Chapter 14
Co-constructing Innovation: Action Research in Partnership

Eric Vall and Eduardo Chia

Family farms today are confronted with uncertainties and continuously changing contexts. They are compelled to innovate constantly to develop and to adapt, not only by leveraging as much as possible their family's productive potential and often modest capital (see, in particular, Chaps. 6, 7 and 11), but also by actively maintaining and undertaking the multiple social and environmental functions that agriculture fulfills in these farms and for society as a whole (Part II). On the whole, however, very few of the many innovations proposed by research have been adopted by family farms. The reasons are that very often these innovations are out of step with the technical, economic and organizational needs of farmers, and also that family farms often have limited possibilities to change due to their rigidity and internal tensions. The combination of strategies of upstream and downstream actors, farm advisory systems and public policy (Chaps. 4 and 12) is also less than conducive to the adoption of these innovations.

Given this situation, the capacity of family farms to change needs to be strengthened. To this end, research efforts must focus on devising mechanisms that take into account the totality of the situation of the farm and the diversity of objectives pursued by the family members in order to produce actionable knowledge. This is the knowledge that helps define the technical and organizational conditions which have to be met so that the actors of family farm are able to adopt the proposed innovations. This is the topic of this chapter on action research in partnership (ARP).[1]

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14.1 A Long Tradition of Research for Development

Agricultural research has long come up with technical inventions in controlled environments (laboratories and field stations) to improve the management of crops and livestock herds. But this knowledge has not taken sufficient account of the family farm, nor of the strong organic links between the family and the production unit (Chap. 3). In practice, these links translate into combinations of domestic and farm rationales in the process of allocation of family labor and its remuneration, in the choice of product distribution between final consumption, intermediate consumption, investment and accumulation. Systemic approaches, such as research and development, started seeing the light of day in the 1980s to overcome the limitations of analytical approaches (Jouve and Mercoiret 1987). By moving research to the real-world environment and by studying practices and production systems, development research helped analyze the causes of problems and formulate hypotheses on possible solutions. However, in these approaches, the innovation proposals were prescribed to family farmers using a top-down logic. Its weakness lay in not sufficiently taking into account any dimension other than the technical, in particular the organizational dimension of innovation: the co-construction of change and empowerment of actors has have never really been addressed by research and development.

At the same time, researchers who faced the same types of problems as agronomists were developing action research (Liu 1997; see also Anadon 2007; David et al. 2001; Avenier and Schmitt 2007; Verspieren and Chia 2012). By according priority to solving the problems of actors on the ground and to producing actionable knowledge, action research seemed to the agriculture sector to be an improvement over research and development (Albaladéjo and Casabianca 1997; Sébillotte 2007). It proposes mechanisms to promote the active participation of all actors in conducting research and invites them to reflect on the options selected and the results obtained. Action research is a research approach that originates when the desire for change on the part of actors on the ground meets the willingness of scientists to undertake research (Liu 1997). It has a dual purpose: successful intended change and production of scientific knowledge. Action research is conducted within an ethical framework negotiated and accepted by all. The process is governed in a way which ensures the participation of all stakeholders in decision-making and in activities. Actors share roles to define the objectives, strategy, and planning and monitoring of activities in order to manage any tensions and to evaluate the eventual results.

However, action research does not put sufficient emphasis on the need to empower actors. Yet, in an increasingly competitive world (for access to natural resources, services, markets, etc.) and with the withdrawal of the State, family farms have a serious need to build up their self-sufficiency and autonomy in order to solve their problems and to seize any opportunities that may arise. To this end, they need to strengthen collaboration amongst themselves and with other actors in their economic and social environment. This observation led us to hypothesize that a

strengthened partnership (between farmers and researchers), i.e., the deliberate decision to work together to achieve a common goal by sharing tangible and intangible resources, would better address the issue of actor empowerment in action research approaches (Chia 2004; Dulcire et al. 2007; Mikolasek et al. 2009b; Vall et al. 2012). This was the basis of the idea of action research in partnership (ARP). ARP is founded on the construction of a partnership of united and responsible actors whose work aims to understand problematic situations, to identify possibilities for change, and to select those that best meet their needs and those of future generations in accordance with negotiated and agreed upon values and objectives. An ARP pursues a threefold goal: to produce actionable knowledge (Avenier and Schmitt 2007), to solve problems of family farms, and to empower the actors concerned (farmers, researchers, etc.). ARP offers an analysis and problem-solving framework which takes the organizational dimension of innovation into account, such as the adaptation of family farms to local conditions, collective resource management, governance of innovation, or even its institutionalization. An ARP uses intermediate objects to develop a common representation of the problem, to discuss possible solutions, to facilitate dialogue with actors on the ground and to help present the knowledge produced. These are formal representations (sketches, images, text, simplified output of models, demonstrations and experiments, etc.) that are sufficiently intelligible to be manipulated and modified, and which have a direct connection with the activities. They can be used at various stages of the innovative design process to fulfill different functions: formalization, translation, mediation, etc. (Jeantet 1998). In an ARP, the researcher always participates actively in the problem's formulation. Sometimes he assumes a leadership and facilitation role in the process (Dulcire 2010). The operational aspects of this approach have been summarized in a handbook for practitioners on the ground (Faure et al. 2010).

The principles of ARP emphasize the development of relationship between farmers and their families, researchers and technicians:

- analysis within family farms of the process of allocation of resources, production, marketing and accumulation taking into account the relationship between technical and organizational dimensions;
- establishment of multi-actor (farming families, researchers, technicians, NGOs, political organizations, etc.) mechanisms, whose members set out a number of rules and define common objectives to form a collective which is united (through interest) and responsible (acting with full knowledge of the facts and in compliance with jointly established rules);
- involvement of the actor collective at all stages of the co-construction of the innovation: common understanding of the problematic situation to be resolved, collective exploration of possible solutions, choice of solutions that best meet the actors' criteria, and joint adaptation of these solutions to optimize the desired effects.

This chapter's goal is to discuss the usefulness and limitations of the application of these principles to the co-construction of innovation by and for family farms. To do so, we rely on the studies of actual cases in several countries (Burkina Faso,

Cameroon, Madagascar, Chile, Brazil, Costa Rica, Ecuador, etc.). Three sets of interventions serve mainly as illustrations: Burkina Faso (Téria, Fertipartenaires, Sustainable Intensification Options and Abaco), Cameroon (design of fish farming innovations) and Brazil (Unaï) (Box 14.1). This chapter will follow the three main stages of ARP: exploration of the situation and the formalization of the partnership, co-design of the innovation itself (milestones, outcomes), and finally the evaluation of the results and the disengagement of research. For each of these stages, we will highlight the usefulness and limitations of the ARP methods in terms of the family character of the farms concerned.

Box 14.1. A few emblematic projects of experiments of action research in partnership.

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In western Burkina Faso (Vall *et al.*, 2012), over the course of four project – Téria (2005-2007), Fertipartenaires (2008-2012), sustainable intensification options (SIO) and Abaco (since 2011) –, ARPs have sought to co-design more productive and more sustainable mixed crop-livestock systems by using the principles of ecological intensification and by improving crop-livestock integration, cultivation techniques (association, conservation agriculture), livestock management (dairy, fattening of animals, draft animals) and the collective management of natural resources (drafting of the land charter). These ARPs relied on local committees involving farmers, researchers and technicians (village coordination committees – VCC). The context was that of family farms consisting of several households with an average of about ten individuals, of mixed farming (cotton, maize, sorghum, groundnuts, cowpeas) and livestock rearing (draft cattle, breeding cattle, sheep, goats, donkeys) and of the use of mainly animal traction equipment.

In western Cameroon (Micholasek *et al.*, 2009), the project for the design of fish farming innovations (CIP) brought together between 2005 and 2010 two Common Initiative Groups (CIG) – the Fishermen and Fish Farmers of Santchou (CIG-Pepisa with over 15 fish farmers) and the Collective of Intensive Fish Farmers of Fokoué and Penka-Michel (CIG-Copifopem with 20 fish farmers) – and a group of researchers from different disciplines and institutions (from the North and the South). It was a matter of co-defining conditions under which a transition to sustainable and durable fish farming could take place based on farming of small ponds by families of fishermen-farmers.

In Brazil (Sabourin *et al.*, 2010), the Unaï project (2006-2009) underwent a transition from a traditional development research approach to one based on ARP principles applied to the co-construction of technical innovations (direct sowing) and organizational innovations (collective marketing of milk and maize). Unaï has brought together over 100 producers out of a total of 400, seven advisors from organizations and six researchers. Unaï has established three thematic interest groups (direct sowing of maize, marketing of milk, development of Cerrado fruits) involving families of interested farmers, a coordinating technician and a researcher. The context was of agricultural families benefitting from agrarian reform, only recently installed, with heterogeneous origins, poorly educated and poorly organized (difficulty in accessing credit and markets). They were establishing mixed farming (rice, maize, beans, cassava) and livestock (dairy cattle) systems on small surface areas of often degraded land.

14.2 Phase One: Exploration and Formalization of the Partnership

14.2.1 Exploration

The exploration phase is crucial in instilling a desire for change on the part of family farmers and a willingness to conduct research on the part of scientists. The first step is to examine the situation which is causing problems to the actors by conducting a diagnosis. This is undertaken in a systematic and multidisciplinary manner. The diagnosis focuses on aspects as diverse as the biophysical conditions of the family farms, their diversity and their dynamics of change, the organization of space (access to natural resources, etc.) and the socio-economic environment (actors of services and sectors), production practices, the division of tasks, allocation of resources, the management of production, etc. It aims to understand the strategies of family farmers in their generality and in the face of the problem identified, i.e., the means they employ and the objectives they have. This diagnosis is undertaken through group interviews, individual surveys (sometimes detailed household surveys), and complemented by an assessment of available knowledge. It involves the participation of family farm actors to understand their representations of their problem(s) and of their situation as well as differences in points of view of the various members of the household. In Burkina Faso, for example, the diagnosis helped identify links between the size and wealth of families and the intensification and extension strategies implemented. This helped orient the search for solutions towards the integration of cultivation and livestock rearing for the poorest households (Vall et al. 2012). The diagnosis also highlighted very quickly the point that mechanized sowing would be difficult to introduce in Bwaba areas since manual sowing there is an activity traditionally assigned to women, and where the heads of farms having investment capacity are more likely to take advantage of low labor costs than to invest in a seeder.

During the diagnosis, key actors and potential partners are also identified for the purposes of creating a work collective. This part of the process is sensitive and takes time; it involves listening patiently and therefore many exchanges. But it helps gradually build a relationship of trust with farmers, a prerequisite to enrolling them in the ARP. To the extent possible, it is necessary to uncover and take into account the potential participants' representativeness, legitimacy, skills, relationships (potential conflicts and asymmetries, power relations or alliances), and displayed or hidden motivations in order to assess the feasibility of the ARP.

The research problem of an ARP is defined based on the outcome of the diagnosis. It actively engages family farm actors and researchers and takes place in three stages:

– developing an argument to establish links between the problems and the initial concerns expressed by the family farm actors and the problems' possible causes;

– the construction of research hypotheses to explain the causes of the problem to be solved;
– the construction of development hypotheses, i.e., possible solutions which are accessible to family farm actors, along with all the elements needed to make them feasible.

The design of innovative family livestock systems in Burkina Faso illustrates how taking the family's composition into account helps in the problematization. In general, family livestock rearing projects face issues of profitability. Feeding practices tend not to be adapted to the conditions on the farm. When several livestock projects have to coexist in the same farm – with the head of the family looking after cattle fattening using financial means and the wives looking after the rearing of small ruminants with labor being their main resource –, their difficulties are obviously not the same. For fattening projects (concerning the heads of families), the logic most often applied is of using cottonseed meal purchased from the market to reduce costs. With small ruminants (concerning the women), on the other hand, it is a matter of producing fodder and taking advantage of local biomass to meet the food needs of the animals without making expenditures.

14.2.2 Consent

This is the time participants (researchers, farmers, etc.) commit to the ARP, formalize their objectives, the reasons for their choices and the means they intend to use to achieve their goals. The actors' engagement in an ARP is first marked by mutual consent, which can be made official in a written or oral contract. This makes is it possible to take everyone's views and collective work into account. But such an agreement is not sufficient to guarantee the participation of all the actors. Indeed, the internal power relations between the head of the family and its dependents or between groups of producers (indigenous versus non-indigenous, for example) often prove to be barriers to the participation of marginalized populations (adolescents, young adults, women, foreigners, etc.). To encourage participation and reduce asymmetries between actors (farmers/researchers, family head/dependent, man/woman, etc.), technicians and researchers then put in place a governance mechanism for the ARP. This mechanism is designed, on the one hand, to ensure the widest possible participation in decision making and the research process and, on the other, to establish operational rules and an ethical framework that clarifies and embodies the values and principles that the collective's actors have agreed to comply with. Such a governance mechanism usually consists of several components:

– the steering committee, composed of representatives of institutions (research, development, producers) and farmer groups, decides the strategic orientations and plans activities. Its role may extend to arbitration in case of disputes between actors;

– the scientific committee facilitates a dispassionate distancing and methodological reflection, and assists researchers in the exploitation of results. It is composed of recognized experts on the issue concerned;
– finally, local committees are responsible for the functioning of the ARP and the implementation of the program of activities validated by the steering committee. Local committees include researchers, farmers and other actors (such as village coordination committees in Burkina Faso, the common initiative groups in Cameroon, or the thematic interest groups in Brazil). The role of farmer representatives in these committees is not easy. Not only do they need to defend the often contradictory interests of groups and families but they have also to espouse the general interest. A proper representation of family farm members in ARP governance bodies remains a methodological difficulty.

All ARP activities are formalized through an agreement or a comprehensive protocol, stating clearly what each participant has committed to – the objectives, work schedule, rules of procedure, and budget and allocations – all validated collectively (Blanchard et al. 2012; Mikolasek et al. 2009b). New developments during the ARP can lead the collective to modify the activities and recast the governance mechanism: new opportunities, limitations that were overlooked by the initial diagnosis, involvement of new actors, etc. In projects implemented in Burkina Faso, in order to ensure that cultivation and livestock activities were well represented in the local committees set up – the village coordination committees –, the actors had decided to divide its presidency and the vice-presidency between a farmer and livestock breeder. The actors also ensured that non-native communities and women were well represented in the executive office of the village coordination committees. In the Unaï project in Brazil, the problematization led to the establishment in three test communities of thematic interest groups (see Box 14.1). These modes of organization helped draw greater attention to the link between the family and the production and to better manage asymmetries between communities or even those existing within families.

In these local committees, their facilitators play a vital role in enabling dialogue, establishing a climate of trust and overcoming misunderstandings between different communities (farmers/livestock breeders, researchers/producers, etc.). They allow actors originating from different worlds – therefore from different cultural backgrounds and with divergent interests – to work together. This mediation function relies on individuals able to "translate" messages between actors, helping one understand the other. Their work helps produce a common language between ARP actors, and the taking into account of a comprehensive approach to farms and their environment, including the specificities of their domestic organization. This role is often entrusted to advisors and agricultural technicians, who, in most cases, are not trained for it. But this role can also be effectively filled by farmers who are adept at using social networks, exchanging information and knowledge and are familiar with specific family situations and who enjoy the trust of the community. In Burkina Faso, it took a few years of practicing ARP before such mediator farmers were revealed. Conversely, in some cases, locals with strong personalities

can block the process when things are not going in the direction they wish, as was the case in Cameroon in some local committees of the project to design fish farming innovations.

ARP actor interactions can be arranged in the form of meetings, guided field or farm visits, study tours, open days, appraisal and planning annual general meetings, etc.

14.3 Phase Two: Co-designing Innovation

14.3.1 Stages in the Co-design of an Innovation

During the co-design phase, the ARP collective (farmers, advisors, mediators, researchers) gradually builds pathways to change by successively addressing the following questions: What are the possible options to address the problem? Which options best meet the criteria and constraints of actors and the ARP's objectives? How to adapt these options to optimize the desired effects? Are the results obtained satisfactory?

The first stage is devoted to the search for options. It calls upon the researchers' expertise and the local knowledge of farmers and agricultural advisors (Vall and Diallo 2009; Vall et al. 2009). The possible options are listed and discussed during get-togethers, including occasions such as local committee general meetings or steering committee meetings. These forums are used to decide the ARP's strategic orientations, without going into details of how options will be implemented – that step will come later.

In the next stage, we try to go from the possible to the practicable, taking into account the constraints of producers and of the research collective. This entails the collective exploration of the feasibility of possible solutions based on the results of the initial diagnosis, objectives and constraints of family farm actors and the possible modifications of the environment. This exploration requires the organization of meetings, research and training workshops, study tours and interactions with other communities, and simulation exercises. This issue is important because it pertains to the solutions to implement, with actors eager to guide this process according to their own interests. The recourse to the ethical framework may become necessary to help actors stay the course, preserve the collective interest, and deal with internal – and sometimes external – power relations. The identification of what is practicable is based on the production of intermediate objects (flow diagram of a family farm, transect of an agricultural landscape, etc.) representing the dynamics at work and the effects of proposed solutions (Box 14.2). Study tours help anchor such objects in reality (typical case studies), and tools to model family farms simulate *ex ante* the effects of changes on the performance of typical farms.

Box 14.2. An example of an intermediate object linked to the family nature of the farm: the Cikeda model.

Nadine Andrieu and Aristide Semporé

The Cikeda model, developed in Burkina Faso to simulate the operation of a mixed crop-livestock farm (Andrieu *et al.*, 2012; Semporé *et al.*, 2011), is an example of an intermediate object which takes the nature of family farms into account. Cikeda consists of seven modules reflecting the interactions between cropping and livestock systems on the farm. These are the resources of the farm (family labor, farm capital, equipment), the livestock rearing system, the cropping system, the feeding of animals, the production of organic manure, the fertilization and the farm's economics. Cikeda simulates the techno-economic operation of a farm over a year and allows the analysis of the impact of innovations such as changes to family labor, land expansion, modification of crop rotations, improvements in the production of organic manure, the introduction of a fattening workshop, etc. Based on data entered by the user (the farm's structural characteristics, strategic and tactical decisions, type of year), the model calculates three main balances: the mineral balance, fodder balance and net economic impact of agropastoral activities. Over time, this model's use has increased and a growing number of projects rely on it to explore possibilities for innovation and to simulate their impacts on farm performance.

To adapt the selected solutions to the local context and to optimize the desired effects, the process then enters a third stage. It consists of the implementation of the selected solutions in real-world conditions, i.e., in family farms or in their immediate environment if it is a matter of a collective innovation (collective construction of a product, management of a resource or infrastructure, etc.). Depending on the cases, the implementation of solutions can take very different forms.

– Some activities can be focused on the production of knowledge to strengthen collective reflection, explore possible situations, and help build decision-making capacities. It can be a matter of specific studies to look more closely at a particular sticking point (on actors' strategies, functioning of systems, territorial governance, the organization of sectors, etc.). For example, in the Unaï project, the diagnosis pertaining to the search for alternatives to maize cultivation included the careful socio-anthropological monitoring of instances and scenes of dialogue or of the divergence between knowledge of farmers and that of the researchers. This work helped reconstruct the research problem and propose innovative strategies for maize cultivation (direct seeding).
– In some cases, it is a matter of experiments conducted by farmers (selected by the local committees) at their farms to test a solution and to adapt it to the local context, taking into account the farm's strengths and weaknesses. When these experiments involve family farms, researchers consult with the farmer to select the location of the experiment on the farm's fields – which may require a reallocation of fields for the household (especially if the experiment occupies a large surface area) –, to identify those responsible for monitoring the experiment (and to explain the reasons behind the experiment's procedures, such as repetition), and to reflect on what each family member gains or loses with the introduction of the innovation. Unlike an experiment in a controlled environment, the farmer participates in the design of the protocol. More importantly, the experiment takes place in a context where the unexpected can intervene, thus making it necessary to suitably adapt data analysis procedures. Given the

variability of experimental conditions between the various family farms in the sample group, multivariate analysis techniques are necessary to analyze the results. They allow us to understand the conditions under which various innovative options can be implemented depending on the family farm context.

– Other actions can change the context of ARP actors more or less irreversibly. Examples from our work include the design of new modes of territorial governance – such as the drafting of a local land charter under Fertipartenaires – and innovative cooperation mechanisms within sectors or institutions – as in the case of the Unaï project. In this type of social experiment, it may be found necessary to change the way the ARP governance mechanism is organized as and when the various phases of the resolution of the problem are completed in order to ensure appropriation and sustainability of the results, or even their institutionalization.

The ARP includes mechanisms to monitor the results (technical, economic, social, etc.) and the behavior of family farm actors to analyze their reactions to the innovative principle being tried out. The collected data pertain to both the studied process and elements of the context in order to explain the results. Interim results are presented collectively in order to benefit from the advice of as many stakeholders as possible. This helps understand how the experiments unfolded and, in particular, strengthen the common language and develop new socio-technical references.

14.3.2 Results of the Co-design of the Innovation

Is the final outcome of the cycle of the co-design of the innovation satisfactory? This assessment often takes the form of participatory self-analysis undertaken with different groups of actors who participated in the ARP and with the different types of family farm members involved (Andrieu et al. 2011). An external evaluation can also complement this self-analysis by providing an external perspective on the ARP's relevance, effectiveness, efficiency, sustainability and impact. But it is never easy to find the balance between the commitment to action, on the one hand, and the distancing necessary to analyze the processes and to translate them into actionable knowledge, on the other (Hocdé et al. 2008). Such an assessment can be conducted at various levels.

14.3.2.1 Actionable Scientific Knowledge

An ARP produces actionable knowledge through the analysis of change. The analysis of change itself and the determinants of this change confirm – once they are ascertained – or refute the initial assumptions and provide information about the conditions under which they are valid.

An ARP enables researchers to understand the strategies of family farmers by analyzing them in real time and not a posteriori, and with their effective participation. In Burkina Faso, when the local land charter in Koumbia was being drafted, the participation of village representatives and the local authorities in the local committees set up allowed researchers to observe their behavior (cooperation, alliance, competition, domination), their representations (relationship with nature), their projects (relating to land, the development of agropastoral activities, etc.), their room for maneuver and the main determinant of the strategy of occupation of space – which is land saturation.

An ARP encourages systemic analysis. It thus leads the researchers to consider the farmers' rationalities by formalizing, with family members, their overall objectives, the planned calendar of farm activities, the rules and practices applied in order to understand the logic behind their actions (Mikolasek et al. 2009b; Chia et al. 2008). The references produced on farmer practices are based on their knowledge and representations (Vall et al. 2009; Vall and Diallo 2009), i.e., on the nomenclatures used by family farmers to manage their activities. They constitute the elements of a common language which facilitates dialogue and reduces the risks of misunderstandings in analyzing situations and finding solutions.

14.3.2.2 Solving the Problems Encountered

The ARP is deemed successful when its deliberate conduct confirms expected results, describes the methods used and the activities implemented, and specifies the path taken to arrive at the result. This then means that this path will be valid in similar circumstances, which thus confers a certain genericity to it.

Problems are solved based on the proposals of actors (researchers and farmers). The ARP allows the path to the solution to be adapted and fine-tuned as and when the objectives, constraints and strategies of farmers are discovered, since these are never known in advance, especially in family farms where family members have differing perceptions and viewpoints. Thus, at the end of the first year of the Fertipartenaires project, it was observed that the need for manure or compost pits for women could not be satisfied because the requirements for providing support to the pit construction project (commitment to build two pits) favored the heads of the farms. In the following year, the criteria for selecting applications for support were changed to allow women wishing to do so to install at least one manure or compost pit.

Through the establishment of local committees, ARP helps organize frequent meetings to discuss management methods and household strategies (work organization, family management of productive capital, product distribution and home consumption, etc.) such as crop cultivation and livestock rearing methods. The difficulties in functioning that arise within family farm households often have causes at higher scales. Local committees are also forums where these issues can be thrashed out by inviting the relevant actors. This is what was done in Koumbia, Burkina Faso, during the drafting of the land charter, where a law firm and

representatives of administrative services were involved in the process. The ARP can contribute towards an improved functioning of producer organizations (associations, cooperatives, inter-professional organizations, sectors) and local authorities (land management, access to natural resources), and modes of coordination among institutions (development, research and producer organizations).

It is also common for an ARP to arrive at unexpected results due to the involvement of new actors along the way, or because some constraints and resources had been overlooked during the diagnosis phase. We can then compare the results to the initial assumptions and seek to explain the differences. In Cameroon, for example, local committees have not always worked at their best because of power games played by some local actors. Because of this, experiments which were being conducted in ponds of producers (fish density, feeding, etc.) did not produce the expected actionable knowledge. Project participants then proposed to hold a fish-farmers' competition so that they could meet, share and define the socio-technical framework for innovation. The idea was inspired by contests held during agricultural fairs which play an important role in genetic selection and management of local breeds (Labatut et al. 2001). The fish contest proved to be a more effective intermediate object than experiments to produce techno-economic (local fish production model) and social (fish-farmer's profession) meaning and references. It led to the co-construction of a regional fish farming manual.

Sometimes the ARP does not lead to innovations, because some constraints, resources and relationships were overlooked or only surfaced once the ARP was underway. The work of problematization and the formulation of new hypotheses has to be done anew. Sometimes it may even be necessary to start a new ARP cycle. Finally, if the experiment fails without any discernible reason, it becomes necessary to repeat the diagnosis.

14.3.2.3 Capacity Building of Actors and Reducing Asymmetries Between Them

The ARP helps build the capacity of actors to undertake research and process information, mobilize partners, build alliances, and test and evaluate implemented solutions. To begin with, it helps actors construct an argument on their situation and the causes of the problem. It then allows them to join forces, pool their resources and knowledge to build collectives where they can share a common understanding of the situation, the objectives, the means to implement and the values to uphold. It helps actors acquire the know-how necessary to experiment with innovative solutions and to validate the results obtained through the formulation of hypotheses, setting of objectives and planning of activities. These lessons empower the family farms, i.e., reinforce their ability to cope with similar problems in a similar situation without calling on external support (Chia et al. 2008). Finally, the empowerment of actors contributes to the sustainability of the ARP's results. In Burkina Faso, for example, of the seven village coordination committees set up by Fertipartenaires, only one still is supported by projects (Koumbia); the other six are no longer

concerned by the new wave of projects. However, 1 year after the end of Fertipartenaires, of the six village coordination committees, three remain active without external support and continue to meet and conduct experiments on the production of organic manure, on minimal plowing, single-bovine traction, etc.

The success of an ARP depends also on the capacity of the research collective to manage the various dimensions that make up the initial asymmetry between actors, especially between farmers and researchers, in terms of both intangible and tangible resources. The ARP reduces disparities by guaranteeing the sharing of information, the right to be heard, participation in decision-making, equitable access to material resources, etc. If necessary, a contract or agreement can formalizes these guarantees in writing. Thus in Burkina Faso, in the Fertipartenaires framework, all partners, including the Union of Provincial Cotton Producers for the region of Tuy, drafted a budget together. This union and village coordination committees entered into agreements with local committees to strengthen their capacity to support producers, improve their self-reliance (empowerment) and initiate a reflection on the role of the advisor.

14.4 Phase Three: Reviewing the Results and Disengagement

14.4.1 Reviewing the Results

An ARP creates a dynamic of production of actionable knowledge, problem solving, capacity building of the actors (farmers and researchers) and reduction of asymmetries (farmers/researchers), shown schematically in Fig. 14.1, through the three main phases of the process. But implementing this dynamic is not easy; too often it comes up against pitfalls and difficulties.

The production of actionable knowledge and the resolution of farmers' problems are rapid and sustained during the first phase, as they proceed from the initial diagnosis and analysis of actor networks. During this phase, actors get to know each other, and they move forward cautiously and probably more carefully than in the following phases. Consequently, the results of the initial diagnosis must be reviewed and refined as the ARP progresses. The governance bodies set up need to be flexible enough to incorporate new actors, especially those who are socially less advantageous and who are not always present at the start of the research, or to separate from "relational offenders" who do not accept the rules established by the collective. During the second phase, the rate of production of actionable knowledge varies because it depends on the success of the experiments, but it is at this stage that the solutions to problems are gradually built. Finally, in the third phase (reviewing the results and disengagement), the production of knowledge is important (scientific and technical publications). This is also a phase of exploitation of results. For researchers, the time between the start of the work and the publication

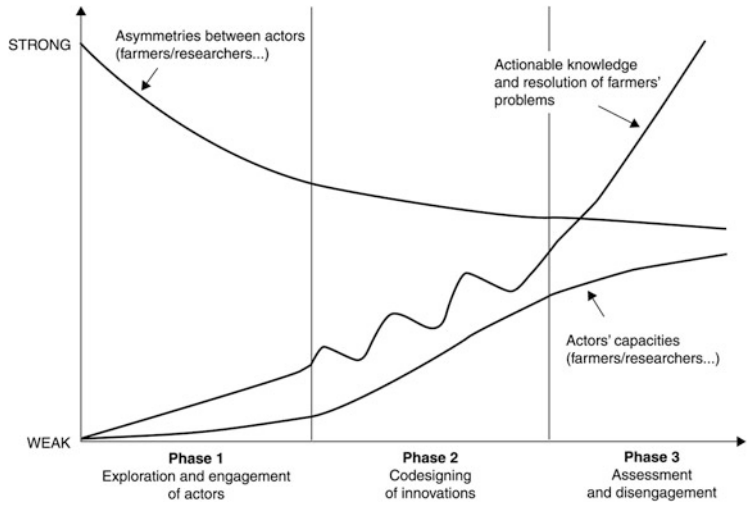

Fig. 14.1 Phases and dynamic of production of results of an action research partnership

phase is longer with ARP than in more traditional research methods. The results must also be framed so that farmers understand them, which is not easy given the cultural differences and disparate levels of education even within farm families, where one is likely to find some members who are literate in the local language, others who have had formal education (the youth) and always a significant proportion of people who have never been to school.

Actors' capacities increase rapidly during the second phase when agreements, which were entered into at the end of the first phase, have helped distribute roles. Then, if the ARP was successful, learning continues and the empowerment of actors increases during phase three.

- Farmers build up their capacity to innovate and build new production reference bases. Through ongoing dialogue between actors (researchers, farmers, technicians, etc.), exchanges of local know-how and scientific knowledge, experimentation cycles and testing of new practices, and breaks for reflection and discussion that are part of it, the ARP supports farmers in the gradual giving up of their normal agricultural practices and the adoption of new and innovative practices. But this process is often hampered by actors who do not desire change, and who occupy center stage when the research process begins. This is where a good facilitator, or a researcher's intervention, can clear the roadblocks preventing the situation from progressing.
- Researchers strengthen their capacity to produce knowledge in action. But to do so, they have to be convinced that it is possible to produce knowledge on subjects and objects they are dealing with. For many researchers, this is a difficult epistemological threshold to cross because they are used to a mode of production of knowledge based on laboratory experiments and field observations (David et al. 2001).

Finally, as far as asymmetries between actors are concerned, they decrease gradually without ever completely disappearing. Reducing asymmetries is a challenge and requires expensive and non-reproducible investments in training and prolonged technical monitoring and assistance. Nevertheless, a partial reduction of asymmetries still remains a prerequisite for a good start to and functioning of an ARP.

14.4.2 Disengagement

Every ARP has a beginning and an end! And this must be planned to avoid creating false expectations (on the side of actors) or a conversion into a system of advisors or experts (on the side of researchers). It is therefore preferable – right from the start of the ARP's contractualization phase – to clearly state the conditions subject to which the ARP is being implemented (start and end dates, if they are known, funding available, etc.) and to set realistic goals and verifiable indicators to monitor the progress of the process. It is a matter of being able to decide whether to stop or continue activities depending on the progress made.

In theory, an ARP can be terminated when the actors feel that the research objectives have been achieved and the desired change has taken place. For family farm actors, that time is when projects designed to bring about changes have been successful or when they find themselves sufficiently empowered and confident to pursue the action initiated by the ARP on their own. For researchers, that time is when they are able to validate the propositions that explain the phenomena studied and transform them into innovation proposals. But there is no guarantee that the outcomes desired by the researchers and those by the on-field actors are attained simultaneously, especially when the activities are funded by a fixed-term project, which is generally the case. It is frustrating for the ARP partners when disengagement is triggered by the funding being stopped before the desired objectives are achieved.

A disagreement or crisis between the actors can also lead to disengagement from the partnership for some of them: lack of effective interest in the project, widening asymmetries experienced by some actors, violation of the ethical framework, lack of ability to deal with the problem, etc. In such a situation, the arbitration mechanism forming part of the system of governance is invoked to help actors negotiate a disengagement, to draw lessons from the work already done, and to preserve the possibility of future collaborations.

The conclusion of an ARP is usually marked by an important event at the end of the project (workshop, conference, etc.) during which the actors present the results, draw lessons from successes and failures, sketch out possible perspectives, share the work with other actors – for the researchers, this means, in particular, the scientific community.

But in any case, the disengagement can take different forms depending on the dynamic established during the project (Box 14.3).

Box 14.3. Forms and changes of the disengagement.

Éric Vall and Eduardo Chia

Opportunistic re-engagement. In Burkina Faso, after the end of the Teria project, the core of the research collective, taking advantage of calls for proposals, reformulated a series of projects based on ARP principles (Fertipartenaires, Abaco, Sustainable Intensification Options) in the same region by involving new partners, specifying the research themes and adapting the mechanisms (from local committees to innovation platforms), while remaining focused on the co-design of the agroecological transition.

Empowering disengagement. The disengagement phase had not been part of the planning of the Unaï project in Brazil. This led to a feeling of abandonment on the part of the actors when the time finally came. But local actors (technicians and producers) took advantage of this phase to strengthen their capacities of reflection and action. The disengagement was long because of the difficulty of empowering farmers and of making thematic interest groups self-sustaining. This withdrawal phase was thus marked by intermediate steps: the training of technicians and the establishment of a technical assistance body and a cooperative for producer associations; and efforts to reduce asymmetries through information and training of farmers at the technical level for interest groups and at the methodological and strategic level for leaders of producer associations.

Planned disengagement. In Cameroon, the disengagement of the CIP project took place gradually as foreseen in the agreement. It was used to empower local actors through the local fish contest which led to the collective development of a manual of regional fish production. But the unwillingness to follow actors and the extent of work required to rebuild a research program led to a momentary halt of the ARP.

14.5 A "Tailor Made" Approach Rather than "Off the Shelf"

The ARP is intended to be adapted to the specificities of the problems faced by family farms. It thus engages farmers actively in the analysis of the problems and the solutions proposed on issues such as the relationship between domestic (family) and productive rationales in the processes of allocation of labor or investment, and accumulation choices or of allocation of monetary resources between the production cycle and the satisfaction of family needs.

A successful ARP is able to define technical and organizational conditions that have to be met in order to unlock productive systems such as family farms and to enable processes of innovation to move forward, all the while respecting the farmers' rationalities. It allows solutions to the problems of family farms to be co-constructed by taking into account the high level of uncertainty they are subject to, by emphasizing a systemic approach (to fully understand the effects of change on the functioning of the farm) and one that is appropriately suitable (adapted to the diversity of needs and situations). The changes that family farms need to undergo must also be designed collectively by pooling the strengths and resources available not only in the producer groups but also among a family farm's members (head of the farm and dependents). The ARP helps all actors (researchers, farmers and other stakeholders) gain a shared understanding of the issues to be addressed, explore possible options for development, choose options that best meet their criteria, and

adapt these options to optimize the desired effects. The ARP intervenes using multi-stakeholder mechanisms and intermediate objects. These mechanisms and devices promote the exchange of knowledge (between farmers, scientists and other stakeholders) and the development of a common language. The ARP produces hybrid knowledge (local/global) and actionable knowledge. It empowers actors and in so doing stimulates their ability to adapt to future changes.

The success of an ARP depends on the quality of the exploration, where not only the actors' problems have to be identified but also the key actors and those who are good mediators. It is these key actors and mediators who can recruit new actors, forge strategic alliances and, in particular, promote learning to build trust. Trust is critical to the ARP's success. It allows governing bodies to function smoothly, minimizes tensions and reduces asymmetries between the actors. This same logic of specific support to family farming can be applied to other forms of support, and the next chapter thus examines – while remaining vary of the application of ready-made approaches – how advisory services for family farms have evolved, and must continue to do so, through co-construction.