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INTEGRATING PARTICIPATORY RESEARCH METHODS IN A PUBLIC AGRICULTURAL RESEARCH ORGANISATION: A PARTIALLY SUCCESSFUL EXPERIENCE IN MOROCCO

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Abstract

This paper reports on a project of institutional capacity development for participatory research, undertaken by the Institut National de la Recherche Agronomique (INRA) in Morocco. The field work comprised a first stage of participatory rapid appraisal (PRA) training and a second stage of developing and testing a locally adjusted methodology for participatory research programme planning. A series of participatory and rapid appraisal exercises were carried out with researchers and development workers in four different locations with the objective of enhancing the knowledge, attitudes and practices of some 70 scientists and extension workers. While the duration of the project was too short for impact to become manifest and measurable, a number of lessons can be drawn with regard to the institutionalisation of participatory methods.

Research findings

The main constraints encountered in the process were conceptual, psychological and sometimes political in nature rather than problems of method. INRA's experience leads us to think that the integration of participatory methods in a public research organisation is not in the first place contingent on the methods themselves. Critical reflection of the project experience suggests that the institutionalisation of participatory research is mainly influenced by:

- *the causal innovation theory to which researchers and decision makers adhere;*
- *the institute's strategy and the extent to which this strategy fits in with rural development policies;*
- *the management of the change process by which staff relinquish old ideas and assimilate new ones;*
- *the sequence of action and reflection and the balance between them;*
- *the simultaneous presence of both external pressures and internal support.*

Policy-relevant findings

The findings imply that successful efforts to institutionalise participatory research need to engineer a triple shift in organisational focus. The first shift in focus is from science and academic research to a broader view of innovation, which in all likelihood will include a great deal of adaptive research and innovation support services. The second shift in focus is from a technically sophisticated but politically naïve concept of participation to concepts that are more appropriate in dealing with plurality and the exercise of power in research and institutional development. The third requirement is the need to give ample consideration to the overall strategy and policy environment of the research organisation.

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Acronyms

CRRA	*Centre Regional de la Recherche Agronomique* / Regional Agricultural Research Centre
DPA	*Direction Provinciale de l'Agriculture* / Provincial Department of Agriculture
DVRA	*Direction de la Vulgarisation et de la Réforme Agraire* / Department for Extension and Agrarian Reform
GTZ	*Deutsche Gesellschaft für Technische Zusammenarbeit* / German Agency for Technical Cooperation
INRA	*Institut National de la Recherche Agronomique* / National Agricultural Research Institute (Morocco)
ISNAR	International Service for National Agricultural Research
MAMVA	*Ministère de l'Agriculture et de la Mise Valeur Agricole* / Ministry of Agriculture and Agricultural Development (Morocco)
MARA	*Ministère de l'Agriculture et de la Réforme Agraire* / Ministry of Agriculture and Agrarian Reform (until 1994)
MARP	*Méthode Accélerée de Recheche Participative* / Participatory Rapid Appraisal
PRA	Participatory Rapid Appraisal
R&D	Research and Development
SRD	*Service de Recherche Développement* / Research-Development Department

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1 INTRODUCTION

In 1994, Morocco's National Agricultural Research Institute (INRA), initiated a project titled Strengthening Research Management Capacity ('Renforcement des Capacités de Gestion des Activités de Recherche'). INRA launched the project, in collaboration with the International Service for National Agricultural Research (ISNAR, based in the Netherlands), while the German government provided financial support through the German Agency for Technical Cooperation (GTZ). The objective was to provide INRA with tools for improved management of technology development and transfer in the agricultural sector. Several institutional and administrative changes were planned under the project to achieve this objective, one of which was to allow technology users to participate in planning and implementing research activities.

This paper examines the experiences gained through 18 months of work to set up mechanisms within INRA for achieving user participation in agricultural research. It presents the activities undertaken to this effect by INRA's senior managers and scientists and the two project facilitators (the authors), and the main ideas that motivated these activities. The paper draws conclusions as to which conditions seem to be prerequisites for introducing participatory procedures in a national research service.

2 THE POINT OF DEPARTURE

Structures and processes

During the design phase of the project, a persistent lack of communication between INRA researchers and technology users was identified as one of the causes of insufficient research impact. Communication and collaboration between researchers and farmers appeared to be inadequate, despite the presence of the Research-Development Departments (SRDs: *Services de Recherche Développement*) that INRA had created in its eight regional agricultural research centres.

The SRD mission was to develop regionalised technology-transfer approaches and programmes in consultation with the extension services, as well as to provide INRA's researchers with the information on farmers' and extensionists' needs that could help orient their research programmes. The functions and responsibilities of the various actors involved had been defined in a work approach called the 'research-development (R&D) process', consisting of four steps:

- to diagnose constraints;
- to test technologies;
- to disseminate verified technologies and train trainers;
- to monitor activities and evaluate the impact of the technologies (MARA/INRA, 1992).

Views and issues

An in-depth analysis of SRD activities and how the Research-Development Departments operated was undertaken to give the researchers and facilitators a better understanding of the causes of the problem and help them specify what action was required. Data for this analysis were collected during a field trip to the regional research centres. A workshop was then organised to allow INRA researchers and representatives from the Ministry of Agriculture and Agricultural Development (MAMVA: *Ministère de l'Agriculture et de la Mise en Valeur Agricole*) to share their views and the problems they encountered in the course of their daily work (Baur et al., 1996).

At the national level, the analysis mentioned the absence of a true R&D strategy compounded by the fact that some of the managers had not been made aware of the R&D approach. The R&D approach had been developed and implemented by a national committee made up of senior INRA staff, together with those from the Department for Extension and Agrarian Reform of the Ministry of Agriculture (DVRA: *Direction de la Vulgarisation et de la Réforme Agraire*). However in 1994, a new programme was launched which then, in effect, made it difficult to implement the R&D strategy developed earlier. The new programme involved a large number of stakeholders and was called the 'National Agricultural Technology Transfer Programme'. As indicated by the name, this new programme's mission was to promote technology transfer. The idea of feeding back information from farmers to researchers – an important feature of the R&D approach – was no longer apparent (Comité National de Transfer de Technologie en Agriculture, 1995 and 1996).

The field application of the R&D approach was not successful. Most of the SRD managers were not knowledgeable enough in social sciences to successfully plan and conduct participatory activities. As a result, the reasoning they applied in carrying out on-farm tests, i.e. during the verification phase of the R&D process, was mainly geographical. The meaning given to the term 'on-farm' was far more agro-ecological than socio-economic. The idea of considering a farm to be a socio-technical production system was not an assimilated notion. While most researchers favoured the idea of doing on-farm research, this did not mean they systematically took into account the views of the farmers.

The R&D process was indeed understood to be a tool for transferring technology, i.e. a means to disseminate technologies that needed no further improvement or adaptation. This linear and sequential model of technological innovation left no room for the idea of learning from shared experience of researchers and users; no space was given to looking at how new

technologies and farm management influence each other in the process of innovation, or to observing the non-verbalised needs of farmers. INRA's research managers expected the R&D approach to facilitate dissemination of the Institute's technologies and thus improve its impact.

However, there was an obvious contradiction in that INRA managers and researchers commonly believed they had a large number of relevant technologies to share with users, while some of the SRDs had difficulty in inducing even a sample group of farmers to collaborate in testing new technologies.

Many of the participants in the workshop wanted the R&D approach to be institutionalised. They expected that would lead to clear mission statements and instructions, provisional budgets, and help define what the various actors involved were to contribute and commit to, and so forth. Yet many of the scientists perceived the R&D activities to be inferior to the 'real research' of controlled experimentation, and for this reason the SRD scientists seemed to be marginalised within the scientific community. For example, SRD representatives insisted on recognition of the SRDs as research structures. They also wanted the other scientists to show a sense of responsibility to ascertain that researchers take into account the problems encountered in the field and that researchers monitor their technologies from beginning to end.

The results of the workshop provoked feelings of unease and uncertainty at INRA. Some of the staff involved did not want a close examination of the R&D approach, or of the existing structures and procedures used, though this activity was planned as part of the project to reinforce the capacity to manage research activities.

3 TOWARDS FARMER PARTICIPATION

PRA training as a shared experience

The first workshop had shown that INRA was not ready for the institutional changes required to accommodate mechanisms for increased farmer participation in planning and implementing research activities. Rather than aiming to institutionalise participatory methods in a straightforward way, it seemed better to introduce new ideas on participation less formally and apply them as part of the researchers' daily activities. It was necessary to show and experiment through concrete actions what can be achieved through participatory research before any meaningful discussion at the institutional level could be held. Training events were organised to this effect, so as to enable participants to learn while doing and to create richer, shared experiences (Kolb and Fry 1975; Nevis, 1987).

A hands-on training course on Participatory Rapid Appraisal (PRA) was developed which offered tools for diagnosing, planning, and monitoring (Gueye and Schoonmaker-Freudenberger, 1991). The twofold objective of this training programme was to enlarge the researchers' repertoire of participatory methods and tools and to increase their motivation to use these methods. Another benefit expected from this practical exercise was to create a coalition in favour of the institutional change planned under the project, and to help the facilitators appreciate the nuances of the researchers' work situation. The training initiative was also meant to help in questioning the concepts used under the R&D approach and to encourage researchers and managers to rethink their notion of innovation. The intensive and shared experience of the PRA training was expected to help create the preconditions for institutionalising farmer participation.

Some 70 researchers and extension workers were trained in four different locations. The training programme offered a range of rapid appraisal methods, with major emphasis on the principles of triangulation, iteration, and optimal ignorance (INRA, 1995). The course was given both in the classroom and out in the field, in the villages chosen by the SRDs hosting the training events. Each time, training ended with a wrap-up session in the village in the course of which a tentative research plan was offered to the farmers. A few headquarter-based INRA decision-makers attended each of the feedback meetings to learn about the methods used and the results.

Partial assimilation of the new ideas

The training events were effective in helping to introduce new ideas into the researchers' frame of reference. In their assessment of the PRA training workshop, the researchers indicated that they had learned interesting methods and principles. All parties concerned spoke highly of the quality of the discussions held with the farmers, the atmosphere during the summing-up meetings, the adopted on-farm research programmes, as well as of the photographic documentation of the visual aids used in the interactions with farmers.

However, the researchers did not come to grasp the principles of PRA sufficiently well to integrate the new methods and ideas into their daily research activities. Many participants were hesitant to actually begin planning individual activities as proposed at the end of the training sessions. This highlights a fundamental difficulty in institutionalising participatory research methods: the methods are based on an understanding of the social and political context of the research process that the researchers and extension workers did not share. Most of them continued to regard R&D as a vehicle for disseminating technologies developed at the experiment station, rather than as a research approach in its own right.

Nevertheless, individual researchers and managers became interested in learning more about the new participatory appraisal and planning methods. But this interest remained at the individual level and was of insufficient strength to incite INRA to make use of participatory methods in its efforts to direct its research more towards rural development.

Proposal for a strategic thrust

Further assimilation of the idea of 'participation' hinged on a shift in thinking at the decision-maker level and on the development of a research strategy that took into account the issues and challenges encountered in INRA's environment. The main issue at stake was to

achieve a better match between scientific results and the needs of producers. Main challenges in the policy environment were the emerging competition of universities and professional organisations, the weakness of the extension services and the sometimes insufficient impact of agricultural research.

The facilitators made a presentation to the Institute's senior management team, describing the existing state of R&D in the regional research centres and analysing the problems encountered in the field (Baur, 1995). They then presented – for the senior management team's consideration and discussion – elements of a strategy that would increase the R&D method's effectiveness and efficiency. They particularly invited questions, recommendations and guidelines relating to four priority areas of strategic management (Zimmermann, 1995). The first area concerned the nature of the outputs R&D was to produce. The second looked at collaboration with other institutions. The third area dealt with qualifications needed in the future, and the fourth with administrative procedures and scientific methods.

This highly critical analysis was well received by the group of decision makers, but they did not act on it immediately, since the project was going to be evaluated in an external review first. In other words, while the idea of a participatory R&D process had now been expressed and some people in the organisation recognised its potential, the time was still far from ripe to even begin thinking about institutionalising participatory methods and principles as part of the research routine.

4 IMPROVING THE R&D PROCESS

A pilot project to test new ideas and minimise risks

Following one of the recommendations made by a joint GTZ–MAMVA external review mission, activities were concentrated in one single regional agricultural research centre (CRRA: *centre régional de la recherche agronomique*) with a view to developing a methodology that would meet local needs and involve technology users in the research. The CRRA in Meknes was chosen for the pilot project. The objective was to carry out small-scale testing of new participatory research methods, while simultaneously developing a real R&D action plan. INRA's senior management had committed itself to informing and supporting the director and researchers of the regional agricultural research centre (CRRA). A steering committee was created to take responsibility for implementing the pilot project and to lead the internal debates and thinking processes. Its task was 'to achieve a permanent and sustainable system by developing the available research resources on the one hand and improving the SRD's functionality on the other' (CRRA du Sais et Moyen Atlas, 1995).

An exact definition of the problem at hand

Expectations and objectives were many and manifold, both at INRA headquarters and among the researchers of the regional centre, and even between the facilitators. Some people expected the outcome to be a clearly visible action programme and more effective mechanisms for technology transfer. Some hoped to develop useful tools and methods for attracting additional funds, while others feared that the change would lead to disintegration and incompatibility with existing structures and procedures. INRA's management team wanted priority to be given to developing a method, while the main concern of the two facilitators was to build up a shared appreciation of the context and of the participatory approach among the members of the research centre.

Moreover, it appeared that there were different ways of interpreting the roles held by INRA headquarters and by the regional centre. The regional centre's scientists were rather sceptical because they had difficulty in seeing how the proposed activities were to improve their working conditions. To deal with this situation, the facilitators suggested a very concrete and practical activity. In order to obtain the researchers' commitment to the new design from the very beginning, they combined developing the new method with planning an action programme that was likely to interest external donors, through an action-research approach similar to Reason's (1994) 'co-operative inquiry', as described in the following section.

To INRA's top managers and staff, the existing four-step R&D process (needs assessment, testing, dissemination, and monitoring and evaluation) was an integral part of the Institute's experience, despite the obstacles to its effective implementation. Because of its very positive connotation, it was impossible to ignore the four-step R&D process as an option for improving the functionality of the SRDs. And indeed, the project facilitators considered the existing R&D process to be a valid and usable framework for participatory research. However, a strategic thrust – together with a larger pool of appropriate methods – was needed to implement the approach effectively. Consequently, the objective was set to 'refine the R&D approach by creating mechanisms that will anchor it, institutionally and methodologically, in the region; these mechanisms are to be generalised at a later stage' (Baur and Kradi 1995). INRA management accepted this objective, as did the scientists in the pilot centre.

A participatory method for planning on-farm research

The participatory planning method that was developed and tested focused on defining constraints in a holistic manner. It gave farmers a strong voice in the selection of possible solutions and emphasised the comprehensiveness and quality of R&D project specifications. The participatory planning method consisted of the following steps:

1. exploring the demand situation;
2. analysing and interpreting the expressed needs;
3. identifying potential solutions;
4. validating the options by consulting the users;
5. prioritising the options;

6. setting up implementation procedures; and
7. evaluating the implementation procedures (internal review).

This method is based on earlier work on the planning of on-farm technology testing (Tripp and Woolley, 1989), on priority setting at the research station level (Dagg, 1991), on priority setting for research teams (Woolley and Tripp, 1994), and on participatory technology development (Haverkort, 1991; Werner, 1993). The following paragraphs give the reasoning behind each of the steps of the programming method. Section 5 presents the main lessons learned in the attempt to institutionalise the use of the method.

Exploring the demand situation

'Exploring the demand situation' means planning an investigatory phase to identify all needs – problem-based needs as well as those resulting from as yet unseized opportunities. This phase is extremely important for a good start to the planning exercise. Many innovation efforts yield poor results because this stage is handled superficially. Planning participants should seek a true diversity of perspectives and not give in to preconceived ideas. Researchers should not try to quantify constraints until they have first established *who* is requiring *what*, and perhaps also *where* the need is felt, i.e. in what geographical area (Werner, 1993). Exploring the demand is not even a definitive, once-and-for-all exercise. It requires an on-going dialogue to gain insights into the problems and hypotheses regarding needs that the users may not yet feel, or of which they are not aware (Werner, 1993; Frosch, 1984; Miller, 1995).

Interpreting the recorded needs

Following the exploration phase, the recorded needs must be interpreted before possible solutions can be identified. Users do not normally ask for research activities. They express their needs in their own words, which generally differ from the terminology used by researchers. Moreover, clients often do not know the cause of their problems and, even when they do know the cause, they may well be unaware that certain scientific findings could help solve the problem. Researchers must therefore show resourcefulness and creativity in analysing the causes of problems and in determining how research can offer solutions.

Identifying potential solutions

The selection of potential solutions for on-farm testing is largely determined by the availability of skills and scientific results. This should not cause too big a problem provided that there are sufficient potential solutions that can be adapted. However, the relatively short time span usually allowed for R&D projects is a constraint in identifying the range of possibilities.

Validating the options with help from the users

Farmers can only make a rational choice among solutions if they understand all the various benefits and costs. To this end, the entire range of potential solutions must be presented to them. In addition, a mechanism is needed to enable the farmers to make a choice. These tasks can be carried out in a validation workshop involving a representative sample group of farmers.

The validation workshop gives researchers an additional chance to present their assessments to a sample group of farmers, along with the potential solutions they propose for on-farm testing. This mechanism allows them to check back with the users to ascertain that the problems have been understood correctly, to explain what the potential solutions entail and to record the farmers' opinions.

Prioritising the options

When priorities between participatory research projects have to be set, the criteria of the users must override those of the scientists. In looking at the procedures that constitute a research institute's 'supply' of products and services, there are two complementary sources of inspiration. The R&D programme represents the 'demand' side. Its main inspiration is the 'market'. Since technical possibilities inspire the other research programmes (most of which are commodity-chain oriented), a proper balance of concerns within the overall research programme of the institute is thus ensured (Hetzel, 1995).

The arithmetic must be kept simple. It is impossible to carry out quantitative analyses on an annual basis for each location and for the whole range of commodities and types of farms. In practice, at this level, priority setting can only be a rough effort made to ensure that the selection process shows at least some rationality and transparency (Dagg, 1991). The following four criteria and weights were adopted and applied in the project described here:

- ranking by the users (40%);
- expected return (20%);
- number of farm families expected to benefit (20%);
- technical feasibility (20%).

The main feature of this weighting exercise is the importance attributed to what the farmers say, with equal weight being attributed to the other three criteria which represent the researchers judgements (see Tables 1 and 2).

Setting up implementation procedures

Implementation procedures must be set up in order to guarantee the relevance and quality of research efforts. An implementation procedure is a comprehensive action plan that includes all the information required for the appraisal of R&D proposals. It is an important tool for improving research impact and for increasing the chances to obtain external funding. It aims to:

- make user needs and concerns intelligible;
- take stock of previous achievements and appraise available solutions;
- state clearly what the research aims to achieve and with what impact;
- help others understand the approach and the design of the research activity;
- offer a concrete set of guidelines for implementing the activities; and
- quantify the implications regarding the commitments to be taken by all partners involved.

The term 'implementation procedure' is chosen on purpose in order draw a clear distinction from the term 'research protocol', which is usually limited to scientific considerations. Where external funding is sought, the implementation procedure will form the basis for a research contract.

Evaluating the implementation procedures (internal review)

To ensure the highest possible quality of research projects, the implementation procedures must be examined by a multidisciplinary group of peers. It is recommended that an internal review should be held during which the implementation procedures are presented and debated. This should foster an ongoing dialogue among the centre's scientists and ensure creativity and conceptual flexibility in the R&D programme.

5 LESSONS DRAWN FROM THE PILOT IMPLEMENTATION

Exploring the demand

Five provincial departments of agriculture (DPAs: *Directions Provinciales de l'Agriculture*) under the Ministry of Agriculture were asked to assist with the identification and ranking of agricultural development needs. Researchers deemed it necessary to begin by working with senior DPA staff members, but eventually to broaden participation and include farmers or their representatives. After five one-day workshops with different DPA leaders and their staff, it was possible to sketch a general picture of the technical requirements in the mandate area of the regional research centre.

The notion of opportunity cost gave rise to a great deal of debate. This notion states that a hectare of land or a day of labour can only be allocated once in a season, and is then no longer available for the production of an alternative crop during that same season. Participants found it difficult to take account of the benefits foregone by not producing the alternative crop, partly because they tend to think in terms of commodity chains rather than farm household systems. In the commodity chain concept, the major concern is with comparing the different technologies for producing the same crop rather than analysing the competitiveness of the crop within the whole farm. An important lesson learnt in this step was the paramount importance of recording the needs just as they are being expressed by the farmers or their representatives: the words should be written down as they are spoken, without any attempt to judge or interpret them.

Agricultural civil servants and extension workers appreciated the workshops. They said that they had rarely had a chance to examine the agricultural problems of their regions so thoroughly and to classify them so systematically. The level of participation of the scientists dropped sharply during the actual needs assessment exercise. Some researchers believed they already knew the problems that were raised during the workshop discussions. Others assumed that it was necessary for only a few scientists to take part in the discussions and that the participants would then inform their colleagues of the outcome.

After the workshops held with DPA staff, some of the steering committee members met with the facilitators to examine the outcome of this phase and to plan further action. The joint analysis revealed the presence of external challenges as well as weaknesses within the research centre. These included a lack of technology in some areas, incongruity of the supply with the demand for technology in other areas, and continuity problems affecting the collaboration between researchers and extension workers.

Table 1 Priority setting of potential solutions considered for on-farm testing

	(1) Potential solution	(2) Ranking by the users	(3) Expected return	(4) Number of farm families expected to benefit	(5) Technical feasibility	(6) Total score	(7) Rank
	Weight of criterion	40	20	20	20	100	
1							
2							
3							
etc.							

Three levels of scoring: High=3, Average=2, Low=1

Ranking by the users: >30% of votes = High
15-30% of votes = Average
<15% of votes = Low

Expected return: (=difference in gross margin/ha): >20% = High
10-20% = Average
<10% = Low

Number of farm families expected to benefit: >75% = High
25-75% = Average
<25% = Low

Technical feasibility: High, Average or Low depending how easy it is
(a) to translate results into recommendations
(b) for the extensionist to disseminate the result
(c) for the farmer to apply the recommendation

At this point in time, researcher motivation for the project had become very weak for two apparent reasons. First, assessing the demand situation had provoked a sense of disillusionment among the researchers by revealing that the research centre performed considerably less well than some of them had thought beforehand. There was a perceived lack of strategic orientation in their overall research effort. Second, it was not clear how participatory R&D would fit into the greater scheme of agricultural research and rural development.

Institutional constraint no. 1: Participatory R&D could not be imagined

The project facilitators decided to take on a more aggressive role by suggesting that the problem should be broken up into more tangible components. A practical dilemma ensued. On the one hand, it was necessary to divide the task at hand in such a way that immediate and clearly visible successes could be achieved (Weick, 1984). On the other hand, a general overview of R&D was needed as a prerequisite in order to make sense of how participatory R&D might evolve within the Institute.

As a first step, reports to the centre's director as well as to INRA's management team at headquarters clearly stated that researcher participation had been weak. Second, a programme and timetable of work were set up with the steering committee to help it take on the identified challenges. Third, the facilitators created a visual aid that synthesised the new ideas in graphical form (Figure 1). This was done to give the approach a visual representation and illustrate the intended conceptual and methodological improvements.

The idea was to help researchers situate the new planning methodology for R&D programmes within its strategic and institutional context and to encourage the joint development of concepts and actions (Goodwin, 1994). The matrix was designed in such a way as to tone down the dilemma arising from the psychological need to take immediate action while the lack of a general overview prevents the actors from placing the action in a conceptual and strategic framework (Kofman and Senge, 1993).

The columns in the background of the matrix represent the raison d'être of R&D, i.e. the pillars of national agricultural policy (of which agricultural research is a tool) as well as the principal categories of outputs that INRA is supposed to provide to Moroccan society. The description of the Institute's output (represented by the columns labelled *genetic material*, *technical advice* and *decision tools*) was general, with details to be worked out in a future strategic planning exercise, based on the results of an in-depth analysis of long-term needs for research services.

The horizontal lines of the matrix show the main steps of the R&D process already adopted by INRA. The analysis of the SRDs' problems revealed that communicating and collaborating had been difficult when it came to diagnosing, setting up on-farm experiments, disseminating the recommendations, and evaluating research impact. To make the process operational, the following two principles were proposed. The first was that users must be active (i.e. functional) participants in defining problems (interface A in the diagram in Figure 1), in carrying out the tests (B), and in evaluating experiments (C). The second was to apply the idea of incessant technical enhancement, whereby adopting a technical innovation entails a two-way adaptation: the farm is adapted to accommodate the new technology, and the technology is adapted to fit the particular needs of the farm (Rhoades and Booth, 1982; Leonard-Barton, 1988).

Institutional constraint no. 2: Too small a coalition to support participatory R&D

As it turned out, all the on-site workshops, discussions, training, concepts, reports and recommendations still failed to create a sufficiently shared understanding among actors that would allow

Table 2 Ranking of Suggested R&D Activities: Cereals

Potential Solutions	Ranking by users	Expected return	No. of families expected to benefit	Technical feasibility	Total score	Rank
Weight of the criterion	40	20	20	20	100	
Productive and drought-adapted varieties	2	3	3	3	260	1
Disease-resistant varieties Chemical disease control Training in disease identification	2	2	3	2	220	3
Crop rotation	2	2	3	1	200	4=
Fertilizer application planning and training workshop on sampling and soils analysis	2	3	3	2	240	2
Direct sowing	0	3	1	1	100	6
Weed control methods and training workshop	1	3	3	2	200	4=

for the institutionalisation of the participatory assessment and programming methodology. Some of the actors suggested – once again – that the term 'technology transfer' be used instead of 'research & development'. Others, on the contrary, were against using the term R&D because they considered the approach to be too conservative and insufficiently participatory. Still others believed that the new methodology was going to pose a threat to the method of 'programming by objectives' – the method INRA had been using for long-term research programme planning (Collion and Kissi, 1994).

The time had come to provide a more detailed description of the methodological elements that had been proposed for improving the R&D process. More important still, the considerations influencing the choice of actions had to be explained. To do so, a more detailed outline of the R&D approach was drafted and communicated to the participating researchers and decision makers (Baur and Kradi, 1996). This draft analysed the main conceptual and methodological obstacles that the steering committee and the project facilitators had come up against. The facilitators shared their sources of inspiration and provided a sketch showing the potential evolution of R&D. The paper looked at a number of issues, including the relationship between long-term strategic planning and the R&D process, the logic of including a verification phase in the process, collaboration with other actors, and mechanisms for monitoring and evaluating R&D activities. The paper was not the subject of an in-depth discussion, but it apparently explained the reasoning behind the participatory method for planning R&D programmes well enough to allow the work in the regional centre to be continued.

Interpreting the recorded needs

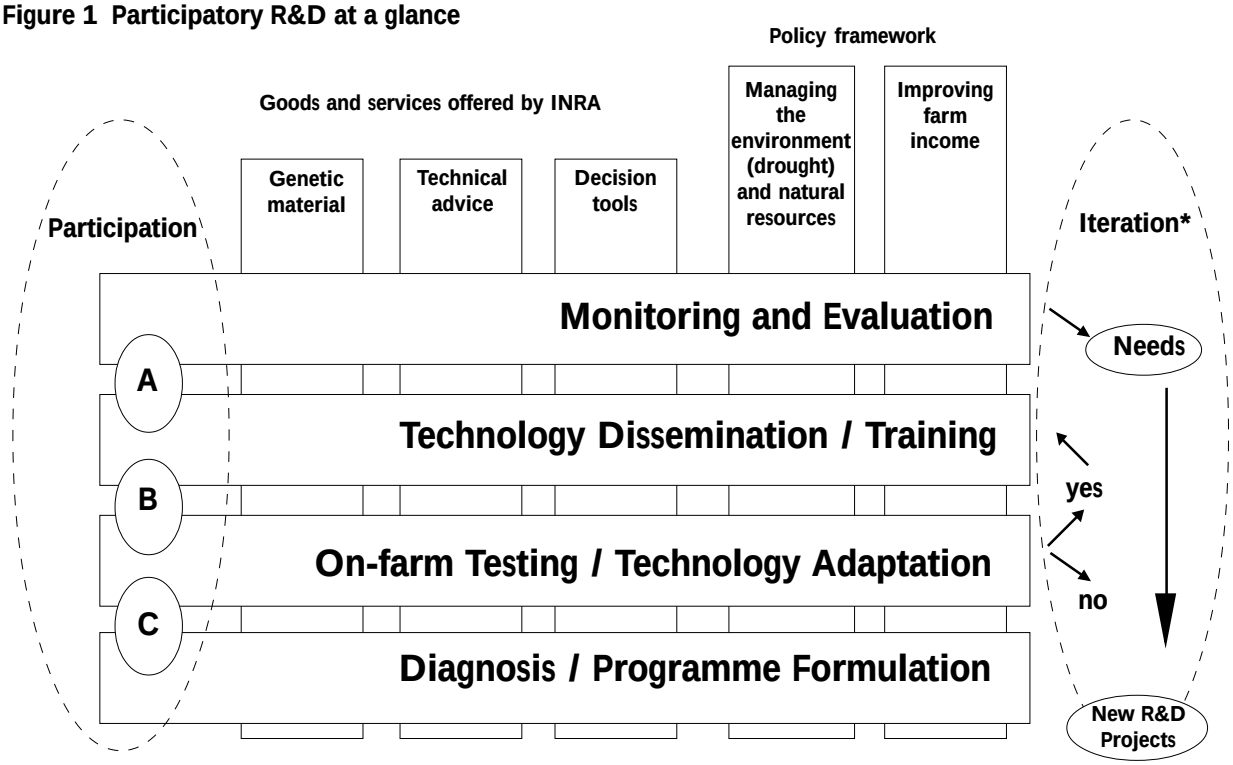
To simplify the methodology, which eventually must be applicable to a large number of commodities and geographical zones, no in-depth analysis was carried out to determine the causes of the identified constraints (as is done in problem tree analysis, for example).

At this stage – again, because of the predominant thinking from single commodity perspectives – it was difficult to reason in terms of household farming systems. The researchers felt that the needs expressed were not precise and that is was not clear which solutions were to be proposed. The difficulty lay in establishing links between the needs such as they had been expressed and the solutions listed by the scientists. The problems had not yet been well defined, nor had the potential solutions.

Identifying potential solutions

Needs and potential solutions were structured following the method of Schubert et al. (1991). By adopting this method, it was possible to deal with the needs and the potential solutions in almost the same way usually used

Figure 1 Participatory R&D at a glance



* There are two main decision points in the four-stage R&D approach. After on-farm testing there has to be a decision whether a given technology shall be disseminated on a larger scale or not. If the answer is yes, the R&D process moves on to the dissemination and training stage. If the answer is no, the information from unsuccessful on-farm testing will be fed back into the design of new R&D projects. Similarly, monitoring and evaluation of disseminated technologies provides information, which will help to update farmers' needs and allow to provide orientation for the design of new R&D projects.

Table 3 Identifying potential solutions: cereals

Needs	Rain-water conservation techniques Disease identification Control methods Soils analysis and optimal fertilizer application			
Objective	Increased productivity			
Major constraints	**Diseases**	**Inappropriate fertilization techniques**	**Drought**	**Weeds**
Potential solutions	Testing performance of varieties that are tolerant or resistant to septoria leaf spot, rust, helminthosp			
Genetic materials	Testing varietal tolerance to cecydomyiinae		Testing drought-tolerant varieties	
Cultivation techniques	Testing the rotation wheat/oil crops/ legumes	Planning fertilizer rates by variety	Testing direct sowing	Crop management techniques to intensify cereal production
	Testing chemical control methods of the main cryptogamic diseases			
Technical advice / Training / Studies	Follow-up training in diagnosis of diseases	Training in soil sampling		Economic evaluation of substituting manual labour by mechanised labour
	Adapted and productive varieties	Soil analysis and interpretation of results		

by researchers. A central problem and a central objective were determined, and the constraints on achieving the central objective were identified. Research outputs capable of overcoming constraints were recorded in a matrix, showing major constraints in the columns and categories of research outputs in the rows. Posters were produced that visualised the problem and the central objective, constraints and potential solutions for each commodity (Table 3).

The identification of potential solutions was very strongly influenced by the researchers' ability to identify results achieved in other places, as well as their personal aims and creativity. The collaborative construction of the matrix proved to be a powerful means to keep a check on idiosyncratic preferences. It also helped to clarify the nature of the constraints and to assess the adoption probability of the potential solutions.

Validating the potential solutions with help from the users

The recorded needs, constraints and potential solutions were translated into Arabic and presented as posters to a group of farmers during a validation workshop. The scientists explained their potential solutions using ordinary language and examples. For each of the major commodities in the region, five to ten potential solutions were presented. Then, voting slips (partial reproductions of the presented posters) were distributed and the farmers were asked to choose the three potential solutions they liked best. Only farmers were allowed to vote. Once filled out, the slips were collected and votes were counted on the spot, in public.

Because of transportation problems and weak coordination between the actors, few farmers attended the workshop while participation of senior DPA staff and researchers was high. Nevertheless, despite the limited number of farmers attending, the agricultural civil service considered the judgements to be representative of the needs of farmers in general.

The farmers asked a great number of questions, especially technical queries, for which too little time had been set aside. At the end of the workshop the farmers recommended that the method should be replicated without delay by holding similar workshops in other zones, closer to the farmers. The need to target different groups of farmers was expressed, because farmers who did not grow crops such as sunflowers or particular fruit trees found it difficult to express an opinion on some constraints and technologies. Another recommendation was to provide more details on the proposed solutions, since the expected benefits still seemed to be vague.

Prioritising the options

Following the validation workshop, the final ranking of potential solutions was produced by adding the other three criteria, i.e. expected returns, number of farm families expected to benefit, and technical feasibility (Tables 2 and 3). It is important to note that only research projects relating to a single commodity had been prioritised against each other, making it possible to compare a range of different projects with the same aim. For example, all projects aiming to improve wheat production could be compared, but it was not possible to rank wheat research projects against fruit tree research projects during the pilot exercise.

Implementation of this method for setting priorities was easy and fast. The only constraint was the almost total lack of economic data on the expected returns of the proposed technologies, such as comparative calculations of gross margins per hectare or of daily labour input.

A problem might arise if the inclusion of the criteria other than the farmers' vote would drastically change the priority ranking of the projects. This did not happen in our case, but it is an aspect of which to be aware. Ideally, farmers themselves should set priorities among R&D projects involving different commodities, because they themselves know their production systems intimately well and can best make such choices. This type of choice might become more feasible in the presence of organisations representing the users and by the emerging markets for agricultural research services.

Setting up implementation procedures

After the validation of constraints and the priority ranking of potential solutions, there was still a lack of clarity among the scientists as to what remained to be done or what the expected outcome was to be. Special emphasis had to be given to spelling out the details of the expected results as well as the resource requirements of the R&D projects.

The main problem lay in specifying the anticipated benefits from research in terms of contributions made to rural development. On the one hand, this difficulty stemmed from the lack of financial data on the profitability of the proposed solutions. On the other hand, the researchers tended to think through the research activities first and then only later look at the results. To reverse the sequence – i.e. to plan the outcome first and then programme the activities with a view to achieving the targeted results – appeared to be a highly unaccustomed manner of proceeding.

Carrying out an internal review of the implementation protocols

The CRRA research team drew up a regional R&D programme consisting of 11 projects (INRA, CRRA du Sais et Moyen Atlas, DPA Meknes, 1996). An implementation procedure was developed for each project. Contrary to recommendations however, no internal review took place and no group discussion among key researchers was held for improving the implementation procedures. Five of the programme's 11 projects were training projects, two were designed to produce teaching materials, and four were research projects.

Furthermore, the priority ranking that had been established was not entirely respected. Four out of 11 projects corresponded exactly to the projects defined as priorities before the implementation procedures were drafted. The other projects had undergone modifications of varying importance, but no underlying reasons for these changes were recorded in the programme document.

Submitting the programme for funding

The programme with the 11 project proposals was submitted to a donor. Funding was not approved but the donor representative made some remarks. The overall approach was well received, but the donor would have liked more information on how the programme had been developed, such as who had participated in the analyses and which criteria had determined the choice of projects. The donor representative also saw a lack of consistency among the proposed projects and failed to see in what way they would be contributing to the rural development of the region. Finally, the donor regretted that the environmental concern had not been given more emphasis.

6 IMPACT ON ORGANISATIONAL CAPACITY

External assistance to help INRA introduce mechanisms for farmers to participate in agricultural research ended after 18 months of work. This clearly was too short a time span to bring about the attitudinal changes and operational transformations implicit in the adoption of participatory research methods and principles. Moreover, because of the typical time lag between institutional interventions and their organisational manifestation, it was not possible to gauge the success of the project at the end of the 18 months (Baur et al., 1996).

Despite this, there are indications that the various interventions succeeded in creating within INRA an environment that is far more favourable to user participation in adaptive research. The field activities, design efforts and practical applications of the prototype methodology for the participatory planning of on-farm research both raised awareness within INRA for the potential of the participatory research approach and provided a range of practical tools for immediate use. The decision makers for instance, had become interested in the resource materials used by the project facilitators. Young researchers were sent to training courses to learn both participatory and farming systems research methods. And finally, INRA formed an internal working group in charge of developing INRA's corporate strategic thinking.

Another achievement was the development of a methodology that combines participatory tools for diagnostic reviews with a sequence of programming steps to be used in planning R&D activities. Although testing the approach gave rise to conceptual and organisational difficulties, it was nevertheless possible to record the potential solutions favoured by a sample group of farmers and to integrate diagnostic review and programming in a practical setting. The approach and methods tested went well beyond the ubiquitous PRA diagnosis and allowed the scientists to develop a local R&D programme in their normal organisational context and with reasonable investments of time.

7 CONCLUSIONS

INRA's experience suggests that the integration of participatory methods in a public research organisation is not primarily contingent on the methods themselves. Naturally there may be some problems in applying certain tools, but these hardly have a decisive influence on the organisation's ability to assimilate a participatory research approach. The lessons drawn from this case study lead to the conclusion that the institutionalisation of participatory research methods is mainly influenced by:

- the causal innovation theory to which researchers and decision makers adhere;
- the institute's strategy and the extent to which this strategy fits in with rural development policies;
- the management of the change process by which staff relinquish old ideas and assimilate new ones;
- the sequence of action and reflection and the balance between them;
- the simultaneous presence of both external pressures and internal support.

The nature of the methods is of secondary importance

Involving technology users in planning and implementing research activities that are carried out by a government research organisation is not primarily a matter of methods or of participatory mechanisms. It is, above all, a matter of institutional strategy, of political context and the way in which senior research managers conceptualise the innovation process. Encouraging farmers to take part in the R&D activities of a research institute where user participation is not customary necessitates a total rethinking of the organisation's strategy. Merely adding participatory mechanisms to the existing strategy and research routines is highly unlikely to achieve its main purpose of giving farmers a voice in technology development and evaluation.

The necessary transformation must include redefining the goods the institute is expected to deliver, i.e. its services and products. The task of participatory research must be expressed in terms of allocating an open space of potential services and products to be explored and exploited together with the users. Creating new types of goods constitutes a powerful lever for modernising the research institution. Such a new mission will generate novel ways of interacting with the institute's environment, better qualified staff, and even new research or management methods.

How researchers conceive of innovation is of utmost importance

The mission of a research institute is defined jointly by its members and stakeholders. It is based on a theory of the institute's usefulness and an approach that defines its way of operating. The causality theory of innovation to which the organisation adheres determines what kinds of approaches and which methods are useful and legitimate. If the idea of involving users does not make sense within the accepted theory of innovation, it will not be adopted because the researchers will consider participation to be useless. In cases where the desire to involve farmers in R&D clashes with the innovation theory in use, the research institute will normally need some kind of external assistance. The main focus of this assistance will be to help abandon or modify the old theory of innovation, and build and assimilate a new one.

Participatory research needs an institutional strategy and personal commitments

In the case described by this paper, there was not a sufficiently accepted institutional R&D strategy. When such a strategy is lacking, organisational development in the sense of establishing mechanisms for participatory research comes up against conceptual and psychological constraints. For example, if an organisational assessment shows that a radical change is called for but staff members think in terms of small methodological and administrative modifications, it is necessary first to find a way to instill a sense of urgency. Without this, researchers will find it hard to link the new participatory methods and principles to their own professional behaviour.

Relinquishing the old innovation theory and assimilating the new one is essential

This is a difficult process to manage because concrete actions give rise to many fears, diverging views, and frictions among the various actors. Nevertheless, it is important to take on concrete action without delay, despite the risk of making errors. There is no way of substituting this process because it is only by experiencing the real problems that people – and thereby the institution – learn and take ownership of new ideas. It is only in concrete situations that contradictions and errors can be accepted and information assimilated. Merely becoming aware of what does not work well is not sufficient. In addition, an attractive vision must be acquired which can provide a new identification model, help create positive energy, and arouse sufficient interest among the involved parties.

Facilitators and decision-makers must jointly maintain critical balances in the change process

As the project progressed, the facilitators dedicated ever more of their time to advocating the idea of participatory R&D within the organisation. At first, they assisted by offering analytical and conceptual inputs into new R&D strategies. Later on, most of their time was spent on activities designed to provide information and explanations, to convince, and to mobilise support for the new participatory methodology. The case in point strongly suggests that facilitators of institutional change need their own coach or peers who can help them monitor some of the most critical balances in the change process.

First, it is necessary to find the right balance between provocative and evocative acts. Provocation is needed to monopolise the attention of staff (including the decision makers themselves), at least for a while, in order to interrupt routine operations and force reactions. Evocative acts are necessary to allow the members of the organisation to review the flow of events, discuss their ideas and make the proper choices.

Second, a balance is to be found between practical action and theoretical reflection. Concrete actions are indispensable, because the essential principles of participation will only be understood through practice. But practice alone cannot guarantee that mechanisms for participation will be institutionalised. Assimilating a participatory research approach is not a concrete action, it is a process that involves changing one's ideas. Action is needed to create the raw materials for reflection. Thinking is then needed to find the words, images, and anecdotes that will represent the new idea and underline its main characteristics. And then again, action is needed to help others understand all this and create the organisational routines that are required for conducting participatory research efficiently.

Pressure from without and conceptual support from within are required simultaneously

Institutionalising participatory research requires much more than the mere creation of participatory mechanisms. It is dependent on a rather deep change in strategy and approach, thinking and behaviour, and of management tools. Hobbs (1997) suggests that launching organisational change in research organisations is mainly a matter of transforming external pressures into an internal sense of urgency. The present case fully confirms this finding, but the question is how to bring about internal urgency.

The senior managers of the institution face a vital task in having to interpret external pressures and develop the conceptual and organisational capacity to respond to them. The task cannot be carried out successfully without the decision makers committing themselves very firmly to redefining the institute's mission (if only partially), and to taking on the process of organisational change – with all the uncertainties for the members of the institution.

Change does not lend itself well to precise programme planning. Change processes only become manifest when practised, because that is how one discovers which human qualities are associated with it and will ensure its effectiveness in the end. The actors' behaviour in this process is largely explained by the changes they undergo at the level of their subjective rationality, which in turn depends on how the researchers perceive themselves, the context of research, and the innovation process. To institutionalise participation comes down to bringing about transformations at this level. Strong pressure from without, and a conceptual effort within the institution are both needed to make it happen.

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