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Interactive Approach for Innovation: The Experience of the Italian EIP AGRI Operational Groups

Andrea Arzeni, Francesca Giarè *, Mara Lai, Maria Valentina Lasorella, Rossella Ugati and Anna Vagnozzi

CREA—Council for Agricultural Research and Economics, Research Centre Agricultural Policies and Bioeconomy, 00187 Rome, Italy; andrea.arzeni@crea.gov.it (A.A.); mara.lai@crea.gov.it (M.L.); mvalentina.lasorella@crea.gov.it (M.V.L.); rossella.ugati@crea.gov.it (R.U.); anna.vagnozzi@crea.gov.it (A.V.)
* Correspondence: francesca.giare@crea.gov.it

Abstract: The interactive approach implies that a heterogeneous group of actors cooperates to identify, develop, and introduce innovative solutions on the ground. Twenty-year studies have shown this approach to be the most suitable to support innovation and knowledge sharing in the agri-food system. The present study aims to analyse how the interaction process works in the implementation of OGs in Italy, and its effectiveness, given the relevance assigned to EIP AGRI as a driver for innovation in the past and the current CAP programming periods. An online survey submitted to 270 OGs and 10 in-depth case studies were used to analyse the interaction process and verify whether a common implementation pattern can be identified. The results show that the implementation of OGs in Italy helped capture the real issues of farmers/rural entrepreneurs and support the creation and strengthening of relationships between partners. However, low levels of internal and external communications and the lack of efforts to disseminate the results reduced the effectiveness of the groups. The study showed how complex it is to describe the processes triggered by the interactive approach, being that it is influenced by the type of relationships existing between partners and by other external factors. The implementation of the next generation of OGs could be strengthened by improving their capacity to address the issues of large groups of farmers, promoting the presence of intermediaries to dialogue between partners and facilitating the active participation of advisors.

Keywords: adoption of innovation; diffusion of innovation; interactive approach; operational groups; EIP AGRI

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1. Introduction

The Common Agricultural Policy (CAP) 2023–2027 confirmed the European innovation partnership for agricultural productivity and sustainability (EIP AGRI) as the preferred strategic initiative for accelerating innovation and knowledge sharing. This intervention, together with all those boosting knowledge and human capital development, aims to be within the new CAP, enabling tools towards the sustainability of food systems. Operational groups (OGs) are key for the implementation of EIP AGRI; they can be defined as complex partnerships involved in projects designed to respond to farmers' problems or generate opportunities through innovation.

This initiative was introduced for the first time in the 2014–2022 European Union programming period, and it had a high degree of implementation. More than 3000 OGs are running or have finished their activities, funded by 98 rural development programmes in 26 European Union member states (source: EC, May 2023).

In Italy, regional public institutions allocated more than 270 million euros to the implementation of over 720 operational group projects (source: www.innovarurale.it, accessed on 30 June 2023); multi-actor partnerships that worked or are still working to identify and introduce innovative solutions to respond to farmers' problems.

EIP AGRI bases its implementation on the so-called "interactive approach" [1] which 20-year studies have shown to be the most effective way of spreading innovative solutions

to farms and rural territories [2]. According to this approach, the interventions are carried out by a diverse group of actors, such as farmers, consultants, researchers, processing industries, and others directly involved in identifying, developing, and adopting specific innovative solutions [3].

The literature on the interactive approach in the context of EIP AGRI is still limited, both at the national and international level, its implementation being recent and thus the availability of data on it being scarce. Hence, the Horizon 2020 projects that studied the interactive approach in EIP AGRI considered all multi-actor-related experiences in their investigations, even those not necessarily linked with this initiative [4,5]. The existing studies on the Italian OGs concentrate primarily on procedures and financial and governance aspects [6,7]. An analysis of farmers' participation and the factors affecting their engagement and promoting interactive innovation processes was carried out in the Veneto region [8], although the study is based on a single OG. Similarly, Harrahill et al. [9] studied the dynamics of farmers' participation in an OG in Ireland, with a focus on how their knowledge shaped the operation of the OG and the bioeconomy activities within it.

This article presents the main results of research carried out in 2020–2022 in Italy; it can count on wider data about the implementation of OGs and, more importantly, on the assessment of OGs that have concluded their projects. The availability of information about numerous groups made it possible to perform an in-depth analysis of all of the different aspects of the interactive approach and the different ways on which it is implemented in different contexts.

The opportunity to study the functioning of the interactive approach in OGs stems from two main considerations. A major aspect of interest lies in the substantial public financial resources allocated to implement OGs across the EU and in Italy, which requires a better understanding of how this mechanism works in the field. This links to the second element of relevance; that is, the attempt to provide suggestions and recommendations to improve the implementation of OGs in the new CAP, taking stock from experience already gained. These recommendations might also have significant impact on the achievement of the food policy objectives since the activities for promoting innovation are considered enabling tools for the sustainability transition and the promotion of development.

The analysis presented in the following paragraphs starts from a review of the literature to define the main elements of the interactive approach according to the most recent studies on this topic and develops around two main research questions.

The first question investigates if the interactive approach is effective in accelerating innovation diffusion and how its main elements are applied in OGs. Special attention is paid to the relationships between categories of partners, traditionally considered a key element for boosting innovation [10]. Additionally, we closely examined the identification of farmers needs and related solutions, the distribution of roles and tasks within the partnership and the existence of communication flows and tools.

The second question refers to the possible identification of a common pattern enabling the most efficient application of the interactive approach within OGs.

1.1. Theoretical Background

In the context of European agricultural policies, EIP AGRI and its OGs are considered as part of the agricultural knowledge and innovation system (AKIS), which is described as "a system of innovation, with emphasis on the organisations involved, the links and interactions between them, the institutional infrastructure with its incentives and budget mechanisms" [1,11]. The definition summarizes the results from research and/or development activities in recent decades on the knowledge and innovation process. It also focuses on the need to connect science and practice in an effective way and to boost knowledge exchange and innovation for the benefit of farmers [12].

This setting is based on the "interactive approach" that is the acknowledgment of all actors' contribution to the creation and sharing of knowledge and innovation. The involvement of the heterogeneity of AKIS actors [13] also implies the enhancement of their

effective abilities and skills in the implementation of different activities connected to the knowledge and innovation process [14]. In particular, it acknowledges the importance of innovation resulting from both research and practice; this coexistence is based on recognising their equal dignity in the innovation process [15].

Sewell et al. [16] consider a key issue of the interactive approach to be the focus on farmers and their real needs. This aspect, highlighted by many studies on innovation pathways, is often graphically synthesized by placing the farmers at the centre of the AKIS, as the most important node of an innovation cluster. This representation highlights the importance of delivering tailor-made solutions, aimed at solving concrete problems or seizing opportunities to improve their existing farming activities, rather than focusing the process on innovation per se. It is therefore clear that the word "interactive" does not only refer to possible relations among actors, but also and mainly to relationships between objectives and knowledge, in an iterative process of co-construction.

Usually, these key elements are introduced in research or innovation projects that have the aim of improving the development or the sustainability of farms, sectors, areas, districts. They are named participatory or co-innovation projects and they are common in European policy interventions related to research (Horizon 2020 and Horizon Europe), rural development and many other objectives. Ingram et al. [17] underline, however, the risk of transforming this approach into a "rhetorical mainstreaming" rather than into a method to promote ideas, research results and innovations useful for solving the problems of farmers and territories. The most important focus pertains to the joint definition of problems/opportunities, the common construction of programmes, the concerted testing of solutions [18] and eventually to the redesign of activities. A real participatory and co-innovation project must have an adaptive cycle of plan-do-review [19] between all project actors. Many authors emphasize the need for an iterative exchange among actors, through repeated interaction in all phases of the innovation activities [20–22].

Since the interactive/participatory approach is not simple to implement due to different interests, points of view and roles of the actors involved, these projects need the presence of facilitation actions along the different stages of implementation [23,24], which can be promoted by the public funding institutions [7]. This function is important in all project phases: during the needs analysis, when building the network, deciding upon objectives and solutions, when the first results are available and in case of changes to the structure and activities of the project. It substantially pertains to the entirety of innovation process management [25]. This function of facilitation in co-innovation projects has lately been named brokerage or innovation support [26] and it can be performed by different actors with specific competencies and skills. Dyhdalewicz and Grześ-Bukłaho [27] desire the setting up of a transnational innovation brokerage system and they proposed a model to illustrate the competences innovation brokers should have, which can be summarised as follows: (i) the capacity to manage the implementation of a project; (ii) knowledge about the innovation process; (iii) the ability to lead a company towards internationalisation; (iv) the capacity to analyse and understand the socio-economic trends of the company sector, thus, the ability to plan the company's actions and forecast their effects; and (v) the capacity to build interpersonal relationships; (vi) the possession of professional qualities and attitudes (e.g., flexibility, openness to new approaches, training and professional growth). Advisors are often recommended as innovation brokers, given their important role in accompanying farmers during changes and business growth. Despite the importance of this function, there is still a lack of studies on the role played by advisors within the innovation process and their contribution to it, including in the implementation of OGs.

Parzonko et al. [28] precisely analysed the role of the innovation broker in the establishment of the EIP AGRI OGs. They show that the main tasks of an innovation broker consist of supporting entities interested in cooperating to obtain funds for innovative activities; preparing project proposals and handling all documents related to the functioning of the OG; and identifying suitable actors to be included in the cooperation project.

Another key aspect of the interactive approach is the dissemination of the results of innovation/research projects towards a wider rural territory and all interested farmers. Yet, in the partnerships of co-innovation projects a small number of actors is involved compared to the large number of potential users. Therefore, to complement and make the projects results more effective in practice, additional innovation support activities, such as technical advice or professional communication, targeting the outside, might be needed [7,29].

Figure 1 summarizes the main components of the interactive approach. We did not illustrate the approach as hierarchical. Considering the current state of knowledge, all its elements are important and interconnected, but they might occur in multiple ways and have different relevance in relation to changing contexts. It is not excluded that further studies may identify additional new elements that play a role within this approach.

Figure 1. Main elements of interactive approach. Source: our elaboration.

1.2. The Context of the Study

In the 2014–2022 programming period, EIP AGRI had good results in Italy, in terms of activated initiatives and financial resources allocated. All Italian regions, except for Valle d'Aosta, implemented, within their rural development programmes (RDP), the measures to support the creation of OGs. As of April 2023, 726 OGs have been funded accounting for 227 million euros, an average of 32 million euros per year. Figure 2 shows the distribution of OGs funded per region. The regions in red (Latium, Sardinia, Abruzzo and Molise) are still selecting OGs.

The difference in terms of number of OGs funded among regions depends on several factors, most of which relate to the heterogeneity of regional socioeconomic contexts, including the importance of agriculture and its level of development. Nevertheless, programming decisions taken by the regional RDP managing authorities played a role in the setting up of OGs. Factors such as differences in financial allocations, thresholds of public contribution per project, size of project partnerships and project duration influenced the number of projects funded and their complexity in terms of implementation process.

Considering the link with rural development priorities, 38% of the OGs address competitiveness and viability issues, 30% relate to supply chains and risk management, 17% to ecosystems protection, 14% to climate change and only 1% to social inclusion and local development.

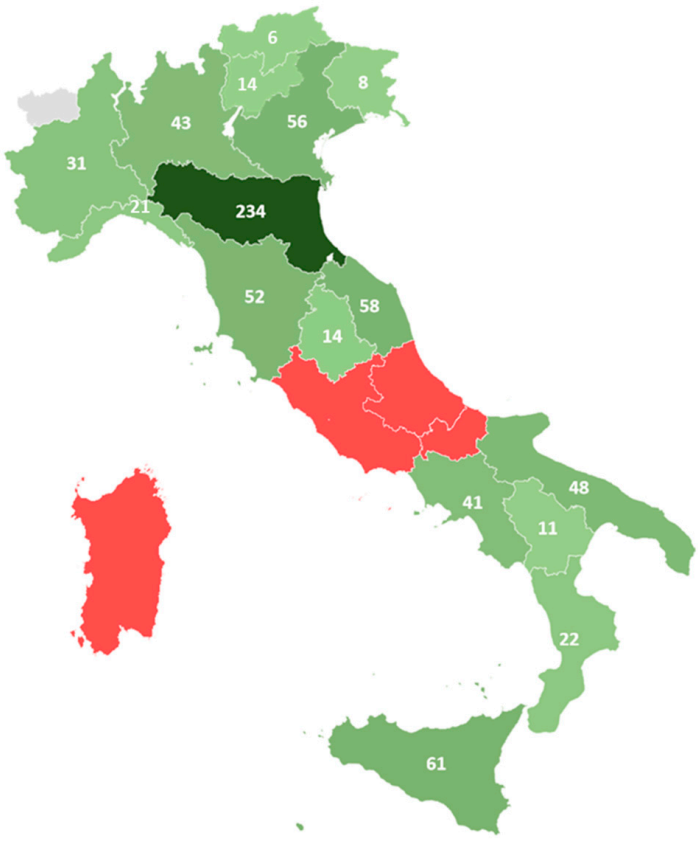

Figure 2. Number of OGs supported per region and autonomous province. Source: www.innovarurale.it (accessed on 30 June 2023).

The OGs' partnerships involved more than 5500 partners, 46% of which are farms and 22% research institutions. Only 8% are advisory bodies.

This intervention was carried out in a not very innovative agricultural and rural context, considering that in the 2018–2020 period, only 11% of Italian farmers introduced innovations in their farms (Census of Agriculture 2021) and there is an important innovation gap between the northern (22%) and southern regions and islands (6%). Thus, a more extensive support action from policy makers to address and improve both human resources and farm structures is more necessary than ever.

2. Materials and Methods

To analyse how the co-innovation process has been applied by OGs, we have chosen to use two different tools: an online survey and a semi-structured interview.

The online survey was submitted using the CAWI (Computer Assisted Web Interviewing) methodology, to the partners of the OGs in two rounds, before and during the pandemic. The aim was to collect information on the organisation of the groups, to understand how and if the EIP interactive model had been implemented and if this influenced the achievement of the project objectives.

The questionnaire initially included 17 questions, integrated with a second stage with an additional three questions investigating the conditions experienced by OGs during the pandemic. The questions explored different aspects of the interactive approach as applied to the OGs, that is: (i) the partners' role in the OG, how and at which stage of the project preparation they were involved, the main motivation to participate in the project; (ii) methods used to ensure internal and external communication, namely, the nature of the relationships and frequency of contacts between partners, tools used to ensure the dissemination of information within and outside the partnership; (iii) the importance of advisors in the implementation of the projects; (iv) methods and tools used to collate partners' needs; (v) the lessons deriving from the participation in the OG for different actors and their level of satisfaction; (vi) the specific conditions experienced by the OG during the COVID pandemic.

The questionnaire was sent to the coordinators of the OGs registered in the directory of the Innovarurale website and accessible through a link to all the participants of the groups, with only the constraint of having completed the project activities or being close to the conclusion of the project.

The voluntary and anonymous compilation of the questionnaire made it possible to collect a relevant number of responses (517 respondents from 270 OGs) in a relatively short time. However, the survey period (2019–2020) limited the participation of OGs, since in various regions the administrative procedures for the approval of the OGs were still in an initial stage. For this reason, the information collected cannot be considered representative of the whole Italian context, it not yet being fully defined.

Nonetheless, analysing the results through descriptive statistics (frequencies and scores) some interesting information on the co-innovation process and the organizational methods of the OGs emerged. Moreover, to provide further elements of analysis to support the research questions, selected answers were cross-referenced, evaluating whether a greater degree of interaction between the partners is correlated to the results achieved by the group. This analysis was at first performed by calculating the frequency distribution of the pairs of scores (scores were assigned by respondents using a 1 to 5 Likert scale) assigned by each participant. The resulting 5×5 contingency table was then aggregated excluding intermediate scores (3) to obtain four classes of score pairs. The four classes count the relative frequency of the score pairs: $s1 > 3$ and $s2 > 3$ (high-high); $s1 < 3$ and $s2 < 3$ (low-low); $s1 > 3$ and $s2 < 3$ (high-low); $s1 < 3$ and $s2 > 3$ (low-high). The higher percentages present in the low-low and high-high score classes show that there is a direct relationship between the level of interaction and satisfaction with the results achieved.

Pearson's correlation coefficient was also calculated to test the statistical significance of the crossed answers (the correlation coefficient was calculated by pairing the average scores per question expressed by each participant, in this way the integer values of the Likert scale were converted into continuous values. The statistical significance of the correlation was measured by the level of probability (p) of the null hypothesis (absence of correlation), while the strength of the relationship by the value of the coefficient ($1 < R^2 < -1$). The values close to zero of the null hypothesis probabilities confirmed that there is a positive association, even if not particularly strong, between the interactive approach and the results achieved by OGs.

The second tool of analysis, that is the in-depth case study, aimed to further explore the interaction process in the OGs, its effectiveness and to assess whether it could be possible to identify the peculiarities of this approach related to its implementation within the OGs. The selection of case studies was based on the following criteria:

- Geographical location: north, central, and south Italy;
- Progress of the project (advanced or concluded);
- Number of partners (between 6 and 10 partners, considering the average of Italian OGs);
- Production sector;
- Horizontal issues.

To carry out the case studies [30], semi-structured interviews were employed to collect information useful for analysing the following aspects, directly linked with the interactive approach, of the OGs:

1. Inclusion: analysis of the heterogeneity of participants and consideration of different perspectives represented within the partnership; the degree of involvement of different partners in the definition of the project objectives and in the preparation of the project proposal; the presence of categories of partners consistent with the problems addressed by the project and the innovative solutions identified; the type of actions carried out.
2. Process: understanding whether the project activities enabled enhancing the knowledge assets of all partners, to involve the whole partnership and how; investigating the capacity of the partnership to adjust the project objectives, if needed, during the implementation period
3. Impact: analysis of the partners' satisfaction; the effectiveness of the participatory processes and of the new skills/abilities that emerged; and how the innovative solutions corresponded to the problems and opportunities identified in the planning phase.

The interviews made it possible to describe all phases of the process (from the project design to the implementation of the planned actions), in terms of relationships among partners, and between them and all other external actors.

Overall, 10 case studies in 6 different regions were run and 64 actors were interviewed, including 20 researchers, 30 farmers, 4 advisors, 2 PMIs and 8 other actors (Table 1).

Table 1. Operational groups per region, sector, cross-cutting theme, and partnership composition.

OG	Region	Sector	Cross-Cutting Theme	Composition of Partnership				
				Farmers	Research	Advisory	PMI	Other
Beenomix 2.0	Lombardia	Apiculture	Biodiversity	3	2			
Biofertimat	Veneto	Horticulture	Bio-fertilization	7	2		2	
Bovini	Emilia Romagna	Cattle	Antibiotic resistance	6	2			1
Cheesmine	Lombardia	Cheese making	Local development	6	2			1
Innobier	Prov. Bolzano	Beer	Farm management	5	1	1		1
Irrigation systems	Emilia Romagna	Fruit	Irrigation	3	4			1
ITA 2.0	Prov. Trento	Multisector	Risk management		2	2		3
Rovitis 4.0	Veneto	Viticulture	Precision farming	2	3	1	2	
Salvarebioviter	Emilia Romagna	Viticulture	Biodiversity	3	3			
Small Fruits	Marche	Fruit	Market	7	1	1		1
			Total	42	22	5	4	8

A brief description of OGs selected as case studies is reported below.

OG Beenomix 2.0—genomics and sustainability in beekeeping. The project aims to improve the prospects of genetic selection and conservation in beekeeping, developing an open fertilization station prototype (ADA, Mating Area) and a diagnostic tool, based on SNP markers, for the racial recognition of Apis mellifera varieties and the development of a test for the SDL locus. The project achieved its objectives, and the activities of the partnership were coherent. This successful outcome mostly depended on the previous experiences of collaboration between the partners.

OG Biofertimat—use of recycled matrices as fertilizers for organic fruit and vegetable crops. An approach to improve the local circular economy. The project aimed to identify the alternative organic matrices to mineral fertilization more suitable for organic farming deriving from agricultural by-products or agri-food waste. The research institutes were the core of the partnership. Researchers reported some communication issues with farmers; the advisor involved in the project played a crucial role to improve the situation. The project focused more on experimentation than on the application of a novel solution; as a result, a ready-to-use innovation was not available by the end of the project.

OG Bovini—integrated approach to reduce the consumption of antibiotics in milk production used to produce regional PDO cheeses. The project aims to build a path to diminish the consumption of antibiotics in dairy cow farms producing PDO cheeses in Emilia-Romagna through the application of innovative tools for the quantification of the antibiotics and the evaluation of biosafety and well-being parameters. The role of farmers was key in the implementation of the project, also due the commitment of PDO consortia. The innovative tools resulting from the project are available to be used by farmers.

OG Cheesmine—experimental path of cheese maturing in the Dossena mines. The project aimed to define a production protocol for bovine and goat cheeses to standardize cheese-making processes with microbiological and structural characteristics suitable for aging in mines. The main scope of the project was improvement pf the economic condition of an inner area. In the first phase, contacts between partners were scarce; the broker role played by one of the partners made it possible to change the situation, improve relationships, and achieve the planned innovations, which were shared with farmers.

OG Innobier—basic business models to produce beer from sustainable and innovative agriculture. The main OG objective was to build business models for the development of a South Tyrolean agricultural beer value chain, taking into consideration all stages of beer production, from both technical (e.g., choice of the most suitable cereal, malting process, etc.) and economic points of view (investments per farm type, profitability, marketing). This project was carried out by public and private institutions that had previous experience of collaboration. Advisors were partners of the project and their role was crucial to its success, due to their knowledge of the area and of local farmers, them having been active in that territory for a long time. Not all results initially planned were achieved.

OG Irrigation Systems—rationalization of irrigation systems for tree crops in response to climate change. The objective was to rationalize the irrigation systems for tree crops and introduce innovative techniques of air conditioning of the orchards. The experimentation activities and innovative results of the project were positive. However, the project did not consider some key elements of the local context, such as the inappropriate level of knowledge of most the farmers of the area and the high investment required to implement the innovations. This reduced the target group able to apply the innovation in the field first-hand.

OG I.T.A. 2.0—Risk management 2.0: research, monitoring, processes, technologies and online communication for the competitiveness of quality agriculture. The project aims to make the insurance chain more efficient using new methods of quantifying and checking damage (natural disasters, plant diseases and price volatility of agricultural products) along with the digitalisation of the entire process. The partnership worked with cohesion and produced ready-to-use results. The role of the local institute regarding research and advisory was crucial, given the strong trustful relationship it has with farmers.

OG Rovitis 4.0—robotic vineyard management. The project aimed to develop two small-sized prototype robots used to manage the cultivation practices in vineyards (defence, localized mechanical weeding, and canopy management); implementing dialogue activities between the robotic medium, sensors and the decision support system. The innovative idea of the project could be usable for farmers and received positive opinions, not only at the local level. However, implementation was hampered by important difficulties in terms of communication and dialogue between partners, who disagree on how to implement various phases of the project.

OG Salvarebioviter—recovery, protection and valorisation of the viticultural biodiversity of Emilia-Romagna. The project aims to counter the risk of loss of regional viticultural biodiversity through the agronomic and oenological enhancement of varieties at risk of erosion as well as the genetic characterization and ampelography of other varieties. The project achieved its objectives, and the activities of the partnership were coherent. This good outcome depended on the previous experiences of collaboration the partners had already had.

OG Small Fruits—innovative solutions to extend the production and ripening calendar of strawberries and small fruits in the Marche region. The project aims to introduce a precision irrigation system for the management of water and nutritional supplies to reduce cultivation inputs and the risk of environmental contamination in strawberry farming. The innovative results of the project were achieved with the participation of all partners. Nevertheless, two weaknesses were reported, that is, the inappropriate level of knowledge of most of the farmers in the area and the limited possibility of transferring the innovation due to the high investment costs needed.

Each case study was analysed considering some items deemed relevant for the implementation of the interactive approach, namely: the connection to and appropriate consideration of the users' conditions and needs; the partnership characteristics with specific reference to competences and roles of single partners; the presence of innovation brokers and how they played their role in all project phases; the working dynamics existing among partners, with particular attention to the division of tasks and the quality/quantity of exchanges; the dissemination and advisory actions both for the approach used and tools chosen.

These criteria are summarised in Table 2, which was used to provide a first synthetic opinion on the overall success of projects in relation to envisaged results and innovative effects. Scores were assigned by the team that carried out the studies according to the rating scale illustrated in the table. Case studies were carried out by teams of two/three researchers, which undertook the interviews and completed a detailed report of the study, including the evaluation formulated according to the table. The final scores were attributed as a result of discussion among all members of the research team.

Table 2. Template for the summary analysis of case studies.

Degree of Implementation / Items of Interactive Approach	1	2	3	4	5
Link with problems and opportunities					
Consistency of the partnership					
Promotion of innovation brokerage					
Teamworking					
Well-defined roles and tasks					
Effective use of dissemination tools					
Innovation effectiveness/efficiency					

Rating scale: absent (1), poor (2) medium (3) good (4) very good (5).

The methodologies adopted are mainly qualitative. We judged that qualitative approach is more suitable to analyse the interactions and relationships between the actors directly or indirectly involved in the OGs. The focus of the analysis is placed on the OG as a study unit of the interactive approach, identified through the methods and tools used to share information and to facilitate the participation of members.

The information gathered through the two survey tools were analysed to evaluate whether the co-innovation process was facilitated and fostered by the interactive approach. This evaluation was based on the degree of satisfaction of OG participants, on the statistical measurement of specific correlations and on the overall judgments expressed by the interviewers.

3. Results and Discussion

3.1. Online Survey

The results of the online survey are presented with the help of few tables and figures, to illustrate the steps of the analysis and facilitate their reading. All numerical information can be consulted in the tables included in Appendix A, structured by groups of questions, dedicated to the following topics:

A1—roles and motivations of partners to participate in the OGs;

A2—interaction between OG members;

A3—exchange of information within and outside to the group;
A4—advisory activities carried out within the group;
A5—project designing and management;
A6—achieved results by the OG.

The participation to the survey was significant, considering that when the survey was submitted only a low share of the planned OGs had already finished their activities or were about to complete them.

The breakdown of the 517 respondents by profile (Figure 3) shows the relevant presence of universities and public research bodies (42.5%), followed by farmers and other small–medium entrepreneurs (36.8%). The share of consultants and technicians is modest (9.3%).

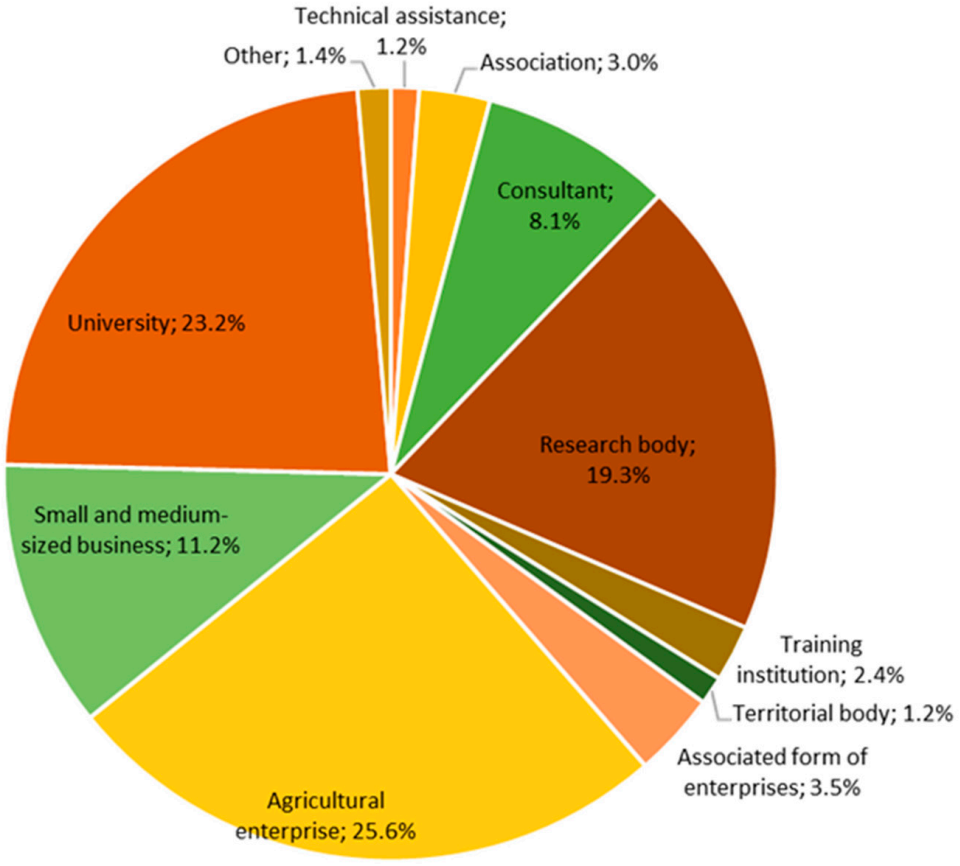

Figure 3. Respondent by profile types. Source: online survey.

The preponderant presence of research institutions together with businesses (79.3%) highlights that these two categories of participants characterized the Italian experience of operational groups. The other categories of actors played a less relevant role, at least from a quantitative point of view, even if in some cases they proved to be decisive in bringing together the innovation needs of farmers with the knowledge and skills of researchers.

Regardless of the professional profile, each partner had a role in building and managing the OG. Almost half of the respondents were coordinators (45%) while 38% are targets of the innovation (Table A1). The main motivation to join the project (45% of the responses) was to find a solution to a problem that the innovation proposed by the OGs intends to solve. However, the need to share a common problem also emerged as a relevant motivation to be part of the group (30%). Almost half of the respondents played the role of group promoters, which corresponds to the share of partners interested in seeking out a solution to a problem that concerns farmers. The role of the project promoters was not played by a single category of actors, but it was carried out in a proactive manner by

those who experienced the issue. This means that practical skills and not just theoretical knowledge triggered the co-innovation process.

The answers to the first three questions listed in Table A2 provide some elements of evaluation on one of the key aspects of the EIP AGRI approach, that is, the interaction between actors. Relationships among partners are more intense between the leader and the innovators and gradually they fade away from the core of the group. This attraction exerted by coordinators was reduced by the pandemic and the consequent restrictions to mobility and direct contact. These limitations, however, facilitated the use of online communication tools and the growth of IT skills. Table 3 details the average scores relating to question 4 for the main categories of respondents. Colours gradient from blue to red indicates the frequency of interactions, with the dark blue for the lower level of interaction and the dark red with the highest level of interaction.

Table 3. Interaction between OG members: frequency score of relationships (from 1 = low to 5 = high).

Question 4—How Often Did You Interact with the Other Participants?	Farmers	Non-Agricultural Entrepreneurs	Researchers	Advisors
With the leader	3.8	4.0	4.3	4.6
With the creators of innovation	3.6	4.0	4.2	4.2
With the subjects who provided the technical-informative support	3.4	3.6	3.7	4.1
With those who have experimented/adopted the proposed innovation	3.2	3.5	3.7	3.9
With the subjects who have facilitated/disseminated the diffusion of innovation	3.1	3.4	3.6	3.8
With the companies receiving innovation	3.1	3.2	3.3	3.5
With the other participants of the OG	3.2	3.5	3.6	3.8
With companies external to the OG interested in adopting/testing innovation	2.2	2.0	2.2	2.6
With other agricultural consultants interested in innovation	2.3	1.9	2.0	2.4
With other OGs having similar problems/needs	1.9	1.8	1.9	2.2

Source: elaboration of the online survey results.

As shown by Table 3, consultants, despite their low level of participation, have the most frequent relationships with other subjects, while the scarcity of contacts with third actors is common to all categories of partners. This was certainly a weakness of the experience; however, participants' commitment and main interest was to develop an already identified solution and, only in a second stage, to disseminate it. Obviously, more frequent exchanges with actors outside the OG would have probably accelerated some processes (or made it possible to avoid some errors).

With reference to the communication aspects (Table A3), the survey revealed that the information between partners circulates mainly in written form, followed by direct contacts. External communications tools are more diversified and based on the use of the internet (websites and social networks). Therefore, the communication methods adopted by the OGs were not particularly innovative; direct contacts and publications were preferred for the dissemination of information inside and outside the group. In this respect, it should be considered that digital skills of farmers are, on average, low and that they usually prefer face-to-face relationships.

The OGs envisage the provision of advice to partners especially through field meetings and visits for groups (66%) or individual contacts (52%). Advice to external actors not directly involved in the OG was also provided through group meetings and visits (47%), while individual contacts were less frequent (21%) (Table A4). These advisory activities carried out by the group did not have specific targets; probably for logistic and time reasons, the organisation of events accessible to many people, often with practical demonstrations, were preferred. A high level of direct involvement of partners is evident in the OGs; however, this does not correspond to a similar commitment outside the group, confirming the lower "permeability" of the OGs.

The planning process that led to the identification of the OG's activities for the adoption and diffusion of the innovation was usually linear, rarely with feedback interventions (Table A5). The innovation needs analysis was developed in the design phase, mainly through meetings with farmers (77%), demonstrating the attention paid to find an appropriate and concrete solution. However, this analysis was subsequently updated, and this might be the reason for the rare changes to project planning; 79% of respondents reported that no variations were needed. However, the analysis of the public calls in all Italian regions shows that relevant changes were not allowed by the regional funding bodies; this condition can explain the low level of adjustments during the implementation phase. Although public support was decisive for the birth of OGs, the strict red tape does not allow for a high flexibility of organizational models, limiting their capacity to adapt to changes (for example, through the reformulation of objectives and strategies). However, from the low response shares on possible issues in question 14, it appears that such flexibility was not needed, as no significant problems emerged. The project developed regularly even if some difficulties were encountered in the participation of the partners (29%) and in understanding their respective needs (24%).

Finally, participants were asked to evaluate the experience of cooperation within the OG (Table A6). The overall opinions were positive, not only in terms of the results achieved in terms of innovative solutions (score 4), but in terms of the network of relationships and new skills acquired (scores 4.1 and 4). All the positive opinions about OGs have higher scores (>3) than the negative ones (<3). The cooperation experience was evaluated positively even if the concrete results in terms of adoption of the innovation or technical or organizational aspects, did not obtain a high score (2.9–3.2). An important reason of this lies in the fact that it takes time to introduce a change in a farm. Yet, the skills growth and the expansion of the network of relationships are valid results that also facilitate the diffusion of innovations subsequently.

To further assess whether these opinions are influenced by the organizational and relational methods adopted by the OGs, we cross-referenced the Likert scores between questions to highlight possible existing correlations between the factors investigated such as, for example, to evaluate if the satisfaction degree is related to the frequency of relationships between partners.

This analysis was developed, as described in the methodological part, by computing the distribution of paired scores and measuring their correlation. Table 4 summarizes the results of these calculations. The presence of extreme values along the diagonals indicates a polarization of answers, which confirms the reliability of the judgements. Pearson's correlation coefficient assesses the statistical significance of cross-referencing answers.

Table 4. Satisfaction degree evaluation in relation to partners' relationships and information exchange—cross percentage of pair scores and Pearson's correlation coefficient.

		Partners' Relations Frequency		**Information Exchange Frequency**	
		Low <3	**High >3**	**Low <3**	**High >3**
Satisfaction degree evaluation with OG's results	Low <3	5.7	20.2	6.2	16.2
	High >3	2.5	39.1	2.7	45.6
Pearson's correlation		coefficient 0.55	*p* <0.01	coefficient 0.61	*p* <0.01

Source: online survey.

The share of responses with a high satisfaction and relational frequency (score > 3) is equal to 39% of the total, against 6% of those who assigned a low score (<3). The most satisfied are those who have more frequent contacts, but it should be noted that even a high relational frequency might be associated with negative judgments (20%); on the contrary, a low frequency of relationships is not linked to a fair level of satisfaction (2.5%).

Compared to the frequency of information circulated between partners, the incidence of the highest scores reaches 46% against 6% of those assigning a score lower than 3. Therefore, a greater intensity of information exchanges seems to be linked to greater satisfaction among OG members; this assessment is reinforced by the fact that a low percentage of respondents (3%) were satisfied in situations of poor circulation of information. However, it should be considered that 16% said they were satisfied even if the dissemination of information was modest.

To summarise, a greater frequency of contacts and information exchanges between partners are the recurring characteristics of the OGs that have achieved the results deemed most satisfactory according to the survey participants. The correlation coefficients confirm the statistical significance of this link; the result appears to be more robust in relation to information exchange.

The key principles of the interactive approach are therefore effective in achieving the objectives of the Italian OGs. However, given the heterogeneity of the OGs' partners, we consider it relevant to understand the role individual partners played within the group. Cross-referencing the answers to the question on the role within the OG (Table A1) with the partner category we obtain the frequency distribution represented in Figure 4.

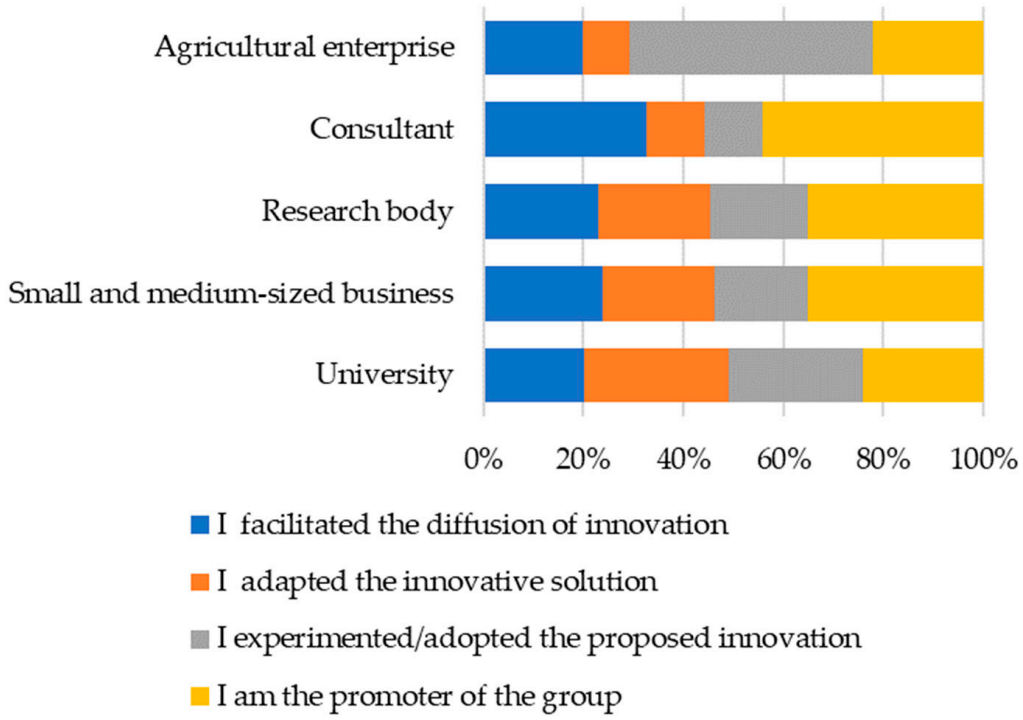

Figure 4. Roles of partners within OG by category (share of multiple responses). Source: direct survey.

We can outline how farmers play a predominantly "passive" role in implementing the innovation, while consultants, when involved in the OGs, are more committed to coordinating and organizing the group. The roles of the other categories of partners are more diversified with a slight prevalence of the organizational position for research institutions and SMEs, while universities carried out the important task of experimenting and adapting innovation to the specific operational context.

3.2. Case Studies

The comparative analysis of the case studies shows a general adherence to the interactive approach in the Italian experience, although in some cases not all of its elements were adequately considered by the OGs analysed (Table 5).

The qualitative analysis highlights how *the problems and opportunities identified by the OG projects* cover the key issues and sectors for the region or area considered and the aspects more important for the farms or SMEs involved. In addition, the proposed innovations are generally considered useful in solving the problems identified or enhancing opportunities.

Table 5. Summary analysis of case studies.

Items of the Interactive Approach / Case Studies	Beenomix 2.0	Biofertimat	Bovini	Chesmine	Innobier	IrrigationSystems	Ita 2.0	Rovitis 4.0	Salvarebioviter	Small Fruits
Link with problems and opportunities	4	4	5	4	4	2	4	3	4	3
Consistency of the partnership	4	4	4	4	5	3	5	4	4	4
Promotion of innovation brokerage	4	2	5	5	4	3	4	2	5	4
Teamworking	4	3	4	3	5	3	3	1	4	3
Well-defined roles and tasks	4	3	5	3	5	4	5	3	5	3
Effective use of dissemination tools	4	2	4	2	4	3	3	2	4	4
Innovation effectiveness/efficiency	**4**	**3**	**4.5**	**3.5**	**4.5**	**3**	**4**	**2.5**	**4**	**3.5**

Rating scale: absent (1), poor (2), medium (3), good (4), very good (5).

Below, the main elements of the interactive approach are examined to highlight the different implementations and their effects.

3.2.1. Setting Up the Project Objectives

The pathways observed for the identification of problems and related solutions are various.

In some cases, *identification of the issues to be tackled starts from the farmers*, which might be single farmers or small groups of them (Rovitis; Cheesmine, Small Fruits), interested in implementing specific innovations, or associated farmers (Biofertimat; ITA 2.0; Innobier). In the latter, farmers' associations range from cooperatives to producers' organisations to farmers' organisations, but in all cases, it is the association that collects the needs of the farmers and from them leads the definition of the problem to be analysed within the OG.

A second pattern of issue identification and definition links to the existence of *specific interests of a public institution or private structure* (Bovini; Irrigation Systems). In contexts characterized by problems relevant for an entire industry (such as the use of antibiotics) or an entire territory (such as water management), technical partners led the process and organised meetings with farmers to better define them and identify possible solutions, which are then formalized in the project proposal.

In a third pattern the *scientific partners led the process of definition of the problem* (Beenomix; Salvarebioviter), which derived, however, from interaction with farmers and producers, originating from previous projects (Beenomix) or from traditional cooperation with farmers in a certain geographical area (Salvarebioviter).

A fourth pattern can be identified in relation to the process that the lead partner, regardless its nature, followed to define the project idea; a process which appears to be based on a shared idea among potential members of the partnership and defined by a process of interaction within them and with other actors, which might decide to join the group (ITA 2.0, Beenomix, Innobier).

Despite the consistency between problems/opportunities identified and innovations proposed, sometimes the solutions were not immediately usable in the farms, for multiple reasons highlighted as follows: (i) a need for further experimentation to introduce the innovation on the ground (Biofertimat); (ii) inaccurate cost/benefit analysis related to the introduction of the proposed innovations, which required high initial investments not always affordable for farmers (Small Fruits); (iii) the adoption of the innovation was subordinated to conditions that were not yet present in the partners' farms, such as farmers' competences that needed to be reinforced, farm structure to be improved, or unsuitable soil conditions (Irrigation Systems); (iv) legal and security conditions were not yet available (Rovitis 4.0). Hence, the process of identification of problems and solutions often did not take into consideration the complexity of factors that could favour or hinder the adaptation and introduction of an innovation in a specific context, including viability, skills, culture and interest for new products or varieties.

Another issue to be highlighted is the research/experimental nature of some projects (Biofertimat, Salvarebioviter) that were not always able to achieve all results and outcomes ready for dissemination.

3.2.2. Partnership Integration: Functioning, Teamwork, and Partner Participation

In most cases, *the OGs' partnerships* were consistent with the problems to be addressed and the actions identified. This aspect was also influenced by the selection criteria envisaged in the calls for the financing of OG projects.

Building partnership appropriate to the problem to be tackled and the innovations to be introduced is a required condition but not necessarily sufficient to have a well-functioning partnership. The *capacity to work in a team* is a key condition, but it is well known that the teamwork is easy to understand and put down on paper in the planning phase but difficult to master in the implementation process.

The results of the case studies showed that the well-functioning partnerships were those with *previous experience* of projects based on a multi-actor approach (e.g., Salvarebioviter, Innobier). The presence of a partner playing an active *mediating role* is identified as an additional success factor in those partnerships considered to be well-functioning by the interviewees (Bovini, Innobier, Ita 2.0, Salvarebioviter), even in projects where potential competition between partners exists. The Bovini OG is an interesting example where the well-played role of the leader was key to promoting the full engagement of potential competitors as partners, which agreed to share experimental results among them to improve the viability of the entire industry (producers of PDO cheese).

Two OGs experienced serious difficulties in these aspects: Rovitis 4.0 did not achieve all of the expected results due to the controversies that arose among partners and the difficulty of reaching a compromise. The partners of Cheesime were not used to working as a team and cooperating with others and this caused arguments and disputes between the partners, which were solved thanks to the capacity of the leader to act in a balanced and coherent way and show the results of the innovation.

The small groups strategy, namely the creation of working groups based on the work to be carried out, was sometimes adopted to support the smooth functioning of the group and to reduce the distance between different partner typologies, such as farmers and scientists, and to facilitate communication (e.g., Irrigation Systems, Ita 2.0). The need to limit the involvement of the entire partnership proves how difficult it might be to promote interaction as envisaged in the EIP AGRI approach. Furthermore, while this solution helps to reduce conflicts, it might also decrease the full potential of the interactive approach,

which lies in the interaction between partners and the possibility to co-create solutions through it.

Communication barriers between partners, which do not traditionally work together, such as farmers and researchers, are identified as the main obstacles to setting up good teamwork procedures. In some OGs, these problems were prevented and/or solved by the presence of professionals with specific mediation capacities (Biofertimat, Bovini, Beenomix, Innobier), who were able to facilitate dialogue between partners. They are often technicians from the farmers' organisations, associations, cooperatives and producers' organisations. On the one hand, they know farmers and their issues, on the other hand, they are experts of the sector, they know production techniques and they can properly communicate with researchers and, at the same time, to work as intermediaries between them and farmers. These experts are often advisors, and their presence in the analysed OGs is more common in those projects that have associated farmers (e.g., producers' organisations, consortia, farmers' organisations, cooperatives) among the partner organisations. The low rate of advisor participation in the Italian OGs, linked to administrative issues experienced at the beginning of the programming period, deprived the EIP AGRI experience of a brokerage function, which could be essential to boosting communication flows and contamination of languages.

Regarding the participation of farmers in the OG projects, it is important underline that often the non-recognition of their engagement, both in terms of time and economic compensation, due the eligibility of expenditure, reduced their interest in the OG activities reflecting negatively on the project results.

3.2.3. Implementation of the Project: Roles, Tasks and External Factors

Well-defined roles, and appropriate distribution of tasks among partners are, together with the above-mentioned teamwork, key elements of the interactive approach.

In the OGs analysed, the *implementation of the projects* was influenced, positively and/or negatively, by all elements mentioned above and especially by the clarity of tasks and roles. When partners, regardless of whether they were farmers (e.g., Biofertimat: Small Fruits) or other core participants (e.g., Rovitis 4.0, Biofertimat), did not have a clear role and were not assigned well-defined tasks, the project management and the development of the results were not fluid and complete.

Another aspect that hinders the achievement of all results was incomplete preliminary context analysis about the future application of the innovation (Innobier, Irrigation systems, Biofertimat, Small Fruits), i.e., if farmers can introduce the proposed innovation given their competences and equipment available or if the chain is capable of supporting its introduction in the market.

Also, the presence of external factors, such as climate change, can influence the planning and results of a project in a notable way. By way of example, Beenomix 2.0, whose innovation consisted of sharing the importance of mating control for effective genetic improvement with beekeepers, was particularly influenced by adverse weather conditions. Similarly, the success of Salvarebioviter, which aimed to grow ancient vine varieties, was undermined by not considering climate changes.

3.2.4. Implementation of the Project: Dissemination and the Role of Advisors

The Italian OGs suffered the consequences of the COVID pandemic. The most negatively affected actions were the experimental tests and the dissemination/training. After a period of difficulties, the partnerships reorganised the schedule and the modes of communication and continued their work.

Analysis of the case studies shows that planning, management and *implementation of dissemination and the role of advisory* were the most important weaknesses. Dissemination actions were usually set up in a traditional manner; often a detailed plan was prepared only at the end of the activities and using generic tools more suitable for a wide audience

than specific users (newsletter, brochure, generic dissemination articles) or more adequate for scientific users (conference, seminar).

Most OGs examined did not apply the real interactive approach because the phase of dissemination and diffusion was managed outside the iterative process among partners. This situation had two consequences: the dialogue with the farmers inside the projects was very low and often there was no dissemination outside the project among the other farms potentially interested in the innovations. The already mentioned lack of advisor participation was the main reason for the difficulty of interacting with farmers and their workers; however, this issue also reflects a cultural gap.

Conversely, in some OGs (Bovini, Innobier, Salvarebioviter, Beenomix) the actions to involve farmers, within and outside the partnership, were implemented during the entire project process and improved the effectiveness of the results. In at least one case (Innobier), the role of advisors was relevant not only to involving the farmers but to solving problems that arose during the implementation of the project.

3.2.5. Overall Effectiveness and Efficiency of OG Action

The indicator of effectiveness and efficiency scores between 3 and 4.5; only in one case its value is 2.5 (Rovitis 4.0), linked to conflicts between partners as already mentioned (Table 5).

The overall evaluation of the analysed OGs ranges from medium to good. The reasons for the less brilliant performances lay in the following factors: (i) the innovative solutions did not always fully correspond to the needs of users and/or their uptake entailed high costs; (ii) relations inside the partnership were not properly managed, especially those involving the users of the innovations; (iii) dissemination was based on generic plans and tools, while targeting actions were usually dedicated to scientific users.

In these conditions, projects were positively concluded, but not all results were achieved and, more importantly, the innovative solutions did not have the diffusion desired (Biofertimat, Irrigation Systems, Small Fruits, Cheesmine).

In other cases, the results reached the target users beyond the project members, making it possible to enlarge the network of relationships and converting the participation to the OG into an investment for future experiences (Beenomix, Bovini, Innobier, Ita 2.0, Salvarebioviter).

4. Conclusions and Recommendations

The main conclusions of the study are summarised below, according to the two main research questions.

The interactive approach can be considered pivotal for Italian OGs to achieve their objectives. The respondents to the online survey pinpoint the creation/strengthening of relationships as the most valuable result of their participation in the OG, while interviewees of the case studies link the success of projects to the adaptive cycle of plan-do-review [18] between all project actors (Bovini, Innobier) or to previous common experiences (Beenomix 2.0, Salvarebioviter).

The focus on farmers' and/or territories' needs led to the identification of the most suitable innovative solutions; this proved to be a success factor for the OGs as well as a driver for the widespread diffusion of their results. The projects where needs were not carefully assessed resulted in solutions not sufficiently adequate to be implemented by local farmers, because of their lack of skills or because of the high upfront investments needed, even when the solutions identified were of good quality and appropriate to the problem addressed (Irrigation Systems, Small Fruits). The case study interviewees reported the impossibility of modifying the project activities during the implementation phase as a major difficulty; a limitation always linked to the public rules of the funding.

The presence of partners acting as brokers (defined at the project start or realized by necessity during the project) was essential to achieving objectives (Cheesemine, Ita 2.0; Rovitis), regardless of when this role was assigned, before the project start or during the

implementation phase, following issues arising within the partnership. It is interesting to note the diversity of actors who can assume this function. It can be a single person with specific relational and communication skills, a farmers' organization with excellent capacities to coordinate its members or an advisor/technician with extensive experience of working with farmers and other local actors.

The difficult collaboration between research and practice was reported as one of the main weaknesses of Italian OGs. Researchers and farmers "speak" different languages and they often have non-coinciding professional routines (Biofertimat). Overall, the researchers work proficiently with technicians/advisors and usually assign a more passive role to farmers, such as the implementation of experimental fields or participation in training events. This condition emerges from both the online survey and the case studies as the major cause of the not optimal results of the OGs. However, this difficulty can be solved with the help of advisors, their work of language decoding and their capacity to understand the needs of farmers.

Another common weakness identified is the complicated communication among partners (which links to the point highlighted above) and lack of dissemination of results, which might be also read as a lack of communication towards third actors. The communication tools designed by most projects were traditional and not customised. As regards internal communication, a low level of interaction between partners is usually reported as the main cause of the issues experienced. External communication was affected by the initial lack of attention dedicated to it by the settings of OGs both in Italy and in the EU.

As a general conclusion, we can affirm that some elements of the interactive approach were proficiently implemented in the Italian OGs. However, the iterative process of co-construction is lacking in most cases examined, with few exceptions. Therefore, for the future implementation of the EIP AGRI OGs, it is key to work on improving the capacity to put in place this iterative process.

Regarding the second research question, the study highlighted how hard is to measure and fully understand the process triggered by the interactive approach. Given that this process is influenced by the specificities of the context where the project is implemented and by the relationships existing between partners, it does not always take the same shape, with similar characteristics. As mentioned in the first paragraph, this approach has been studied for many years and it has become evident how some of its key elements can favour or hinder the adoption of innovations. However, it cannot be considered to be a predictive model, due to the complexity of fully defining the role of each component and its weight on the process. For example, the results of previous and present studies show that when the actors work together the innovation process is more effective. However, the intensity, modality and direction of this relationship can be different according to the situation; thus, the effects can change. It follows that the experiences studied in specific contexts can give essential insights about the interactive model, but they do not make it possible to define precise roles and criteria.

In addition, we highlight that this study cannot assess the impact of the EIP AGRI on the Italian agrifood system, since the conclusion of the OG projects is recent, and many are still ongoing. The in-depth analysis of the effects the EIP AGRI in the long term might be the focus of a future study.

Nevertheless, this analysis makes it possible to formulate some recommendations for the future implementation of OGs, considering that they have been confirmed in the 2023-27 CAP programming period.

The principal focus should be on the diffusion of the "contamination culture", that is, promoting the knowledge of each element of the interactive approach and clarifying the real extent of concepts as multifactoriality, co-innovation and the benefit deriving from working together. Researchers, advisors, and public institutions in charge of planning these interventions can play an active role in disseminating this knowledge and, as a consequence, creating an enabling environment for innovation.

A major orientation of OG projects toward the problems and opportunities of rural enterprises and territories should be boosted. Two working directions could be useful in achieving this aim: promoting the use of specific methods and tools to identify and solve the problems of farmers and rural areas; incentivising the active participation of agricultural enterprises by facilitating the financial reimbursement of their participation, of course against real and effective involvement.

The presence of an "intermediary" should be encouraged, that is, a member of the group who plays the role traditionally described as the innovation broker. OGs should include such a role within their partnership from the beginning of the project. In the view of some authors, the OGs could themselves be the actors playing the brokering function towards farmers and other actors in rural territories. An online survey submitted to Spanish EIP AGRI OGs to investigate their characteristics and functions [31] reveals that they perform three main functions: innovation process management, demand articulation, and institutional support and innovation brokering.

The difficulty of involving final users of innovations or their "passive" role was magnified by the almost total absence of advisors within the EIP AGRI partnerships. According to the job profiles outlined in the European Commission documents, this professional figure combines specific technical knowledge with design, relationship and communication skills and can facilitate exchanges between entrepreneurs and territorial stakeholders. Furthermore, their presence might streamline the dissemination of project results outside the OG to other potential users with problems and characteristics compatible with the innovative solutions adopted within the OG.

To conclude, brief consideration should be addressed to the question of the huge availability of innovative solutions that the EIP AGRI initiative generated. This relates to two main topics: (i) enhancing the value of what has been achieved; (ii) improving the capacity to disseminate innovations.

There might be a high risk that a portion of all results will remain at the exclusive disposal of the project's partners. The importance to disseminating these results to make them common heritage for all potential interested users should be strongly supported.

The lack of effectiveness of the actions aiming to promote the wide adoption of the innovations identified by the OG projects emerged from the analysis. It could be appropriate to provide specific training to improve the skills of advisors in terms of promoting and supporting the adoption of innovations. Additionally, it might be relevant to explicitly ask in the calls and public notices for specific actions in this direction, to be rewarded in the selection process.

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Appendix A

Table A1. Online survey: roles of OGs partners and the reasons for their participation.

Questions	Responses	% Share on Total
1—How would you define your role within the OG (individually or through the company/organisation you represent)?	multiple choice	
I am the promoter of the group	234	45%
I adapted the innovative solution	148	29%
I adopted the proposed innovation	196	38%
I facilitated the diffusion of innovation	183	35%
2—How did you get involved in the GO?	single choice	
I am among the promoters of the project	246	48%
I was contacted by the OG leader	144	28%
I was contacted by another OG partner	50	10%
I knew about it through the technical assistance services	7	1%
I was already linked with the OG subjects	55	11%
By chance, I inquired and expressed my interest to participate	5	1%
I attended a meeting about the OG topic and contact them	9	2%
3—What is the main reason for your participation in the OG?	single choice	
I am interested in finding a solution to a problem	232	45%
I found a solution and I want to spread it	34	7%
The solution might more easily emerge from the interaction with others	156	30%
I have the opportunity to complete a previous experience on the same topic	63	12%
Other	32	6%

Table A2. Online survey: interaction between OG members.

Questions	Pre-Pandemic	Post-Pandemic	Shift
4—How often did you interact with the other participants?		weighted average score (1–5)	
With the leader	4.3	4.1	−0.2
With the innovation promoters	4.1	4.0	−0.1
With partners providing the technical-informative support	3.8	3.6	−0.2
With partners who have experimented/adopted the proposed innovation	3.7	3.5	−0.2
With partners who facilitated/disseminated the diffusion of innovation	3.6	3.4	−0.2
With companies receiving innovation	3.5	3.2	−0.3
With other participants of the OG	3.7	3.5	−0.2
With companies external to the OG interested in adopting/testing innovation	2.5	2.2	−0.3
With other agricultural consultants interested in the innovation	2.5	2.1	−0.4
With other OGs having similar problems/needs	2.0	1.9	−0.1
5—How often did you participate in the OG activities?		weighted average score (1–5)	
Plenary meetings	4.1	3.5	−0.6
Subgroup meetings	3.8	3.3	−0.5
On-line contacts (email, whatsApp, social networks)	4.2	4.2	0.0
On-line activities by cooperative tools (e.g., online platforms, shared folders or documents, etc.)	3.6	3.7	0.1
Field visits (farms, laboratories, etc.)	3.5	2.9	−0.6
Other interaction methods (specify)	2.4	2.1	−0.3

Scores: 1 = very low frequency 5 = very high frequency.

Table A3. Online survey: exchange information within and outside the group.

Questions	Multiple Choices	
6—How did you receive information on the OG's activities?	weighted average score (1–5)	
Through documents dedicated to OG members	4.0	
Through direct contacts with other OG members	4.2	
Through documents also disseminated outside the OG	2.8	
Participating in public events (e.g., seminars, media interviews)	3.1	
Consulting information disseminated online (e.g., website, blog, social network)	3.1	
Through ad hoc tools created for communication between OG partners	3.4	
7—The OG spread public information about the project mainly through	responses	% share on total
Dedicated website	284	55%
Generalist social networks (Facebook, Twitter, Youtube, etc.)	183	35%
Scientific or professional social networks (ResearchGate, Linkedin, etc.)	13	3%
Dissemination articles	168	32%
Scientific articles	57	11%
Seminars and workshops	222	43%
Scientific conferences	55	11%
Meetings and fields visits	201	39%
Videos	47	9%
Demo fields	81	16%

Scores: 1 = very low frequency 5 = very high frequency.

Table A4. Online survey: advisory activities carried out by the group.

Questions	Multiple Choices	
8—The OG advised entrepreneurial partners about innovation mainly through	responses	% share on total
Collective meetings and field visits	342	66%
Video tutorials	33	6%
Demo fields	173	33%
On-site individual advice	268	52%
Off-site individual advice	37	7%
Remote individual advice (telephone, e-mail, chat, etc.)	187	36%
On-site advice for small groups	85	16%
Off-site advice for small groups	46	9%
9—The OG advised external entrepreneurs about innovation mainly through	responses	% share on total
Collective meetings and field visits	244	47%
Video tutorials	75	15%
Demo fields	162	31%
On-site individual advice	108	21%
Off-site individual advice	47	9%
Remote individual advice (telephone, e-mail, chat, etc.)	132	26%
On-site advice for small groups	64	12%
Off-site advice for small groups	48	9%

Table A5. Online survey: project designing and management.

Questions	Multiple Choices	
10—In which phases of the project were the problems/needs of the farmers identified?	responses	% share on total
Collection of issues/needs during the design phase	308	60%
Feedback check after some phases of the project	98	19%
Feedback check after all phases of the project	91	18%
Check after the last phase with partners and/or farmers	20	4%

Table A5. *Cont.*

Questions	Multiple Choices	
11—What tools were mainly used to identify the problems/needs of farmers?	responses	% share on total
Questionnaire to farmers partners for analysing issues/needs	83	16%
Questionnaire to other farmers for analysing issues/needs	46	9%
Meetings to assess the real needs of farmers	398	77%
Informal gatherings during the activities	263	51%
Interviews of farmers	165	32%
Analysis of available statistical data	130	25%
Applications (apps, social networks, etc.) for information gathering	19	4%
12—Were changes introduced compared to the project presented?	responses	% share on total
No, there were no significant changes	407	79%
Yes, the partnership changed	42	8%
Yes, the objectives changed	16	3%
Yes, the organisation of the activities changed	62	12%
14—What issues were encountered during the project implementation?	responses	% share on total
Non-participation of all partners in the activities	150	29%
Lack of funds dedicated to the exchanges/meetings between partners	73	14%
Lack of actions for exchanges/meetings between partners	37	7%
Understanding the needs of the different actors involved was difficult	122	24%
Lack of a facilitator within the group	37	7%
Lack of a business support consultant	53	10%
Other	59	11%

Table A6. Online survey: achieved results by the OG.

Questions	Multiple Choices
13—What changes has the OG produced in your professional environment?	weighted average score (1–5)
I have expanded my network of relationships	4.1
I introduced new organisational methods	3.2
I adopted a new tool/device	2.9
I acquired new skills	4.0
Other changes	2.1
15—Considering your OG's experience, how much do you agree with these statements?	weighted average score (1–5)
I investigated the problem to be addressed	4.2
Participation required too much time for me	2.3
The group of participants was too large	1.7
I understood the points of view of the other participants	3.7
The solution identified has been scarcely applicable or unsuitable	1.7
Timing to implement the project activities was too limited	2.6
With the project I learnt how to solve the problem	3.3
I was marginally involved in the decision-making process	1.7
I had the opportunity to develop new ideas	3.8
I enriched my initial knowledge (before the OG)	4.0
The OG's objectives should be limited (e.g., at territory or sector scale)	2.4
16—In a nutshell, how satisfied are you with the following aspects?	weighted average score (1–5)
Results achieved by the OG	4.0
Involvement in activities	4.2
Relations with other participants	4.1
Organisation of the OG (e.g., methods of communication, frequency of meetings)	4.0
Other aspects	2.6

Scores: 1 = strongly disagree; 5 = completely agree.

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