Learning and experiences of the PETRRA project, BANGLADESH

PETRRA – an experiment in pro-poor agricultural research

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Uptake pathways

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Uptake methods research: the PETRRA experience

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Introduction

Output 5 reads:

- Improved methods for effective uptake of technologies identified, pilot-tested and recommendations for improved uptake pathways made by the Poverty Elimination Through Rice Research Assistance (PETRRA) project's sub-project (SP) partners and project management unit (PMU).

Contribution to this output came from:

- a first call for concept notes (CN) in which the focus was farmer access to new rice varieties;
- a second call for concept notes on uptake methods which was the outcome of a review of progress for uptake methods research (Alex and Halim, 2002);
- initiatives at the PETRRA project level that drew together SPs. Examples were the focal area forum (FAF) and the Bangladesh Rice Knowledge Bank (BRKB); and
- extension innovations from technology development SPs.

The poverty focus and gender inclusive aspect of the PETRRA project added another dimension to the research. PETRRA project management spent considerable effort and time on the uptake methods and pathways output.

It was apparent early that the organisations submitting CNs and subsequent research proposals (RPs) on uptake methods were not able to clearly articulate the actual uptake methods being tested. Submissions were more like disseminating a variety or validating a technology than experimenting with methods. To move forward, the PETRRA PMU adopted a 'learning by doing' approach. This approach placed heavy demands on the PMU as regular learning workshops were needed. To support this, an uptake forum was created in early 2000 to support the first commissioned SPs. The Principal Investigators (PIs) were members of the forum and in addition two representatives from the Department of Agricultural Extension (DAE) also participated from time-to-time. The forum enabled dialogues on issues in methodology and also contributed to capacity building.

The 2001 output to purpose review expressed concerns about progress against the output for innovations in extension methods. As a result a special review was held in April 2002 to document initial lessons learned and to navigate options for further work on uptake pathways for rice technology. This resulted in a second call for concept notes that focused particularly on women-led extension, dissemination of knowledge intensive technologies and private sector links in technology dissemination. Given the earlier tendency for concept notes to not clearly articulate as extension method a very clear guideline was given as a prerequisite for assessment. The guiding definition of an 'innovative extension method' was:

> *An Innovative Extension Method is defined as a new, more effective and cost-effective way of*

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interacting with large numbers of resource-poor farm households for the dissemination of an identified proven technology.

Even with this definition and a guiding assessment sheet, from 156 concept notes received, only 14 satisfied the minimum selection criteria. The outcome of this call was the addition of ten SPs with an implementation period of 18 months only.

Finally the PETRRA research on uptake methods and pathways did not focus on the effectiveness of the principle government service provider, DAE. There was a separate larger Department for International Development (DFID)-funded project Agricultural Services Innovation and Reform Project (ASIRP) that was dedicated to the effectiveness of the DAE. The PETRRA commissioned research was conducted within the framework of the New Agricultural Extension Policy (NAEP), which promoted decentralisation of extension services through pluralistic institutions targeting farmer groups. Within that competitive framework any extension person from the DAE was in a position to apply. What will be evident in discussion below is that the support of the decentralised pluralistic approach increased demand for DAE services.

The beginning: access to quality seed and variety validation by farmers

In the stakeholder consultative process issues of 'lack of suitable modern variety with seed quality and knowledge of modern rice cultivation' were high priorities. This complemented the priority that was placed on seed by the PETRRA project steering committee (PSC). Access to suitable varieties was therefore seen as an entry point to research on improved uptake pathways and methods.

The first call resulted in submissions that lacked clarity in the articulation of the extension method being tested or pathway being developed. There was a tendency to 'do extension'. There were submissions from non-governmental organisations (NGOs), private sector and government agencies. There were no submissions from the DAE. It was decided to give invitations to the better submissions for proposals that were for one year instead of three and with a limited budget. This was then followed by a Phase II for a further one year and a Phase III for two years. The initial guideline stated:

- PETRRA is a research project. One objective is the development of improved financially – sustainable approaches to technology uptake. The approach may serve as a model for your organisation and for other organisations;
- The pilot scheme is very specific. The agent is requested to identify one district and within that district three villages for an intensive demonstration/training/seed exchange programme for new varieties for the *aman* and then the following *boro* season. It's not necessary that the *aman* and *boro* locations are the same, as ecosystem and cropping pattern may not permit. The type of demonstration chosen, training given, level of farmer participation in choice of demonstration etc., seed exchange method, linking to other organisations etc. is your innovation. Preference will be given to low cost effective sustainable models;
- The target group are resource-poor farm households (small and marginal farm families); and
- It is important in the submission, to show how this links to on-going work and priorities of your organisation. Strong on-going links to resource-poor farm house-holds need to be shown. If implementation is through a partner NGO it is necessary to show the links within that organisation.

There were 10 SPs selected that represented a diverse group of implementing agencies. This provided an opportunity to assess the competitive advantages of each in promoting innovation and productivity increases for resource-poor farmers (RPFs). The implementing agencies are given in Table 1:

Table 1. Type of implementing agency for variety validation and uptake

Type of implementing agency:	Organisation/Institution
National government agency: BRRI (Principal source of new technology and linked training and source of Breeder Seed for new varieties)	◆ Genetic Resources and Seed Production Division (GRSD) of BRRI ◆ Adaptive Research Division (ARD) of BRRI ◆ Training Division (TD) of BRRI
Regional development agency of the national government (with mandate for training village organisations)	◆ Bangladesh Academy for Rural Development (BARD), Comilla
National NGOs with extensive village level organisation (non-agriculture specific)	◆ Bangladesh Rural Advancement Committee (BRAC) ◆ Proshika
Regional NGOs with extensive village level organisation (non-agriculture specific)	◆ Rangpur Dinajpur Rural Service (RDRS) ◆ Grameen Krishi Foundation (GKF)
National NGO that is singularly focused on agriculture and enables local NGOs and CVOs	◆ Agricultural Advisory Society (AAS)
Local NGO (strong local commitment but limited technical capacity. Needs to utilise links to local expertise [DAE])	◆ Shushilan
Private seed companies	◆ Agri Business Corporation (ABC)

There was regular interaction with implementing agents through uptake forum meetings, a peer review, a review by external consultants, logframe and gender training, communication material development discussions and exercises in documentation. Given the importance of seed, seed systems and variety validation by farmers, this level of engagement was seen as essential. Overall the following observations were made:

- Poverty focus increased over time with successive reporting of 40%, 64% and 96% respectively. PETRRA gave a general guideline for targeting with an understanding that the SPs were expected to develop their own definitions with evidence to contribute to overall increased understanding;
- Inclusion of women in extension activities increased over time. For all PETRRA SPs there was a sequential increase in successive years of 10%, 27%, 38% and 41% respectively;
- Revision of logical frameworks after phase I gave greater clarity for documentation of extension methods. The revised outputs for RDRS and BARD Comilla respectively illustrate this:
  - RDRS extension method replicated, validated, documented and sustained within RDRS and shared among the key actors of the north-west region; and
  - BARD method for rice technology dissemination developed, validated and documented and institutionalised;
- An understanding of variety suitability developed for each location. This was confirmed by the Bangladesh Rice Research Institute (BRRI) Adaptive Research Division (ARD);
- Cost analysis was inadequate;
- The essential link to BRRI for best information on rice varieties and access to breeder or foundation seed was recognised. For BRRI Genetic Resources and Seed Production Division (GRSD) each SP partner had become a part of the seed network; and
- Linkages to DAE evolved positively through demand for their services.

Each model had a strong organisational component (see Table 2). At the national level there were models developed by ARD and GRSD of BRRI. If both these

models are supported by BRRI, a pathway and method will exist for ARD to directly validate technology for male and female RPFs with NGOs and local level DAE. A feedback mechanism would have been created that is more inclusive of the existing field level diversity of service agencies. The GRSD had developed a networking approach that originated with its own breeder seed. GRSD developed links to more than 50 private sector agents or NGOs for seed production. There were links with the Bangladesh Agricultural Development Corporation (BADC) at the regional level. Through the established network the likelihood of RPFs having access to high quality seed increased. The organisational models for NGOs were, of course, organisation specific. Management of RDRS and AAS had endorsed and adopted their specific models. For Proshika, GKF and BARD, this was the next step. The models taken together represent a wide range of experience that may guide any interested group.

Review of extension methods research in 2002

The review by Alex and Halim (2002) provided a useful stocktaking exercise for PETRRA. There were useful observations:

- The implementing agencies did not seem to fully exploit their own comparative advantage;
- SPs were quite clear on the technology being introduced and tended to focus

Table 2. Organisational models for validation of new varieties and access to seed

Partner organisation	Popular name	Nature of uptake models and methods	Status/Progress
BRRI	Location specific technology identification for resource-poor	National organisational model for technology identification & dissemination	Mastered a model that promised to be sustained within BRRI for identification and validation of BRRI developed technologies as part of the national mandate; poverty focus, gender and participation were some of the new elements that the Adaptive Research Division (ARD) was confident to deal with.
BRRI	National rice seed network	National organisational model for pro-poor seed network	National rice seed network was in place; BRRI expanded its commitment to work with NGOs for ensuring supply of breeder seed (BS) nationwide; beside the national network there were also regional networks through BRRI regional stations & regional NGOs; NGOs were vehicles to reach RPFs.
BARD Comilla	Institutional approach for rice technology dissemination	Institutional approach for rice technology dissemination	BARD has a unique set of institutions under its Comprehensive Village Development Programme (CVDP); poor focused dissemination programme through this network of institutions has great potential; early results indicate that the community can take care of their development that is pro-poor.
RDRS	Federation-led quality seed promotion	People's organisation based regional organisational model	RDRS was very innovative in developing the model; it successfully replicated the model on no-cost basis by innovative use of the revolving fund and using its federation approach.
GKF	Quality rice seed marketing method	Organisational model for seed production & marketing	The learning outcome was not available within the project period; the model GKF could potentially streamline and expand their production and marketing. Seed dealership, production and marketing were linked to this approach.
Proshika	Union federation-led technology dissemination	People's organisation based national organisational model	Results were promising as Proshika has a strong people's organisation base through which it can easily disseminate any technology quickly.
AAS	FARMSEED extension approach	Organisational model for technology dissemination	The AAS FARMSEED model mobilised CBOs; it proved a cost effective means to reach a large number of RPFs.
Shushilan	Women-led cultural extension	Local NGO model of women-led CBO based cultural extension method	The Shushilan model reached very poor women through the performance of a cultural team.

more on this than the uptake pathway being tested;

- The practice of targeting RPFs and women and evaluating that was generally not well developed;
- The framework within the SPs for distilling lessons learned was weak;
- The focus had been access to seed of new varieties and did not address other technologies that may have different extension requirements;

The review recognised the synergies that were developing between SPs due to the uptake forum and the piloting of a regional focal area forum (discussed below). It was apparent PETRRA was operating at two levels. There was the methods research taking place within the SPs and then the organisational pathways that link the disseminating organisation to the source of the technology.

Alex and Halim made several useful suggestions for taking learning forward:

- Reduced funding for existing SPs with a focus on distilling lessons learned;
- A call for concept notes for experiments in women-led extension, introduction of knowledge intensive technology, and private sector linkages;
- Uptake methods for promising technologies emerging from the technology development SPs such as the seed health improvement (SHIP), urea super granules (USG) and rice-duck technology; and
- Continuing the uptake forum as a means of coordination and shared learning across SPs and to explore regional forums as a pathway for dissemination.

Women-led extension

Inclusion of women was a high priority within PETRRA research. Generally women have been an 'add on' to general extension programmes. To take learning forward and as a follow on to the recommendations of Alex and Halim (2002), PETRRA placed a call for concept notes for submissions on women-led extension (by women for women). In addition, all SPs of PETRRA were expected to be inclusive of women. Village women were included in two specific ways:

- Training in specific technologies in which they are actively engaged (particularly post harvest); and

Training in the overall production system so that they could contribute more in decision making. This latter emphasis was seen as proactive for women.

The engagement with women in the PETRRA research produced a rich experience on which to draw lessons.

In addition to the women-led cultural extension activity of Shushilan that is given in Table 2. Table 3 shows six SPs in which women were to the fore:

- The women-led group extension method for rice and rice seed drying and storage technology (SP 39 02) showed a very positive adoption by women and was actually promoted from village to village by women.

- The learner-centered video production to enhance women-to-women extension of post-harvest innovations (SP 37 02) showed a positive response for drying and storage technologies. There has

been high demand for the videos. The use of video is a way for the village women to spread their learning beyond their own village.

Table 3. Uptake methods for knowledge intensive technology and women-led extension

Organisation	Nature of uptake models and methods	Description
AAS	Women-led group extension method for rice technology	Women promoted and marketed the technology through pictures of seed drying tables.
CABI Bioscience, UK and RDA	Learner centred video for women-led extension	Participatory production of video materials for extending seed health technology; early response in the village and among the secondary audiences was very positive.
EPRC	Women-led extension method	Participatory development of communication materials linked to comparison of different training for effectiveness.
BRRI	Whole family approach for knowledge intensive technology	Whole family training approach was being tested as a method to promote the use of leaf colour chart (LCC).
AAS	Skilled family members extension approach	Analysis showed that husband and wife trained together gave the best result.
RDRS, BRRI and JSS	Women-led extension method for knowledge intensive technology	Use of farmer field school (FFS) concept was used for disseminating technology (rice-potato-rice cropping pattern) with women in the lead

- The husband-wife training (as developed by International Maize and Wheat Improvement Centre [CIMMYT] for wheat post-harvest care) gave the best result in terms of knowledge test, adoption of technology and rice provisioning ability. The common thread in response was that the husband and wife being trained together supported decision making.
- Even for systems technology like the rice potato system, training of women (in the mode of farmer field school [FFS]) showed a positive impact in terms of technology adoption. A comparison with non-FFS showed greater adoption but there were no comparisons between the training of men and women.

A general experience that comes through consistently is that the inclusion of women was positive and well received. The exact village arrangement for that exchange may depend on the social customs of the area. Women-led extension can be encouraged. For this women-led NGOs can be given the opportunity to expand their agenda to include all aspects of agricultural production whether it is the homestead or field crops. It is this last point, which was consistent across the PETRRA SPs.

Enterprise web: multiple actors and crucial linkages

Many technologies entail complex linkages that are essential for successful adoption. There were three technology development SPs and one extension methods SP that helped build our understanding of points to consider for the effective dissemination of complex technologies (Table 4).

The practice of extension is often limited to the passing on of the most up to date knowledge, whether through a brochure, a radio programme, a demonstration or a farmer field school. However, for numerous potential technologies to be adopted by farmers, more consideration of organisational links is needed. Appropriate technologies may end up sitting on the shelf due to lack of understanding of the essential linkages that are necessary for the technology to be maintained in an area.

When an innovation is extended to vulnerable farm families, due consideration must be given to the enterprise matrix for the technology. The enterprise matrix comprises all aspects of

Table 4. Technologies that require an understanding of market chain or multiple actors for adoption

Partner organisation	Popular name	Nature of uptake models and methods	Outcome
BRRI, FIVDB and BDS	Rice-duck farming	Inter-organisational model for knowledge-intensive technology dissemination	Rice and duck are distinct technologies that demand specific expertise; each essential step for adoption was articulated and the extension model developed can be used to further disseminate the adoption of the integrated rice-duck system of farming.
APEX, BREA and Mark Industries	Value chain approach for aromatic rice	Market chain model for production, processing and marketing aromatic rice	Established capability of local mill to produce export quality aromatic rice; established contract growing system that was inclusive of male and female RPFs and linked nationally to market opportunities that were either local or international.
BRRI and IDE	urea super granule (USG) technology in tidal area	Market chain model for knowledge intensive technology dissemination	IDE developed a model that established links from manufacturing of USG , through to its distribution by dealers and adoption by farmers for tidal-prone areas. In the model BRRI was engaged in the early validation phase.
IDE	Network development for mobile pump Marketing	Market chain model for technology dissemination	IDE established a model for the manufacturing, marketing, installing and promotion of the mobile pump. This method can be used to establish the mobile pump in any new location.

the organisational, technical and social domain that are essential requirements for a new technology to become a sustainable economic activity of an identified client group, in this case male and female RPFs. The development of a robust enterprise web is built on:

- A careful analysis of all the necessary factors, whether knowledge itself, or social, economic or perceptual factors (Drucker, 1988); and
- The analysis must identify what factors in the matrix are weak or require engineering. Any enterprise, whether for subsistence or for the market has an enterprise web that must be fully satisfied for sustainability. The social requirement of targeting may vary according to the nature of the technology and the extent of social stratification (Magor, 1996).

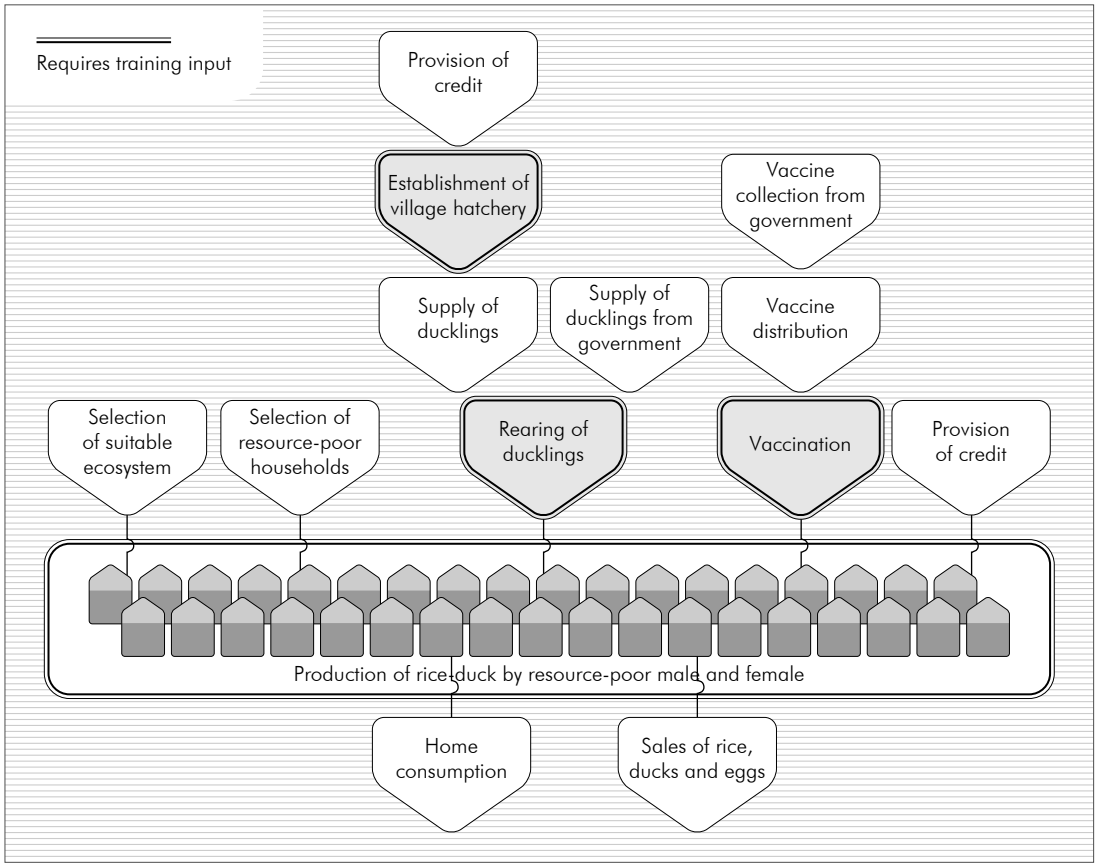
Important points are:

- The suitable ecosystems must be identified. For initial experimentation, BRRI with Friends In Village Development of Bangladesh (FIVDB) identified the *beel* areas and rainfed shallow flooded *aus-aman* system in Sylhet and the tidal non-saline areas of Barisal;
- There is an important selection process in identifying resource-poor men and women. For a pro-poor technology this step was essential for all four examples;
- For this system ducklings must be available on time and at the right age. FIVDB utilised its own hatchery for this and also its established village hatcheries (known as the Chinese hatchery system). This practice was then extended to Barisal through training local farmers by farmers from Sylhet. Without this resource, extending the technology is not possible;
- Micro finance may be necessary for male and female RPFs;
- Without links back to government vaccine supplies, high mortality of ducklings will occur; and
- At this point in time, marketing is not an issue but as the adoption of the technology expands it may become a limiting factor.

The activity web for rice-duck in Figure 1 in the next page illustrates the activities.

A lynch-pin activity is the link to government vaccine. It is a single source link. Without access to vaccine, duck mortality will be unacceptably high and

Figure 1. Activity web for rice-duck farming



adoption of the technology will not be sustainable. Apart from this, once the knowledge is available, there is an interchangeability of actors. In other words other NGOs could take up the promotion of rice-duck technology through careful consideration of all links. A duck marketing firm, in theory, could also observe these steps and produce a viable enterprise that has links from rice-duck establishment in the field through to marketing.

Private sector linkages

Herbicides are being rapidly adopted for irrigated rice in Comilla district. Labour shortages and high labour costs make herbicides an attractive alternative to manual weeding. This was a new practice for farmers. The critical issue was a cost effective means for information flow from the private company (in this example Syngenta) through dealers to farmers along with farmer awareness of the potential use of herbicides. A FFS method was used for education of farmers. The lead agency was an NGO that formed a partnership with Syngenta. Through the method there was a positive increase in knowledge of dealers and farmers and a resulting increase in usage. Concerns have been expressed over the cost of this method for improving information flow. Although Syngenta appreciated the approach, the cost of FFS was considered too high to be a method employed by a private firm.

Other innovative methods

From the technology development SPs two other extension methods showed promise. There was the method called 'going public' for seed technology and 'success case replication' for no pesticide application.

- Going public involves selecting a place where people gather for other purposes and then communicate ideas or

messages concerning a particular technology, in this case to seed health issues. An example of location is the *hat* or village market. Going public can be used for raising awareness of an issue by a large number of people in a short time. A comment by a farmer illustrates the learning, *'This system is very good, we can learn a lot without any fixed schedule'*. During testing, the use of the market place excluded women; and

- For the success case replication method, there were two main steps. Firstly locating farmers or groups, who have achieved success in their enterprise and secondly, mobilising the successful farmer or groups to train other villagers. This method was used in the livelihood improvement through ecology (SP 27 02) and was found useful for not only extending the IPM 'no pesticide learning of farmers' from the SP, but also for identifying other potential technologies for transfer.

Networks

In the above sections we have briefly looked at a range of extension methods that were developed by SPs. SPs can appear to be isolated entities and can miss overall linkages in the flow of knowledge. Networks at the level above farmers are also important in the extension process. Two innovations that were used under PETRRA have contributed to strengthening relationships between essential expertise and end users. These were the uptake forum at the national level and the focal area network that was piloted in two regions:

Uptake forum: The uptake forum was formed immediately after the commissioning of the technology uptake SPs in early 2000. PIs of the technology uptake SPs were members of the forum. Representatives (two) from the DAE also participate in the forum from time-to-time. Since the SPs were commissioned on a pilot basis and many dimensions of the uptake methods research lacked clarity amongst the partners, the forum presented an opportunity for learning from each other. Members came from a range of agencies:

- National level institution, BRRI concerned divisions, with a lead role for developing rice technology but limited links with farmers. There was a working relationship with the DAE;
- Regional or local NGO partners with limited technical knowledge, especially on rice, but good access to RPFs;
- National NGOs with access to the poor in their mainstream programme but with agriculture often not well integrated;
- Government academy (BARD) with long experience in working with communities but insufficient focus on agriculture and on male and female RPFs; and
- The DAE, the lead service provider for knowledge for farmers and redefining its role in a changing environment in which there are multiple actors providing extension services.

The forum helped each organisation understand both its strengths and limitations. It challenged partners to adjust their programmes to better target RPFs, to more actively include women, to structure their monitoring and evaluation, to clarify their extension method being tested and to consider how their research fed into the plans of their respective organisations. Key lessons coming from the forum:

- National institutes like BRRI are still the single most important source of knowledge in the field of rice;
- The NGOs are the main means of reaching RPFs through their good networks at the field level;

- The DAE, though having limitations, is a good source of expertise at local levels especially for field training and dissemination;
- Useful partnerships between and among these different groups are important; and
- Exposure to each others' area of expertise can open up opportunities for future cooperation.

The uptake forum linked to the focal area network that was being piloted in two regions.

Focal area forum: The focal area forum was also on the agenda. There are limitations with a centralised system of knowledge dissemination. The concept of focal area was introduced to enable a better regional focus on rice issues. It was piloted in the north-west and north-east regions. In its earlier definition, the focus was the regional needs of the PETRRA project itself. It was defined as:

> *A focal area is a region of activity in which the PETRRA project has research and uptake activities. It is the geographical area of influence of the respective regional stations of the BRRI. For example in the south-west of Bangladesh the BRRI regional station of Satkhira is expected to influence Khulna, Satkhira and Bagherhat districts. The*

boundaries are such that the PETRRA resources can at best be a catalyst for uptake and therefore the research findings are dependent on strong links to local networks and resources.

However, the concept of networks proved more significant than we first anticipated. It became an essential component of the overall PETRRA model.

In the approach that evolved, the PETRRA SPs were actors within the regional issues of rice knowledge. Regional actors revisited their own responsibilities within the context of the national perspective. They were able to understand their strengths and opportunities and at the same time limitations. The focal area forum looked for synergies that linked actors in the field of rice knowledge together – a decentralised approach or an approach from below to knowledge and technology dissemination.

Forum discussions suggested that there was scope to strengthen the spread of rice knowledge in the region:

- There are actors that can be proactive for strengthening the dissemination of available knowledge;
- There are players that can work intensively with male and female RPFs;
- Existing networks permit linkages with the research institutes, which are leaders nationally;
- These networks can strengthen the existing government committees; and
- There are many actors working in the field of rice but there is insufficient interaction. The focal area forum provides the chance to bring these actors together. The overall feeling is – rice, being a very important element of livelihoods of the people of Bangladesh, demands special treatment. Also, if a model can be demonstrated as successful for rice, key principles may then be extended to other enterprises.

Response to the focal area forum concept developed by PETRRA was encouraging. Basic elements of the framework were endorsed by the two pilot regional forums in the north-east and north-west. Most important issues that the forums identified were:

- Seed (network, quality, dissemination);
- Rice Knowledge (movement, identification, recommendation, updating);
- Voice (raising, facilitating, assisting in creating environment to listen to male and female RPFs; and
- Training or capacity building (as a cross cutting issue for all the above).

It was evident from the discussions that there is a need for strong leadership that cannot be taken by one agency. Traditional leaders are recognising their limitations and asking for partnership to complement each other. Out of the many players the forums could easily identify a group of actors to take the lead as a think-tank for the region. Main actors recognised as leaders are:

- BRRI as leader for knowledge together with its regional station and DAE;
- DAE as leader for training with support from BRRI and NGOs;
- BADC as leader for seed together with BRRI-GRSD and other NGO and private sector players; and
- NGOs (RDRS & FIVDB) as leaders for voice together with fellow partners.

The focal area forum became independent in the north-west and was functioning two years after PETRRA. However, in the north-east it did not continue as there was no strong leadership that took ownership. In the north-west the group experimented with a pilot scaling up activity that tested the

management of the group and gave experience for regional leadership for dissemination of rice technology. The experience of the focal area group feeds into the DAE managed technical committees and supports the NAEP through enabling a stronger local network of service providers.

Bangladesh Rice Knowledge Bank (BRKB)

For research and development projects, the availability of information in a format suitable for extension personnel and farmers once a project is completed, is a challenge. More often than not the information is hidden within reports that are limited editions only. To achieve this end the PETRRA project linked to a longer term commitment that IRRI has in Bangladesh: it was a commitment to the development of the BRKB.

The Rice Knowledge Bank (RKB) was initially developed by IRRI Los Banos, Philippines. It is a digital extension tool that provides extension service providers and farmers, a single and credible source of updated rice knowledge, training information and teaching aids. A key principle in its management is the principle of single source publishing. It can be accessed on the internet at (www.knowledgebank.irri.org) and for Bangladesh the site address is (www.knowledgebank-brri.org). It is available in CD-ROM version for persons who do not have access to the internet, and for persons who do not have computers, they can access the printed version. IRRI is committed to the RKB in the long-term. For this reason PETRRA supported the initial development of the BRKB. The institutional home is BRRI with backup support from IRRI. The BRKB is in Bangla and English. A content group was established under the leadership of Director-Research of BRRI.

It would appear that the BRKB fulfils a set of key recommendations on knowledge dissemination that came from the policy dialogue for 'Strengthening rice research and extension linkages in Bangladesh' that was held on April 20-21, 2002:

- Massive training efforts to upgrade and update knowledge of block supervisors (BSs) and thana-level extension workers;
- Putting together knowledge from multiple sources – a new rice production manual; and
- Diversify media for knowledge dissemination, using information communication technology (ICT) at appropriate level;

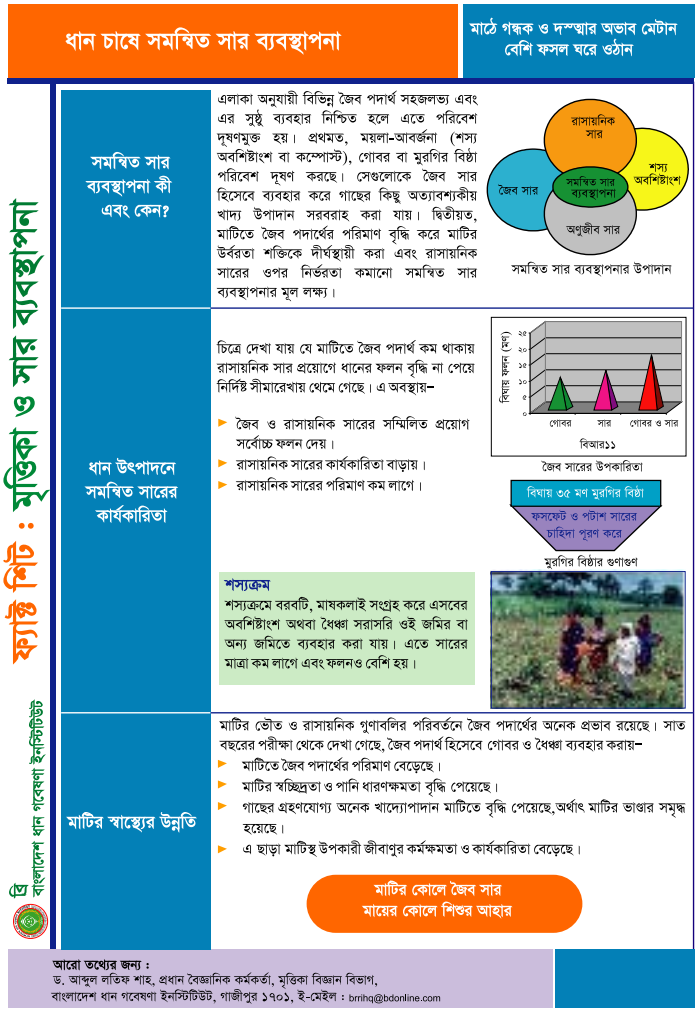
On this basis PETRRA made a commitment to:

- Support the early phase of the BRKB with a particular focus on ensuring all PETRRA developed transferable technologies were available in simple fact sheet form that were also accessible at the BRRI-BRKB web addres (www.knowledgebank-brri.org).

Audience-friendly materials were crucial. For the BRKB in its early stages the focus was i) trainers and extension workers; and ii) male and female farmers. The PETRRA team gave particular attention to training material for farmers. The types of training material developed were fact sheets and reference materials. It was developed in Bangla and English.

Fact sheets: A fact sheet is a one or two-page sheet with simple information about the technology. It answers the questions on 'what is the technology?' and 'how to practice it?'

Reference material: This contains detailed information on a research innovation issue; suitable for trainers, extension planners, professors, students in higher studies etc.



The BRKB was still in its very early stages at the end of the PETRRA project. A list of fact sheets is given in Table 5.

DAE and demand for services

As the principle service provider it is important to comment on the interaction with DAE through the PETRRA project. Formally the director general was a member of the project steering committee (PSC) and a Deputy Director was a member of the technical committee (TEC).

At the SP level the considerable demand on DAE services is reflected on Table 6. The engagement did not entail formal agreements. In most of the 42 SPs, which reflected research in more than 500 villages in more than 100 upazilas across 8 regions, DAE personnel were active trainers and participants in workshops, meetings and field days. In addition, the DAE was an active member in the focal area forum experiment in the north-west and north-east, hosted a research-extension dialogue, national discussion on PETRRA in its formative period, and participated in joint monitoring/dissemination exercises in at least four of the regions in which PETRRA SPs had research.

It may be concluded that PETRRA SPs created a demand for services and that the

Table 5. List of fact sheets on the transferable technologies of PETRRA SPs

1. Introducing BRRI dhan28	১. ব্রি ধান২৮ পরিচিতি
2. Introducing BRRI dhan35	২. ব্রি ধান৩৪ : আধুনিক সুগন্ধি ধানের আবাদ
3. Introducing BRRI dhan36	৩. ব্রি ধান৩৫ পরিচিতি
4. Modern aromatic rice (BRRI dhan34)	৪. ব্রি ধান৩৬ পরিচিতি
5. Modern aromatic rice (BRRI dhan37)	৫. ব্রি ধান৩৭ : আধুনিক সুগন্ধি ধানের আবাদ
6. BR-4828-54-4-1-4-9	৬. বিআর-৪৮২৮-৫৪-৪-১-৪-৯
7. BR-6110-10-1-2	৭. বিআর-৬১১০-১০-১-২
8. BRRI hybrid dhan1	৮. ব্রি হাইব্রিড ধান১ প্রবর্তন
9. *Parbatjira* dhan: A traditional fine rice variety	৯. পর্বতজিরা : দেশীয় উচ্চ ফলনশীল সরু জাতের ধান
10. Self-sustaining system of hybrid rice seed production	১০. বীজ বপনের পূর্বে বীজ পরিষ্কারকরণ
11. Rouging for pure seed production	১১. বিশুদ্ধ বীজ উৎপাদনের জন্য রোগিং বা বাছাইকরণ
12. Seed cleaning before sowing	১২. বীজ শুকানোর বিকল্প পদ্ধতি
13. Alternate method of seed drying	১৩. জমিতে ফসল প্রতিষ্ঠাকরণ
14. Safe preservation of seed	১৪. ড্রামসিডারের সাহায্যে সরাসরি অঙ্কুরীত বীজ বপন
15. Farmseed: An approach of good quality seed dissemination of poor farmers	১৫. প্রয়োজনমত ইউরিয়া প্রয়োগের জন্য লিফ কালার চার্ট (এলসিসি)
16. Introducing direct wet-seeding by drumseeder	১৬. অংশগ্রহণমূলক ব্যবস্থাপনা
17. USG technology for tidal submergence-prone area	১৭. জোয়ারভাটা পরিবেত নিম্নাঞ্চলের জন্য গুটি ইউরিয়া প্রযুক্তি
18. Introducing leaf colour chart (LCC)	১৮. মোবাইল পাম্পের স্থানীয় নেটওয়ার্ক প্রতিষ্ঠা
19. Participatory nutrient management	১৯. গুটি ইউরিয়ার স্থানীয় নেটওয়ার্ক প্রতিষ্ঠা
20. Local network for urea super granule (USG)	২০. খামার বীজ : গরীব কৃষকের নিকট বীজ বিস্তারের একটি পদ্ধতি
21. Improved water distribution system	২১. আত্মনির্ভরশীল পদ্ধতিতে হাইব্রিড ধানের বীজ উৎপাদন
22. Improved aromatic rice milling	
23. Improved processing of long grain aromatic rice	
24. Improved rice marketing system	
25. Foot operated mobile pump	
26. Local network for mobile pump	
27. Integrated rice-duck farming system	
28. Low-cost duck hatchery for RPFs	
29. Rice-potato-rice-pattern	
30. BRRI dhan33/39-mustard-BRRI dhan28 pattern	
31. Rice-mustard-rice cropping pattern for maximum profit	
32. Participatory variety selection	
33. Rice seed network: for making quality seed available	

DAE was responsive to this. This reaffirms the NAEP, which promotes decentralisation of extension services through pluralistic institutions.

Observed weaknesses in the extension methods research

Three points (this is by no means

Table 6. Percent participation of DAE in PETRRA SPs by category

Type of SP	No of SPs	Formal partnership	Assist in training	Participation in workshops/ meetings	Participate in field days
Uptake methods	17	11	88	94	94
Technology development	20	5	80	95	90
Policy dialogue (in which relevant)	5	0	85	100	100

exhaustive) are made on weaknesses or constraints to the research on extension methods and pathways:

Firstly, despite a large number of submissions (more than 150 for the second call), submissions focused on 'doing extension' rather than research on method. That lack of clarity is an experience that also resonated with the submissions for the partnership funds under ASIRP (personal communication).

Secondly, the 'commitment of organisations' to take on board the learning from the research was mixed. RDRS strongly built on the learning and adopted it within their own organisation. AAS extended the principles to its other work. There were methods developed from BARD, GKF and Proshika that have organisational implications but it was not apparent that the organisations were about to incorporate lessons learned into their mainstream programmes.

Thirdly, there was a lack of analysis of costing. How much will the FFS method for herbicide education cost a private company? What does the method of establishing a mobile pump extension network cost? What does the rice-duck extension method cost? Importantly in a pro-poor extension method, what is the cost of purposely including RPFs, and then from amongst these including women? In each of the methods developed there was an activity named 'forming RPF groups' or 'identifying resource-poor women'. This is a transaction cost of a pro-poor extension agenda (transaction costs are the 'costs of running the economic system'). The government has been discussing subsidies for agriculture. The extra cost of organising and mobilising access for male and female RPFs may be a cost that the government deems reasonable from a social equity perspective. However, that analysis is needed.

Encouraging strengths in the research process on uptake methods

Potential implementing organisations were involved in the development of the methods. If the management of these organisations concurs with the results, the scope for adoption of the method is high.

The practice of bringing partners together for regular discussions on methods allowed effective action and reflection. Through this process, poverty focus and inclusion of women were strengthened. Each partner gained access to additional expertise and thereby developed its own capacity.

The experiment with the focal area forum was particularly encouraging. There is the scope to expand into non-rice issues.

The partnerships with BRRI will continue for a number of the PETRRA project partners even after the project is over. This is expected because the links to the source of recommendations for technology was recognised during the project.

Summary and recommendations

The PETRRA project provided a rich and diverse experience in research on uptake methods and pathways. SP partners and their respective organisations have to respond, and where appropriate, mainstream the methods into their organisational set up for technology dissemination. The 'how to' will then be available to extension service providers.

Recommendations have emerged concerning:

- A national organisational model for technology identification, validation and networking (developed by BRRI);
- Institutional models for validating and up-scaling new varieties within organisations were developed for major NGOs and BARD;
- Uptake methods for knowledge

intensive technology, private sector links and women-led extension have shown early promise; and

- A focal area forum approach that supports decentralised decision making and supports the NAEP shows potential.

In addition there were approaches developed specifically from the technology development SPs:

- From the USG sub-project (SP 21 01), a marketing chain model has been developed; and
- From the rice seed health improvement SP (SP 00 99) a 'going public' approach was tested and found effective; and for the rice-duck SP an organisational model to understand essential requirements for such technology dissemination was developed.

Many of these experiences have been documented in the publication 'Innovations in rural extension : case studies from Bangladesh', Edited by Paul Van Mele, Ahmad Salahuddin and Noel P. Magor. 2005. CABI Publishing, UK.

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Focal area forum in the north-west Bangladesh: evolution, approach and practices

S. Samsuzzaman and Mohammad A. Mazid

REPRINT

Abstract

Bangladesh Rice Research Institute (BRRI), Department of Agricultural Extension (DAE), Bangladesh Agricultural Development Corporation (BADC), Bangladesh Agricultural Research Institute (BARI), Bangladesh Institute of Nuclear Agriculture (BINA), non-governmental organisations (NGOs) like Rangpur Dinajpur Rual Service (RDRS), Grameen Krishi Foundation (GKF) and private sector seed companies have been working together to develop improved rice technologies and delivery systems to encourage uptake of these technologies and thus ensure more sustainable livelihoods among poor farmers. To provide access of poor farmers to consistent information and technologies in the field of rice-based knowledge, training, inputs and voice of the poor, a focal area forum (FAF) was established in August 2002 with local representatives from the above institutions. The forum has so far identified three research findings e.g., seed uptake model, variety upscaling of BRRI dhan28 and BRRI dhan29, and leaf colour chart (LCC) (to determine N-dose and time of application) for large-scale extension in north-west Bangladesh. To increase contact of farmers with researchers/trainers, focal area forum has identified the farmer field school (FFS) of 15-20 member as the more efficient and cost-effective option. Two hundred farmer field schools have received consistent knowledge and skills on the above research findings through effective coordination of focal area forum in support of increased production and livelihoods for 3,793 poor farmers (target 4,000) of 18 upazillas in the north-west region of Bangladesh. BRRI regional station, Rangpur organised training of trainers (TOT) for field level officers of focal area forum member institutions and developed 60 core trainers, who in turn, trained 173 block supervisors (BSs) and 130 farmer promoters (FPs). Focal area forum was responsible for the innovation of an organisational extension model and provided a mechanism for continued access to centres of technical expertise and the joining together of organisations in the region for effective dissemination of rice-based knowledge. Focal area members have committed to continued support of the activities by sharing in meetings, venues, transport, logistics and other costs in order to sustain focal area forum. It was decided to address the challenges as to how to build upon the strength of member institutions rather than always demanding assistance from outside, and how to make the forum members responsive to farmers for quality services. Policy research indicates that top-level commitment is required from the potential partners to empower their local representatives. DAE can include the farmer field school sessions in the tour schedule of the BSs. NGOs can provide credit to farmer field school members following skills training, and research institutions can channel information and technologies through the focal area forum. The forum can assist the agricultural technical committee

DFID Department for International Development

IRRI International Rice Research Institute

Bangladesh Rice Research Institute

(ATC) to deal with issues on rice-based technologies and also provide feedback to research institutions.

Introduction

Even though improved technologies may be available from research institutes in Bangladesh; social, economic and dissemination barriers may inhibit their uptake. Resource-poor farmers (RPFs), as a result, often remain marginalised. In this context effective linkages between research and extension are a critical tool for poverty alleviation and food security.

Bangladesh has a New Agricultural Extension Policy (NAEP) that is designed to provide integrated and coordinated extension services to farmers, However, a major challenge is decentralisation of decision making and commitment to partnership and networking by the different stakeholders (government [GO], NGO and the private sector).

Integrated and coordinated extension services were found to be congruent with strategies of many development projects in Bangladesh such as PETRRA in the areas as follows:

- targeting resource-poor households;
- promotion of gender equity;
- a commitment to farmers' participation;
- support of decentralisation in decision making; and
- linking technology identification and development with dissemination.

Several stakeholders (GO, NGO and the private sector) in north-west Bangladesh, have come to the fore to collaborate with assistance from the PETRRA project. The common objective of this collaboration has been to develop improved rice technologies and delivery systems to encourage uptake of these technologies and thus ensure more sustainable livelihoods among poor farmers. PETRRA as a research project, commissioned research in Bangladesh between July 1999 to June 2004 aimed at substantially increasing domestic rice production and income of poor farmers by 2008 such that it could contribute towards a 50% reduction in rural and urban poverty by 2015.

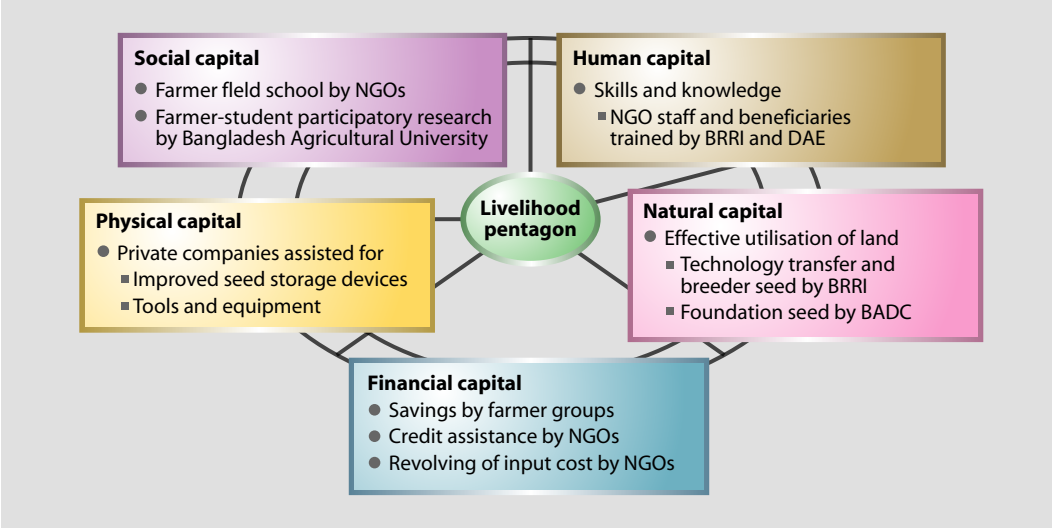
Partnership and link with other institutions

PETRRA/stakeholder collaboration has created an opportunity of building upon strength (rather than demand) of different stakeholders to enhance the farmers' capabilities, assets and activities (Figure 1). For example, BRRI and DAE jointly provided TOT and skill training on improved production technologies to beneficiaries and the staff of NGOs such as RDRS. Quality foundation seeds were mobilised from the BADC seed marketing division. Improved skills and technologies and quality seeds put forward have helped the resource-poor by expanding human capital and improving access to effective utilisation of natural resources (e.g., land).

NGOs such as RDRS with its long experience in micro-credit, were responsible for managing and recovering input costs from participating farmers. The consequent profits were then placed in a revolving fund that enabled the replication of activities. A most challenging area was building physical assets at the grass root level. That asset was essential in the delivery of seed to farmers. Here, a private company supplied improved organic seed cocoons (community-based storage device) to RDRS managed federations (apex of groups).

RDRS has organised poor farmers into group-based farmer field school in support of farmer-student participatory research and technology dissemination in

Figure 1. Partnership and livelihood asset building



collaboration with the Bangladesh Agricultural University (BAU).

Linking technology development and uptake

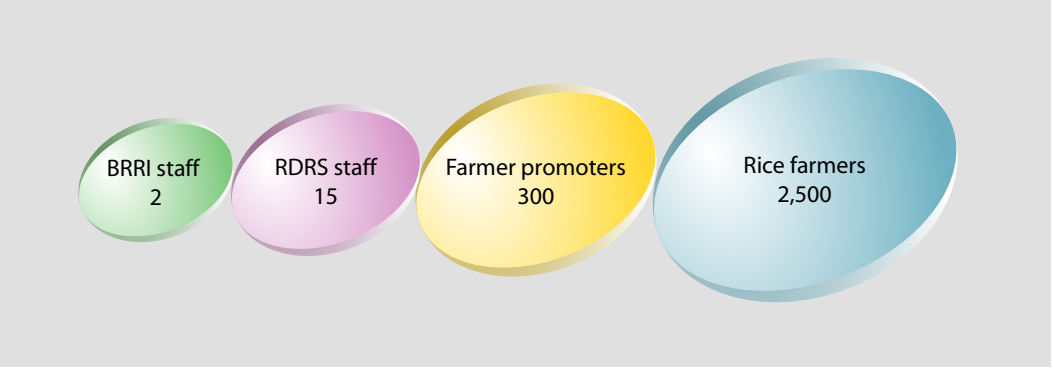
Many projects are donor driven and ignore the issue of continuation beyond project funding. Partnership requires building of ownership sense through shared responsibility, accountability and benefit. Farmer capacity can be built though recovery and revolving of resources (e.g., credit, savings, income etc.) but requires updating of skills and knowledge as and when required. The above collaboration has been able to tap expertise from BRRI to continue to provide TOT to staff of NGOs like RDRS, who in turn, provide skill training and follow-up to farmers, even after donor support is over, because of cost effective integrated resource management (Figure 2).

In order to institutionalise the process of technology development/identification and their uptake to a wider community of poor people in north-west Bangladesh, an effective network among GO, NGO and the private sector was envisaged by the collaborating institutions. The main intension is to provide poor farmers with access to consistent information and technologies.

Approach of focal area forum

A focal area forum was established in August 2002 with local reprsentatives (competent in decision making) from the

Figure 2. Integrated human resource development

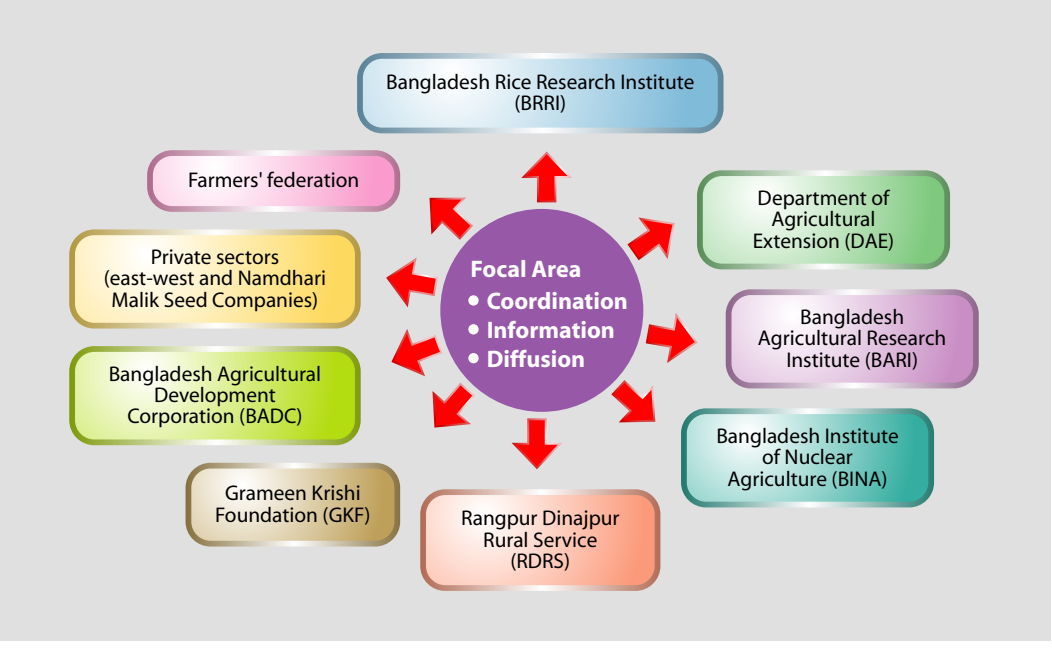


government institutions including DAE, BRRI, BARI, BADC, BINA and NGOs including RDRS and GKF, and from the private sector East-west and Namdhari Malik Seed Companies and farmers' federation etc. (Figure 3). This forum will rotate the chairperson periodically and oversee the planning and implementation of issue-based activities in the following fields for promoting proven technologies and information so far generated from research projects:

- Rice-based knowledge;
- Training;
- Inputs mainly seeds; and
- Voice of the poor.

The forum will promote good governance as an exercise of the power in managing the diffusion of consistent information and technologies. It will also provide the mechanisms to promote institutional accountability, transparency, and citizen participation.

Figure 3. Focal area forum, north-west Bangladesh



Logical framework of focal area forum

Goal:

The livelihoods of RPFs is improved.

Purpose:

Up-to-date rice-based knowledge is identified, discussed and disseminated in the region.

Outputs:

- Stocktaking of available rice-based knowledge and its sources organised, documented and assessed;
- Voice of the RPFs heard through ensuring their participation in discussion forums;
- Capacity building package (training, visit etc.) designed, planned and implemented for different stakeholders;
- Issue and theme-based discussion, workshops, seminars organised.
- Innovative tools/mechanisms for disseminating tested technology/ knowledge developed and used; and
- Recommendations on rice related technology for the north-west region made through identification, verification and validation process in focal area forum discussions and field testing.

Important principles

- The issues of the region need to be addressed, not the area in a geographic sense; and
- Target and respond to those issues, which are most relevant for the area.

Membership

- Looseness rather than strictness in criteria for membership is the strength of the focal area forum; and
- Some pro-active members are needed. However, many more less-active members can be accommodated and called upon when necessary.

Methodology: knowledge movement through different pathways

- Use existing networks;
- Create new linkages;
- Use directly engaged partners of research;
- Use networks developed by others;
- Use innovative methods (cross visit, experience sharing, meeting etc.); and
- Conduct and participate in peer review, participatory monitoring and evaluation, and impact studies.

Use of information generated through the process

- Provide feedback to the member institutions;
- Contribute to institutional and sustainability issues of research;
- Help consolidate the knowledge most appropriate for regions;
- Help organisations concerned to open up dimension as to how knowledge of one agency can be useful for the others;
- Regular feedback to the concerned agencies that can be used for policy advocacy and dialogues at national level forums; and
- The learning environment is expected to be used as the best possible means for the development of uptake pathways.

Practices of focal area forum

The focal area forum has collected the potential technologies/innovations that have come out of research projects such as PETRRA and marked the ones that PETRRA recommended as suitable for the north-west region as follows:

- Leaf colour chart (LCC) for calibration and timing of urea fertiliser;
- Variety up scaling of BRRI dhan28 and BRRI dhan29;
- Seed health improvement (clean seed, roughing and storage) at farmer's level;
- Integrated crop management (crop, water and nutrient interaction);
- Seed uptake though farmers' federation facilitated by RDRS;
- Integrated rice-duck farming;
- Fine quality rice production, processing and marketing;
- Application of urea super granule (USG);
- Judicious use of irrigation water through plastic pipe;
- Promotion of BRRI hybrid rice 1; and
- Dissemination of diversified farming systems from BARI.

Focal area forum screening technologies in a workshop

Focal area forum screening technologies in the workshop

Through a series of workshops resulting from the output of PETRRA assisted sub-projects, the forum has so far identified the following technologies for promotion in north-west Bangladesh through BRRI, RDRS and DAE in collaboration with other stakeholders:

- Seed uptake model through farmer's federation;
- Variety up-scaling of BRRI dhan28 BRRI dhan29; and
- LCC (to determine N-dose and time of application).

Programme implementation

The focal area forum has undertaken a programme for wider uptake of the rice technologies of seed uptake, variety up scaling and LCC among farmers (Figure 5). To increase the contact of farmers with researchers/trainers; focal area forum has recognised the farmer field school as the most efficient and cost-effective option.

Strategy and output

- Organised 15-20 interested rice farmers from among the groups of NGOs like RDRS and GKF;
- BRRI developed 60 core trainers (DAE-38, RDRS/GKF-18, BADC-2, BARI-1, private sector-1) through TOT;
- Farmer field school members selected FPs from among themselves to facilitate school sessions on a contract hire basis;
- Core trainers provided training on FFS and the technologies selected for extension to 173 BSs of DAE and 130 FPs;
- BSs and FPs conducted farmer field school sessions twice a month; and
- A total of 3,793 farmers (target 4,000) from 18 upazilas were brought under direct extension services (about 50% female) through 200 farmer field schools.

Major impact of the focal area forum

- Farmers have gained access to consistent information and improved technologies (e.g., LCC, seed uptake, variety up scaling of BRRI dhan28 and BRRI dhan29) through meeting with BSs and FPs twice a month at farmer field school.
- Farmer's federation procured 70 metric tonnes of truthfully labeled seed (TLS) of BRRI dhan28 and BRRI dhan29 produced by farmer field school members and preserved the same with an expected increase in coverage of 30% in subsequent *boro* season;
- Focal area forum members monitored the field activities periodically and took appropriate action through meetings;
- Commitment of focal area forum members to continue supporting the activities as follows:
  - Participating organisations to share meeting, venue and other costs by rotation;
  - The member secretary to support communication (postage, IT etc.) and stationery; and
  - Respective organisations to share transport while monitoring and visiting the field activities.

Figure 4. Development of focal area forum (FAF)

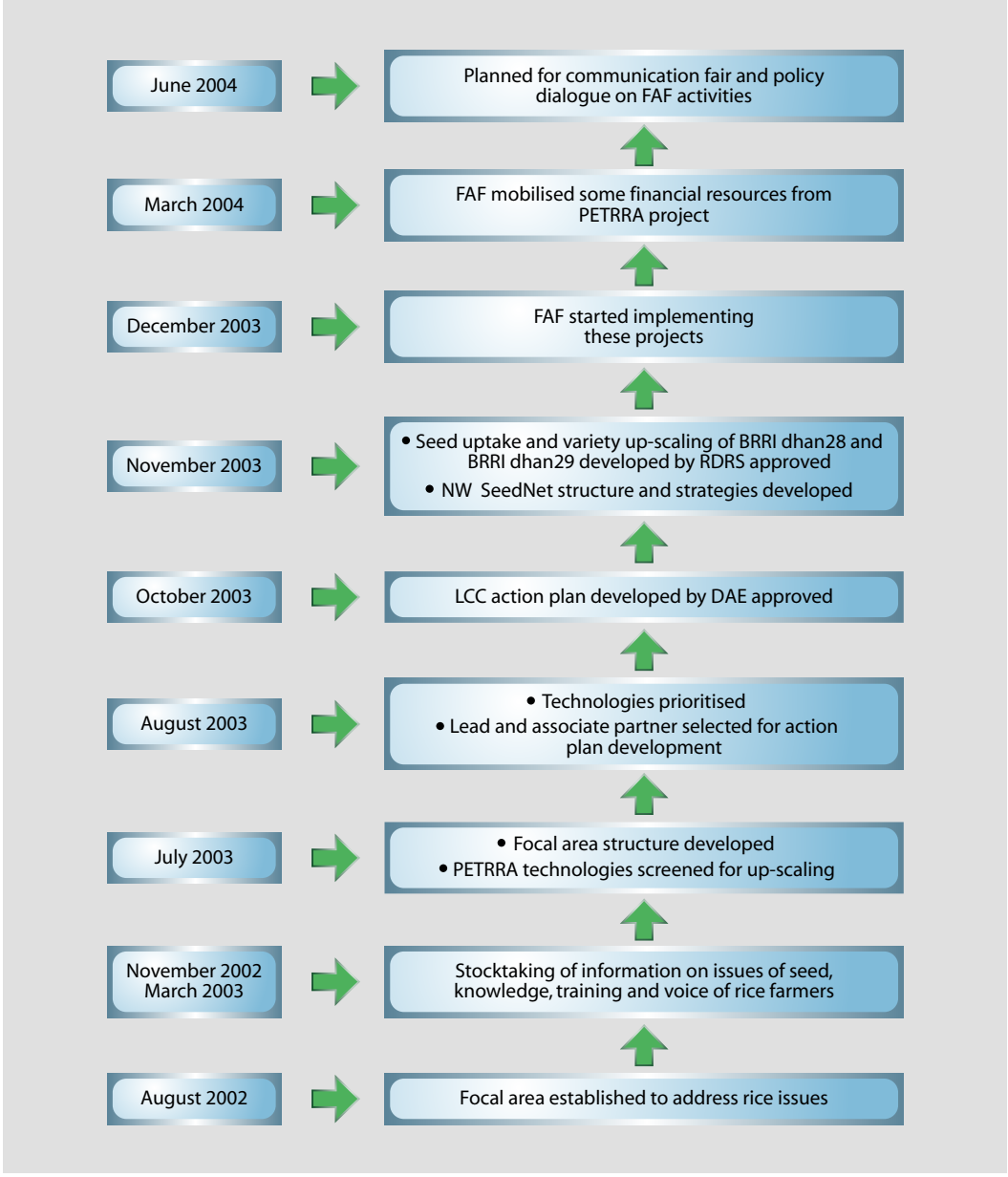
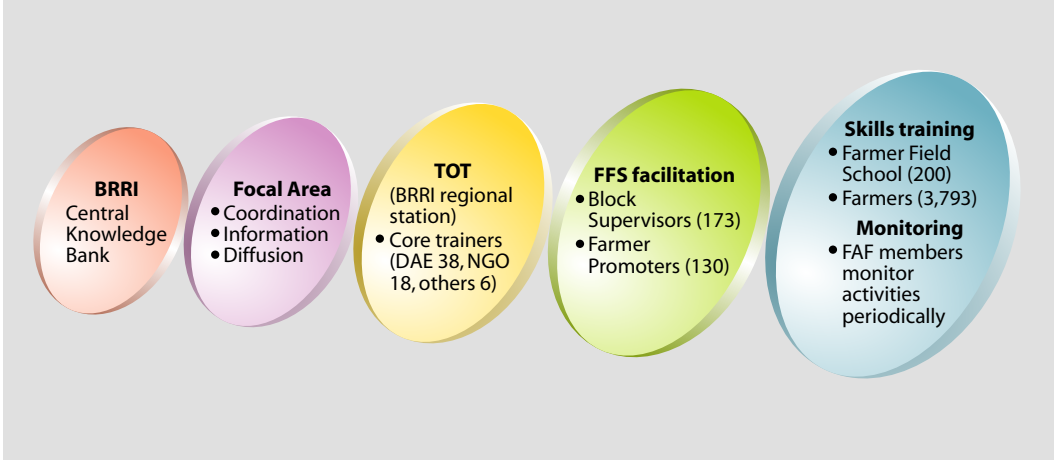


Figure 5. Uptake model of improved rice technology



Policy research

How to continue and replicate the model of the focal area forum?

The focal area forum needs to address the challenges of how to build upon the strengths of member institutions rather than always demanding assistance from outside and how to make the forum members responsive to farmers for quality services.

Where are the concerns?

As policies and processes vary widely from institution to institution, there is a consequent imbalance in the delivery of services to users. A change of policies itself becomes a challenge for the partners if they are to ensure effective responses to the diverse demands of the people.

Many changes have taken place in agricultural extension during the past few decades, culminating in the New Agricultural Extension Policy (NAEP) being designed with integrated extension services in mind. The synthesis of services, ranging from social development to economic promotion is affected due to inadequate partnership/networking and commitment from all stakeholders (GO, NGO and the private sector).

Policies	Institution	Culture
Government organisations like DAE work with all categories of farmers	GO/NGO/private sector regulate the access of people to diverse information	Rely on indigenous knowledge and experience
NGOs work with RPFs (landless, marginal and small)	Private sector mostly regulates the availability of inputs in the market	Believe in results by doing

Where the issue of livelihood is addressed in Bangladesh, the majority of cases are confined to the narrow spectrum of enhancing household income generation through micro-credit. Thus the concerns of reducing vulnerability/risks, of increasing access of poor people to consistent information and technologies, and the influence on process and policies of service providers is ignored. This is due to the 'tunnel vision' in addressing poverty instead of a broad-based livelihood approach. Similarly, poor farmers receiving training on improved technologies may not be productive without access to financial assistance. For example, the short duration varieties BRRI dhan28 (*boro* season), BRRI dhan33 and BRRI dhan39 (*aman* season) are successfully demonstrated and the farmers are trained in production technology, but rapid adoption of these by the farmers requires the availability of money and quality seeds.

Where are the synergies to address the above concerns?

For the extension services to provide individual attention to more that 10 million farm families is beyond the

Woman farmer promoter (FP) conducting FFS

resources available to Bangladesh. A group approach to extension, offers the opportunity for effective use of limited extension resources for problem identification and solution, sharing of information and the cost-effective choice of extension methodology. A group approach to extension also has the advantage of providing a forum for the participation of farmers, an area in which many non-government organisations have considerable expertise. DAE, research institutions and NGOs can exploit the following synergies in support of continuation of focal area forum activities.

Conclusion

The focal area forum innovated an effective extension model that commenced with testing and disseminating improved technologies and has since expanded to include the findings of research projects. Coupled with that has been the experimentation in uptake pathways of the focal area network. That may provide a mechanism for continued access to centres of technical expertise like BRRI, BARI and the joining together of organisations in the region of north-west Bangladesh for effective dissemination of knowledge on rice-based technologies.

The focal area forum needs to address the future challenges as to how to continue and replicate the developed extension model, and how to build upon the strength of partners.

Structure	System	Policy
GO/NGO can work together with resource-poor being the majority in Bangladesh	Block supervisors (BS) of DAE can attend FFS sessions as more than half of their village coverage	Top level commitment from the potential partners to empower their local representatives
FFS can be developed through groups of NGO	NGO can provide credit to FFS members following skills training	DAE can include the FFS sessions in the tour schedule of the BS
Consistent information and technologies to FFS through FAF		Research institutions can channel information and technologies through FAF
		FAF can assist agricultural technical committee (ATC) to deal with issues on rice-based technologies
		FAF can provide feedback to research institutions

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Overview of the book *Innovations in rural extension: case studies from Bangladesh*[1]

Paul V. Mele, A. Salahuddin and Noel P. Magor

Introduction

About half of the population in Bangladesh lives below the poverty line, mainly in rural areas and with a preponderance of women. From 1999 to 2004 the Poverty Elimination Through Rice Research Assistance (PETRRA) project focused on technology development, uptake and extension methods and policy. It was funded by the Department for International Development (DFID) and managed by the International Rice Research Institute (IRRI) in collaboration with the Bangladesh Rice Research Institute (BRRI). Based on the project's experiences, this book explores the development of innovative extension methods through 'a learning-by-doing process'. Topics addressed include seed production, marketing and distribution systems, crop and soil fertility management, post-harvest technologies, mobile pumps, aromatic rice and integrated rice-duck farming. The methods used include women-led group extension, whole family approach, educational videos, 'going public' and picture songs.

Conducting research and documenting the learning proved a major challenge. Partners initially focused on doing extension per se, rather than doing extension method research. They lacked experience in analysing, reflecting and documenting processes that underpinned their innovations. People had a strong tendency to only think about technology, not about the broader context and forces shaping it. To evaluate processes and uncover the human, institutional and organisational dimensions of each project, a narrative approach around key questions was used.

This book unveils the challenges and potential of working with male and female poor farmers, not merely as producers, but also as customers, sellers, marketing agents and agricultural extensionists.

The book covers four thematic areas: women in agricultural extension, learning from rural communities, enterprise webs and pro-poor seed systems. Finally all experiences are interpreted within a broader context of innovation system and transaction cost theories.

The bulk of the book merges quantitative impact assessment with more qualitative process analysis, and is written in a simple style to offer 'relaxed reading' for development workers, service providers and university students.

Women

Rice research and extension institutions have tended to exclude women not deliberately but more an omission of not seeing. The PETRRA project through its commitment to include women discovered that women want more agricultural advice. The idea that women benefit from learning about field crop agriculture has been under-explored. It is in the context of purposeful inclusion of women that these chapters have a broader implication

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than 'women and extension'. For Bangladesh the traditional approach for working with women in agriculture has been limited to post-harvest technologies or homestead activities. The project had a gender strategy. There was a specific call for extension research with women. The call encouraged women in management for the research through allocating bonus point for the concept note if the lead person was a woman. In the quarterly progress report there was a simple question, 'what work have you done with women in the last quarter?'

There were no early champions. The seed health improvement (SHIP) sub-project (SP) focused on seed and even though preserving seed is a women's activity, only one of the 28 field researchers was a woman. In a workshop at the end of year one, no women clients attended. Involving more women was a prerequisite for beginning to effectively work with them. Inclusion increased over the life of the project from 10% to 41%.

The case studies show how partners broke down cultural barriers through women-led extension for promoting seed drying tables and airtight containers for seed storage. Through colour photographs of seed drying tables, women spread this message to neighbouring villages. The family extension approach was extended from post-harvest to rice production as a whole. Research indicated that training both men and women together gave the best output. Even if women do not work in the fields, training in all aspects gave them a voice in household decision-making. One exciting innovation brought science to life through video development for women-to-women extension. The videos were made with households that had been experimenting with the technology for seed care. Village women had a say in the script and were the actors. Communication and adoption barriers were broken down. Another experiment built on a local organisation's expertise in picture songs or *jari gan*. Their theatre troupe that normally promoted health messages and social issues expanded its expertise to include agricultural messages.

The conclusion of the chapters on women is that women have a right to learn, that women want more agricultural advice, and that impact can be achieved by building on local organisational strengths and by developing culturally acceptable learning tools and methods.

Learning with rural communities

Learning helps to transform information into knowledge. Even if extensionists improve the poor's access to information, questions arise as to what extent farmers can apply this information. What does it help to learn about improved varieties if they are not available, or can be obtained only through great effort? Or to listen to a lecture or radio programme if the vocabulary is too academic? This section engages with rural communities and gets them involved. In the first case study, village women were the actors in short videos on improving seed quality on-farm. It proved more cost-effective than farmer-to-farmer extension. The next case study entitled 'village soil fertility maps' gives impressive evidence on how within a short time and with limited

financial resources, soil fertility management was improved in more than 200 villages by combining principles of soil fertility mapping, participatory research and farmer-to-farmer extension. The last two cases in this section built on old forms of reaching rural audiences, namely, going to local markets or other public places and using folk songs. They have been revived into new agricultural extension methods called 'going public' and picture songs, the latter bringing entertainment-education to rural women.

What was evident in each of these case studies was the enthusiasm that was generated among farmers and extension agents alike. To be sustainable, tools and methods have to be attractive to intermediaries and end-users alike.

The enterprise web

Many good technologies are not adopted by farmers. At times, this may not be due to inappropriateness of the technology, but an ignoring of factors that are social, organisational, economic or perceptual. This section with case studies of three innovations that are highly attractive to farmers builds on business principles for extension. The overview chapter introduces the enterprise web as a visual analytical tool that can be used by service providers to unpack the many discrete activities that are undertaken for the introduction and dissemination of an innovation. Drawing out visually each activity parallels the activity chain used in the analysis of competitive advantage in business. The three case studies contrast.

First, is the dissemination of the integrated rice-duck system. It is a low-cost, organic farming method for small entrepreneurs. Ducks at a specified age and for a specified time period are grown together with rice, with benefits to ducks and the rice. Access to ducklings and vaccines were two critical inputs that were lynchpin activities for the dissemination of the technology. These were the weakest links. An organisation must build surety around these activities. This case study makes the important observation that the extension strategy for a given technology is organisation dependent.

The second case study focuses on the manufacturing, marketing and use of the mobile pump for small-scale irrigation. In the tidal area of southern Bangladesh surface irrigation for vegetables and rice was highly appropriate. The non-governmental organisation (NGO) International Development Enterprises (IDE) with marketing expertise established a local manufacturing unit in a nearby town and three marketing outlets each with trained mechanics. Farmers were the beneficiaries of this market network. IDE activities included building an effective network and the promotion of the mobile pump. For sustainability of the technology, it was necessary that manufacturers, dealers, mechanics and farmers each made a profit.

The final case study introduces the value chain approach for production and marketing of aromatic rice. Once again, the visual use of the enterprise web helped identify interdependent activities, namely establishing a grower base, the rice millers and the national exporters group. The NGO APEX was strong at linking the Exporter Association, but not so strong in organising farmer groups.

Potential local partners were identified who could do the latter. In this regard, the use of transaction cost theory helped challenge the culture of an organisation going solo. Rather than APEX vertically integrating, it made more sense to contract out the establishment of grower groups.

The visual nature of the enterprise web helped service providers clarify essential activities. While using the exercise with service providers, we ensured that each enterprise web included an activity for identifying poor farmers. For this activity, NGOs that already have an established village-level network have a comparative advantage. In pro-poor extension, this organisational social capital is critical.

Pro-poor seed systems

Farmers repeatedly mentioned limited access to good seed as a key constraint. In response, PETRRA put strong focus on creating innovative mechanisms for effective delivery of good-quality seeds to the doorstep of male and female resource-poor farmers. The National Seed Act of 1997 that sought to promote diversification and decentralisation of seed production provided the legal framework for PETRRA to take up the challenge to stimulate innovations in seed systems.

The first two case studies are led by the Adaptive Research Division (ARD) and the Genetic Resources and Seed Production Divisions (GRSD) of BRRI describe a new approach to technology identification and the development of a rice seed network. For ARD, the innovation lay in taking into account poverty and women in evaluating multiple varieties. An enthusiastic NGO with strong links to farmers provided an entry point for the government agencies, both research and extension. Facing an increased demand for breeder seed, the seed network grew from three to 54 organisations over five years. The rice seed network provided a loose umbrella for diverse institutions, and allowed several seed supply models and partnerships to be applied.

This is illustrated through three NGO case studies. The Agricultural Advisory Society (AAS) in its FARMSEED model put farmers at the heart of the seed system and developed a strategic network of 64 NGOs and community-based organisations (CBOs). The Grameen Krishi Foundation (GKF) identified farmers who owned less than 0.5 hectare, processed the seed in a central processing facility but gave growers a priority to buy back and market their seed. There was a built-in price incentive system that ensured farmers, retailers and GKF a financially sustainable business. Finally, the Rangpur Dinajpur Rural Service (RDRS) built a seed system around its existing federations that comprised 30-40 groups at the union level with 256 federations across north-west Bangladesh. A seed committee at the federation level is responsible for quality control and marketing.

Each case study shows how the organisations built on their own strengths and drew in linkages to appropriate sources of government expertise. Overall, the case studies show a strong relationship between government and NGOs, with each bringing specific skills to the links.

People and pro-poor innovation systems

'Innovations in rural extension' book shows that extension is about working with multiple actors, each with their personal and institutional histories, norms, values and interests. It is about getting the technologies right, improving access to inputs, knowledge and markets within existing policies, and stimulating learning and experimentation.

Being pro-poor adds a further challenge. For poorer households, the transaction costs (which represent time and costs to access information, services, markets and technologies, negotiate contracts and so on) are relatively higher compared to better-off farming families. In addition, the strategies people use to cope with poverty are quite diverse. This adds to the need for plurality in extension and the recognition that extension pathways and methods employed must be purposeful in providing access for poorer households.

For greater equity in reaching women, community-based organisations with flexible employment approaches may assist in increasing women's access to extension services.

What is apparent in the case studies is the number of partnerships that brought together complementing skills. For example, for farmers to have good-quality seed of the most recently released varieties at their doorstep, there was a role for the Bangladesh Rice Research Institute and local small seed suppliers. For complex or knowledge-intensive technologies, mediators enabled local agents to deliver. A motivated local government was very effective in spreading a message beyond the borders of a village. Initiatives, such as regional actors coming together, added to the consistency of messages to farmers at a lower cost through the sharing of skills. For each technology, the most appropriate extension method had to be defined that also matched the capacity of the organisation and the client.

We found many local organisations doing exciting work. We hope that the efforts made to help them tell their story will enrich the extension landscape through sharing and celebrating their local creativity and methodological diversity.

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People and pro-poor innovation systems

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"Improving access to technologies and services for resource-poor farmers, men and women, is one thing; considering them as partners, not just as recipients or beneficiaries, yet another."

Extension, complexity and poverty

Innovations in rural extension shows that extension is about working with multiple actors, each with their personal and institutional histories, norms, values and interests. It is about getting the technologies right, improving access to inputs, knowledge and markets within existing policies, and stimulating learning and experimentation. These dimensions, and the level to which they are addressed in an integrated manner, determine the success of extension.

Adding a poverty aspect further complicates each of the above mentioned dimensions. The need for farmer participation becomes more stringent when developing and promoting pro-poor technologies and markets. But private businesses, scientists and governmental extension agents often have little or no experience in working with the poor, especially with women. Illiteracy rates are higher among poorer people, their personal networks are less elaborate and transaction costs (which represents time and costs to access information, services, markets and technologies, negotiate contracts, and so on) are relatively higher compared to better-off farming families. High transaction costs not only affect the poor in getting access to support, but also affect service delivery agents who want to target the poor while developing extension or business models. To add to the complexity of reaching the one billion rural poor in this world, one has to consider the diversity of poverty itself Berdegué, J. A. (2000). The diversity of strategies people use to cope with poverty adds to the need for plurality in extension.

Participatory technology development is an integral part of the innovation system and has been addressed as such in the various chapters. Reader-friendly overviews can be found in books by Ashby et al (2000) and Bentley and Baker (2002). The multi-faceted needs of poor farmers and the multiple demands on their precious time influences our choice of methods for situation analysis, communication and training. This calls not only for diversity in extension mechanisms, but equally for a flexible use of multiple communication and learning tools fine-tuned to the specific client group, and building on the strengths of the range of service providers available in the system. This innovation systems approach not only moves away from the idea of a one-size-fits-all technology, but also from an ideal blue-print extension method (Biggs, 2004).

This section synthesises lessons learnt from the Poverty Elimination Through Rice Research Assistance (PETRRA) project and ventures into some new areas. We will first describe the influence of policy on people driving the innovation system, followed by a discussion on the dynamic roles that multiple actors play in pro-poor extension and business development, and how actors

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Offering choice is a necessary step to improve farmers' decision-making.

interact in the 'theatre of agricultural innovation', to quote Röling and Jiggins (1998: 304). We further discuss the concept of transaction cost theory, illustrated with experiences from PETRRA. We then explore some of the promising innovations that emerged, followed by suggestions for future research.

From 1999 to 2004, PETRRA inspired partners to innovate not only with technologies, but also with farmer education, communication, organisational and institutional models in delivering pro-poor services and inputs. Innovations in Rural Extension offers us a rich menu for the reader to select their own dish. Ingredients can be replaced, spices added.

People matter

People are the drivers of change. This is true for policy-makers, donors, service providers and clients, and hence justifies having a closer look at the human dimensions, social contexts and organisational cultures of these actors. In what follows, we use the term service in its broadest sense, including advice, training, technologies and anything that brings benefits to the intended target group.

Extension policy and public sector

In Bangladesh, changes in policy created an enabling environment for innovations to emerge in seed systems (see Danielsen et al, 2005; Hussain, 2005; Bashur et al, 2005; Van Mele, 2005; Van Mele et al, 2005c and Samsuzzaman and Van Mele, 2005) and more broadly in the extension system. In what follows, we will give a brief overview of how large projects influenced policy at the Department of Agricultural Extension (DAE), followed by the various ways PETRRA interacted with DAE.

During the 1980s the World Bank funded DAE to implement the top-down training and visit (T&V) system of extension. The field extension agents or block supervisors visited mainly better-off farmers and hoped that technologies would spread spontaneously to other layers of the farming community. To trigger desired changes in the T&V model, in 1992 a first DAE reform initiative took place through the Agriculture Support Services Project (ASSP), funded by the World Bank, DFID and the Government of Bangladesh (GOB).

By 1996, the DAE had a New Agricultural Extension Policy (NAEP), which also embraced the livestock, fisheries and forestry departments (Hassanulah, 2002). DFID further strengthened this initiative through the Agricultural Services Innovation and Reform Project (ASIRP) from 1999 to 2003. Major outputs of this project were a mission statement and a strategic plan to help motivate change in the organisation.

"The DAE's mission is to provide efficient and effective needs based extension services to all categories of farmer, to enable them to optimise their use of resources, in order to promote sustainable agriculture and socio-economic development."

DAE, 1999

With its large bureaucracy and roughly 24,000 staff members, the largest resource of extension staff in the country, the

challenges to induce institutional change were enormous. Stakeholders within and beyond DAE felt that donors drove the agenda and pushed for the quick achievement of outputs in some areas, resulting in reduced internal ownership (Pasteur, 2002). In an interview with the *New Agriculturalist* in April 2000, Donal Brown, a former natural resources advisor for DFID in Bangladesh, confirmed this: "One could try and impose [changes] but, if one imposes, the long-term sustainability of these activities is just not going to happen."

PETRRA's modus operandi was guided by principles that stood in contrast to this charge of 'lack of ownership'. From its very inception it nurtured a 'learning by doing' environment. PETRRA developed ideas jointly with their partners through personal or group interactions, and helped them to reflect on their own comparative advantages, their strengths and experiences, as such cultivating local ownership. Many technologies and extension methods developed or fine-tuned under PETRRA became mainstreamed in their respective partner organisations.

PETRRA worked with multiple service providers at the field level, while maintaining good links with policy makers and DAE senior management. DAE block supervisors were invited to participate in field activities in most of its sub-projects (SPs). This shift from DAE contracting out others to deliver services, as was the case under ASSP and ASIRP, to non-governmental organisations (NGOs) asking DAE to partner, indicates a move towards better balanced partnerships and power, as was recommended by World Bank expert Gary Alex (2001). He also indicated that the mechanisms set up under the ASIRP project, although they supported decentralisation and improved extension support to farmers, failed to strengthen research-extension linkages. This shortcoming partly explains why in August 2004 the state minister for agriculture so strongly endorsed the newly established focal area forums that bring representatives of poor farmers, researchers, private sector and intermediaries together (see Box 1).

Donors and flexibility

Creating a learning system requires commitment, flexibility and fundamental changes in norms and values, not only within implementing organisations (Pretty and Chambers, 1994; Röling and Wagemakers, 1998), but equally within the donor community.

"For far too long, the heart of development practice has been characterised by an irony which saps the energies and motivations of even the most enthusiastic practitioner: those very institutions that are established to facilitate societal change at one moment, invariably become its next constraint."

Bawden, 1994: 258

A project-wise and planned approach with logical frameworks or logframes is often proposed as the most appropriate way to organise innovations and development (Leeuwis, 1995). This philosophy, however, presumes that people proceed based on rationally organised decision-making and learning, which goes at the expense of creativity and scope to respond to new learning and unpredictable change.

"Funding agencies of innovation and development activities usually wish to know in advance which goals have been set and how these goals will be realised… thereby the capacity to learn, in intervention processes can be severely hampered."

Leeuwis, 1995

"Institutional innovation itself needs to be recognised as an important and valid (if difficult) research subject and output."

Dorward et al, 2000

"Some of these [donor programme management systems] will require a long time scale and a

process approach, chipping away at problems, and being willing to be opportunistic and flexible."

Duncan et al, 2002

The new challenge for donors and implementing agencies alike is to develop mechanisms that allow one to capitalise on the diversity of perspectives, ideas and opportunities that arise when implementing a project. This points us to the principles of change management and organisational learning, which has been present in business literature for decades, but which has only been widely recognised more recently (Easterby-Smith and Araujo, 1999).

"The challenge for development agencies is whether they want to provide the incentives to encourage a learning and change culture and incorporate professional people with these skills into their staff and development projects."

Biggs and Smith, 2003

Organisational learning at the donor level also requires regular consultation with those implementing the projects and the clients to develop evidence-based policy, while at the same time, for gender for instance, gender-sensitive and gender-knowledgeable people in decision-making positions will be needed at both donor and project level.

"While there are some positive developments in donors' policies and practice, the key challenge to gender mainstreaming occurs at the implementation stage."

Macdonald, 2003

'Strength in diversity' has strong resonance in development circles (Chambers et al, 1989; Hall et al, 2003b; Biggs, 2004), and more recently in donor thinking about rural poverty alleviation (Berdegué and Escobar, 2001; Farrington et al, 2002a). Donors have a large responsibility in stimulating local innovations, but their support to mainly the largest NGOs with heavy management structures may push the development landscape in the other direction. Vertical integration has its limitations, especially for development organisations. Small, flexible and professional NGOs are often ignored despite their ability to quickly respond to emerging local needs and mobilise the poor, irrespective of their membership of microcredit programmes. To unlock the potential of more local actors, donors could support innovation systems research to identify champions, and to unravel their personal, historical and institutional contexts that shaped them.

Projects, service providers and potential champions

Innovations require more than creative capacity to invent new ideas; they require managerial skills and talent to transform good ideas into practice (Van der Ven et al, 1989 in Ayas, 1989). To this, we would like to add the need for motivation and a long-term vision.

"Unlike buying stocks, it is hard work to put ideas into practice. And no one can do everything."

Nalebuff and Ayres, 2003: 10

Ways to identify potential champions among project partners and to nurture their commitment deserve equal emphasis to the policies and regulations shaping institutional change. In their report for DFID on drivers of pro-poor change, Duncan et al (2002) say that reform can be stimulated in two ways: by promoting broader processes of social and economic change (such as education, in particular of women); and through identifying and supporting champions of change (including NGOs, community-based organisations, reform-minded elements of the political parties and of the civil service, the media, the private sector, professional associations, the research community and the Bangladeshi diaspora). The cases presented in the book by Van Mele et al (2005d) and analysed here highlight some of these

champions. We believe that committed people are the glue that make partnerships successful and drive institutional change. Understanding the historical context and personal characteristics of those people shaping innovation systems is crucial, yet often ignored.

Short-term projects like PETRRA may be criticised for not having changed the institutional context in which scientists work or for not having brought in enough international extension experts. But one could argue that values, once experienced, become part of people's personal history that will remain within the system. All four top management officials from BRRI interviewed and more than 80% of the people involved in PETRRA SPs actually improved their knowledge, attitude and practices with regard to value-based, demand-led research (Solaiman et al, 2004). As for bringing in experts, the way in which new ideas are introduced and their modus operandi are at least as important as their actual technical or methodological expertise. Creating local ownership and empowering project staff are key to the sustainability of induced change. Although these are popular contemporary advocacies, they can easily fall to pieces in one's hands.

"Project cycle planning and management could be improved a great deal if it was acknowledged that all parts of projects are carried out by people working in social contexts, with all the features of social relationships that are present in human interactions."

Biggs and Smith, 2003

Professional pride and personal satisfaction after having worked through a problem with farmers can become major motivational factors for researchers and extensionists alike. But often scientists and governmental extension agents lack the opportunities of getting heart-warming feedback from resource-poor farmers, policy-makers and donors alike. It is with this in mind that PETRRA created an enabling environment for government, non-government and private sectors to experiment and develop or test new technologies and methods with farmers, together. Nurturing a shared hope for change was a prerequisite for PETRRA and its partners to walk the extra mile.

"Hope, as an ontological need, demands an anchoring in practice. Hopelessness and despair are both the consequence and the cause of inaction or immobilism."

Freire, 2003: 9

A first experience is a lesson for life. Through effective partnerships that build on complementary skills and mutual benefits, the chance of having a rich first experience increases. Besides, professional pride and ownership is shared from the outset and boosts scaling-up, as witnessed by the video SP (Van Mele et al, 2005a) and several others (Solaiman et al, 2004). Innovation systems research, which addresses organisational culture, can help in bringing 'like-minded' organisations or individuals closer together and ensure a higher partnership performance. We believe that win-win situations could occur both more frequently and with better planning.

"A more systematic consideration of organisational culture issues within project planning and management is likely to improve the effectiveness of development interventions."

Biggs and Smith, 2003

Cultivating local ownership is important, no doubt, but professional pride can also close one's ears for criticism and stifle one's creativity. We also experienced that ownership can lead to protectionism. Occasionally, PETRRA had to intervene to overcome partners' apparent resistance in bringing their innovations into the public domain, as was the case when trying to scale up a new rice-duck farming system. Involving additional partners and shifting responsibilities offered solutions (Khan et al 2005).

Appropriate incentives and communication mechanisms are important for lifting motivation of staff who are involved in developing innovations to a higher level of organisational pride and ownership. Some SPs had inadequate communication between local, regional and national offices and lacked clarity about mandate and decision-making power at each level, as such undermining staff motivation.

While we recognise professional pride, personal satisfaction and heart-warming feedback as important incentives for people to engage in participatory research, there also exists the risk of them sticking to their newly acquired comfort zone. We believe that researchers and extensionists need to be stimulated more to continuously challenge their own work, get out of their professional comfort zone pro-actively, and change their culture of non-listening to farmers.

Reaching rural women: policy and reality

Resource-poor farmers, women in particular, are extremely motivated to receive training in all aspects of agriculture (Paris et al, 2005; Latifun Nessa and Van Mele, 2005; Rashid, 2005; and Van Mele et al, 2005a). A selection of quotes presented by Orr et al (2004a) from women and men who participated in PETRRA SPs illustrates the impact training has had on gender and livelihoods. *"When we used to fail to preserve good quality seeds, husbands used to quarrel with us." "When you are poor, you don't want to consult with your wife or family members." "We are not interested to sharecrop anymore, we want to work with our own agricultural land."* But also links to scientists and government extension agents improved: *"Before we were afraid of the Rural Development Academy, it is a well-protected area and big officers may not talk with us. Now we are proud to talk to scientists." "Now Block Supervisors come to us and even ask us for solutions."*

But women's involvement in training programmes is still largely determined by donor policies. Reviewing European Union (EU) and United Kingdom (UK) development co-operation, Khan (2003) mentions that gender remains a low priority despite policy commitments to the contrary. She suggests donors increase their collaboration with civil society organisations and open up their dialogue with multiple actors.

Gender studies are useful for analysis of separate household needs, responsibilities and roles, but it has also led to new knowledge being compartmentalised. Perceived wisdom often reinforces existing gender discrimination in access to information:

"More attention must be paid to traditional women's roles, such as post-harvest activities and livestock care, as well as to new off-farm livelihood activities."

Gill et al, 2004

This stands in sharp contrast to PETRRA's findings, which promote women to get training on all aspects of agriculture, including those areas where they do not necessarily do the work. Limiting women's training to their traditional roles excludes them from household decision-making about agriculture and inhibits empowerment.

"Women can be empowered by giving them equal access as men in training and extension programmes."

Hossain et al, 2004

Under PETRRA, resource-poor women, once trained, emerged as strong advocates. In some cases also female solidarity was a driving force for female farmer extension agents to establish new groups in new villages and promote low-cost agricultural technologies. Tools for identifying these champions among the rural poor as important actors in the innovation system, not just as beneficiaries, need further attention.

The transaction cost theory offers additional insights into forces that shape the innovation system, and into how access to technologies, services and markets can be improved for the poor.

TRANSACTION COSTS: BRINGING PEOPLE INTO ECONOMICS

In 1985, Williamson articulated the evolution of modern institutions as a key contributor to the theory of new institutional economics (NIE), which tries to apply economics in the real world where people and organisations engage in both transformation (production) and transaction (contracting and exchange) activities. As people are given a more central position, the theory borrows liberally from social science disciplines. More recently, it is finding its way into development and rural extension literature (Dorward et al, 2000; Morrison et al, 2000; Farrington et al, 2002a). The seeds of awareness and practice can be seen in the concept of institutional intermediation as used by the Bangladesh Rural Advancement Committee (BRAC) for developing a pro-poor poultry business model that reduced linkage weaknesses (Lovell, 1992). Similarly, in Magor (1996) the enterprise web adds understanding as to why some promising technologies failed to be extended. Political economy aspects of research and development, as addressed by Biggs (1978, 1992) and Biggs and Farrington (1990), also relate to new institutional economics.

Transaction costs in pro-poor service delivery

The concept of transaction cost theory is central to new institutional economics (Magor, 2005; Khan et al, 2005; Alam et al, 2005; and Hassanullah et al, 2005). Transaction cost theory was used as a pragmatic tool for analysing uptake pathway models for specific technologies. Below, we expand this line of thinking to a more generic level, namely to innovation systems and how transaction costs are affected when bringing in a pro-poor agenda.

It is important to note that transaction costs only mean anything in the social system in which they are analysed: the purpose of the system determines what is defined as a good transaction cost minimisation and what is not (Biggs, personal communication). For example, the highly socially differentiated agrarian sector of Bihar, India, used different modes of transactions in the labour, land and credit markets that were very transaction cost efficient. However, that was in a social system that maintained poverty and social exclusion over time (Biggs, 1978).

Establishing contacts and capacity

Service providers require contacts with multiple institutes and farmer groups, and they need time to source information or technologies and fine-tune them to the needs of their clients. In some cases they may also require training to upgrade their skills in order to perform. Basically, all these make up the transaction costs that by and large determine whether an actor will embark on providing a certain service to their clients or not; or whether a partnership or a network will be established to fulfil specific tasks. The PETRRA SPs described in this book illustrate the underlying principles.

To reduce transaction costs for pro-poor agricultural development, PETRRA facilitated the establishment of networks and partnerships between scientists, NGOs, and private sector entrepreneurs, from technology development and validation, all the way to promotion and developing communication materials. Establishing initial contacts between actors requires a facilitator and in the case

of pro-poor agricultural development initial public or private investment is needed. Experimentation with institutional and organisational innovations does not happen spontaneously, nor does it happen overnight. The majority of the twenty SPs on uptake and extension were led by NGOs; seven established partnerships with community-based organisations.

Once capacity is built, other incentives take over. NGOs and private entrepreneurs were trained by national and international experts, a major motivational factor at the early stages. But as the SPs gained more experience of working with poor farmers, NGOs started to realise how well-suited agriculture was for poverty alleviation and for integrating it with their other on-going programmes. After the Rangpur Dinajpur Rural Service (RDRS) embarked on seed production, other federations started producing polythene-lined jute bags as part of their income-generating activities (Samsuzzaman and Van Mele, 2005).

Sourcing and validating information

Sourcing and validating information may be a major constraint for service providers to embark on new areas. Bangladesh has thousands of NGOs, yet only a few have agricultural expertise. Lack of technical capacity and information being a global issue for NGOs (IIRR, 1999), what would motivate them to engage in agriculture, where could they get relevant agricultural advice and technologies, and at what cost?

Under PETRRA, NGOs established technical links with government research and extension, and learnt to commit financial resources for tapping into this expertise. Links were established through the uptake forum, focal area forums or specific partnerships.

The focal area forums provide a mechanism for a wide range of actors to get continuous access to sources of technical expertise and streamline their efforts in validating technologies for local suitability, feasibility and acceptability (see Box 1). This breakthrough not only helps to optimise use of human and financial resources between actors from the government, NGOs and private sector, it also allows for local innovations to enter the formal research, extension and education systems.

The Bangladesh Agricultural University (BAU) and the NGO RDRS signed a memorandum of understanding for students to conduct action research with poor farmers. The role of NGOs as intermediaries between formal educational institutions and the rural people remains an area of great potential for developing innovations (Wallace, 1994), and may help to institutionalise participatory approaches in higher education.

Establishing farmer groups

Working with the poor may initially increase costs. The case of the aromatic rice value chain (Hassanullah et al, 2005) raises the issue of cost-effectiveness in establishing producer groups for domestic and export markets. There is an extra cost involved in organising a larger number of poor farmers compared to working with a few well-off farmers, but in reality this approach has the potential to create a substantial volume of rural employment (Farrington et al, 2002a). Public fund allocation strategies need to take these implications for the labour market into account. Working with the poor also allows for economies of scale, especially when NGOs are involved to coordinate their members or those of local NGOs and community-based organisations (Van Mele, 2005; Van Mele et al, 2005c; Samsuzzaman and Van Mele, 2005).

But organisations that have the necessary skills and contacts, such as commercial businesses, researchers and governmental extension officers, often lack the knowledge or confidence to facilitate the

establishment of groups of poor farmers, despite them constituting the largest part of the farming community. So, one of the questions that arise is: Do I organise farmer groups myself or establish a strategic partnership with someone else who can facilitate this more efficiently than me? In communities where various groups already exist, building on these rather than establishing new ones limits transaction costs.

Vertical integration or strategic networks

For establishing contacts, building capacity, sourcing and validating information, and establishing farmer groups, an actor can opt to go solo or link up with others. The governmental research and extension institutes along with many NGOs are generally used to doing things solo; only since the reshuffle of public funds, the need has arisen to start thinking about strategic partnerships. Also, international companies operating in developing countries often lack the usual infrastructure and support system: market intelligence, manufacturing capabilities, or distribution channels. So, they have much to gain from tapping into local networks and local knowledge (WBCSD, 2004).

A strategic network is a way to lower transaction costs without having to vertically integrate (Jarillo, 1995). As the different partners remain independent, there is more flexibility, but also the need for building trust becomes more prevalent. Under PETRRA, especially the smaller NGOs chose to build strategic networks with local organisations. By having worked with over 150 local NGOs and community-based organisations in various projects, the Agricultural Advisory Society (AAS) has filtered out the 'opportunist feeders'. They now have a rich source of sincere organisational relationships on which they can build, as and when they see fit.

Strategic networks may be formed based on economic considerations, although organisational history and personal contacts often play an equally important role in selecting partners, as indicated by several case studies in this book. It is our experience that the success of a partnership between NGOs and community-based organisations, for instance, is determined by the size, history and organisational culture of the partners, along with the influence sphere of the individuals leading the partnership.

Partnerships are dynamic and context-specific: multiple scenarios are possible depending on the diversity and density of service providers, their intrinsic strengths, the type of service to be delivered, the intended client group, and so on.

Diversity of service providers

We use the term diversity to indicate both the number of different actors and their relative abundance or density in a given area. These dimensions affect choice and quality of service delivery, from the community level up to the national and international level.

Multiple actors: competing or complementing?

Who has what role to play in developing pro-poor technologies and establishing pro-poor markets? We will address how different actors may compete with or complement one another in the delivery of quality seed supply, complex technologies, and training and advice. These key 'commodities' will help to clarify the need for diversity in service providers.

Seed suppliers

According to Tripp and Pal (2001) plenty of private sector seed enterprises have emerged in developing countries, but there are few examples of those embarking on public crop varieties, such

as self-pollinated rice and wheat that are not hybrids. Also, NGO and private seed enterprises not only compete with public sector seed providers and farm-saved seed, but also between themselves (Almekinders and Louwaars, 1999). Despite this, a number of innovations in the rice seed system emerged under PETRRA. As the rice seed market in Bangladesh is far from saturated and poor farmers are eager to get access to quality seed, we anticipate that more competition will strengthen self-imposed quality control mechanisms (Danielsen et al, 2005; Husain, 2005; Bashur et al, 2005; Van Mele, 2005; Van Mele et al, 2005c; and Samsuzzaman and Van Mele, 2005).

Most of the private seed enterprises in India offer few economies of scale, but high economies of scope as they can expand into other seed crops (Tripp and Pal, 2001). This may be only partly true for Bangladesh. Some NGOs embarked on wheat, mustard, potato and onion seed production, after having learnt about rice seed production. But as the rice seed market is far from saturated in Bangladesh, economies of scale are still possible. Syngenta started producing rice seed in the late 1990s, and is gradually increasing their production while they gather experience and explore the market.

But the incentives are not merely economic. While for seed-producing agribusinesses it offers an option to diversify their income and strengthen their customer base, for poor farmer seed entrepreneurs it more often is an end to a means. Rice seed production offers a pathway out of poverty and a pathway into community respect. *"I no longer have to buy, but can actually sell seed,"* says Shamima Akhter during a village fair in Kishoreganj, *"My husband, mother-in-law and neighbours respect me much more now."*

In brief, governmental organisations, agribusinesses, NGOs and farmers each have a role to play in the production and supply of quality seed. While most actors reach their clientele through an existing distribution network, small-scale farmer seed entrepreneurs diversify the outlets for seed in the community exponentially. By 2004, the awareness of quality seed was still growing, leading to increased demands.

Public funds are especially required in the initial phase to build capacity among NGOs and small-scale, private seed entrepreneurs. But once capacity is built, one should be able to produce and trade seed on a full commercial basis, in the absence of market distorting policies.

Suppliers of complex technologies

Do the same principles in developing pro-poor seed businesses hold for the dissemination of a complex technology, a new farming system or a value chain for exporting aromatic rice? Often these innovations are non-existent at the time of intervention, resulting in a higher perceived potential to position oneself in these new markets. But these innovations are intrinsically complex; as more side conditions need to be fulfilled, initiatives by individuals or small-scale enterprises are less likely to take place.

To disseminate or establish complex technologies, also larger organisations or businesses need to make crucial decisions on opting for vertical integration or strategic partnerships, on addressing all required activities themselves or outsourcing some. Partners are selected based on their competitive strength, interest in participation and for a variety of motivational and personal reasons. Establishing contacts and trust between the various actors is part of the initial transaction costs. To help organisations in this decision-making process, Magor introduced the enterprise web as an analytical tool for strategic planning (Magor, 2005; Khan et al, 2005; Alam et al, 2005; and Hassanullah et al, 2005).

Irrespective of the level of market integration, public funds are likely to be required to help disseminate complex pro-poor technologies. Once networks and necessary conditions are fulfilled, the system should be self-sustaining.

Suppliers of training and advice

In a synthesis of a six-country study on extension, Farrington et al (2002b) recommended to create and support opportunities for the poor, not just as producers and labourers, but also as consumers. However, they fail to acknowledge the active role poor farmers can play in delivering services, advice and technologies, themselves. Pioneering large businesses already started to blend social and financial values under the umbrella of corporate social responsibility, and involve the poor in their markets, as customers and entrepreneurs (WBCSD, 2004). Training the poor is considered a necessary investment.

Cases presented in this book support the need to consider poor farmers as partners, not just as recipients or beneficiaries. Giving them the opportunity to play a role in delivering services themselves, as a means to social and economic empowerment, opens up a whole new debate on public fund allocation. Several interesting concepts and experiences have been presented recently (Katz, 2002; Rivera and Zijp, 2002; Scheuermeier, 2003). Rather than channelling money through service providers, for instance, public funds could be assigned to farmer groups who then decide how to best use it.

This book gives examples of male and female poor farmers, taking on the role of seed producers, sellers and marketing agents, but also of extension agents. Once trained, they quite easily established new groups of poor farmers in other villages and taught them about rice and seed production, as well as soil fertility management. RDRS federations started to use communicative female farmers as resource persons to train other groups, paying them Tk. 50 (US Dollars 0.90) per session.

Public funds allocation is needed in well-integrated areas for the delivery of services related to health, safety and the environment, whereas substantial support will remain crucial for agricultural extension related to subsistence crops and for those areas where access to information, advice and markets is weak (Farrington et al, 2002a and b).

Local government

One would be tempted to think that local governments are more aware of people's needs, constraints and opportunities, and should be better able to respond to these than the central government. Although they can play a significant role in community initiatives for agricultural development, local governments are not a necessary or sufficient condition (Tendler, 1997; Bentley and Boa, 2004). So far, in Bangladesh social development organisations have been much more pro-active in involving local government than actors working in the field of agriculture have been. Shifts may gradually occur with some NGOs (re)discovering the importance of agriculture in rural development.

Although clear benefits could be reaped, most PETRRA partners did not establish links with the local government or Union Parishad. For the rice-duck and mobile pump SPs, both complex enterprises with clear impacts on the wider community, local government support was a prerequisite. Also, the Rural Development Academy (RDA) in Bogra built strong links with the Union Parishad, whose chairman was well known to the deputy director of agriculture at RDA. The latter involved the local government in organising various awareness and scaling-

up activities under the Seed Health Improvement SP. Good human relationships are the corner stone for a successful collaboration.

Learning networks and forums

Arising from the need to provide farmers with consistent information, PETRRA SPs started to interact more at the regional level among themselves and with other projects, NGOs, farmer representatives, governmental organisations and commercial businesses with an interest in rice.

Two focal area forums, namely in the North-east and the north-west, emerged as multiple actor platforms for: i) channelling the voice of male and female poor farmers; ii) establishing a network that facilitates quality control and dissemination of quality seed in the region; iii) screening, validating and transforming information into consistent advice, as well as for; and iv) pooling resources in training farmers (Samsuzzaman and Mazid, 2004). The focal area forums are a practical example of decentralised decision-making in agricultural research and extension.

Currently, two farmers are members of the north-west focal area forum, along with representatives of governmental institutes (BRRI, BARI, BINA and BADC), NGOs (RDRS and GKF), the government extensions service (DAE) and private companies. Mrs. Bulbuli Rani, vice chair of one of the RDRS federations, was elected as a farmer representative. Over the years, she has established contacts with multiple organisations and interacted in action research with scientists and university students. She now critically assesses new technologies in her own field, helps to coordinate seed production at the community level and has set up a small tailor workshop at her house, where she teaches young ladies from the neighbourhood.

RDRS, stimulated by PETRRA, started the initiative for a focal area forum in August 2002. Although they asked the DAE numerous times to sign a memorandum of understanding to become a formal member of the north-west focal area forum, their initial reaction was one of reservation and hesitation.

Several events brought the various actors closer together, but it wasn't until the state minister for agriculture provided his support during a policy dialogue in 2004 that the director-general of DAE came on board (Box 1). Immediately after, the DAE Block Supervisors were asked to collect the meeting times of all RDRS federations, and received instructions to meet the farmer groups at times that these already gather for other activities. As such, DAE saves considerable time by not having to organise group meetings, and farmers save time by having to interrupt their schedule only once a week.

"I could not believe that the minister would accept the idea so strongly; he was brilliant," said Dr. Syed Samsuzzaman, one of the focal area forum initiators from RDRS, immediately after the policy dialogue.

"Honouring an agreement is a strong motivator to behave in the collective interest."

Kerr and Kaufman-Gilliland, 1994 in Röling, 1996

Clearly the new agricultural extension policy enabled an initiative like the focal area forum to emerge and crystallise, but until this event, the country lacked good examples of how partnerships and decentralisation in research and extension could take shape on the ground. The focal area forums became a reality, and the endorsement by the minister a historic event, probably as significant as the establishment of the new agricultural extension policy itself. Mechanisms of cost-sharing were discussed from the early onset and ensured that this platform got a life-span that transcended the PETRRA project.

Box 1.
Minister endorses focal area forums

3 August, 2004 was a great day for all north-west focal area forum members as the state minister for agriculture and other distinguished guests participated in a policy dialogue with them and other agricultural players in the region. The top decision-makers not only expressed their appreciation of the concept, activities and progress made, the minister also instructed all to immediately take necessary action to formalise the forum and replicate it.

"Congratulations to the organisers who have invited me to such an enthusiastic meeting. I had been thinking over this issue for a long time. My experience with farmers was that there is a gap between scientists and farmers; I failed to see hope. But today I see some light and hope for the first time that it can work. The focal area forum concept has come to us as a big opportunity and the director general DAE should go for signing a memorandum of understanding involving all relevant DAE offices. We should try to replicate it all over Bangladesh."

Mirza Fakhrul Islam Alamgir, state minister for agriculture

"Advice of the minister is very vital to sign a memorandum of understanding with relevant partners in the focal area forum. We will start the revolution. We start with rice but will expand to various other crops. PETRRA has made a revolutionary contribution to all this. … focal area forum activities are like a one-stop service. … We have reduced the gap between the different actors."

Tariq Hassan, director general, DAE

"We talked about research linkage and its importance. The focal area forum showed the pathways as to how it can be done. … Coordination, capital and credit can play a very important role. … The focal area forum is a model that can be replicated all over Bangladesh if encouraged and supported by the government."

A. R. Gomosta, Director-Research, BRRI

"We started with rice because it is very important and it still needs continued development. The focal area concept very much matches with the new agricultural extension policy. Within the focal area forum we are not only governmental organisations and NGOs, but also private sector. We are supporting farmer groups organised by RDRS. We are doing it in addition to, but not hampering our regular programme, rather strengthening it."

Elias Hossain, Additional Director, DAE, Rangpur

(Salahuddin, 2004)

Extension services can tap into multiple resources of actors, methods and tools. Under PETRRA a vast range of methods and tools were developed, tested and validated in order to make the learning environment more accommodating for the poor, women in particular. Each of the examples, or elements out of them, can be used by any service provider depending on the situational context, as such adding further to the desired diversity in extension and pro-poor business development.

Multiple extension and learning methods

Which extension method is the best and which one do we promote, is a question often asked. But does it make sense to promote a single method? By proceeding under the perspective of the 'pipeline' model of linear transfer of methods (in analogy to the concept of linear transfer of technologies), many opportunities to reduce poverty in a cost-effective way are missed (Biggs, 2004). The scope for local actors to innovate with extension methods and institutional models is reduced from the very beginning. Clearly new thinking is required as to how to reach more people more quickly (IIRR, 2000). Promoting diversity and cross-fertilisation between various extension, farmer education and organisational development methods point the way ahead (Hagmann et al, 1998; Braun et al, 2000; Van Mele and Braun, 2005; this volume). A lesson for donors and decision-makers, therefore, is to avoid endorsing extension monocultures.

Techniques from anthropology and other social sciences allow us to prioritise problems of communities (or groups within), learn about areas where new knowledge is likely to result in innovations, as well as what opportunities exist to build learning methods into existing organisational structures. There is no single extension method that reaches all farmers, neither is there a service delivery system that works under all conditions.

In what follows, we will first discuss how transaction costs influence poor farmers' access to information and education. We then consider farmer field schools as one of the main innovations in farmer education, followed by a range of other methods and tools tested under PETRRA, and which we believe have great potential to complement farmer field schools.

Transaction costs in receiving extension services

Under PETRRA, a number of transaction cost reducing innovations emerged in terms of capacity building and awareness raising. Demonstration plots were no longer in the fields of better-off farmers, but in poor farmers' fields. Women received training in their courtyard or in buildings of community institutions, rather than having residential training sessions (Paris et al, 2005; Latifun Nessa and Van Mele, 2005; Rashid, 2005; and Van Mele et al, 2005a). Through partnerships with community-based organisations poor farmers, male and female, easily engaged as group coordinators and in some cases as extension agents in their own and neighbouring villages.

For access to technologies such as seed, transaction costs for the clients is lowest when the retailers are actually farmers within their own community. To remain workable, these systems rely on regular supply of foundation seed, resolved by the rice seed network, NGOs and strategic networks with community-based organisations (Danielsen et al, 2005; Husain, 2005; Bashur et al, 2005; Van Mele, 2005; Van Mele et al, 2005c; and Samsuzzaman and Van Mele, 2005). The potential benefits of decentralising a system lie in the strengths of its local institutions.

Bringing multiple services together through carefully identified local champions significantly reduces transaction costs for the poor. This concept builds on the one-stop shop. The idea is definitely not to go for one model, one method or one service provider, but to offer multiple services in the same person, locality or facility. To give some examples, the NGO AAS trained resource-poor farmers to become seed producers, so people in the community know where to get good quality seed. But AAS also trained the same people as village soil fertility management experts, as such bringing multiple services together in the same persons (Saleque et al, 2005). Going public, to interact with people where they already gather such as in market places, or linking agricultural extension to traditional entertainment brings multiple services together in the same locality (Nash and Van Mele, 2005; Bentley et al, 2005). The NGO Shushilan, on the other hand, uses their facility as a

Women attend an agricultural fair organised at a neighbouring village in Kishoreganj.

one-stop shop. They sell quality seed, trustworthy fertilisers, vaccines for livestock among other inputs, while farmers can also bring in samples of soil, water or diseased plants and consult the small library and field workers at their agricultural service centre. When we asked the librarian, Suriya Sultana, how she would like to see her small rural library evolve, she mentioned that pictorial children's books would be a good addition, as women tend to bring their children when visiting the library.

Under PETRRA, many of the NGOs moved towards inclusion of agricultural programmes. RDRS organised weekly training sessions on rice-potato-rice cropping for groups of women in the village. But these were generally held the day after they had gathered for their credit programme. As women already meet on a weekly basis, this opportunity could be grasped to identify their interests and needs, and give them access to other services, be it public health, information or markets.

Apart from reducing transaction costs by improving access to information and technologies, service providers need to assess the critical amounts of information that farmers need in order to trigger local innovation. By capturing this critical amount in farmer education programmes, impact can be realised more efficiently and at lower cost.

Learning from farmer field schools

The idea to replace recommendations with education based on experiential learning has brought about a major paradigm shift in extension (Kenmore et al, 1987; Röling and Pretty, 1997; Röling and Wagemakers, 1998), with farmer field schools being one of the best documented examples (see Box 2).

In rice-based cropping systems, the immediate benefits of field schools continue to be closely linked to the use of inputs, especially insecticides. According to Bartlett (2004), farmer field schools are not designed for rural families with no access to land, and there are fewer immediate benefits for poor farmers who have not been using high levels of purchased inputs. Also, women from poor households often sell their labour and find it difficult to participate in regular training sessions, whereas the better the economic position in society, the stricter the form of *purdah* or seclusion that women in Bangladesh practice (Banu and Bode, 2002). They may avoid contact with men with whom they have no direct kinship relation or simply avoid public places altogether. What scope is there to strengthen cultural and social sensitivity of extension methods?

We believe that the shift to learner-centred approaches in extension is one of the better evolutions over the last two decades, but at the same time we want to pose a challenge: that farmer field schools and other learner-centred approaches should be promoted as part of a broader framework of farmer and community development, complemented by other

The farmer field school uses experiential learning to improve farmers' agroecological knowledge, as well as their experimentation and decision-making skills (van de Fliert, 1993; Gallagher, 2003; Winarto, 2004). A field school usually comprises season-long regular group meetings with a set pattern of activities. This includes agroecosystem analysis whereby farmers visit their field on a regular basis, observe the crop, its pests, natural enemies and environment, after which they return and draw what they just observed on a large poster paper. The whole exercise involves measurement, analysis, peer review and experimentation. But a field school also involves presentations and special topics along with group building activities. farmer field schools, which were initially developed to tackle the brown plant hopper problem in rice in the late 1980s, are now promoted in various agricultural, fisheries, livestock and forestry programmes. For examples see *LEISA* magazine, March 2003 at www.leisa.info.

Box 2.
Farmer field schools at a glance

methods, and based on local institutional strengths. Rice farmer field schools have been developed longest, yet we still lack evidence of them experimenting with or being complemented by small or mass media to reach those millions of farmers that haven't been lucky to be part of a field school. How to reach more farmers with quality education remains an issue (Heong et al, 1998). Bangladesh has roughly 12 million farm families of which 9.4 million are small farm holdings with less than one hectare (BBS, 2004). By 2001 and under various projects, the DAE established 6,200 farmer field schools across Bangladesh; roughly 157,000 farmers received direct training in integrated pest management (IPM) in rice (see www.communityipm.org). Even if all rice farmer field school efforts undertaken over the past 15 years across the world were to have been concentrated in Bangladesh, still only two million farmers would have been reached. Even if one takes an optimistic view of how farmers might use their field school education to offer this to other farmers, and to develop community-based organisations that undertake progressively more ambitious self-directed development, the impact would not meet the need. Are farmer field schools designed for and suited to become a mass education approach? If not, how might we redefine their role?

Even if one takes an optimistic view of how farmers might use their field school education to offer this to other farmers, and to develop community-based organisations that undertake progressively more ambitious self-directed development, the impact would not meet the need. Are farmer field schools designed for and suited to become a mass education approach? If not, how might we redefine their role?

Barzman and Desilles (2002) pointed to an excessive preoccupation of their farmer field school programme to train a certain number of farmers annually, under pressure of donors, and at the expense of quality of the learning process. This was confirmed later by a report for CARE Bangladesh by Andrew Bartlett (2004) who mentioned that in the scaling-up, project staff became stuck in delivery mode. In an early review of farmer field schools in Asia, van de Fliert (1993) mentioned that training quality and intensity deteriorated as the programme scaled up. So how can quality be maintained in farmer education methods when going to scale?

We consider the key objective and strength of farmer field schools to lie in its focus on learning, not on reaching large numbers. Understanding ecological relationships, and changing learning and experimental behaviour can be achieved through participatory learning approaches, such as farmer field schools, which offer great opportunities to develop, validate and select the most relevant learning exercises that trigger experimentation and innovation. But additional value could be obtained, once these methods, exercises and materials are developed, if they were incorporated into other learner-centred methods such as video, entertainment-education, or mass media (Bentley and Van Mele, 2005; Van Mele et al, 2005b; Saleque et al, 2005; Nash and Van Mele, 2005; and Bentley et al, 2005), used by champions positioned in organisations outside the field school.

Other methods: going to scale

An overarching factor stimulating creativity was the competitive tender mechanism that PETRRA used in approving SPs. As none of the extension methods were imposed, but built on the organisations' strengths and philosophies, most innovations became mainstreamed in the respective organisations that researched them. Ownership was

cultivated through a learning by doing culture and a flexible management system.

By adding a certain element of competition and stimulating cross-fertilisation between methods, PETRRA speeded up the innovation processes. During regular uptake forum meetings, each partner had to present their methods to other SPs, DAE staff and other non-participating NGOs. A knowledge, attitude and practice study revealed that out of 27 SPs covered by the study, findings of 21 were used by a wide range of governmental and NGOs (Solaiman et al, 2004). Folk songs, for instance, were readily taken up by other organisations, indicating that extension methods should not only be appropriate and attractive to the client group, but equally to those implementing it.

External reviewers asked us to make comparisons between methods, but this would mean taking methods out of their context: any method may have a high or a low impact, be cost-effective or not, depending on those implementing the method, the learning content, and the characteristics of the clients and communities. Nevertheless, we have tried to extract some generic characteristics in terms of investment requirement and anticipated outputs (see Table 1). A service provider who wants to try out any of these methods could use this as a decision-making tool.

Women-led extension approach

A recent Food and Agriculture Organisation (FAO) survey showed that female farmers receive only five percent of all agricultural extension services worldwide and that only 15% of the world's extension agents are women (FAO, 2004). Women farmers in Nigeria were more satisfied with the quality of the services delivered by female than by male extension agents (Lahai et al, 2000). That more women should be recruited by service providers is well known, but often social, cultural or institutional barriers have hampered this. Under PETRRA, trained village women who displayed a high level of solidarity and commitment became extension agents; they organised events in their neighbouring villages once a month (Latifun Nessa and Van Mele, 2005).

Working through community-based organisations and having flexible employment formulas for village women extension agents may help to reduce the gender imbalance in extension services and increase women's access to extension.

Family approach in training

This approach showed that training husbands and wives together (with or without children) improved intra-household decision-making and community respect (Rashid, 2005). The family approach helps to reduce social

Table 1. Qualitative assessment of extension methods

Method	Input			Output	
	Facilitation skills	Money	Time to organise	Human capital	Social capital
Farmer field schools	High	High	High	High	High
Farmer-to-farmer extension	Medium	Medium	High	Medium	Medium
Video-supported learning	Low	Medium	Medium	High	Low[1]
Going public	Medium	Low	Low	Medium	Low
Entertainment-education[2]	Low	Medium	Medium	Medium	Medium

[1]*Will be high if objective of video is social mobilisation.* [2]*Can be live shows or programmes on radio or TV.*

and cultural barriers; it enables women to get access to services delivered by outsiders more easily. The method has been pioneered in Bangladesh by International Maize and Wheat Improvement Centre (CIMMYT) for wheat post-harvest (Meisner et al, 2003), and has been expanded under PETRRA by giving women access to information about all agricultural topics.

Farmer-to-farmer extension

Farmer-to-farmer extension can be very powerful, especially when linked to experiential learning and participatory rural appraisal (PRA) techniques, such as village soil fertility maps (Saleque et al, 2005). Building a vast network of local NGOs and community-based organisations may lead to a more efficient use of social capital, and allow a more coordinated approach in training farmer extension agents.

Video-supported learning

Unexpectedly, comparative analysis revealed that women learnt more things from meticulously designed videos on post-harvest technologies, including insect and disease management, than from farmer-to-farmer extension (Van Mele et al, 2005b). The videos resulted in higher levels of experimentation and adoption of new technologies.

Over the last couple of decades we have seen many changes in the use and role of media for communication in development (Norrish, 1998). The potential of using video within the framework of an interactive dialogue, and still having a video product at the end is an enormous advantage when it comes to scaling-up. Especially for quality maintenance of methods like farmer field schools, videos can add tremendous value, as the messages can be carefully engineered and remain the same. The instant playback feature of video enables continuous participation and immediate feedback. Besides, images have a high credibility and can easily motivate people (Dagron, 2001).

Apart from the potential of video adding value to farmer field schools, field-based experiential learning methods can also provide useful inputs for making mass media farmer education programmes (Bentley and Van Mele, 2005).

Going public

A method whereby extensionists or scientists go to public places, such as markets, to interact with farmers was developed earlier by CABI Bioscience in another project in Bolivia (Bentley et al, 2003), and tested in Bangladesh with AAS, BRRI and the RDA.

To address the criticism that farmer field school graduates hardly share their learning with the wider community, as was the case in the Philippines (Rola et al, 2002), Going Public offers one of the possible solutions. Van Mele and Zakaria (2004) invited trained farmers to man a stand at a weekly *hat* or market and to share their newly acquired seed health expertise with interested visitors. And because women in Bangladesh remain mainly confined to their homestead, Going Public was further modified to reach more women by going to the uthan or courtyard (Nash and Van Mele, 2005).

Entertainment-education

When Shushilan embarked on their SP to test improved seed uptake pathways, they started with the more familiar field demonstration days. Through the regular uptake forum meetings, organised by PETRRA, they started to discover their own organisational strengths. The picture songs emerged as a jewel in the crown. With their vast experience in using traditional media such as drama and songs, Shushilan developed a new cultural programme with agricultural messages. Music, lyrics and paintings all came nicely

together in the picture songs, which turned out to be a culturally appropriate way to reach large numbers of rural women (Bentley et al, 2005).

Traditional media, such as folk songs, drama and puppet shows were, for instance, proposed in Sri Lanka to complement group training in integrated pest management (IPM) (van de Fliert and Matteson, 1989). But FAO perceived multimedia strategic extension campaigns as only suitable for awareness raising. Soon afterwards, they piloted farmer field schools in Indonesia and since this was perceived as a more effective approach to promote IPM, it replaced all other IPM extension approaches in Sri Lanka.

Only in the mid 1990s, and under supervision of Dr. K. L. Heong from IRRI, entertainment-education was successfully applied to address pesticide misuse by Vietnamese rice farmers. Because farmers depend on local radio broadcasts as their primary source of information, the researchers placed the farmers' ever-present radios at the heart of a media campaign. *"We got a group of actors to play out a series of brief comedies, relating solid scientific facts through rustic situations to make the audience laugh,"* Dr. Heong explained. *"We found these simple, humorous messages fixed themselves in the minds of thousands of farmers."*

Entertainment-education refers to "the process of purposely designing and implementing a media message to both entertain and educate, in order to increase audience knowledge about an educational issue, create favourable attitudes, and change overt behaviour" (Singhal and Rogers, 2003). Considering that entertainment-education is a major approach used to trigger behavioural change on public health issues, it is quite remarkable how little it is used in agricultural development. A quick search on the internet yielded 94,300 results for entertainment-education and health, compared to only 4,130 when combined with agriculture, indicating the huge potential for agricultural extension to draw from cross-sector experiences. Likewise, experiences presented in this book may have practical applications for fisheries, forestry, public health and other sectors.

Primary school and college education

Reaching farmers through their children is a very powerful extension approach (Nathaniels, 1998; CIP-UPWARD, 2003; Arnst et al, 2005). Although several national NGOs in Bangladesh (e.g., BRAC, Proshika, FIVDB and RDRS) develop their own non-formal education curricula and learning tools, integrating these with their agricultural development programmes has so far remained under-explored. NGOs in Nepal, such as the Centre for Agro-Ecology and Development (CAED), have been using schools for years with very promising outcomes.

In Table 2. we present the potential circumstances in which each of the methods described can be used. As stated earlier, these offer some broad guidance only.

Making small modifications of education curricula can be a real challenge, even if the environment seems conducive at first. In 2002, Van Mele tried to introduce some of the seed health exercises in the non-formal primary education programme of the NGO BRAC, the largest non-formal education system in the world (Mednick, 2004). With a group of women teachers the curriculum for biology classes was assessed: as sowing seed, observing plant growth, and weekly drawing was already part of their curriculum, only minor modifications were needed. Children would bring a small amount of rice seed from their home, manually clean it in the classroom, and sow the spotted and irregular seeds in

Table 2. Suggested use of extension methods

Method	Circumstances under which method may be used
Women-led group extension	Requires communities where a certain critical mass of social capital is already in place
Family approach in training	Is applicable for any community, irrespective of the level of social capital
Farmer-to-farmer extension	Requires solid organisational support for it to be effective and will work best if implemented alongside other rural development activities
Farmer field schools	Requires skilled facilitators and high initial investment cost. Ideally used in pilot phases to develop and test learning tools that can be incorporated in all other methods. Principles and processes could be built into curriculum of wide range of service providers
Video-supported learning	Requires multidisciplinary approach in developing scripts. Adds value to any other method. Can be effective to educate farmers in remote areas without the need for well-trained facilitators. May need adjustment to fit regional or local culture
Going Public	Can be tried by any service provider with little preparation. Lends itself well to reach people in remote areas where general organisational support may be weak
Entertainment-education	Requires multidisciplinary approach in developing scripts. If no use is made of radio or TV, the method is limited to areas where live performers operate. Highly appropriate to reach rural women
Primary school and college education	Requires flexibility of education system and teachers' corps to include processes and tools of farmer field schools, or to organise video or agricultural entertainment shows. Children welcome this as a shift from sterile teaching methods in most rural areas

a separate pot from the healthy seeds. Within one season and after having trained the teachers, more than 2,000 children in 70 schools learnt about rice seed health. Children brought the message back home and stimulated parents to test the importance of seed health for themselves. The monthly parents meetings revealed an increased awareness and improved practice. The experience looked promising: as BRAC operates thousands of schools across the country and educates mainly girls, the potential was enormous. But it was never mainstreamed, illustrating one of the challenges of vertical scaling-up (between programmes) within large rural development organisations.

Multiple learning tools

Sometimes discussions arose in meetings between PETRRA SPs as to whether video is a tool or a method. Basically, the process of developing a video can be empowering in terms of the experiential learning that occurs among those involved in its development; the end-product, the video tape or digital video disk (DVD), is the tool that can be used to share information contained in the video with many others. The method deals with how this end-product is used in training and determines the quality of the learning that takes place among those watching it. Building a common understanding of terminologies used in extension method research was one of the hurdles PETRRA had to tackle during various uptake forum meetings. All its 20 SPs on uptake and extension involved partnerships with NGOs and various other actors. Seven of them were led by researchers, the others by NGOs mostly in partnership with researchers and DAE staff. Especially those SPs that were approved at the earlier stages of PETRRA embarked on doing extension, rather than on extension method research. This challenge was addressed in an iterative and interactive way, as part of the project learning cycle.

Discovery learning exercises

Discovery learning relies on engaging people in experimentation, observation, measurement and so on, activities which allow people to draw their own conclusions. Creating tools for discovery learning has emerged as an important challenge for scientists (Röling and Jiggins, 1998).

Before developing discovery learning exercises, testing scientists' perceptions about local knowledge is required. As farmer field schools have not included issues like seed storage management (Bjoernsen Gurung, 2003), seed health discovery learning exercises were developed with Bangladeshi scientists from national research institutes and universities under PETRRA (Van Mele, 2002). According to one of the senior entomologists who participated in the workshop, "Farmers don't know the exact role of seed moisture content on the development of storage insect pests." A discovery learning exercise was developed to address this knowledge gap on the life cycle of storage insect pests. However, in-depth knowledge analysis carried out for the video project on post-harvest about one year later (Van Mele et al, 2005a; and Van Mele et al, 2005b) revealed that women knew all too well that high seed moisture resulted in higher insect infestation (without knowing about increased insect fecundity rates). Addressing the issue of insect life cycle was useless in this case: the missing knowledge was that moisture was carried by air through the pores of the earthen storage pots. Porosity had to be addressed, not insect life cycles. Scientists' perceptions about local knowledge shouldn't be taken for granted when developing farmer education curricula and tools.

Farmers show their innovations, of which photos help to build pride and to stimulate spontaneous dissemination.

Overall, creativity and flexibility are needed to develop conditions in which these discovery learning exercises can be used. Exercises developed in farmer field schools are currently being used in the formal education system (CIP-UPWARD, 2003; Arnst et al, 2004). As a learning platform, 'going publuic' also allows similar exercises to be used, but only those that allow people to observe or experience something in a short time, let's say 10 minutes, rather than exercises requiring weekly or season-long observations (Bentley et al, 2003).

Visual aids

All cases described in this book developed or incorporated visual aids for various purposes. Tools in themselves play a flexible role in extension and farmer education; they can be used or modified as one sees fit and, depending on how they are used, can have a greater or lesser impact.

Let us take the example of photos. They were used to stimulate creative thinking in group discussions (Latifun Nessa and Van Mele, 2005; and Van Mele et al, 2005b). They also cultivated pride among farmer

innovators in various SPs (Orsini and Jahn, 2004; and Van Mele and Zakaria, 2005), and helped communities to learn about the social dynamics in the adoption of new technologies (Van Mele and Zakaria, 2002).

But photos were also used as learning tools in training-of-trainers sessions. A4-sized laminated photographs of farmer interviews and focus group discussions confronted project staff with multiple scenarios (Van Mele et al, 2002). It helped young researchers to gain a better eye for details and to be aware of social dynamics when conducting farmer interviews or focus group discussions with a community.

Shushilan combined songs and dance with large paintings depicting major rice pests and natural enemies, how to use organic fertiliser, and so on (Bentley et al, 2005). This case, as in the video project, shows the necessity to involve multiple disciplines and farmers in developing messages for rural communities. Scientifically validated information should form the basis of learner-centred farmer education.

The NGO SAFE used agroecosystem analysis in farmer field schools to visualise and evaluate the effect of herbicides on rice plants, earthworms and other living organisms. The tool helped farmers make better-informed decisions; initially they feared herbicides would "poison" the soil or reduce soil fertility if used continuously on the same field (Chowhan et al, 2004). In another SP, villagers drew soil fertility maps that helped them in testing and improving their soil fertility management (Saleque et al, 2005).

During a PETRRA workshop on communication material development in April 2004, scientists worked alongside non-formal education specialists and graphic designers to produce diagrams of their uptake and extension methods. Earlier on, the same mix of people had developed extension materials with extensionists and farmers.

But communication is not only about making things visible and easily accessible to a client group. Coordinated efforts are needed to make optimal use of the diversity of information sources, communication tools and learning methods. The way this is shaped is context-specific and depends on the resources available in the innovation system, such as money, motivation, moral support, experience, enthusiasm, knowledge, creativity and collaborative spirit.

The Bangladesh Rice Knowledge Bank (BRKB): public knowledge organised

PETRRA helped to sustain the research findings in the public domain and to increase user access to updated knowledge and technology beyond projects and organisations by catalysing the BRKB. This linked to a regional initiative of IRRI to establish digitised, country-specific rice information systems.

Extension service providers are the direct beneficiaries, as both English and Bengali versions of technical information, leaflets and posters can be downloaded for printing. It is regularly updated with an emphasis on low-cost technologies, and is available on CD-ROM, in print and online (www.knowledgebank-brri.org). The institutional home of the knowledge bank is the Bangladesh Rice Research Institute, linked to the focal area forums, and with back up support from IRRI to ensure long-term sustainability.

Innovation systems research

Innovation systems research emphasises the relationship between innovations and its evolving political, economic and social context. It provides a framework for i) exploring patterns of partnerships;

ii) revealing and managing the institutional context that governs these relationships and processes; iii) understanding research and innovation as a social process of learning; and iv) thinking about capacity building in a systems sense (Hall, 2002). The success of an innovation system depends on its capacity to change in ways that are positive in a development sense. Although organisations are important, it is often individuals rather than organisations that are critical (Clark et al, 2003).

Röling and Jiggins (1998) have argued for some time that more professionalism is needed in thinking about people if sustainable development is to be reached. Learning about people helps to manage institutions that drive innovation systems, and may require certain tools to facilitate this. To give an example, Van Mele and Zakaria (2002) developed a new tool, namely the 'innovation tree', to visualise and analyse the way an innovation spreads over time between community members. Learning about local innovators led to changed behaviour of staff at the RDA, as reflected in the way subsequent activities and project proposals were developed.

During the documentation of the cases presented in this book, which was considered an integral part of the institutional learning process, we used narratives, enterprise webs, photographs, actor linkage maps, innovation systems research methods (Hall et al, 2003b; Matsaert et al, 2004) and various other social science methods. We agree with Biggs and Smith (2003) that more tools are needed to analyse organisational cultures and personal behaviours, but at the same time we recommend a wider use of tools for stimulating creative thinking and local ownership (see also Box 3).

Unfinished business

We wanted to encourage partnerships that equally and effectively combined strengths and eliminated weaknesses of different groups of people and their organisations. This doesn't happen often enough, nor is it the accepted norm among government organisations, NGOs or the private sector. We saw changes in behaviour and

1. Avoid funding or promoting a single blue-print extension method
2. Use actor analysis to explore organisational cultures, strengths, ambitions and weaknesses in engineering partnerships
3. Apply innovation systems research in planning projects and identifying local innovations
4. Create early, low-budget opportunities for multiple actors to interact and learn to work with each other
5. Train people involved in community needs assessment to distinguish between implicit and explicit demand
6. Link agricultural research and development (R&D) activities, whether by government, non-government or private sector, more closely to the established education system
7. Incorporate communication specialist and broad-based professionals with experience in learning approaches from the beginning of the project
8. Build adult learning and discovery learning principles into mass media programmes
9. Increase understanding of institutional elements that are important in developing local ownership over technologies and extension methods
10. Develop mechanisms to increase creative thinking capacity among all actors
11. Introduce new ideas in the system as early as possible in a subtle way
12. Allow for a flexible management structure that can be responsive to opportunities
13. Support institutional learning continuously.

Box 3.
Suggestions for Successful Innovation Systems

better joint working practices, though we're still not sure how wider improvements can be stimulated. Will other NGOs and government organisations change the way they work and collaborate after observing partnerships forged through PETRRA? Mechanisms to stimulate wider changes are still required.

The emerging practice of NGOs in Bangladesh to link agriculture to their social development programmes is encouraging but still in its infancy. Better promotion of links with agribusiness and cross-fertilisation between extension and education, whether formal or non-formal, would benefit from 'innovation'. The explicit policy of pro-poor development is already stimulating new ideas, though that must be matched by a flexibility and commitment to change in institutes and organisations. Policies themselves need refining as evidence of success is gathered.

Partnerships and learning networks help to share ideas and create new ones. But ideas need to be tested, to branch out, amplified and be modified if they are to benefit the millions of poor farmers. We do not have enough experience to confidently mix and match extension, education and communication methods and tools. More experimentation is needed and a willingness to accept that not everything works the first time round.

Information sources, such as the BRKB, are just becoming part of decentralised information hubs. But creating the trough at which the horse can drink is not enough. How will service providers gain access to these hubs? Validating and incorporating local knowledge and innovations is yet another challenge.

We found many local organisations doing exciting work, but why is this ignored so often? The simple answer is poor documentation. Writing things down takes time, a certain creativity and persistence. It also has to be seen as rewarding in its own right. We hope that the efforts made in writing this book (Van Mele et al, 2005d) help to shine the light on the forgotten heroes of local development, and that the chapters are seen as a warm tribute in part to local creativity and methodological diversity.

At the end of PETRRA can we say that we've answered all the questions? The short answer is that this is never going to be possible. Development doesn't start and stop. It keeps on refining, applying, going back and then going forward, providing solutions and doing new things alongside old improved things. The book (Van Mele et al, 2005d) is our way of documenting what PETRRA and its partners have done and achieved. It points to things that still need to be done. Above all else, the book is a testament to the innovations produced by committed champions for pro-poor development in Bangladesh. We hope it suggests how we can each become one and provides the inspiration for you to have a go yourself.

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Review of the book *Innovations in rural extension: case studies from Bangladesh*[1]

Robert Chambers[2]

REPRINT

This inspiring book shows how far some have come from the early days of technology transfer. For here are presented illustration after illustration of a participatory and pluralist paradigm so different that it seems odd to apply the same label-extension-to both the earlier monolithic mindsets and monocultures of methodology, and the contrasting rich panoply of approaches described here.

Poverty Elimination Through Rice Research Assistance (PETRRA) was a 5-year (1999-2004) project funded by the United Kingdom's Department for International Development (DFID). The project was managed by the International Rice Research Institute (IRRI) in close collaboration with the Bangladesh Rice Research Institute (BRRI). Its philosophy and practice were learning by doing. During its life, it approved, managed, and supported 45 subprojects-on pro-poor policy (6), technologies (19), and uptake and extension (20). It is these latter that provide the experience and material for the book. This was an exercise that set out to learn by conducting research on a variety of approaches to extension itself.

This is a far cry from older orientations. The first major section, on gender, gives long overdue prominence to women in South Asian agriculture. The book stands on its head the old linear or pipeline paradigm in which research innovates and passes on innovations to extension for promotion and spread. In the place of such old mindsets and methods are a range of practices and approaches that stress listening, learning, negotiating, and facilitating, as well as training of facilitators.

We have here accounts of experiences and comparisons among a rich variety of extension approaches. Innovations include integrated rice-duck farming and various aspects of seed systems-building a rice seed network, a value-chain approach for aromatic rice, and much more. These are but some manifestations of the diversity and originality that flowered with this project.

PETRRA was pathbreaking. For many, it will be the final synthesis that is most striking. There, the editors confront and discuss the issues of extension, complexity, and poverty; of creativity and flexibility; and of motivation. They point to the professional pride and personal

DFID Department for International Development

IRRI International Rice Research Institute

Bangladesh Rice Research Institute

satisfaction of having worked through a problem with farmers as a major motivation for researchers and extensionists.

Perhaps the most important section, which could have the biggest impact, concerns donors and flexibility, projects, service providers, and potential champions. Lessons and warnings are laid out. Among these, one that stands out is the incompatibility of logframe approaches with conditions of uncertainty and the fostering of creativity. This book should be required reading for all who fund agricultural research and extension.

Paradigmatically, Innovations in Rural Extension has opened up as never before the need and potential for methodological pluralism. It shows such a wide range of complementary choices of what to do, and it compares their costs and effectiveness. For too long, agricultural extension has been in the doldrums, and agriculture a diminished priority among aid agencies.

The big practical question now is whether normal extension services, without special project support, can adopt or adapt some of PETRRA's rich repertoire of approaches. At least those aid agencies that wish to help poor farmers will now know that so much can be achieved with vision and appropriate continuity of support, facilitation, leadership, and staff. May PETRRA and this book inspire many others to follow and do likewise.

And, if any donor agency is looking for a cost-effective investment, it would be hard to do better than to provide the means to make this book cheap and accessible, and to send a great many copies with a covering letter to those concerned with agricultural research and extension policy and practice around the world.

[1] *Mele, P. V., Salahuddin, A. and Magor, N. P., editors. 2005. Innovations in Rural Extension: Case Studies from Bangladesh. CABI Publishing, CAB International, Wallingford, UK, and Cambridge, Mass., USA.*

[2] *Robert Chambers is a research associate at the Institute of Development Studies, Sussex, UK. He is a co-editor of Farmer First (1989), which makes the case for a farmer-first mode to complement conventional procedures for research and transfer of technology.*

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