2 Lessons for out-scaling and up-scaling from *Managing agricultural research for poverty alleviation*

Background

During the eleven-year Department for International Development (DFID) Renewable Natural Resources Research Strategy (RNRRS) Programme (1995-2006) managers had to manage a movement away from strategic research on commodities and towards 'demand-led' applied research on production systems designed to meet the Millennium Development Goals. DFID's current (2008) re-orientation towards the out-scaling and up-scaling of research findings will mean that the managers of new programmes will need to manage further changes.

Key points

The experiences of the Plant Sciences Research Programme (PRSP) provide some lessons that may be helpful in the task of out-scaling and up-scaling research findings. The following key points were identified by the research.

- A key factor in out-scaling and up-scaling research findings will be to determine 'demand'.
- People need to be trained in new approaches to research.
- What research strategy is most effective will depend on circumstances. An example would be choosing between a research strategy focused on demand, as opposed to one focused on a production system or a scientific discipline.
- Participatory research, building on earlier strategic research, produced the greatest benefits to farmers.
- Networks help out-scale and up-scale research outputs.
- Action research validates research outputs and increases uptake.

Lessons learned

In the final stages of the RNRRS, the research undertaken through the Plant Sciences Research Programme was described as 'firmly demand driven'[4]. Much of the research was being done in developing countries and farmers there were benefiting from it, with the outputs of decades of strategic research being applied in practical plant breeding and participatory crop improvement programmes (see Box 2.1 for one of the many examples available).

This situation was in sharp contrast to the situation in the early 1990s, when little attention was paid to linking strategic research in UK institutions to location-specific adaptive research in developing country organisations. In the early 1990s, there were therefore few useful research findings that could be adopted by end users because research at that time was designed to be strategic, and was not designed to meet end user demands.

Box 2.1

From strategic to applied research - a long process

Over 15 years, researchers solved the problem of preventing epidemics of downy mildew in the most popular pearl millet grown in India and also created new tools for breeding pearl millet. This research looked at the genes in a pearl millet hybrid released in 1989 that was grown in nearly three quarters of pearl millet growing areas in some states. This hybrid was particularly vulnerable to downy mildew.

The research resulted in the release of an improved version of the hybrid resistant to downy mildew in 2005. To do this, research managers linked together research groups with complementary interests and expertise in the UK and India.

During the transition from commodity focus to demand led research, much research shifted from UK institutions to developing countries. The balance is likely to change still further in the work of out-scaling and up-scaling research findings. And, as the current emphasis in DFID shifts to adapting and applying existing research findings, research managers in UK research institutions may play a less central and less research-oriented role in DFID-funded activities. Their main role in this may be advising and supporting take-up processes for research findings.

A key factor in out-scaling and up-scaling research findings will be to determine 'demand'. The definition of 'demand-led' as applied to research projects at the beginning of the Renewable Natural Resources Research Strategy Programme was *'an identifiable constraint to development with quantified benefits that could be achieved and an identifiable community of beneficiaries'*[5].

This meant that representatives of the beneficiaries were to participate in defining their needs for research.

In fact, however, because beneficiaries were defined in very general terms, end-users were often not consulted. What happened was that DFID staff in developing countries were asked to identify researchable problems in production systems in the countries for which they were responsible. The principle of establishing demand was sound, but a broader perspective for establishing it would have been better.

[4] Stirling, C. M., Harris, D. and Witcombe, J. R. 2006. 'Managing an agricultural research programme for poverty alleviation in developing countries: an institute without walls'. Expl. Agric. volume 42, pp. 127-146.

[5] Research Task Group, 1994, p. 22.

Research projects also had to identify 'uptake pathways', meaning that they had to identify those in developing countries who would transfer the research findings—that is package and promote them—to end-users. In many cases it was assumed that research findings would be taken up by DFID projects in developing countries, thus linking research with development. In fact this rarely happened.

The lessons learned from these experiences suggest that for out-scaling and up-scaling research findings, all those involved will need to have a much clearer common understanding of (i) 'demand' for research, (ii) the extent of uptake to be achieved, and (iii) the pathways for uptake than was the case in the RNRRS Programme.

The way researchers define the terms 'demand-led' and 'uptake pathways', and the processes of determining them, may differ significantly from those of other stakeholders. The Plant Sciences Programme for example, determined 'demand-led research' by commissioning experts to further refine the demand initially identified by DFID.

This led to a number or options being identified. One was for cotton research in Africa, though the expert group involved concluded that even though there might be demand there was no point in funding further research until 'institutional deficiencies' were sorted out. Another was a study on pearl millet which concluded that applying new technologies in pearl millet could make a big difference (i.e., they concluded that in this case that there was a significant 'demand'). And, yet another study used remote sensing to show that 15 million hectares in India, Nepal and Bangladesh could be used to grow crops instead of being left fallow after the rice harvest. In some cases, high demand was clearly established but the only technically feasible way of meeting that demand has not yet been found to be acceptable (Box 2.2).

Learning how to meet the objectives of any new strategy may take some time. In the PSRP there was a time lag before the programme fully reoriented to the new Renewable Natural Resources Research Strategy Programme, for example. It took some time to change what and how things were done. Three major research areas that were funded before 1995 carried over into the new RNRRS Programme, which began in 1995. Subsequently, two of the research areas were discontinued and the third evolved into a more demand-led project. Over the eleven-year period, research did become more sensitive to client needs and the participation of farmers helped promote uptake of research results.

People need to be trained in new approaches. When DFID adopted the use of a logical framework (often known as the 'log frame' approach) as a method for managing research, scientists were unfamiliar with the methodology and had to be trained. Adoption of the innovation system framework for out-scaling and up-scaling research findings is also likely to mean that the people involved will need to be trained in the new methodology.

The logical framework did not always work for research because it was designed to manage projects where the relationship between the delivery of inputs and the achievement of outputs was clear (which isn't always the case). Nevertheless the 'log frame' served as a useful project management tool. The logical framework may also be a useful management tool in an innovation systems approach, although it is likely that more attention will need to be paid to processes rather than outputs.

Box 2.2

Research findings with nowhere to go—yet.
The following are examples of successful research that developed pest and disease resistant transgenic crops. However, these research findings have not yet been taken up because, for example, developing countries where a technology could be used do not have the appropriate legislation. This said, it seems likely that, as more developing countries cultivate transgenic crops and as more data emerge on their environmental and financial benefits, transgenic technology will be widely adapted by developing countries.

Nematode resistance. Nematodes lower the yields of potato, banana and rice by up to a fifth and are difficult to control without using expensive chemicals that harm users and the environment. Taking safe nematode-resistant genes from maize and rice and transferring them to other crops is an effective method of developing nematode-resistant plants.

Research on nematode resistance in potatoes was very successful in the UK and led to transgenic nematode-resistant rice, for example. However, the absence of biosafety regulations in countries that would benefit prevented research findings from being used.

Transgenic rice resistant to rice yellow mottle virus.
By 1999, UK researchers had developed transgenic rice resistant to rice yellow mottle virus. But none of the developing countries in Africa where rice yellow mottle virus was a problem had biosafety regulations in place that would allow the resistant rice to be tested in the field.

The most effective research strategy will depend on circumstances. Shifts in strategy and focus do not always translate promptly and readily into action on the ground, for a variety of reasons.

For example, the RNRRS shifted from a commodity focus to a focus on production systems—semi-arid, high potential, hillside, tropical moist forest, forest-agriculture interface, land-water interface and peri-urban interface. The Plant Sciences Programme projects did not fit easily into these production systems and managers found that they could more usefully organise research around 'research themes'.

This suggests that whether the focus of out-scaling or up-scaling is, for example, thematic, geographical, commodity-based or technology-based, will depend on the particular circumstances of the innovation system and the history of the institution charged with the task of out-scaling or up-scaling. In the case of the PRSP,

the three research themes that had evolved by the end of the eleven-year strategy were defined by a technical approach—molecular marker technology in plant breeding, transgenic crops and participatory technology development—not by production systems. The first two research themes evolved from research programmes that were already in place before the Renewable Natural Resources Research Strategy. The third emerged during the strategy as concern for greater uptake of research findings grew and meant that closer links with applied plant breeding and extension programmes in developing countries were important.

Participatory research, building on earlier strategic research, produced the greatest benefits to farmers. In farmer-participatory selection and breeding in Nepal, Bangladesh and India, researchers used participatory methods to identify farmers' biggest problems. Then they prioritised those that were most likely to be solved by research. Using 'participatory technology development' methods, they developed drought-tolerant varieties of rice and low-risk methods of growing an additional crop each year during the time when land is normally left fallow. This participatory research built on earlier strategic research on drought tolerance, molecular marker technologies and seed priming.

The 'client orientation' of this participatory research meant that farmers readily adopted new varieties and low-risk methods. Rates of adoption were particularly high in marginal areas. This was because conventional plant breeding programmes target major production areas and varieties produced for these areas often fail in marginal environments. Client oriented rice and maize breeding, on the other hand, produced varieties specifically selected to meet the particular needs of resource-poor farmers. The livelihoods of poor farmers are improving because the new varieties of maize and rice yield more grain and more straw. So, it seems that participatory methods are also likely to work well for out-scaling research findings in marginal areas.

Networks help out-scale and up-scale research outputs. A strong international network is a mechanism for spreading client-oriented approaches to plant breeding. Such networks help people exchange germplasm and ideas across countries and organisations (Box 2.3).

Box 2.3

Networks help up-scale research outputs

More than 30 international organisations, non-government organisations, government institutions, universities and community organisations belong, formally or informally, to the network for participatory crop research in south Asia.

This network helps spread client approaches to plant breeding and selecting varieties to institutions throughout south Asia. The rice breeding programme in Nepal, for example, has linked up with non-government organisations and government organisations in Nepal, Bangladesh, India and Pakistan.

Action research validates research outputs and increases uptake. Researchers in the PRSP found that a participatory way of working could give them a much better understanding of how farmers take up research findings and adopt and adapt them to their own needs. Action research on seed systems and seed supply helps spread research outputs.

But to do this, researchers had to step outside the research sphere and, for example, produce quantities of seed of new crops and new varieties to distribute through the local seed supply channels normally used by farmers. By doing this they could speed uptake of new varieties. Looking at the ways that have been used to speed the uptake of research findings provides useful lessons for out-scaling and up-scaling.

This synopsis of lessons learned for up-scaling and out-scaling research into use is drawn from:

Stirling, C. M., Harris, D. and Witcombe, J. R. 2006. 'Managing an agricultural research programme for poverty alleviation in developing countries: an institute without walls', Expl. Agric., volume 42, pp. 127-146.