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Examining Researchers' Attitudes, Barriers, and Opportunities for Participatory Research: The Case of the Riso-Biosystems Project on Organic Rice

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Abstract: This paper reports on the conception and implementation of a participatory approach within an agricultural research project aimed at fostering the transition towards organic in the Italian rice district. We investigate the relationships among scientists and stakeholders, exploring researchers' attitudes, barriers, and potential in relation to participatory research. We use participant observation, in-depth interviews, and systematic cataloguing of communication documents, from the beginning to two years into project implementation, for a total period of three years. The results of the analysis show that, despite a high level of authoritative commitment to participation, scientists reveal a scarcity of knowledge and skills, and poor attitudes that come from a negative perception of participatory research. They engage in various forms of collaboration with stakeholders, as long as decision-making remains essentially in their hands. With the deep analysis of a case study, the paper contributes to the ongoing discussion on the quality of participatory agricultural research, in particular, presenting evidence on the key role of researchers and their attitudes. The paper also contributes to the development of a culture of learning by doing, through honest monitoring and evaluation, and the capacity to learn from failure.

Keywords: organic rice; agricultural research; participation; public funding; scientists; monitoring and evaluation

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1. Introduction: Where Are We in Participatory Agricultural Research?

Almost forty years after Chambers' seminal work "Rural development: Putting the last first" [1], the popularity of participation in agricultural research shows no sign of abating. For a long time, and even now, the discussion has focused on the issue of quality of participation, typically looking for "as much participation as possible", and measuring the quality of participation on a linear scale in which the stakeholders' power and control over the research process grow. The highest form of participation is regarded as the best form of participation, while non-participation is seen as the lowest and worst form [2]. For example, in Pretty [3], the quality of stakeholders' involvement ranged from "passive participation (people participate by being told what is going to happen or has already happened)" to "self-mobilisation (people participate by taking independent initiatives)". Similar classifications can be found in Arnstein [4], Biggs [5], Ashby [6], and Lambrou [7]. This line of thinking is also espoused in the "quality of participation" framework put forward by Shirk et al. [8], whose fundamental question was "whose interests are being served?". Based on this question, they proceeded by examining opportunities for actors' participation and the extent of incorporation of their interests.

As far as quality of participation is concerned, most agricultural research seems to fall into an intermediate category. Indeed, in a systematic review of thirty-five experiences of participatory processes with the involvement of farmers in the choices for the protection, management, and transformation of rural areas, Menconi et al. [9] concluded that there are

different types of participation, but most participatory experiences regard farmers merely as a source of information to be used by researchers, rather than as active participants in decision-making.

The next discourse in the field of participatory agricultural research then explored how to blend various forms and intensities of stakeholders' participation with formal agricultural research [10–12], "uniting science and participation" [13], into "compromised participation" [14], considering that "there is a potential for synergy from closer integration of formal and farmers' experiments" [15]. This led to a shift from maximizing to optimizing the use of participatory methods.

At first, when the objective was to maximize participatory activities, agricultural scientists were asked to reflect on which methods and approaches to use. While later, when the objective was to optimize the use of participatory methods, integrating and harmonizing them with those typical of traditional research, they were asked to reflect on whether, when, in which phases, about which issues, they want to, can, and should combinate participatory and traditional research [16].

The tools and indications proposed by the literature to design, implement, and monitor such well-balanced combination of participation and formal research are multiple, complex, and sometimes confusing. The review by Menconi et al. [9] shows that there is no preferred scheme for participatory projects: every initiative is tailor-made on the researchers' preferences, resources, context, and project, even though—the authors admited—simplicity seems to be the best quality of any participatory activity.

Under the European Union's Horizon 2020 Programme, the project "LIAISON Optimizing interactive innovation" investigated how to design and implement interactive innovation projects and provided a list of practice-ready methods and tools, intervention options, effective attitudes, and recommendations [17]. This recent package of resources suggests that researchers have not yet fully integrated them into their practices and that participation is still a difficult task for the majority of agricultural researchers, especially the ones from the so-called "hard sciences", used for traditional and mono-disciplinary research. Indeed, the literature describes agricultural researchers as lacking in practice, skills, and competences, but also awareness, interest, time, incentives, and recognition by the current research system [18–22]. Yet, public research and development (R&D) programmes urge agricultural researchers to undertake participatory research for sustainable agriculture. The European Commission has explicitly encouraged the transition to sustainable farming through interactive innovation and multi-actor approaches since 2012 [23]. In Italy, the Ministry of Agricultural, Food and Forestry Policies (MIPAAF) supports participatory and multi-actor projects for the development of the organic system, by requiring researchers who wish to receive financial support to include farmers among their research partners [24,25]. Hence, the presence of farmers in research partnerships has become compulsory in Italy, but Mansuri and Rao [26] warned against "induced" participation, which is participation promoted through bureaucratically managed research and development interventions. They stressed the need for a fundamentally different approach, one that is long term, context sensitive, committed to developing a culture of learning by doing through honest monitoring and evaluation.

There is no final conclusion about the *best* way to coordinate an agricultural research project in a participatory manner, and the discussion is still ongoing. As discussed above, two main theoretical perspectives on participation exist: (i) the theory founded on power and control of the research process exercised by the stakeholders, using linear typologies to categorize participation and frameworks that assess the degree of stakeholders' participation in research; (ii) the theory of optimization of the use of participatory approaches in a given research context, in which researchers play a key role in determining the best combination of traditional and participatory research.

To contribute to the ongoing discussion on what makes successful participatory agricultural research projects, we assess what may be learnt about participatory research in practice from critical reflection on the origins and development of a recent R&D project,

i.e., the Italian Riso-Biosystems (RBS) research initiative, funded by MIPAAF for three years (2017–2019) and specifically requiring the adoption of a participatory approach. The aim of our work is to present an in-depth case study of participatory agricultural research to reflect attitudes and values of the researchers involved, potential and barriers, and evidence for policy makers and funding agencies fostering participation in agricultural R&D.

Considering the diversified and ever-evolving background concerning participatory research in agriculture, it may be useful to illustrate the theoretical and analytical framework that has guided the study.

First of all, as stated by Ison et al. [27], participation only makes sense if it is useful. Its main purpose is to encourage more effective management of knowledge in situations of complexity and change. By sharing this general principle, the transition from maximizing participation to optimizing it becomes acceptable, so that different levels of participation can be used for different phases, activities, and purposes of the research project, trying to achieve each time the most useful combination of participatory and traditional research. As for participatory strategies, methods, and techniques, alongside the heterogeneity highlighted in the literature, there is a comforting conclusion by Menconi et al. [9], according to which there is no perfect recipe and it is good to favor simple activities. Once again, what is most useful is most effective.

Both of these conclusions seem to allow researchers great freedom as to whether, when, and how to use participatory research. In order not to risk becoming arbitrary, however, participatory initiatives must be analyzed and reflected upon in light of a framework. The one proposed by Neef and Neubert [16] appears to be useful, as it offers an exhaustive list of participation dimensions and attributes of each dimension that are considered in an integrated way within the tool. Due to its completeness and generality, this framework is well suited to any case study. In particular, by considering the institutional context and risks of the project among the attributes to be analyzed, it allows to take into consideration the context in which a participatory research project is carried out, which, as seen in Mansuri and Rao [26], is a crucial element to avoid purely formal participation, implemented only to comply with the requirements of a client.

This article analyzes the experience of an R&D agricultural project according to the second conceptual framework described in the Introduction. Moreover, it refers to research and development projects in agriculture, in which a portion of the activities is oriented towards the experimental application of research results. In this type of project, the participation of farmers is functional to the project objectives. The project is always coordinated by a researcher, but there is (or should be) more room for negotiation with farmers in order to plan and control the research process. As we will see in the Results section, this has implication in terms of how to frame the assessment of participation.

This study adopted the analytical framework based on the work of Neef and Neubert [16], which tries to optimize the use of participatory approaches in a given research context. The framework looks at participatory research elements along different dimension and attributes, thus taking into account the diversity, specific context, and dynamics of agricultural research projects. The framework provides a basis for agricultural researchers engaged in participatory processes with local stakeholders to decide which issues and in which phases certain participatory elements could be used in a specific research context. This framework enables a process of reflection, helping to identify particular strengths, opportunities, and limitations of stakeholders' inclusion in a research project.

The framework is designed for reflection conducted by researchers, possibly together with stakeholders. For this reason, it lends itself well to our case study, in which the participatory research project is analyzed above all from the point of view of researchers, who play a decisive role in choosing the best combination of traditional and participatory research. In particular, the reflection is conducted by the research group responsible for promoting and monitoring a participatory approach within the research project investigated here, in which the authors of this article took part. Only the first three dimensions of this structured tool are expanded in the presentation of the results of this study.

Context of the Case Study: The Crisis of the Italian Rice District

Italy is the leading European producer of rice [28]. Since the Green Revolution, the cultivation has typically been intensive monoculture, without crop rotation, with heavy chemical input, and strong mechanization. As a consequence, the impact of rice growing on the environment tends to be regarded as very high, especially on the quality of the soil and watercourses [29].

The transition to organic rice farming is perceived as a solution to ensure environmental protection [30,31], but the spread of organic methods has taken place rather slowly and organic rice production has remained niche, being pursued only by a handful of pioneer farmers who, in the absence of prior knowledge, test innovative practices with a self-help and trial-and-error approach, as in Padel [32].

Organic rice farming involves the elimination of chemical inputs. Weed control, the farmers' major problem, is achieved through an elaborate mix of agronomic techniques, adapted to the specificities of the land and the resources of each farm. This complex work requires sophisticated know-how, experience, and skills that the Italian rice farmers have long lost, because they have been completely dependent on technology suppliers. Indeed, even though the agricultural research and advisory system is committed to ecological intensification, there is a lack of specific research dedicated to organic rice production. A single experiment developed on favorable land was described by Romani et al. [33].

A decrease in the price of conventional Italian rice, due to competition from Asian countries, and a simultaneous rise in the price of organic rice (now three to four times that of conventional rice) have made organic production increasingly interesting. Nevertheless, the lack of chemical residues on the rice grain, despite repeated spraying of the plant, which is a good point for consumers, makes organic cultivation susceptible to fraud.

In his interview, a farmer explained that: "Ethics has always been a focal point for this sector, as well as professionalism. There are many concrete examples. But the price difference between conventional and organic products is too high, the profits are too attractive: opportunity makes the thief. Going organic should be a lifestyle choice, prices should match the higher costs but, the way it's going, they become the only reason for converting."

Local authorities and farmers' associations thus started to put pressure on MIPAAF to reform the certification and control scheme, which, they warned, failed to guarantee the transparency and honesty of the system. To face this crisis, MIPAAF, which is responsible for the governance of the organic sector at the national level, invested in a research, development, and extension project, bringing together the Italian scientific excellence on rice for three years (2017–2019), to support the transition to organic rice farming.

2. Materials and Methods

This paper is based on reflection originating in fieldwork. The RBS project was thoroughly investigated from its start to two years into its implementation, for a total period of three years (2016–2018), using a case-study research approach based on qualitative data. During data collection and analysis, we applied various triangulation types to ensure objectivity [34–36] and we constantly acknowledged the pedagogical model provided by Tracy [37] for quality issues in qualitative research. Its eight key markers of quality, including worthy topic, rich rigor, sincerity, credibility, resonance, significant contribution, ethics, and meaningful coherence, guided all the research work by means of a checklist that was constantly referred to.

Data triangulation was applied by using different sources, i.e., farmers, researchers, and other key informants, while triangulation methods were achieved by using multiple qualitative methods to gather data, including:

- in-depth interviews;
- systematic cataloguing of communication documents;
- participant observation.

Furthermore, investigator triangulation was ensured by the presence of two researchers collecting the data, conducting the analysis, and discussing the results.

For the two years of the project, monitoring was conducted in parallel with the development of the project itself, while, as for the project conception phase, at the start of the activities, an ex-post evaluation of the participation process implemented during the design phase was performed. The in-depth interviews, which were carried out at the beginning of the project, made it possible to capture the researchers' initial perceptions concerning participation. On the other hand, observation throughout the course of the project and the cataloguing of events made it possible to understand the evolution of these perceptions and practices.

2.1. In-Depth Interviews

Twelve in-depth interviews were conducted with partnership members, including the project coordinator and all the work package (WP) leaders, alone or together with their junior researchers. The interviews were conducted with a discursive approach [38], facilitating the conversational exchange with a semi-structured interview guide (summarized in Table 1), with a sequence of themes to be covered and a list of prepared open ended questions [39].

Table 1. Interview guide.

Research Questions	Interview Questions
Which form of research privileges participation? Which kind of researcher practices participatory research?	The partners were invited to describe their job, their organization, experiences, skills, and values in relation to participatory research.
Which are the relations between interdisciplinary and transdisciplinary research?	The researchers were asked to illustrate previous collaborations with other research partners and stakeholders of the rice sector: the context of the collaboration (i.e., other public research and development projects), the methods of collaboration, and the perception of the outcome of the collaboration.
Which are the barriers and the opportunities for participation perceived by the researchers?	The researchers were asked to talk about perceived critical issues and potential within the project. They were invited to make proposals for extension, stakeholders' involvement, and collaboration among partners.

Twenty-nine interviews were also carried out with key informants among farmers and other stakeholders, as well as with a representative of MIPAAF, with a discursive approach [38], so as to understand the context of the case study and the expectations of the stakeholders and the Ministry itself.

Each interview lasted about two hours, was noted down and recorded with the interviewees' permission, and later transcribed and analyzed. The overview of the interviews is presented below (Table 2).

Table 2. Overview of interviews conducted.

Researchers	Farmers	Other Stakeholders
1 Project Coordinator 6 Principal Investigators 5 Postdoc collaborators	10 involved in the project 6 not involved in the project	1 Donor representative 2 Representatives of local authorities 8 Representatives of organic agriculture organizations and farmers' associations 2 Entrepreneurs
12	16	13

2.2. Cataloguing of Communication Documents

The cataloguing of communication documents took into consideration all the interactions for which there was a record, such as minutes, reports, agendas, and emails sent to all partners. Messages addressed personally to the authors were not included, even though the use of individual communications by phone or email was widespread, also on issues of general interest. The documents were collected, sorted chronologically and analyzed. In total, 38 communication documents were catalogued, and a specific database was used to collect the date, place, type of communication, subject initiating the exchange and recipients or participants in the communication, key themes/topics/words, problems/criticalities, and solutions/strategies. All attachments relating to each communication were suitably filed with an identification code referring to the specific communication event catalogued.

The analysis of this database focused on the frequency and quality of interactions among partnership members and stakeholders.

2.3. Participant Observation

Interactions within the partnership and with stakeholders were directly observed and noted down during partners' meetings and other research events, such as conferences or workshops.

The researchers who conducted the observation were members of the research group responsible for monitoring and encouraging a participatory approach throughout the course of the project. Observation was contemplated in the role and functions of researchers, since both the objectives and the working methodology had been defined in the design phase of the research project, together with the partnership. Participants were not expressly informed that they would be observed by the researchers during every project meeting in order to foster their spontaneity. The observation was aimed in particular at detecting whether the actions envisaged in the research project to promote the broad participation of stakeholders were actually being carried out and whether they followed the set schedule and methods. During observation, notes were taken on whom, and for what reasons, departed from the planned actions, how the partnership reacted, and which were their final decisions. In addition, in cases of discussions featuring different or even conflicting points of view on participatory research issues, any behavior of the researchers (verbal or non-verbal) that was clearly an expression of a desire to support or hinder the participation of stakeholders was accurately documented.

The observations were examined together with the results of the interviews and those of the cataloguing of communication documents, using two grids of analysis:

- the first aimed at describing the profiles of the researchers involved in the partnership (according to the attributes Attitudes towards participation, Attitudes towards local stakeholders, and Accountability towards the potential users of the analytical framework) and their evolution during the course of the research project;
- the second aimed at identifying the critical issues relating to the implementation of the participation activities envisaged by the project (according to the dimensions Project type and Project approach of the analytical framework).

3. Results

This section presents the results of our analysis of the RBS project through the dimensions and attributes of the analytical framework put forward by Neef and Neubert [16].

3.1. Project Type

Type of research

The RBS project involved two universities and three research organizations, one of which participated with three of its departments, for a total of seven scientific partners involved. RBS was a research, development, and dissemination project. This means that, alongside basic research activities—i.e., experimental research aimed at acquiring

knowledge to better understand of certain phenomena, without any particular application—applied research, in which investigations are primarily undertaken to serve a specific practical purpose, was also carried out (see Table 3). RBS studied the organic rice system in its agronomic, genetic, environmental, socio-economic, and regulatory aspects, by means of an interdisciplinary approach, whereby various partners, having different kinds of expertise, contributed to pursuing the objectives of the six different WPs in an integrated way (see Table 3).

Table 3. RBS research plan.

WP	Scientific Partners Involved (N)	Research Objectives	Type of Research	Type of Participation	Type of Stakeholders
1	1	Coordination; Support to MIPAAF for policy making and drafting legislation	A	Consultation on critical issues and solutions	MIPAAF Permanent technical table on organic agricultural
2	6	Study of innovative techniques for the management of organic rice systems: variety identification and evaluation; agro-techniques' definition and evaluation; economic evaluation	B and A	Formal research without participation (i.e., mesofield research at university laboratories and work on experimental plots at research centers)	
				On-farm research at pilot farms	1–2 farmers for each agro-techniques
				Supply of technical and economic data through a survey featuring a questionnaire	25 farmers
				Co-learning and co-innovation	WP5 multi-actor research network
3	1	Analysis of the control and certification system	B	Supply of information through individual and group interviews; consultation on critical issues and solutions	Key stakeholders
4	2	Analysis of water contamination by pesticides in intensive rice farming areas and identification of strategies to reduce risk to organic rice fields	B	Formal research without participation (by sampling carried out in the fields of pilot farms)	
				Supply of dataset	Institutions responsible for environmental monitoring
5	3	Integrated assessment (technical, economic, and environmental) of organic rice systems; facilitation of networks, partnerships, and working groups for R&D initiatives following the project	A	Co-learning and co-innovation; invigoration and empowerment	WP5 multi-actor research network
6	2	Extension and invigoration of a participatory, multi-actor approach	A	Supply of information through individual interviews and participant observation; communication; public engagement	Partners, farmers involved in the project and key stakeholders

WP, work package; N, number; B, basic research; A, applied research; MIPAAF, Ministry of Agricultural, Food and Forestry Policies.

Research objectives

The general objective of the project was to support the transition of Italian rice cultivation to organic farming. Table 3 summarizes the specific research objectives of the project, which show its underlying approach, that is to address the multidimensionality of the challenge of converting to organic by integrating different scientific objectives with each other and with development and dissemination objectives.

Potential users and beneficiaries

The project was supposed to provide policy makers with useful and concrete guidelines for modifying the system that regulates, controls, and certifies organic rice. MIPAAF also wanted to use the project to give consumers a positive image of the sector and to

extend organic methods to new rice farmers. Finally, the project aimed to integrate science and farmers' knowledge and to co-create innovation that might be easily and quickly disseminated and adopted in the sector. In brief, the potential users and beneficiaries of the project were MIPAAF, local decision makers, the various actors of the control and certification system for organic rice, as well as farmers and consumers.

Institutional context of the research project

The RBS research project originated from a precise request made to the project coordinator by MIPAAF. No real research commission was established, as MIPAAF entrusted the research design to the project coordinator, defining only the general issues to be addressed. However, there was direct assignment of public research resources, made possible not only thanks to funding coming from a mandatory 2% fee on the sale of agricultural chemicals but also by the fact that MIPAAF is free to invest in research objectives without prior planning, for example, in response to specific emergencies such as the one affecting the rice sector, described in the section dedicated to the Context of the case study. This was a rather unusual case, since financing of public research in agriculture normally occurs as a result of a multi-year strategic plan, a public tender, and a selection process. Such a situation allowed MIPAAF to affect the design of the research. In fact, in addition to evaluation by an external technical commission, set up by MIPAAF, the Ministry directly asked the researchers to carry out some priority research activities and involve competent partners in them. Pressure from local authorities (Lombardy and Piedmont Regions) and from the Organic Agriculture Committee of the European Commission was decisive in identifying these priorities, which included the definition of precautionary and preventive measures, in particular crop rotation, and the production of easily distinguishable organic and conventional rice varieties, eligible for mixed farming.

Risks involved in the project

The technical, socio-economic, and environmental crisis of Italian rice farming, which was discussed in the section on the Context of the case study, led to a situation of tension and opposing views within the sector, i.e., different policies by national or local authorities in support of organic production, supporters and detractors of organic methods, and stakeholders for or against organic rice. The researchers were immersed in a flow of information from different and often conflicting sources and they were negatively affected by this tense environment. This had an impact on some of their choices, including the decision to maintain a low profile when presenting their results during conferences open to the public, in order to avoid possible attacks. The decision to maintain a certain degree of confidentiality on the results obtained during the project appears relevant in terms of a participatory approach. In fact, if there is no transparency in the sharing of results with the stakeholders, there can be no real interaction. In this sense, the issue of yields is particularly illustrative of what occurred during the project. As a project partner clearly explained in the course of an interview, organic farming yields are on average lower than those obtained in conventional farming, since they are not supported by chemical inputs. However, these lower yields are offset by the higher prices fetched on the market, which compensate for the disadvantages of this production system in terms of technical means. Conversely, in the rice sector, many organic producers report yields equal to or even higher than conventional ones. This is obviously a fraudulent situation that the control and surveillance system is currently unable to eliminate. In the RBS project, yields were investigated using both traditional methodologies (measurements on experimental plots at the research center or at pilot farms) and participatory methodologies (the multi-actor research network of WP5 in which rice growers actively participated in the investigation). Early results in WP5 [40] confirm that, on average, yields are indeed lower in organic production, but they can approach conventional levels in particular cases. This scientific evidence was deemed too risky to disclose because, if exploited and misinterpreted, it could have endorsed fraudulent productions. There was a long discussion among the partners on the matter and their final decision was not to disclose the results to the stakeholders at all. This experience

testifies to the risk that the context surrounding the project might limit its participatory approach, as well as the researchers' freedom to act. However, this issue does not fall within the scope of the present article.

Another risk brought to light by the case study has to do with the timeframe of the project. Reflecting on the progress of participatory research and discussing critical issues during project development were originally meant to support adjustments in later phases. Nevertheless, the short duration of the project did not allow for any major change of course, while the increasing pressure felt by the researchers to complete their activities and obtain comprehensive results, as the project deadline approached, decreased their willingness to engage in participatory activities. Hence, some of our fellow scientists simply refused to take part in participatory workshops and do further participatory research.

3.2. Project Approach

Research methodology

The overall research approach stated in the project was transdisciplinary and multi-actor, participatory, supportive of policy makers, based on extension and communication activities, and oriented towards empowerment.

Based on the above aims, the structure of the project was conceived as in Table 4. Thus, it strongly relied on transdisciplinarity. According to most of the literature (see, for example, [41]), this differs from interdisciplinarity, in that a transdisciplinary approach implies the direct participation of non-academic actors (in this case, farmers and other local stakeholders) in the research process, working together and integrating different disciplines. The attempt to manage the complexity and heterogeneity of the techniques and production systems of organic rice farming by adopting a transdisciplinary research methodology led to difficulties in integrating the results provided by the various partners. This occurred, for example, in the processing of the technical-economic data collected in WP2 by a variety of partners at different times and using different techniques, as well as in the study of the yields, on which the partners discussed at length without finding an agreement on how to combine data measured with different techniques.

Table 4. Main interactions during the RBS project.

2016	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**OCT**	**NOV**	**DEC**
MIPAAF			Call for proposals	CM; Summary of indications by key Italian and European stakeholders; Consultation	First project proposal			Request for integrations and submission of the revised project proposal	Project approval
Partnership				CM; SM (WPs 1, 5)					
Stakeholders				Consultation	PB *		Working group *		Working group *
2017	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**OCT**	**NOV**	**DEC**
MIPAAF	Request for addition of supplementary scientific content	Kick-off meeting							CM; Summary of indications on policy measures
Partnership		Kick-off meeting			SM (WPs 1, 6)		2 SMs (socioeconomic aspects of WP2; WPs 1, 6)		CM
Stakeholders		Kick-off meeting			2 OD and visits to experimen-tal plots		OD and visits to experimen-tal plots		PC
2018	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**OCT**	**NOV**	**DEC**
MIPAAF		Consultation							
Partnership		2 CMs	CM						CM
Stakeholders	FG with control and certification bodies (WP3)	Consultation				OD and visits to experimental plots; WS (WPs 3, 5, 6)	2 SMs (WPs 5, 6)		

Months featuring no meaningful interactions were removed to help readability. * on the initiative of local authorities. FG, Focus Group. WP, Work Package. CM, Coordination Meeting. SM, Specific Meeting. PB, Public Conference. OD, Open Day. WS, Workshop.

The project envisaged various forms of participation (see Table 3), with the objectives of increasing research efficacy (in all WPs), supporting political action (WP 1 and 3), and empowering the farmers involved (in WP5).

As well as focusing on coordination, WP1 explicitly made room for exchanges with MIPAAF, in order to respond to specific and urgent requests that might arise during the project. Additionally, WP6 was designed to facilitate the stakeholders' engagement in all WPs and to coordinate extension and communication activities in a participatory manner.

Research epistemology

In this research attribute, Neef and Neubert [16] include those characteristics of research that define the nature of scientific knowledge and the ways in which this knowledge can be accessed, which are placed along a range whose opposites are the positivist scientific paradigm on the one hand and the constructivist one on the other. According to the first, typical of the so-called "hard sciences", reality exists independently of the observer and, as such, is independent of the context and has general validity. According to the constructivist point of view, however, research results acquire validity only in a given context and can be seen from multiple perspectives, including local perspectives and indigenous knowledge. In this sense, the constructivist paradigm is more open to participatory approaches. Our project takes into account the diversity of environmental and business contexts in which organic rice cultivation is carried out and the wealth of cultivation techniques used by rice growers in all WPs. In WP5, it attempts to integrate the knowledge of rice growers into a real process of co-learning and co-innovation (described in detail in Pagliarino et al. [42]). In this sense, it can be said that the project is close to the constructivist paradigm and, therefore, more capable of incorporating a participatory approach.

Research plan

The project envisaged a well-defined and articulated research plan with objectives, activities, milestones, and deliverables (a summary is presented in Table 3). This did not mean, however, that new activities suggested by the client could not be included. Vice versa, a number of more creative participatory activities (for instance, workshops to train the partners on participatory topics using theatre performances) planned during project conception were not implemented, because they were too far from the stance of some WP leaders and of the project coordinator. Even more traditional proposals, such as inviting the farmers to attend the project meetings and to elect the stakeholders advisory board, were rejected. The project did not envisage a system to explain why some of the activities were not carried out. When activities were not completed, this was simply reported in the periodical reports and final report.

Research process

The MIPAAF call for a research and development project on organic rice was followed by a long and intense period of designing activities. As shown by the cataloguing of communication events, from 12 April 2016 (request to submit the project proposal) to 19 December 2016 (approval of the project and granting of the loan), the researchers were engaged in both autonomous and participatory design work, in collaboration with MIPAAF and representatives of the stakeholders (the permanent technical table on organic agriculture made up of the representatives of professional farming organizations, organic farming associations, and organic certification and control bodies). Simultaneously with these planning activities, the local authorities initiated a discussion to which the researchers were also invited (two working tables with farmer associations and a public conference, see Table 3) and whose results were integrated into the project. This design phase was followed by the implementation of the project, which featured the development of the research activity along with regular meetings among all the partners (Coordination Meetings in Table 4) or only among those involved in specific activities (Specific Meetings in Table 4), and other moments to discuss the results and receive feedback from actors (see Table 4).

Research methods for accessing local knowledge

The ways of integrating local knowledge into the project were different depending on the WP and the planned activity, as can be seen from Table 3. These are mostly very traditional participatory activities, in which the role of the stakeholders consists in giving information and in being consulted about specific activities. This is what Pretty [3] defines "participation by consultation". In WP5, on the other hand, an innovative participatory activity was carried out within a multi-actor network made up of WP5 researchers, 12 farmers, two public officials, and a distribution company of organic products. The ways in which this activity was carried out and its results are presented respectively in Pagliarino et al. [42] and Orlando et al. [40]. Pretty [3] would define this activity "interactive participation", which, in its framework of analysis of degrees of participation, represents the most advanced level of participation, where stakeholders have the most active role and are in an equal condition with respect to researchers.

3.3. Researchers' Characteristics

Previous experiences with participation

Of the seven partners involved, five had specific experience with rice, including expertise in agronomy, genetics, physiology, biochemistry, and agroecology. Researchers from the other two partners were involved because of their expertise in agricultural economics and facilitation techniques in transdisciplinary and participatory research, respectively. From the interviews with the researchers involved in the project, it emerges that no one had previous experience of a research project in which the participatory approach was as central as in the RBS project. The methods of interaction with farmers to which the researchers were accustomed were typical of agricultural research (on-farm experimentation and surveys involving farmers) and there was a general lack of knowledge of more interactive methods and tools.

This means that choosing researchers for their scientific excellence in their respective disciplinary fields, without taking into account their competences in terms of participation, can be risky for the success of a public participatory project. The solution of having a team of researchers to facilitate participation is not enough. Probably, the objective of broad inclusion of stakeholders in research established in the design phase was seen by some researchers as a specific objective of WP6 (that of facilitation) and not of the entire project. The lack of a more explicit accountability system to formally account for the non-achievement or partial achievement of certain participation objectives is probably the most relevant factor in the failure of some activities.

Attitudes towards participation

The participatory approach was instigated by MIPAAF, but the participatory thinking was not shared in equal measure by all those involved in the research. The participating scientists showed different attitudes towards participation. Some of the researchers interviewed stated that doing research in the field of sustainability, committed to environmental and social goals, generally makes researchers more aware of their responsibilities towards the stakeholders and naturally more willing to cooperate with them. However, most researchers interviewed regarded participatory research with a great deal of skepticism. They claimed that participation is not very compatible with rigorous, high-quality research. "Science is not democratic" said a WP leader during an interview. The researchers tended to see participation as non-scientific, irrelevant to agricultural research, and something that should be done by facilitators. Indeed, WP6 was intended as a sort of service capable of 'magically transforming' conventional research into participatory research, harmonizing the results of other WPs and translating them for the benefit of the stakeholders. Indeed, during the researchers' meetings, a certain amount of confusion emerged on the different meaning of participatory research and research dissemination, for example, some of the researchers stated that they were already employing participatory methods when they

interviewed farmers using a standardized questionnaire, giving the impression of ignoring the literature on participation.

Another widespread view was that participation is time consuming. Some researchers seemed to grow impatient during the meetings devoted to reflecting on participation, because these distracted them from the 'real' research work, that related to their specific scientific research objectives.

As we have already said, a number of creative participatory activities and even more traditional proposals planned during project conception were rejected. This was frustrating for the researchers involved in WP6, dedicated to facilitating participation. Yet, there is probably no real solution as to what to do when researchers simply are not keen on participatory research.

The academic background and the institution of provenience seemed to influence the interests, attitudes, and values of the researchers on participation. For example, the group of researchers involved in WP5, the most participatory one, had a leader who had studied at the University of Davis and had come into contact with some of the most important agroecology scholars, pioneers of agroecology understood as "the practice of science with people" [43]. Thus, his group was willing and curious to test the participatory approach and verify its effectiveness.

Vice versa, the most uncollaborative group was the one led by a professor who came from agro-chemical research, which is very close to the top-down innovation system typical of the Green Revolution. Furthermore, the researchers coming from an institute with a long history of supply-driven agricultural research and a well-organized network of extension agents were used to the linear transfer-of-technology model through experimental plots and open days and they were not oriented towards more inclusive participatory approaches.

Attitudes towards local stakeholders

Epistemological differences between local and scientific knowledge domains and social distance between the farmers and the agricultural scientists [44] were perceived differently depending on the researchers involved. Some scientists showed great empathy for the farmers' problems and perspectives and saw them as equal partners, appreciating the opportunity to learn from each other. Other researchers had a negative opinion of the farmers, whom they considered mostly uninterested in research—unable to understand its dynamics and, above all, the rigor needed in experimentation—and consequently unreliable. Some researchers even opposed inviting the farmers involved in the project to attend the research meetings for fear that their preliminary results would be disclosed.

The integrated analysis of the results of the interviews on the one hand, and those of participatory observation and of the cataloguing of interactions between researchers and stakeholders on the other, made it possible to understand that the initial attitudes shown by researchers on both participation and stakeholders did not change in the course of the project.

Accountability towards the potential users

The RBS research project provided for an accountability system towards the client through the obligation to prepare short annual reports and a final report featuring all the expected deliverables. Furthermore, the intermediate and final results of the project were expected to be presented to stakeholders, mainly farmers, through a package of dedicated dissemination actions, the main moments of which are summarized in Table 4. What is missing is a precise feedback mechanism from stakeholders on these results.

Commitment to the problem-solving cycle

In general, the researchers displayed good ability to react to problems that occurred during the project and to mediate among the partners. Due to their work, researchers usually feel a strong commitment to the problem-solving cycle, but they show an individualistic attitude in reaching the best solution. They are also not very oriented towards the search for a shared solution by building consensus among different positions. In cases

where there were different positions among the researchers as to the possible solution to problems and a lack of consensus on the final decision to be taken, the authoritarian role of the project coordinator was decisive in the pre-selection of a final decision, though not shared by all.

3.4. Researcher-Stakeholder Interaction

Involvement of stakeholders in the research process

In the project conception phase, there was a resolute call for participatory research—a normative commitment to participation—to which the researchers responded positively by working towards involving the stakeholders and discussing with them.

In the project planning phase, a consensus was reached among the participating stakeholders on major challenges and research questions, while constant exchange of views with MIPAAF made it possible to clarify not only the objectives but also the approach of the research. MIPAAF's verbal advice could not have been clearer: "We encourage researchers to take risks and press hard to involve stakeholders in the research!" (interview with a MIPAAF official).

The stakeholders' engagement in the research conception phase occurred in a rather improvised way, relying on selection of representatives operated by MIPAAF (the permanent technical table on organic agriculture) and on involvement initiatives launched by other actors (see Table 4). To improve the quality of their participation and make it systematic, one of the planned activities consisted in analyzing the stakeholders, in order to assess their interest in the project's issues, their ability to influence action on those issues, and the importance of those issues to them. An ad hoc survey was prepared and tested, but it was then blocked by one of the scientific partners, immediately supported by the project coordinator. The nature of the partner in question is rather peculiar, since it is both a research and extension centre and a service institution for farmers and processing industries in the sector. The president of this institution is a political official, elected by the businesses in the rice sector. His concern about the analysis, aimed at understanding stakeholders' interests and influence, arose from the possibility that its results might compromise the image of the center. Hence, this concern, of a purely political nature, undermined an already scheduled scientific activity, showing that the autonomy of the researchers was limited by political authority. Additionally, the planned stakeholders' advisory board, whose members should have been selected following the analysis of the stakeholders, was not established, as it was deemed unnecessary.

Both organic and conventional farmers, their associations, the main actors in the supply chain, as well as advisory services, local media, and local authorities were consulted, and their needs and priorities were included in the research design. Conversely, consumers and environmental NGOs were not involved in the discussion. This appears serious if we consider that, among the main objectives of the project, were the promotion of organic rice cultivation in the eyes of consumers and the understanding of the relationships between rice cultivation and water pollution. The lack of involvement of consumers or their associations and environmental NGOs is not due to a specific will to exclude them on the part of the researchers, but to the lack of adequate identification, analysis, and selection of stakeholders.

The project design actually detailed the type of involvement of farmers expected for each WP, but not their number or which firms were involved, which the researchers were free to decide. In carrying out the project, then, the involvement of farmers was different across the different WPs, both in the number of participating farms and in the quality of the interaction. In particular, the number of farms involved in the project varied from 25 (in WP2 for a survey with questionnaire) to 12 (in the participatory research network of WP5) to 1–2 for each of the experiments conducted in WP2.

Control of research and centers of decision-making

In WP2 on-farm research, farmers' land and labor were used, but it was the researchers who guided the activities and defined the research protocols. Indeed, the researchers acknowledged the farmers' expertise and trusted in their ability to perform experiments on their fields, but reserved the right to measure, analyze, and interpret the results. The farmers were chosen from among those whom the researchers knew and trusted, but they were never invited to the project coordination meetings. Moreover, some of the farmers involved in the first year were replaced by others during the second year of the research, without any particular rationale.

In the multi-actor research network of WP5, farmers and other stakeholders were involved in problem definition, research design, result assessment, extension, communication, and decision making (participation in new research projects and initiatives). This WP enabled a mutual learning process and was also a space for stakeholders and scientists to plan collective actions that were activated in the course of the research or provided a good basis for follow-up projects. Indeed, WP5 was a sort of project within the project, an experimentation niche separated from the rest. It benefited from a pre-existing network of social learning, which the project enhanced.

Contribution to the generation of knowledge

In all WPs, the farmers and other stakeholders provided information and data. In consultation activities (WP1 and WP3), the stakeholders were informed of the processes and outcomes of the research. Their opinions were heard, but rarely did these affect the progress of the project, which only happened in two cases:

1. to develop a list of easily distinguishable organic and conventional rice varieties;
2. to identify rice yield as a warning indicator for the control system.

In both cases, an explicit request was made by MIPAAF and a response from the project was expected. This possibility was actually envisaged within the context of WP1 (support for decision making).

Type, frequency, and intensity of interaction

The cataloguing of the interactions that took place during the project shows that stakeholders' participation was intense and diversified, with two extensive public consultations, one in each year, and other moments of ad hoc dissemination dedicated to the rice growers (see Table 4). The participant observation showed that the quality of these interactions was mostly one-way, from researchers to stakeholders, with limited opportunities for the latter to control or affect the research process.

Investment of resources and payment

In the RBS project, farmers provided the experimental plots and contributed their labor in the experiments of WP2 and WP5. Farmers and other local stakeholders made time to participate in the surveys, interviews, and consultation of WPs 2, 3, 4, and 6. No remuneration for the stakeholders' involvement was envisaged by the project; hence, their participation was voluntary.

3.5. Stakeholders' Characteristics and Stakeholders' Benefits

These dimensions of the analytical framework cannot be taken into account in the presentation of our results, since an analysis of the local stakeholders, aimed at exploring their experiences with previous projects, perception of the research project, and of the researchers, time availability, and scope of action, was not performed. Likewise, no systematic analysis was carried out regarding the consequences of the project in terms of innovations, improved practices, creation of knowledge and awareness among stakeholders, improvement of skills and livelihoods, empowerment, and social capital.

However, observations performed during the events and the interviews with participating farmers and key stakeholders show that the stakeholders actively participated in the research project, making a large investment in terms of labor and time. They were willing to cooperate with the scientists because they were in a situation of crisis, had high expectations regarding the project, and believed that their voices should be heard by the researchers.

4. Discussion

4.1. Project Type

The RBS project was a mix of basic and applied research activities. Like other empirical studies [45–48], it shows that participatory methods are primarily used in applied research activities. Here, traditional participatory activities were carried out, such as on-farm research in WP2, but also more innovative ones were envisaged, such as the one conducted in WP5. Instead, basic research (for example, mesofield research at university laboratories and work on experimental plots in WP2) appears to have less potential for adopting a participatory approach. In fact, in WP3 and WP4, characterized by basic research, the degree of stakeholders' participation was lower, with interactions that were limited to consulting stakeholders on critical issues and solutions identified by researchers and the provision of information by farmers and other stakeholders.

According to Neef and Neubert [16], the objective of a research project has a strong influence on the potential for involving stakeholder in the research process. Research with a major focus on complex and contested concepts, such as "sustainable agriculture", they say, may call for striking a balance among the objectives and interests of scientists, farmers, and other local stakeholders. The particular strength of participatory approaches, they add, lies in addressing complexity and heterogeneity in a holistic way [14,15,49]. In our case, the general objective of the project was precisely to facilitate the transition to more sustainable rice farming, in particular organic farming. For this reason, the partnership tried to reconcile research objectives closer to the interests of researchers with the objectives of responding to the problems of the sector and the needs of its various actors. As a result, traditional research activities, in which the contribution of stakeholders was limited and purely of a consultative nature, were combined with more participatory activities. This project structure reflects the most current theoretical orientations on participation, aimed at optimizing rather than maximizing participation.

Given the complexity and multidimensionality of the research challenge, the potential users and beneficiaries of the project were many and heterogeneous. This led to difficulties in terms of stakeholder involvement, due to the large number of potentially interested actors and the diversity of specific actions concerning the different targets. As mentioned above, in our case study, there was a lack of identification and selection of the stakeholders with which to interact. For this reason, the interactions with stakeholders, albeit numerous, were carried out with a certain degree of discretion on the part of the researchers, based on their preferences and attitudes, as already highlighted by Menconi et al. [9].

The institutional and socio-political context of the research played an important role in the project's conception and implementation phases. In our case study, the client formulated specific requests regarding the content of the project and its approach. To this end, two specific WPs were included: one, WP1, which, in addition to coordinating the project, was aimed at supporting MIPAAF in policy making and drafting legislation, and the other, WP6, intended to facilitate a transdisciplinary and participatory approach, fostering the active involvement of stakeholders. WP1 was successful in achieving its goals; in fact, the priorities decided by MIPAAF were included both in the project design phase and in its implementation, when urgent issues not foreseen in the design phase emerged. Although this willingness on the part of the researchers to modify the objectives and research activities to respond to the client's requests may appear obvious—the client pays and its requests are met by the researchers—it highlights the fact that, besides being willing, the researchers actually managed to implement these changes. This ability should

be taken into consideration and valued to promote change even in the areas (those of WP6) in which researchers were not motivated to collaborate. In the future, MIPAAF may consider interacting more closely with researchers, formulating more precise requests also for what concerns the participatory approach. For example, room for negotiation with stakeholders during a project should be effectively incorporated into its design and negotiation results should be included in project assessment. Researchers should be asked to provide evidence of whether and how stakeholders' priorities and perspectives are taken into consideration.

At the same time, the institutions responsible for the governance of agricultural research should develop a political and institutional context in which participatory research can actually be tested. For example, our study shows that the duration of a project affects its participatory approach. In the design activities and in the early stages of a project, there is a greater willingness to carry out participatory activities, which then tends to decrease as the project approaches its end. To be effective, participatory projects need constant adjustments, learning in the field, and experimentation. All this implies that any project should have a suitable duration, so that participatory activities are not compressed and end up losing their value [25]. Additionally, Bijttebier and Liberloo [50], who analyzed the role of participatory reflexive monitoring to foster transdisciplinary knowledge exchanges on agroecological innovation, warn that these processes take time if they are to be effective.

We will address the issue of support from the institutional context when dealing with barriers to participation pinpointed by our study.

4.2. Project Approach

It is difficult to effectively apply a transdisciplinary research approach as intended when the results obtained through a participatory approach are not integrated with those obtained through a traditional research approach. This situation occurred during the project and was not resolved, probably because there was no real room for discussion among researchers or because there was no real intention to look at results that were already useful and publishable through a more complex reflection lens, taking into account many more perspectives and interpretations. This situation is attributable to a research system that is still strongly oriented towards monodisciplinarity, also in the process of recognition of results, as highlighted by Ortolani [21].

From an epistemological point of view, the nature of the project and its structure bring it closer to a constructivist approach, which, according to Probst [51], is open to a participatory approach and to the inclusion of indigenous knowledge in order to scientifically explain the complexity of reality. On the other hand, if we consider the characteristics of the researchers involved in the project, as we will see later, in particular their academic background, their professional paths, and their disciplinary field, this proximity seems less decisive and homogeneous in the partnership.

The project envisaged a relatively rigid research plan that could not be easily modified during the research process. Unlike the conclusions reached by other authors [44,48], who claim that a project of this type does not allow taking changing needs and problems into account, the rigidity of the research plan did not prevent the inclusion of new activities suggested by the client and the elimination of others, without specific consequences.

In the RBS project, local knowledge is a crucial component in the generation of scientific knowledge. It is useful in all the WPs where it is collected through questionnaires, interviews, focus groups, and stakeholder consultation meetings. Additionally, in on-farm research, rice growers made available to the researchers not only their fields, but also their knowledge and skills in cultivating them. In agricultural research, therefore, the collaboration of farmers appears essential, as already highlighted by several authors [13,52–55]. However, as already observed by Menconi et al. [9], in this interaction between researchers and farmers, the role of the latter was passive: they provided information but were not part of the subsequent elaboration and interpretation process. They were involved again at the end of the research process, as recipients of agricultural dissemination. In this regard,

our project was very active, organizing frequent specific events dedicated to farmers, such as open days and visits to experimental fields. Between acquiring useful information for researchers and presenting the results obtained with the contribution of such information, in our case study, there were no other forms of interaction, with the exception of WP5, where the entire research process took place together with the researchers. The results published in Orlando et al. [40], with the names of all the participants of the multi-actor research network, suggest that this research modality is equally rigorous and likely to be revised by other scholars. They also indicate that it is difficult to articulate, describe, and validate the knowledge of farmers through a fully participatory research process, as remarked by Hoffmann et al. [56]. Finally, these results can encourage the experimentation of this type of research even among the researchers who are most skeptical not only about the value of participatory research, but also about the ability of farmers to take an active part in the entire research process. For example, in our case study, most of the partner researchers made unflattering comments about the farmers' ability to participate in the research process. This judgment originates from an experience of interaction with farmers in which the role of the latter is limited to providing information. In the participatory research experience of WP5, however, the interactions were much more demanding for the farmers and the researchers had a positive opinion of them. This might lead to the conclusion that, using a more interactive approach, farmers might become more responsible and trust on the part of researchers might grow. Beyond its value in terms of scientific results, therefore, an experience of this type, if conducted with conviction by both farmers and researchers, provides true learning to both parties in terms of skills and attitudes.

4.3. Researcher–Stakeholder Interaction

Focusing on sustainable agriculture, where ecological, economic, and social interests need to be balanced, the project dealt with a wide range of actors—e.g., farmers, both organic and conventional, as well as the processing industry, distribution, consumers, local authorities, and extension workers. The researchers should have carefully considered whether a large number of stakeholders were needed to ensure a successful outcome or whether working with a few representatives from the major stakeholder groups would have sufficed. In our experience, researchers tend to contact as many stakeholders as possible, always using the same broad stakeholders' list. The activities of identifying the stakeholders, analysing and subsequently selecting those to be involved, and the most appropriate ways of involving them were not conducted. This lack confirms that the fifth dimension of participation, the characteristics of local stakeholders, is widely neglected in the discussion of participatory approaches [16], while it would greatly help researchers to optimize the use of a participatory approach [57].

Stakeholder analysis should be a preparatory activity for any participatory project that takes place in a new context and for the first time. It should be conducted before starting the research design, so that the selected stakeholders also participate in the design of the project. If this were the case, however, the problem would arise of who bears the costs of this activity, as well as of participatory planning. In the case of the RBS project, the design took several months, actively involving local stakeholders, but it was a very particular case of research funding in which the awarding of funds was direct and did not involve competition. Normally, as the allocation of funding is uncertain, all preparatory activities are limited to what is strictly necessary. In this sense, a selection in two steps—first an expression of interests, then the preparation of a real research proposal—as already experimented in various research programmes, could facilitate the implementation of preparatory activities that support a participatory approach. The direction undertaken by MIPAAF with the most recent call for organic farming project proposals [25], that is to involve stakeholders in the partnership and therefore to provide them with financial incentives, must be carefully analysed in future studies, also in light of the principle that stakeholders should participate voluntarily in research, rather than being motivated by financial incentives [12]. The results of WP5, in which the participation of stakeholders

was intense, responsible, useful for the production of research results, and voluntary, seem to confirm this principle.

Finally, the last dimension of participation, the outcomes of participatory agricultural research, would require an analysis comprising expected benefits and actual outcomes, which was not performed in our project but which, according to some supporters of participation, should be carried out, as the success of a participatory project should be assessed based on its ability not only to define knowledge and innovation but also to adopt such knowledge and innovation and overhaul the whole socio-economic context [12,49]. Yet, in line with Johnson et al. [47], the duration of our project did not seem suited to this sort of follow-up.

4.4. Researchers' Characteristics

In our case study, there were some good opportunities to develop a participatory approach in the project: the clear demand for a participatory approach by the client; the consequent planning carried out with particular attention to transdisciplinarity and with the contribution of stakeholders in identifying research needs and priorities; a research plan that responded to participatory intentions. What prevented the full application of the above was the lack of previous experience in the context of participation by the partnership and, above all, the attitudes of the researchers. Researchers have a major influence on the implementation of any given project [16] and are fundamental for the success of participatory approaches [58]. In our case, a group of researchers was interested and well prepared to experiment with innovative forms of stakeholder involvement and they were able to verify the results of this activity with a scientific and rigorous approach [40,42]. The rest of the partnership, however, continued to interact with stakeholders as it was used to, refusing to experiment with different proposals. Our study seems to suggest that such attitudes depend on professional characteristics (institution of affiliation and academic education), as well as on personal propensity.

It is true that the responsibility of researchers should be better considered in the monitoring and evaluation process of the project. It is also true that those who govern the agricultural research system and intend to encourage a participatory approach in agricultural research must ask themselves how to foster positive attitudes; in fact, the attitudes shown by our researchers are not an exception [18–22,58]. Negative attitudes can be changed and, according to Ison et al. [27], epistemological awareness and praxeology can be developed through learning systems in which thinking and practice of participation are incorporated. They also highlight the role of universities and higher education institutions in the facilitation of such learning of participation, creating the 'learning spaces' for 'learning participation'.

Public funding is fundamental in activating participatory projects. In our case study, the role of MIPAAF was key in gathering, coordinating, and orienting the top scientific experts in the sector, encouraging transdisciplinarity and participation to increase public awareness and involvement, and facilitating small-scale transformative co-learning experiments in WP5. Additional actions might regard steering the political and financial system to support the development of participatory thinking among researchers. There is a need for collaborative action among research and educational institutions, funding agencies, and policy makers for supporting the creation of learning spaces for learning participation, for example through tutoring by researchers who have been successful in previous participatory projects or other initiatives to promote knowledge and duplication of successful participatory projects, education and training, and mechanisms to both incentivize and empower researchers committed to participatory research.

Our findings on the issue of participatory agricultural research are in line with those of others European and Italian studies. Guzmán et al. [59] analyzed several case studies of participatory action research (PAR) in Spain and concluded that when applied to an agroecological transition, PAR promotes technological change and, at the same time, improves ecological sustainability of farming systems. Rossi [60] studied three initiatives located in Italy and highlighted that interaction among actors and facilitation are crucial factors ensuring effectiveness of mutual learning. At the same time, the author showed the need for deeper research and adequate forms of support of the co-learning process. Menconi et al. [9] analyzed the experiences of 35 participatory processes with the involvement of farmers in many European agricultural studies. The review shows that the collaborations between farmers and researchers are not managed properly. Too often, in participatory processes, farmers are considered only as a source of information to be used by researchers rather than as active participants. In participation contexts, it is not possible to establish standardized methods and tools, because each process should be tailored for the community that expresses it. Nevertheless, the review highlights the need to establish some minimum principles or key questions, to which those who design the path for an effective engagement of agricultural stakeholder must respond. Additionally, Cristiano and Proietti [61] promoted the use of indicators to measure the potential of participation and reveal the importance of participatory monitoring and evaluation approaches in recognizing synergies and effects of cooperative processes. Another European review of 39 papers [62] investigated the role of farmers and other stakeholders in participatory research and concluded that the role farmers play in such projects is rarely made explicit and it is often limited to simple knowledge providers. Instead, to foster the agroecological transition, the researchers should share project leadership with farmers and organize co-design locally to better bridge the gap between thinking and doing. This means better accounting for the singularities of farmers' situations and of the local systems to be transformed. Additionally, Ciaccia et al. [63] demonstrated the validity of integrating farmers in the decisional role of applied research, through a methodology of co-innovation implemented between researchers and farmers within an organic network in Italy.

Delate at al. [64] compared participatory organic research in the USA and Italy and found that researchers express their vision of participatory research as helping to improve communication between researchers and farmers, to enable work on relevant research, and to allow farmers to adapt technologies to their own conditions. Italian organic farmers identified 'knowledge-sharing' as a critical value of participatory research, and conduct on-farm research with less compensation than US farmers. The 'lack of time' was cited as the most important constraint limiting participatory research by Italian and US farmers, although the 'lack of common language' also was rated as potentially impairing full participation. In a very recent article, Canali et al. [65] examined the organic food and farming research and innovation projects funded in Italy in the last 10 years and acknowledged the importance of a multi-actor approach. The organic agricultural knowledge and innovation system must be based—they said—on the participation of the relevant actors along the whole knowledge chain. Consequently, all the activities of research and innovation (i.e., planning, projecting, implementation, and result evaluation) must be authentically shared among all those actors. They recommended that a fair and active actors' and stakeholders' involvement should be properly granted and promoted, in order to achieve the full implementation of the multi-actor approach. A wide range of interventions are needed to dissolve the cultural barriers and the specific lock-ins for which socio-economic actors remain subaltern to research institutions due to inequality in roles and access to resources.

A diagram is provided below (Figure 1) which illustrates the interactions and perceptions of the actors involved in the case study and the resulting recommendations.

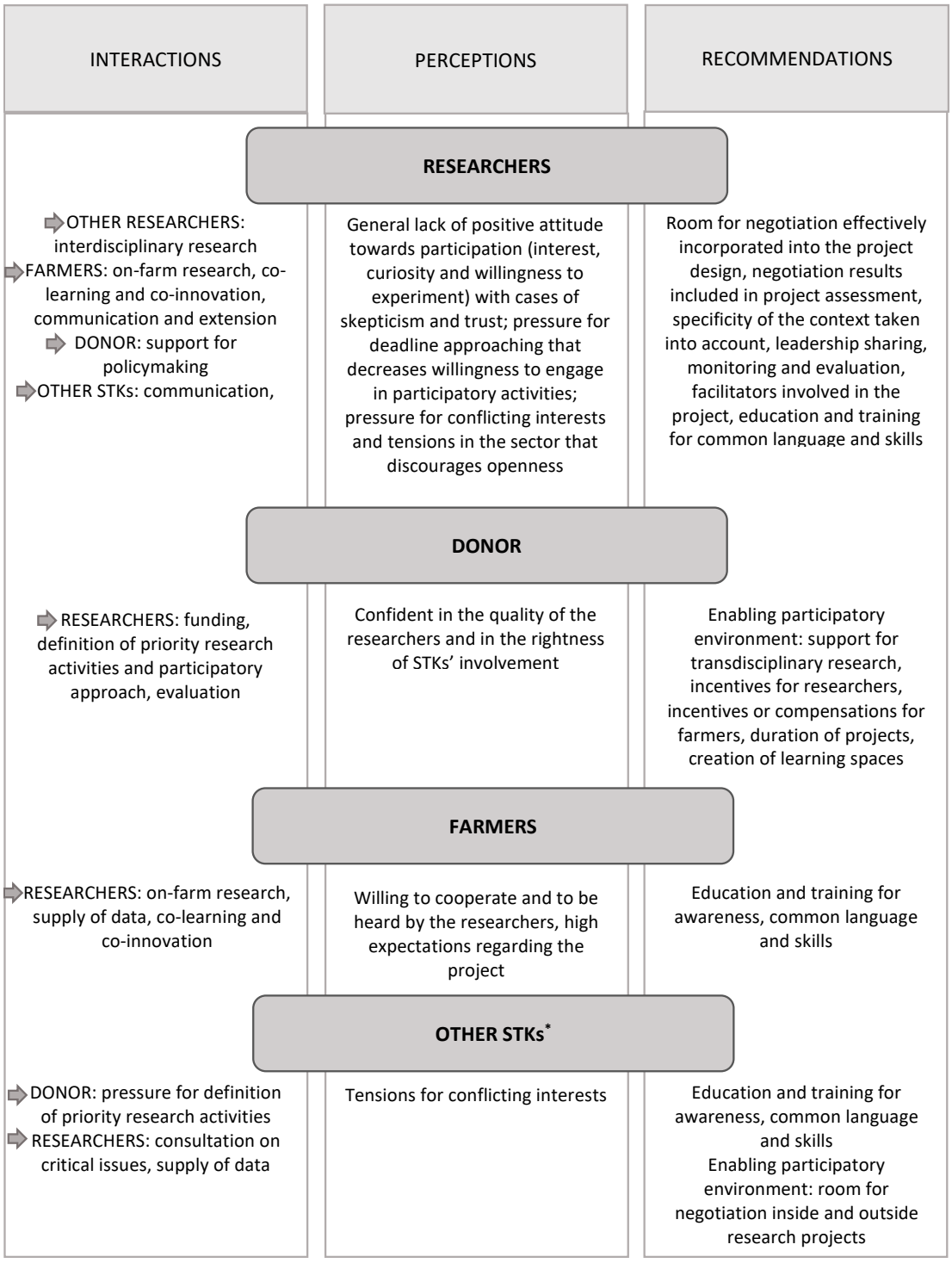

Figure 1. Interactions and perceptions of the actors involved in the case study and resulting recommendations. * STKs, stakeholders.

5. Conclusions

Stakeholders' participation in agricultural research is a multi-dimensional process that changes over time and in varying contexts, like any human interaction. Various participatory elements and the roles and responsibilities of those involved should be considered more explicitly throughout the research process, from planning to implementation, and should be reflected in its monitoring and evaluation. In this case study, we used the analytical framework developed by Neef and Neubert [16] to guide the reflection on the results of a participatory research project in agriculture. The RBS research and develop-

ment project was analyzed in its conception and implementation phases and different WPs, focusing on the role of researchers and their interaction with farmers, other local stakeholders, and the donor of the project. Indeed, researchers themselves certainly exert considerable influence on the implementation of a participatory project and the question of researchers' interests, attitudes, and values is crucial to the success of participation, although this aspect has remained largely unaddressed after Chambers' claims [1]. This is why there is undoubtedly still a need to study different cases and analyze both failures and successes in participatory research.

Our study concludes that agricultural researchers, with some exceptions, still lack not only experience and skills, but also a positive attitude towards participation, curiosity, and willingness to experiment in this area.

The authoritarian request for a participatory approach on the part of the client can encourage more careful planning and effective involvement of stakeholders in the design of the research. In carrying out the research project, there was an attempt to integrate traditional and other participatory activities. This solution went in a direction now consolidated in the literature on participation, which is that of optimization in the use of participatory approaches in agricultural research rather than its maximization. In our case, the integration of formal and participatory research responded to the preferences of the researchers and not to a specific intention based on the knowledge and practice of participation.

The use of an analytical framework allows us to reflect and carefully evaluate the development of the project, taking into account the specificity of the context in which it was carried out, its dynamics, and the characteristics and limits of the researchers who led it. Thus, in the future, this integration will be increasingly considered and predetermined to respond not only to the preferences of researchers, but also to the diversity of local stakeholders and their actual involvement needs.

Our study also concludes that an authoritarian request for a participatory approach is not sufficient to change researchers' attitudes. Attitudes and perceptions are certainly not static, but can be modified by learning to think differently and by acquiring the language and practices of participation. We believe that a common participatory language and mutual understanding may support a more informed debate on the use of participatory approaches and effective participatory research. If the institutions that govern and finance agricultural research want to support the transition towards more participatory research, then they have to encourage the creation of a learning space, through joint and coordinated actions between the scientific community and the educational system. Among these, the dissemination of the results of participated projects is of great value. The experience of a participatory project and reflection on the experience are training for the researchers involved—in this sense, we can speak of learning by doing—but also for others, even if expectations in terms of participation are not fully met.

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