development of social capital, based on trust and networks, in rural environments would encourage collective action for more sustainable development.

To summarise, the most critical inferences drawn from the literature on this topic are the following: in LAC rural systems, collaborative innovation could be achieved with low levels of social capital (Schröter et al., 2015; Geldes et al. 2017; Teixeira et al., 2018); bridging social capital could be the most important type when it comes to leading collaboration and innovation (Hanson, 2009); and local knowledge, sustainability, new organisational forms, and trust would form part of the bases for collaboration in these systems (Adams et al., 2013; Zimmerer, 2013; Rover et al., 2016; Teixeira et al., 2018; Gallego-Bono & Tapia-Baranda, 2019).

O2 was to explore the principal authors, countries, and research network dynamics on the subject of collaboration for social innovation. Thus, in Chapter 2, collaboration in the scientific domain was addressed. The article highlighted an increasing interest in studying collaborative systems in LAC. Studies have been contributed by researchers from different countries, which has generated and enhanced the collaboration among international researchers. The articles with the most citations present analyses from

¹ Objectives (O1 to O4) and propositions (P1 to P4) of the thesis are set out in Chapter 1.

various perspectives—for example, environment, gender equity, inequality, and poverty. The most popular methodological approach is the case study. Recent articles reflect a growing interest in cases and experiences of social innovations.

Collaboration between LAC's researchers with universities and research centres located in Europe, the United States, and other advanced countries can be observed. This network could increase Latin American researchers' visibility and give them a broader analytical perspective. These results confirm P2, indicating that a network of authors and multinational institutions have made progress in the study of innovative collaboration in LAC.

Functions carried out by multi-actor groups as innovation intermediaries

In the second article (Chapter 3), collaboration was addressed by analysing EIP-AGRI OGs' intermediaries' functions. This level could be seen as a multi-actor platform domain related to innovations in agri-food systems. This study's primary contribution is to empirically test the theory of the functions of intermediaries through a direct survey of OG members. In the model developed, three functions emerged as being most commonly carried out by the Spanish OGs: innovation process management, demand articulation, and institutional support and innovation brokering.

These results suggest that encouraging collaboration, sharing information, and developing joint projects are core activities for an innovation intermediary. This action must be combined with identifying opportunities, developing studies, and seeking solutions of interest to the network. Several examples along the same lines can be found in the literature (Kilelu et al., 2011, Kilelu et al., 2013; Klerkx & Leeuwis 2008, Klerkx & Leeuwis, 2009; van Lente et al., 2003; Smits & Kuhlmann 2004; Aerni, 2015; Garcia-Alvarez-Coque et al., 2020). Finally, institutional support and innovation brokering are central factors to build links among innovation actors.

Based on the results described above, P3 is confirmed. The collaborative actions developed by multi-actor platforms can be framed as functions of innovation intermediaries.

Characteristics that can help ensure a successful collaboration to achieve social innovation

Aiming to advance the knowledge on drivers of successful collaboration, the third article (Chapter 4) addresses an innovative strategy coordinated by cooperatives. For this research, the domain selected was farmers and their organisations. Results showed two routes or recipes that provide the conditions needed to achieve the collaboration objective. In both cases, plural governance and size were among the conditions identified.

This result suggests that the organisation's size is essential to achieve goals that need investment capacity and management ability. The openness to incorporating women and

young farmers in the cooperative's management positions is another crucial element in all recipes, in line with findings reported by Tyson (2003) and Lückerrath-Rovers (2013). Alongside plural governance and size, other conditions must be present to achieve the collaboration objective; namely, innovative orientation, propensity for cooperation among cooperatives, and older social mass. Results show common characteristics present in the collaborating groups that lead to the implementation of social innovations. These findings support P3.

In summary, the article provided some guidelines to identify the conditions observed in cooperatives that implement joint cropland management initiatives. Social and economic innovation, size, and propensity for cooperation among cooperatives are conditions that help create a cooperative profile capable of tackling the challenge of members' land abandonment and the consequent loss of production. Results show that the development of social innovations as local solutions requires cooperatives to behave as social entrepreneurs.

5.2 Implications

Knowledge of the main determinants of collaboration in the rural and agri-food environment in Spain and LAC will help public and private organisations to make better decisions aimed at promoting innovative cooperation actions in rural territories.

In the scientific domain, the preliminary analysis of the literature shows that the study of collaboration in innovation activities is a topic of current interest, especially in LAC. The results can help policymakers take on initiatives that foster collaboration between researchers in LAC and the rest of the world. Understanding and fostering collaborative innovation in the rural sector in LAC can help in the design of policies that facilitate these initiatives. The same research shows that the determinants of collaboration may differ between regions. It is therefore essential to study the context in which collaboration takes place. This result is in line with what is proposed by Malecki (2011) and Hermans et al. (2015).

In the case of Spain, policies such as the EIP-AGRI OGs promote innovative collaboration between actors in the agri-food sector. The empirical testing of the theory of the functions of intermediaries can offer a starting point for studies to continue investigating the actual outcomes of these efforts. Such findings could help innovation intermediaries improve and strengthen their functions.

In the domain of farmers and their organisations, we find that collaboration can help revitalise rural areas, and cooperatives can take the lead in these initiatives. This strategy could play a role in preventing land abandonment. Results could be helpful for cooperatives that are seeking to reorient their organisational structure to adopt these strategies, or those that have already made progress in this direction. In the same vein, policymakers in regions with substantial tracts of abandoned land can find allies in cooperatives. Therefore, the promotion of collaboration and joint initiatives can be of interest for the

actors directly involved, as well as when it comes to developing public policies necessary to promote sustainable initiatives in rural areas.

5.3 Conclusions

This thesis seeks to provide a better understanding of the opportunities offered by collaboration for innovation activities in the rural sector. To this end, the research addresses different domains where innovative collaborations occur.

In the scientific domain, collaborative innovation is a topic of interest for researchers worldwide. Moreover, their work on this subject has generated reciprocal collaborative networks that harness synergies in research. Concerning the initiators of collaboration, knowledge and linkages are the starting point for developing innovative joint actions. In addition to these, social capital is a factor that can be decisive for a successful collaboration, especially the so-called bridging capital. These links between different actors can generate innovative collaboration and help achieve sustainable development. The research reveals the role of institutions in strengthening social capital by building trust and cohesion, as well as their function as intermediaries of innovation and knowledge. Another highlight is the importance of the specific local context: these particular features determine the other elements that are necessary to make progress in joint action.

The study in the multi-actor platform domain reinforces the previous results. The intermediaries themselves acknowledge that they perform the functions of innovation process management, demand articulation, institutional support and innovation brokering. The development of these functions paves the way for successful innovative collaboration. These results confirm the importance of policies promoting collective value creation, partnerships goals and co-design through participation, in line with Mazzucato (2021, 2016).

In the domain of farmers and their institutions, results show characteristics—related to social and economic conditions—that should be present in order to achieve successful innovative collaborations. Joint management initiatives require plural institutions, which strengthen social capital, cooperate with other institutions, innovate and have sufficient financial and managerial capacity.

As we have seen, collaboration could be the most viable response to coordinate actions to tackle a common problem at the domain level. From the results, it can be concluded that collaboration for social innovation in the rural sector offers a way to address structural problems such as rural poverty, territorial development and the demographic challenge.

5.4 Limitations and Future work

Admittedly, the present thesis is not without certain limitations. In Chapter 2, the sole source of information for the study is the Web of Science database. It cannot be expected to cover all publications and research on LAC's agri-food and rural system innovation systems. Despite this limitation, most bibliometric studies use this database as a data source. In addition, databases are becoming more and more relevant for analysing scientific relevance and research collaboration. The analysis could be completed by considering grey literature, which would contribute to assessing the state of the research in the policy dimension. In addition, future research could monitor results related to societal missions or SDGs (Mazucatto, 2018; Klerkx & Begemann, 2020).

In Chapter 3, one limitation may be the approach, which is primarily based on self-reported data capturing OG members' opinions rather than their actual performance. Another limitation is that OGs represent a relatively recent innovation tool, meaning more time is needed to better understand their potential outcome. This limitation creates an opportunity for future studies, given that many of these projects are currently being finalised in Spain and other EU countries. The methodology can be extended to assess innovation intermediaries and collaborative networks in national and regional contexts other than the EU.

The third article (Chapter 4) has several limitations. The main constraints are the small sample size, the need for further study of some conditions, and the analysis of other possible characteristics that promote joint actions. Future studies employing a case study approach could go some way to addressing these limitations and enable a more in-depth exploration of the drivers of this form of social innovation.

Finally, the gender approach to collaboration is a theme that emerges from the results of these studies. Plural governance is a condition in all the recipes that achieve joint land management. Crucial aspects in this regard are developing skills, building trust, and establishing business networks. In this sense, works such as those of Hanson (2009) emphasise that women's participation in business networks improves the lives of women and the community in general. Future research could analyse how women's involvement contributes to collaborative issues in rural sectors.

5.5 References

- Adams, C., Chamlian Munari, L., Van Vliet, N. et al., (2013). "Diversifying Incomes and Losing Landscape Complexity in Quilombola Shifting Cultivation Communities of the Atlantic Rainforest (Brazil)." *Human Ecology* 41 (1): 119–37. <https://doi.org/10.1007/s10745-012-9529-9>.
- Aerni, P., Nichterlein, K., Rudgard, S., and Sonnino, A. (2015). Making agricultural innovation systems (AIS) work for development in tropical countries. *Sustainability*, 2015(7): 831–850. <https://doi.org/10.5167/uzh-105491>

- Gallego-Bono, J. R., & Tapia-Baranda, M. R., (2019). "The Values of the Social Economy as Drivers of Change in Clusters with a Strong Fragmentation of Knowledge: The Case of Sugar Cane in Veracruz (Mexico)." *CIRIEC-España Revista de Economía Pública, Social y Cooperativa*, 97: 75–109. <https://doi.org/10.7203/CIRIEC-E.97.14108>.
- Garcia-Alvarez-Coque, JM., Saini, E.; Esteban-Rodrigo, E.; & Mas-Verdu, F., (2020). "Governance of knowledge and innovation in the Ibero-American agri-food system" *Spanish Journal of Agricultural Research* 18 (4): e0112
- Geldes, C.; Heredia, J.; Felzensztein, Ch.; & Mora, M., (2017). "Proximity as Determinant of Business Cooperation for Technological and Non-Technological Innovations: A Study of an Agribusiness Cluster." *Journal of Business and Industrial Marketing* 32 (1): 167–78. <https://doi.org/10.1108/JBIM-01-2016-0003>
- Hanson, Susan, (2009). "Changing Places Through Women's Entrepreneurship." *Economic Geography* 85 (3): 245–67. <https://doi.org/10.1111/j.1944-8287.2009.01033.x>.
- Hermans, F., Klerkx, L., & Roep, D. (2015). Structural conditions for collaboration and learning in innovation networks: using an innovation system performance lens to analyse agricultural knowledge systems. *The Journal of Agricultural Education and Extension*, 21(1): 35-54. <https://doi.org/10.1080/1389224X.2014.991113>
- Kilelu, C. W, Klerkx, L.; Leeuwis, C.; & Hall, A., (2011). "Beyond Knowledge Brokering: An Exploratory Study on Innovation Intermediaries in an Evolving Smallholder Agricultural System in Kenya." *Knowledge Management for Development Journal* 7 (1): 84–108. <https://doi.org/10.1080/19474199.2011.593859>.
- Kilelu, C. W., Klerkx, L., and Leeuwis, C. (2013). Unravelling the role of innovation platforms in supporting co-evolution of innovation: Contributions and tensions in a smallholder dairy development programme. *Agricultural Systems*, 118: 65–77. <https://doi.org/10.1016/j.agsy.2013.03.003>
- Klerkx, L., & Begemann, S. (2020). "Supporting food systems transformation: The what, why, who, where and how of mission-oriented agricultural innovation systems". *Agricultural Systems*, 184, 102901. <https://doi.org/10.1016/j.agsy.2020.102901>.
- Klerkx, Laurens, and Leeuwis, C. (2008). Matching demand and supply in the agricultural knowledge infrastructure: Experiences with innovation intermediaries. *Food Policy*, 33(3): 260–276. <https://doi.org/10.1016/j.foodpol.2007.10.001>
- Klerkx, L. & Leeuwis, C., (2009). "Establishment and Embedding of Innovation Brokers at Different Innovation System Levels: Insights from the Dutch Agricultural Sector." *Technological Forecasting and Social Change* 76 (6): 849–60. <https://doi.org/10.1016/j.techfore.2008.10.001>.

- Lückerath-Rovers, M., (2013). Women on boards and firm performance. *J. Manag. Gov.* 17: 491–509. <https://doi.org/10.1007/s10997-011-9186-1>
- Malecki, E. J. (2012). Regional social capital: Why it matters. *Regional Studies*, 46(8): 1023-1039. <https://doi.org/10.1080/00343404.2011.607806>
- Mazzucato, M. (2021). *Mission economy: A moonshot guide to changing capitalism*. Penguin UK.
- Mazzucato, M., Kattel, R., & Ryan-Collins, J. (2020). Challenge-driven innovation policy: towards a new policy toolkit. *Journal of Industry, Competition and Trade*, 20(2): 421-437.
- Mazzucato, M. (2018). "Mission oriented research and innovation in the European Union. A problem solving approach to fuel innovation-led growth". European Commission. Directorate-General for Research and Innovation. <https://euagenda.eu/upload/publications/untitled-137188-ea.pdf>
- Mazzucato, M. (2016). From market fixing to market-creating: a new framework for innovation policy. *Industry and Innovation*, 23(2): 140-156.
- Rover, O.; de Gennaro, B.; & Roselli, L., (2016). "Social Innovation and Sustainable Rural Development: The Case of a Brazilian Agroecology Network." *Sustainability* 9 (1): 1–14.
- Schröter, B.; Matzdorf, B.; Sattler, C. & Garcia Alarcon, G., (2015). "Intermediaries to Foster the Implementation of Innovative Land Management Practice for Ecosystem Service Provision - A New Role for Researchers." *Ecosystem Services* 16 (December): 192–200. <https://doi.org/10.1016/j.ecoser.2015.10.007>.
- Smits, R., and Kuhlmann, S. (2004). The rise of systemic instruments in innovation policy. *International Journal of Foresight and Innovation Policy*, 1(1–2): 4–32. <https://doi.org/10.1504/ijfip.2004.004621>
- Teixeira, H.M.; Van den Berg, L.; Cardoso, I.M.; Vermue, A.J.; Bianchi, F.J.J.A.; Peña-Claros, M.; Tittonell, P., (2018). "Understanding Farm Diversity to Promote Agroecological Transitions." *Sustainability* 10 (12): 4337. <https://doi.org/10.3390/su10124337>.
- Tyson, L., (2003). The Tyson report on the recruitment and development of non-executive directors. London Bus.
- Zimmerer, K. S., (2013). "The Compatibility of Agricultural Intensification in a Global Hotspot of Smallholder Agrobiodiversity (Bolivia)." *Proceedings of the National Academy of Sciences of the United States of America* 110 (8): 2769–2774. <https://doi.org/10.1073/pnas.1216294110>.

DISEÑO Y EDICIÓN: PAULA NIETO
IMAGEN DE PORTADA: MARCELA GÓMEZ



UNIVERSITAT
POLITÈCNICA
DE VALÈNCIA