

Applying the Participatory Impact Pathway Analysis (PIPA) approach to enhance co-innovation for sustainability within livestock family farming in Uruguay

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Abstract: Participatory approaches are needed to ensure learning processes and to incorporate lessons learned during the implementation of a project. This is particularly important when the aim is to improve farm sustainability considering changes in knowledge and skills, natural resources management and networking. This paper describes the Participatory Impact Pathways Analysis (PIPA) implemented within the participatory action research project “Co-innovating for the sustainable development of livestock family-farming systems in Rocha, Uruguay”, which involved stakeholders for planning, monitoring and evaluating of the project’s progress. Six workshops were implemented during 2012 - 2015 to enhance the project’s actions. Participatory methods were used to adapt PIPA to the Uruguayan culture. During 2013 an interinstitutional network was established, a shared vision of expected project results was defined, as well as impact pathways, goals and activities to achieve them. During the 2014-2015 workshops, reflections and suggestions led in turn to new or modified activities. This process contributed to confidence and commitment building, improving the quality of the established relationships and strengthening networking to enhance the dissemination of the project findings. As a result of the learning process, and inspired in the project’s methodological and technological results, one stakeholder organization established a project for another region. The last workshop focused on a participatory evaluation of the whole project, demonstrating that a successful innovation process took place. This Uruguayan case showed that within the co-innovation framework, the PIPA approach nurtured the creation of a common space for social learning and innovation, providing a useful instrument for rural development.

Keywords: Learning Process, Methods, Networks, Planning, Monitoring and Evaluation

1. Introduction

The traditional linear transfer of technology model is a top-down process from research institutions to farmers. This model is still worldwide predominant and has often led to low use of many improved agricultural technologies (Moschitz *et al.*, 2015; Okali *et al.*, 1994). To overcome this, new theoretical perspectives had emerged where the development of network and system approaches and the inclusion of relevant actors to broaden agricultural innovation were incorporated (Klerkx *et al.*, 2012). These new perspectives are most needed when dealing with natural resource management systems to improve farm sustainability (Speelman *et al.*, 2007), where a variety of stakeholders are involved (Schut *et al.*, 2015). However, most of the institutions in charge of fostering innovation are still locked into old approaches and methods of intervention (Moschitz *et al.*, 2015).

Participatory collaboration in knowledge generation, technology development and innovation has proved its ability to add value to science-based technology development (IAASTD, 2009). Working with a network of researchers, extension agents, farmers and local actors, focused on bringing new products or new processes into economic use as well as sharing and exchanging knowledge among them, strengthens innovation (Klerkx *et al.*, 2009). To promote changes in agricultural practices towards more sustainable production systems, a collective learning process among all stakeholders is needed (Dogliotti *et al.*, 2014). Stakeholders are actors interested in addressing a problem and their participation is seen as a critical success factor to solve complex agricultural problems (Schut *et al.*, 2015). Social learning projects should include a reflexive design to encourage and facilitate the learning processes, particularly when outcomes are expected to contribute to sustainable development (Loeber *et al.*, 2007).

Project monitoring and evaluation (M&E) can be used to enhance learning during its implementation and not only for accountability issues (Douthwaite *et al.*, 2003; Rossing *et al.*, 2010). M&E is increasingly seen as crucial to the success of rural research and development projects because it supports a real-time feedback (Douthwaite *et al.*, 2007a). Furthermore, stakeholders should periodically reflect on the validity of the impact hypotheses, and the entire process should be facilitated (Moschitz *et al.*, 2015), and documented so as to better understand the mechanisms through which socio-technical changes are fostered

Participatory Impact Pathway Analysis (PIPA) draws from program theory evaluation (Rockwell and Bennett, 2004), social network analysis and ongoing research for development to understand and foster innovation and is related to designing strategies, as well as a basis to set out a monitoring and evaluation framework (Alvarez *et al.*, 2010). The PIPA method was successfully used by Douthwaite *et al.* (2007b) to enhance the developmental impact of projects through better impact assessment, to provide a M&E framework, to allow stakeholders to learn for future initiatives and to provide information that can be used for public policies.

During the last decades in Uruguay a 21% reduction of farms occurred between 2000 and 2011, most of which family farms. At livestock farming level, there are more than 26.000 farms in 11.7 million has, 60% of them being family farms (Tommasino *et al.*, 2014). There are opportunities for improving family farms sustainability by re-designing those systems through an adequate selection and orientation of production activities and the use of appropriate technologies and farming management skills, through a participatory intervention to promote learning and innovation (Albicette *et al.*, 2016).

Between 2012 and 2015 a group of researchers at INIA (Spanish acronym for National Agricultural Research Institute) implemented the project “Co-Innovating for the sustainable development of family-farming systems in Rocha-Uruguay”. The project presupposed an innovation paradigm shift through participatory research, aiming to contribute to the improvement of livestock family farms (LFF) sustainability and rural development. Three interconnected and simultaneous participatory processes took place: at farm level, at research team level, and at Rocha regional level, with specific methods for each one (Albicette *et al.*, 2016). In this article we focus on the regional level where the PIPA method was adapted to plan, monitor and evaluate the co-innovation process along the three years project engaging regional stakeholders in a participatory learning process. We describe the method used, the M&E activities, the results obtained and the lessons learned.

2. Methodology

Co-innovation approach is considered as a participative and interactive approach to foster effective innovation across stakeholders (Coutts *et al.*, 2014), combining farming systems theory, social learning and dynamic project M&E (Dogliotti *et al.*, 2012; 2014; Rossing *et al.*, 2010). In this project the approach was implemented between 2012-2015, considering three interconnected simultaneous processes: (i) at farm level, seven representative LFF based on native grasslands (project farms) (Albicette *et al.*, 2016) were selected as case studies to assess sustainability using the MESMIS framework (Spanish acronym for Evaluation of Natural Resource Management Systems Incorporating Sustainability Indicators [Mäsera *et al.*, 2000]); (ii) at research team level, a participatory action research (PAR) methodology was used to implement this project; and (iii) at regional level, the PIPA method (Alvarez *et al.*, 2010) was adapted to involve local actors to M&E the project.

2.1. PIPA participatory methods, techniques and tools

Specifically at regional level, the PIPA method was adapted and implemented to plan activities, to M&E the project, and to include the lessons learned during the process in real time. The PIPA method was implemented through workshops held at the local offices of farmer's organizations. Thus, six half-day PIPA workshops (PW1 to PW6) took place between July 2012 and August 2015 with two major objectives: (i) to share and discuss results at the farm level as a M&E process, promoting a learning process among participants; and (ii) to jointly develop activities to share the results.

In order to promote a constructive atmosphere to M&E the project advances and generate a learning process during the six PW, six key points were considered: (i) each PW was carefully planned using a script with roles and responsibilities, specifying timetable and methodological tools, and the expected outputs were written and distributed among the research team (Schut *et al.*, 2015); (ii) the agenda for each PW was written in a flip chart to share it with the participants; (iii) the date for each PW was coordinated among project farmers, research team and other stakeholders, who were invited by e-mail with the agenda and the minutes of the previous workshop attached to be used as a kick-off point for the PW; (iv) moderation cards and visualisation charts (Schut *et al.*, 2015) using different participatory techniques selected from a toolkit (Knowledge Sharing Toolkit, 2009) were applied during the PW, leading to a collaborative knowledge and reflection process; (v) a facilitator (member of the research team) oriented each PW introducing the methodology, guiding plenary sessions, monitoring group sessions and facilitating workshop sessions (Home and Rump, 2015); (vi) all materials and results were photographed and presentations were recorded in order to document the information (Akpo *et al.*, 2015).

2.2. PIPA steps

Originally the PIPA process starts with the definition of a problem tree to understand the problems that the project addresses and what needs to change (Alvarez *et al.*, 2010). In our case, a Rapid Rural Appraisal of the region (Capra *et al.*, 2009) was used, with which the main constraints of LFF systems were identified. Therefore, we started the process by inviting farmers, researchers and local actors to build a regional interinstitutional network (IN) (Table 1) to plan and M&E the project "Co-Innovating for the sustainable development of family-farming systems in Rocha-Uruguay".

Table 1. Stakeholders of the Interinstitutional Network (IN)

Stakeholder groups ¹	IN Stakeholder
Research and Training	INIA - Research Team (Research Institute)
	Facultad de Agronomía – FAGRO (University - Research and Education)
	Centro Universitario Regional Este - CURE ((University - Research and Education)
	Instituto Plan Agropecuario -IPA (Extension and Training Institute)
Government	Intendencia Municipal de Rocha - IMR (Local Government)
	Sistema Nacional de Áreas Protegidas - SNAP (Environmental Ministry)
	Ministerio de Ganadería Agricultura y Pesca - MGAP (Livestock Ministry)
Non-governmental organizations (NGO) and civil society organizations	Comisión Nacional de Fomento Rural - CNFR (National Farmer Union)
	Delegates from SFR 109 and SFR-C (Local Farmer’s Organization)
Farmers	Project farmers
	Farmers of the region

¹Based on Schut *et al.* (2015)

From the project objectives, in PW1 the participants expressed what their goals concerning the project were and what they expected at the end of it (the shared vision). The starting question to elaborate that vision was: “What will be happening in 2015 with farmers, professionals, organizations and their relationships after the successful ending of the project?”. Based on the vision, the IN generated the outcome model considering the following questions: “What changes do we intend to undergo?”, “Which are the actors expected to change?”, “What is needed to achieve the expected changes?”, “Through which activities?” and “Who will do/implement them?” (Table 2).

As a way to implement the activities on the outcome model, the IN suggested the development of a Communication Plan (CP). For this, a committee of 4 IN stakeholders designed a strategy which was presented as a draft at the PW2, in order to discuss and formalize a CP. Finally the CP was defined and the activities were planned annually at PW3 and PW5, considering three target groups: farmers, professionals and organizations related to rural development.

During PW2 to PW6, M&E was done by IN stakeholders through the discussion of partial results presented by the research team, and the analysis and reflexion of the outcome model and CP. These cycles of M&E lead to a continuous process of knowledge acquisition, where strengths and weaknesses, suggestions to improve the project implementation to achieve its goals and IN vision were identified. Thus, several learning cycles occurred.

A final participatory evaluation of the project methodology and results was carried out with a survey of 17 questions and an open space for comments, answered by 18 IN stakeholders (INIA researchers were not included). The survey (see Annex) was designed following Bennett's hierarchy criteria (Bennett, 1975; Rockwell and Bennett, 2004). The evaluation was processed (i) during the PW6 where participants copied the answers on a pin board where the questions were written, and the results were discussed and analysed in a plenary session (Figure 1) and (ii) after PW6 where it was processed in order to collect and make sense of quantitative and qualitative results. Quantitative results were determined calculating the average score for each response, which was previously scored with a 5 points scale (++ = 5, + =4, 0 =3, - =2, -- =1).



Figure 1. Plenary discussion during final evaluation

3. Results and Discussion

Significant changes were obtained at the three levels where the project was implemented to enhance co-innovation in order to improve LFF sustainability. At farm level, the farming systems were re-designed by adjusting the stocking rate and sheep: cattle ratio, allocating pasture according to biomass height and using low cost breeding practices. These changes in turn resulted in a 23 % meat production increase and a 56% increase in net income, while maintaining natural resources untouched. Furthermore, it was observed a 25% reduction in the estimated workload on animals and pasture management, a 97% implementation of 11 of the proposed technologies and the incorporation of mid-term planning. The mentioned changes revealed changes in farmers' knowledge and skills related to their LFF system (Albicette *et al.*, 2016).

At the research level, by applying PAR methodology it was possible to consolidate a "research team", with a mutual understanding of how to address the problem and the methodological approach to face it. From a group of researchers with a varied range of backgrounds and expertise - agronomy, environmental and social sciences - (Albicette *et al.*, 2016), transdisciplinarity emerged as a new property where disciplinary scientific knowledge (scientific evidence) and knowledge from other sources (field experiences) were combined (Moschitz *et al.*, 2015; Wiesmann *et al.*, 2008).

At regional level PIPA method was adapted for planning and reviewing the project progress towards its objectives, becoming more impact oriented (Alvarez *et al.*, 2010). The key results of this level are described below.

3.1. A network perspective

Six PWs (PW1 - PW6) were organized during the project's implementation with an average number of 32 participants (from 29 to 39). All IN stakeholders that were invited to PW1 in 2012 participated throughout the six PWs. This outstanding level of participation demonstrated that stakeholders were supporting what was taking place during the PWs and were highly involved in the process (Home and Rump, 2015).

During the PW1 IN stakeholders developed a shared vision of the project. In their own words: (i) "*There is a considerable improvement of farms sustainability, using suitable technologies that resulted in higher income, preservation of natural resources and life quality improvement*"; (ii) "*farmers adopt an interactive working style*"; (iii) "*farmers and professionals acquire knowledge and develop skills for specific techniques and resource management*"; (iv) "*regional organizations are involved in the improvement of LFF, working as a network*"; and (v) "*appropriate knowledge is being shared through presentations and field days and through mass media, making an efficient use of communication tools*". This vision was a clear expression of the stakeholder's dreams about the project's impact and became a strong motivating spring for them to design a clear strategy and activities to be implemented (Douthwaite *et al.* 2007b).

Based on the IN vision, stakeholders defined impact pathways using an outcome model (Alvarez *et al.*, 2010), describing what is expected from the project, the ways in which stakeholders can adjust their behaviours and the interactions needed to achieve their project vision (Table 2). The outcome model was agreed during the PW2 and was used as a basis for the project M&E (Alvarez *et al.*, 2010). This strategy presupposes a paradigm shift during the research process (design and methodologies) in order to achieve development impacts, where end-users are proactive actors in socio-technical changes (Akpo *et al.* 2015).

Table 2. Outcome Model elaborated by the Interinstitutional Network

What changes do we intend to undergo?	Which are the actors expected to change?	What is needed to achieve the expected changes?	Through which activities?	Who will do/implement them?
Sustainability of the PF ¹ enhanced	PF and RT ²	Interaction among field agronomist, RT and PF. Discussions and agreements to generate learning and change.	On farm Work	Mainly PF and RT. Strategically, IN ⁴ professional
		Commitment of RT and PF		
Farmers in the region are aware of technologies promoted in the project	PF	PF interacting with their groups	Strategic group meetings	PF, professionals and IN organizations
	Organizations farm members	Members of the organizations interacting with PF	Yearly meetings for presentation and exchange of ideas	PT ³
	Farmers in the region	Farmers interacting with PF	Various activities: face to face, mass media, web.	PT
	Professionals working in organizations linked to the project	Professionals interacting with PF	Strategic visits to PF	PT
			Interaction of professional teams of the region	
	Professionals working on other organizations	Inform and raise awareness about the results and ways of working in the region	Various activities	
	IN representatives	Encourage networking	Lead by example	PT
			Channelling issues to corresponding organizations	Acts as an emissary of the new ideas
Encourage organizations to adequate approach for working with LFF			Workshops with organizations/ policy makers for awareness	PT

¹PF: Project Farmers, ²RT: Research Team, ³ PT: Project Team = project farmers, research team and professionals of the IN, ⁴IN: Interinstitutional Network

High stakeholder's involvement was achieved as they were asked to monitor the process. Constraints and interests of different stakeholder groups were considered, allowing the triangulation and validation of the products generated by the IN (Schut *et al.*, 2015). Some conflicts emerged in relation to high stakeholders' expectations of the project considering the resources available to implement it. Therefore, negotiating was necessary, to balance the demands into a mutually acceptable solution (Leeuwis, 2000). As stakeholders suggestions were incorporated, the original high motivation level remained. Within this view, farmers and other stakeholders were seen as relevant actors of the process (Leeuwis and Van der Ban, 2004), rather than conceiving them as technology consumers (Moschitz *et al.*, 2015).

Two annual communication plans (CP) (2013 and 2014-2015) were elaborated by the IN stakeholders focused on activities to share project methodologies and results related to the LFF, aiming to promote learning among different target groups: farmers, professionals and organizations. On-farm meetings and local activities were included to enhance interactive

learning process among farmers and professionals in the region. Dissemination activities were important to respond to local farmers' demands. Field days were key activities for sharing results and interacting with a broader audience. Promotion of projects progress using mass media was important to reach politicians and people from outside the region. Project strategy and results were also presented at national and international academic events and at activities related to LFF policy makers (Table 3).

Table 3. Summary of the Communication Plans elaborated by the Interinstitutional Network (IN)

Activities	Objective	Who were invited	Channels used for invitation	N° of Activities and Total Participants
On-farm meetings	Share and discuss implementation and results of the project at farm level	PF ¹ groups, their agronomist and neighbours	Personal invitation SMS ²	9 meetings, 100 participants
Local activities	Exchange information on specific technological topics (e.g. cattle body condition scoring, pastures management, ovarian diagnosis activity)	IN ³ stakeholders	SMS	3 on-farm activities , 90 participants
Dissemination activities demanded by local farmers organizations	Exchange information on technological topics (bull and cow management for mating, heard management under drought conditions)	Farmers in the region	SMS	2 meetings, 70 participants
PW1 ⁴ to PW6	Planning, M&E	IN stakeholders	Personal e-mails and SMS	6 PW , 180 participants
Seminars for Professionals related to rural development	Technical discussion (Social and Environmental issues)	Professionals	E-mail	2 Seminars, 90 participants
Field days at PFs	Share project results and processes	Open invitation	Personal Invitations, Newsletter INIA, Twitter, SMS, advertising in mass media, Web, flyers	5 Field days, 600 participants
Participation in Mass Media	Disseminate of project activities and results	PT ⁵		9 articles in Rural Magazines. Radio and TV interviews.
Participation in National and International academic events	Disseminate of project methodologies and results	RT ⁶		20 activities with 1900 participants, 13 conference papers
Participation in Interinstitutional meetings	Discuss co-innovation related to LFF policy makers	PT		5 activities, 110 participants

¹PF: Project Farmers, ² SMS: Short Message Service, ³ IN: Interinstitutional Network, ⁴ PW1: Workshop 1 to PW6: Workshop 6, ⁵ PT: Project Team = project farmers, research team and professionals of the IN, ⁶RT: Research Team

On December 8th 2015, 200 people attended the field day where project final results were presented. The evaluation sheet of the activity was responded by 98 participants: 93% considered the activity excellent or very good. Also, 83% of the responses indicated that the proposed technologies presented during the field day were feasible to implement in their own farms. Furthermore, at the end of that day, seven national authorities stressed the importance of project approach and results in relation to: (i) fostering farm sustainability through an intensification process and adaptation to climate change, while maintaining farm families on their land; (ii) enhancing farmers' knowledge and skills; (iii) promoting regional networking; (iv) generating scientific data to support family farm policies. Finally, the process was highlighted as a methodological innovation for INIA, as "*a way of working which thinks on what (...) and how things are done*". A summary (in Spanish) of the field days of 2014¹ and 2015² is available at INIA's website.

3.2. Monitoring and evaluating the project's progress as a learning process

Throughout PW2 to PW6 research team members and farmers presented and shared the project activities and farm results, so that anyone could follow and monitor the project advances. Special attention was paid on reporting all activities; a key factor in the coproduction of knowledge in a multi-stakeholder processes (Akpo *et al.* 2015). The participatory M&E process enhanced stakeholders learning through a regular reflection on the project progress and results, using a different perspective of impact assessment (Douthwaite *et al.*, 2003; Rossing *et al.*, 2010). M&E is traditionally used for accounting project achievements whereas we used it for analysing the process and emphasizing the importance of real time feedback, thus promoting learning (Douthwaite *et al.*, 2003; 2007a).

By active M&E stakeholders suggested improvements to the outcome model (Table 2) and to the CP (Table 3). This process contributed to confidence and commitment building, improving the quality of the relationships and strengthening networking. As posited by Schut *et al.* (2015) different stakeholders enhanced insights in the different dimensions of a problem, and can look for different types of solutions. As an example of the depth of the M&E process, some reflexions of the 30 participants during the mid-term workshop (PW3, September 2013) are presented in Table 4. Participants analyzed project achievements and difficulties as well as elaborated suggestions for enhanced project implementation. Most project achievements were related to the co-innovation approach used. At farm level this was reflected by the "*good farm results*", at the research team by an "*efficient methodology to work with at farm level*" and at the region level by the consolidation of an Interinstitutional Network (Table 4). Difficulties at the farm level were associated to the decision making process and to animal health management, whereas at the region level difficulties were due to interinstitutional coordination and scope of the process. Improvement suggestions were considered and most of them included in the CP (Table 3). Incorporating a specialist in the area of animal health was not possible.

¹ 2014 Field day: <http://www.inia.uy/estaciones-experimentales/direcciones-regionales/inia-treinta-y-tres/jornada-de-produccion-familiar>

² 2015 Field day: <http://www.inia.uy/estaciones-experimentales/direcciones-regionales/inia-treinta-y-tres/hacia-una-ganaderia-familiar-sustentable-jornada-final-del-proyecto-co-innovando-en-rocha-2012-2015>

Table 4. Stakeholder's perception of project achievements, difficulties and suggestions for improvement, analyzed during mid-term PIPA workshop (PW3, September 2013).

	Stakeholders reflexions
Project achievements	<p><i>"There are already good farm results".*</i></p> <ul style="list-style-type: none"> • Unexpected productive performance (positive results) • High increase in meat production • Farm planning • Learning about production technologies • Continuous technical support • Be aware of a different way of working (<i>"we have change our minds"</i>) <p><i>"There is an efficient methodology to work with at farm level".</i></p> <ul style="list-style-type: none"> • Interaction farmers – research team • Assess natural resources management in relation to production activities <p>Consolidation of Interinstitutional Network (IN)</p> <ul style="list-style-type: none"> • Knowledge acquisition by IN stakeholders • More linkage between regional organizations
Project difficulties	<p>At the project farms</p> <ul style="list-style-type: none"> • Difficulties with implementing changes in the farm. • Some technical issues uncovered (<i>"we need animal health assistance"</i>). <p>At IN</p> <ul style="list-style-type: none"> • <i>"Project coordination with other regional organizations was difficult at the beginning"</i> • <i>"We have difficulties to follow the process"</i> • <i>"How project results could reach other actors is not clear"</i>
Suggestions for project improvement	<p>At the project farms</p> <ul style="list-style-type: none"> • Include animal health plan in the re-design of the LFF • Include on-farm meetings with neighbours to learn about the LFF re-design process <p>At the research team</p> <ul style="list-style-type: none"> • Incorporate a veterinary <p>At IN</p> <ul style="list-style-type: none"> • Exchange information among IN stakeholders on specific technologies being used at the farms • Efforts to reach more farmers: use mass media to enhance dissemination of project results • More coordination with other organizations, especially with MGAP to disseminate on-farm approach.

* Statements in italics are stakeholders statements recorded during PW3

The last workshop (PW6) focused on a participatory evaluation of the whole project and tackled different topics: global project's assessment, goal achievement, project performance and personal changes in knowledge and practices. The methodology used allowed the participants to immediately visualize the results of the survey and reflect on the process (Knowledge Sharing Toolkit, 2009), and was aligned with the whole participatory process (Home and Rump,

2015). The collective reflection on the individual responses constituted the global perception of project results and was later reinforced by the quantitative analysis of the survey.

The quantitative analysis of the survey valued the overall project performance positively: all topics were valued above 3 in a 5 point scale (Table 5). Particularly, global project assessment was highly rated with a mean value of 4.22 out of 5, whereas the achievements reached at farms level (questions 2a, 2b, 3 and 8) were among the highest values. The weakest points were related to knowledge of project results (question 5) and future impact of project results in the region (question 16), with mean values of 3.61 and 3.44 respectively. Several open questions allowed participants to express their own ideas and perceptions of the process. Some comments of the participants were: *“The project improved over time”*; *“It is a very valuable experience”*; *“The methodology of co-innovation stands out”*.

Table 5. Final Project Evaluation results

	Question N° ¹	Question topic	Mean Value ²
Global Project	1	Global project’s assessment	4.22
Goals Achievement	2 a	Changes in the farms	4.17
	2 b	Relevance of the farm changes	4.28
	3	Methodology used to work with Project farmers	4.44
	4	Methodology used to work with local actors	3.67
	5	Knowledge of projects results	3.61
	6	Knowledge of technological information to be promote by public policies	4.06
Project Performance	7	General project’s implementation performance	4.44
	8	Work at farm level	4.44
	9	Communication plan	3.94
	10	Interinstitutional coordination	4.17
	11	Incorporation of suggestions during the project	4.17
Other Topics	12	Fulfilling of personal expectations	4.06
	13	Knowledge related to LFF	3.94
	14	“New ways to do things”	3.72
	15	Personal feeling related to participation	4.39
Future	16	Impact of project’s results in the region	3.44

¹ See Annex for detailed questions. ² Mean values were calculated as the average of the responses. Each response was valued with a 5 points scale: ++ = 5, + =4, 0 = 3, - = 2, -- =1

PWs were the key-elements for interaction among stakeholders (Home and Rump, 2015). All project outcomes were possible because participation of IN stakeholders during PW was adequately organized and facilitated, while considerable time and resources were allocated on this process (Klerkx and Leeuwis, 2009; Home and Rump, 2015). The social learning process could be seen as different stakeholders interacting to solve a problem, while simultaneously acquiring new skills (both technical and social), producing knowledge, as well as developing relationships (Schut *et al.*, 2015). This participatory process continued as an interactive experimental learning cycle (Douthwaite *et al.*, 2002).

As a result of the learning process, and inspired in the project’s methodological and technological results, one stakeholder organization established a project for another region. The CNFR farmer Union had high valued this way of working and presented a project to a

competitive fund, which -if approved- will allow them to obtain funds to working with other farmers using the co-innovation approach.

4. Lessons learned

Stakeholders successfully worked together in the IN over a three-year period to support a participatory and collaborative process to generate innovation in the seven LFF, which contributed to the success of the whole project and to the dissemination of its results. The stakeholders involved in the IN were strongly committed from the beginning of the project, their continuous engagement was essential in the building of network reliability (Akpo *et al.*, 2015). Furthermore, some processes characteristic were particularly relevant: (i) clear objectives, (ii) negotiation and facilitation, (iii) systematization and keeping up with a certain continuity and coherence between PW, (iv) consideration of local culture to define when and where to set the PW, and a (v) clear agenda for PW.

The shared vision of the project's expected results along with the required activities to achieve them contributed to a clear and common understanding of the desired project outcomes and also was a motivating spring. As the impact pathways to achieve the project vision were validated and made explicit throughout activities, it was easier to M&E the advances and final results. However, specific indicators would be needed in the future for M&E. In our case during PWs stakeholder reflected about the obtained results and shared ideas for project improvement in real time, identifying whether or not interventions successfully contributed to achieve the vision.

The co-elaboration of CPs by the IN with specific activities was a strong tool that generated interaction and promoted coordination among local organizations. From the activities organized for farmers and technicians to share results and to exchange ideas of new technologies, we highlight on-farm field days. An evolution of project farmers' role was noticeable: after three years they directly explained to others the changes and associated results introduced in their LFF, reflecting the undergoing learning process.

The spaces generated with the PWs and the implementation of the CPs could be seen as platforms for social learning and innovation for farmers, researchers and local actors where the "real world" actors are involved in the process. This spaces demand time and resources to reach a common understanding of how the project will achieve the desired impact. Within this platform, the M&E allowed visualizing changes and their relevance at farm level in a particular context, while making learning cycles explicit which happened along the process.

5. Final reflections

This Uruguayan case demonstrated that applying the PIPA method enhances co-innovation at regional level, nurtures the creation of a common space for networking, participatory planning, M&E and social learning. Researchers, farmers and organizations were capable to plan, M&E the project focusing on sustainable LFF production systems. Several learning cycles took place to adapt and adjust the project in real time, while strengthening the impact-oriented vision of the project. The PIPA method provided a good framework for innovation towards sustainable LFF providing a useful instrument to contribute to rural development. As stakeholders understood the benefits of the approach, they effectively used the new knowledge for their own organizations as key issues for future initiatives and to provide information for agricultural family farming policymakers.

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ANNEX
FINAL PROJECT EVALUATION

**Co-innovating for sustainable development of family farm production systems in Rocha-
Uruguay**

To answer the following questions there are five alternatives:

(++) (+) (0) (-) (--)

Please indicate with (X) which best reflects your opinion.

OVERALL

1) How do you assess the project globally?

Excellent () () () () () Very bad

Comments:

GOAL ACHIEVEMENT:

Considering the objectives of the project and the shared vision generated by the interinstitutional network (IN), assess the following:

2) Did the project allow positive changes in the 7 farms considering their sustainability?

a) Many changes () () () () () No changes

b) Very relevant () () () () () No relevant

Please indicate the most significant changes for you:

3) Was an appropriate methodology used to working with Project farmers?

Very appropriate () () () () () Inadequate

Comments:

4) Was adequate methodology used to promote networking and thus contribute to regional development?

Very appropriate () () () () () Inadequate

Comments:

5) Do farmers, professionals and local organizations know the results of the project?

Know much () () () () () Unknown

Comments:

6) Do farmers, professionals and organizations know high-impact information technology to be promoted through public policies for family farming?

In a high degree () () () () () In a low degree

Comments:

PROJECT IMPLEMENTATION

7) Generally speaking, how do you think the project has worked during this time?

Appropriately () () () () () Unsuitable

Please indicate the most significant aspects for you:

8) To what extent was it appropriate at farm level?

In a high degree () () () () () In a low degree

Comments:

9) To what extent were the activities foreseen in the communication plan drafted by the IN appropriate?

In a high degree () () () () () In a low degree

Comments:

10) To what extent was the institutional coordination of the activities from the project adequate?

In a high degree () () () () () In a low degree

Comments:

11) To what extent you believe the project was "permeable" to suggestions for improvement made by yourself during the process?

In a high degree () () () () () In a low degree

Comments:

OTHER TOPICS

12) How far were you expectations regarding the project fulfilled?

In a high degree () () () () () In a low degree

Comments:

13) To what extent have you improved your knowledge on technological strategies for family livestock?

In a high degree () () () () () In a low degree

Please indicate the most significant aspects for you:

14) To what extent do you have "new ways of doing things" in relation to your work with livestock farming?

In a high degree () () () () () In a low degree

Please indicate the most significant aspects for you:

15) How did you feel about your participation in this process?

Comfortable () () () () () Uncomfortable

Comments:

TOWARDS THE FUTURE

16) To what extent do you believe t the project results may impact in the region?

In a high degree () () () () () In a low degree

Please indicate three aspects that facilitate this process:

Please indicate three aspects that limit this process:

17) Based on the experience and learning generated within the framework of this project, which suggestions would you make to policy makers when defining public policies for family farming?

Name three aspects or policies considered critical to support family farming in Uruguay:

I WOULD ALSO LIKE TO ADD:

INDIVIDUAL CHARACTERIZATION

Are you?

Mark with an X the option/s that correspond

- (I) Project farmer? -----
- (II) Farmer representative of a SFR? -----
- (III) If you represent a SFR, please give us its name -----
- (IV) Professional -----
- (V) If you are Professional, what organization you belong to

THANK YOU