



ODI Food Security Briefings

3 Applications of Appropriate Agricultural Technology and Practices and their Impact on Food Security and the Eradication of Poverty: Lessons Learned from Selected Community Based Experiences

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Introduction and overview

Some formidable technological challenges are thrown up by the need to feed and improve nutritional standards for a growing world population, in a context of continued natural resource degradation and the conversion of farmland to non-agricultural use. The rate of productivity growth in green revolution areas has been in sharp decline since the late 1980s and in many areas it has reached a plateau or even declined. Increasing attention is now being turned to less favoured areas, such as risk-prone environments, zones of diverse ecological conditions and areas reliant on rainfed crops - which includes almost all of sub-Saharan Africa. These areas were by-passed by the green revolution and are home to some of the world's most food-insecure people. The need to achieve large and sustainable productivity gains in such areas represents an immense and expensive technological challenge, yet investment in agricultural research is low and has been falling in most of the poorest countries. There is still a supply of 'off the shelf' technologies that can, with local adaptation, help enhance food security in many areas. While further work is needed on removing constraints to applying existing technologies, there are also legitimate concerns that the supply of appropriate new technologies in the pipeline is dwindling.

The need for community-based and participatory approaches to technology generation and dissemination is now widely acknowledged. This is explained by factors such as: community-ownership or control of the resource base (watersheds, pastures, forests); economies of scale; the existence of positive group interactions; collective bargaining power; the facilitation of linkages to extension, marketing and input supply; relevance and appropriateness of technologies. It is also widely accepted that the most appropriate focus for a community-based approach is the indigenous farmers' organisation (FO) or what some refer to as rural producer organisations¹. These are widely regarded as the most effective means of promoting a demand-led approach.

However communities are not homogeneous with regard to technological needs and challenges, and farmers' organisations represent economic interest groups and do not necessarily represent the whole of the community. Women may be excluded and overlooked by male-dominated extension services, yet the gender division of labour means that women's technological needs are different from men's. Given the often-dominant role of women in household food supply, attending to gender-specific technological needs is likely to have a positive impact on food security.

Similarly, the technological needs of the poor are likely to be different from those of the not-so-poor. For example, the food security of the subsistence producer may be best served by technologies that boost food supply in the hungry season (e.g. early maturing varieties), rather than crops that command a high market price. The poor may also be under-represented in FOs. Even if a farmers' organisation is inclusive, farmers' technological choices may adversely affect the food security situation of non-farmers. A particularly important instance is where potential for increased production is constrained by peak season labour shortages, so that larger farmers may demand labour-saving technologies. There may be important trade-offs here, because such technologies may promote increased production, thus boosting national level food availability, but at the same time reducing the labourer's bargaining power, thus increasing poverty and reducing household level food access for one of the poorest groups in the community.

Where technological change aims at reducing poverty and boosting food security through the production and sale of a surplus, the demand-led approach must take consumer demand fully into account. Technologies have in the past been promoted which, although technically suited to a particular farming or production system, were unsustainable because of a failure to take into account adverse marketing conditions (e.g. no accessible market, or only a thin market in which increased supply led to sharp price decline, unreliable input supply, poor marketing infrastructure, an unfavourable policy environment, non-availability of credit, etc.).

HIV/AIDS threatens the effectiveness of community-based approaches to technology development as it threatens community cohesion. It also results in loss of indigenous technical knowledge. It may also imply a need to shift towards the development of labour-saving rather than labour-intensive technologies.

Priority recommendations that could be promoted by donors include the following issues:

- Help build coalitions to promote investment in national and international agricultural research to develop sustainable technologies for poor and disadvantaged people in favoured areas and all people in unfavoured areas (particularly targeting the hungry season).
- Adopt a holistic approach to rural development which, *inter alia*, reconciles the need to increase national level food availability with the need to improve access to food by the weakest groups, particularly landless agricultural households. A livelihoods approach may help here.

- Move away from traditional ‘recipient-beneficiary’ models of technology development and dissemination towards new partnership roles driven by client needs.
- Replace the project approach with a local empowerment approach geared to developing democratic institutions in which the whole community is represented. Use participatory methods such as participatory rural appraisal and other visualisation and group-based tools to assess the different technology needs of each group of rural people in a particular context.
- Identify and target groups of producers with similar characteristics and help empower them through the development of the internal capacity to assimilate, use and adapt technologies. In areas with market access, provide market research services to ensure potential new technology-based livelihood opportunities are sustainable.

Position, thinking and priority issues promoted by other key global players

The World Bank takes the attainment of household, national and global food security as one of its four objectives. It has invested significantly in agricultural research and extension. Its policy is to place strong emphasis on giving farmers (especially smallholders) a strong voice in setting research priorities, conducting research and validating results. It promotes reform of public sector research and extension bodies to make them more responsive to farmers’ needs and assists in the development of multi-agency national research systems, which include the private sector, civil society and rural producer organisations.

The European Community adopted radically new policies on development co-operation in November 2000. The principal aim is now to ‘reduce poverty with a view to its eventual eradication’. Part of the new approach involves refocusing priorities in order to do fewer things better, and one of the six new focus areas is food security and sustainable rural development. However the implications for efforts to promote appropriate agricultural technology have still to be fully worked out.

Many EU Member States (Denmark, Netherlands, Sweden, UK) have adopted poverty eradication as their overarching theme. This helps focus the technology/food security debate much more closely on the livelihoods of all producers, not just those of farmers or farm families. Germany is now also working towards a comprehensive anti-poverty approach. It takes the view that in agriculture the most important instrument for

poverty alleviation is ownership of the means of production, particularly land. This implies that only after land has become a scarce factor of production should attention switch to intensification of agricultural production.

Food security is not one of USAID’s four strategic priorities, but each of them is regarded as supportive of improved food security. The Agency has historically been a major funder of agricultural research and development, but in recent years funding for agriculture has been squeezed, even in poor food deficit countries. In Africa, funding for agriculture declined from a high of \$200 million per year in 1988 to \$125 million in 1993.

The Consultative Group on International Agricultural Research (CGIAR) is at the centre of the most important set of partnerships at the technology development end of the spectrum. It is a multi-donor initiative to support sixteen international agricultural centres (IARCs) whose mission is to contribute to food security and poverty eradication in developing countries through research, partnership, capacity building and policy support. One of its major research thrusts is to strengthen national research in developing countries by building working relationships between scientists and by providing training. National research systems reciprocate by providing facilities for collaborative work and through local adaptation of genetic material developed by the international centres.

As emphasis on demand-driven approaches using indigenous organisations grows, new partnership approaches are beginning to emerge. These involve more equal relationships with traditional partners – research, extension and service providers, and the involvement of new partners – a range of civil society and producer organisations, the private sector and donor agencies.

Recent debates on this topic

In the 1980s the most contentious ‘appropriate technology’ debate ranged around whether ‘appropriate’ meant ‘inferior’. The greatest polarisation now hinges on the technology–environment axis. Agricultural scientists argue that technology is the only route to achieving sustainable increases in food production. They point to the gains of the green revolution in staving off famine in South and East Asia in the 1970s, where intensification of production on favoured lands greatly increased food security while providing an alternative to environmentally-catastrophic extension of cultivation into fragile uplands. Environmentalists cite the negative productivity effects of land degradation, expressing concern that the same could now happen on the more

fragile areas towards which agricultural researchers are increasingly turning their attention.

A very forceful debate is taking place about the role of genetically-modified organisms in meeting expanding food needs. One issue of particular concern to developing countries is that of intellectual property rights and the possibility that in future poor farmers will be forced to buy all of their seeds from large multinational companies.

On community-based and participatory approaches, although there is general agreement on their desirability, there is some debate as to which characteristics of the resource and resource users are most likely to promote and retard co-operation.

Globalisation will help shape the spatial future of world food production, and will therefore have profound implications for agricultural technology. However the process, its possible poverty impact and its likely future course are as yet poorly understood. An example of one of the less complex technological questions is the extent to which (perhaps excessive) food safety, sanitary and phytosanitary regulations in industrialised countries will prevent developing countries from taking advantage of globalisation to export high value food products, such as horticultural produce, and use the proceeds to import basic foodstuffs. A deeper worry concerns continuing high levels of agricultural subsidies in rich countries. Despite the 1994 GATT/WTO Agreement on Agriculture, these are still running at around US\$1 billion per day, more than six times the rich countries' entire aid budgets.

Links with wider development themes

Three elements in the recent debate on food security are of particular relevance here. First is the need to establish an enabling policy environment. Second is the question of priority targeting and allocation of resources by activities, regions and groups. Third is the need for institutional reform.

Several elements of the policy environment impinge on technology issues. A regulatory framework is needed to maintain quality standards, e.g. to prevent adulteration of inputs. Liberalisation is needed to promote agribusiness, to promote functioning and competitive markets for inputs, outputs, credit, etc. Structural adjustment, by removing constraints on trade, such as price controls, monopoly marketing boards, restrictions on movement of produce, and correcting exchange rate overvaluation, can turn the terms of trade in favour of agriculture and encourage investment. Investment can

also be encouraged by land reform by providing security of tenure, promoting labour-intensive technologies, via easing management constraints and by enabling women to acquire land rights. Legislation may be required to strengthen the legal basis of indigenous farmers' organisations. Ending of a state monopoly in research and extension needs to be paralleled by measures to encourage the emergence of multiple providers of these services.

Resource allocation for technology identification, development and dissemination may be focused on activities identified through participatory needs assessment among all members of community and partnerships with organisations representing particular groups of producers. Regions may be prioritised on the basis of such criteria as potential to contribute to national food availability, such as irrigable areas, or existing levels of household food access, e.g. unfavoured environments, zones with a marked hungry season. Disadvantaged groups such as women farmers, poor farmers and subsistence producers may be targeted to identify, develop and promote technologies appropriate to their specific needs.

Institutional reform reinforces the provision of an enabling policy environment. Where public sector research and extension institutions are retained, efficiency and responsiveness will have to be increased through measures such as performance-based funding, recruitment, and promotion. There is a need to promote the emergence of demand-led research by placing resources with farmers' organisations to commission technology delivery. An important role may be played by decentralised state institutions in democratising the delivery of technology services.

International best practice

A number of key points emerge from the best practice in this field:

- Adopt a holistic approach to rural development which, amongst other things, reconciles the need to increase national level food availability with the need to improve the household level access to food for the weakest groups, especially landless agricultural households. Areas that need to be brought in include policy measures that promote growth of the non-farm rural economy as a means of providing alternative livelihood opportunities for landless households to reduce their dependence on agricultural wages and increase their potential to benefit from falling food prices.
- Move away from traditional 'recipient-beneficiary' models of technology development and

dissemination (monopolistic public sector research and extension institutions, maximum accountability to government, minimum accountability to farmers) towards new partnership roles driven by client needs. The most devolved structures are found in Chile, where farmers' organisations receive vouchers that they can use to contract in technology services from a wide range of potential providers including government, universities, NGOs and the commercial private sector. Government provides the funds and monitors the system.

- Replace the 'project approach' with a local empowerment approach aimed at the development of democratic institutions in which the whole community is represented. Use participatory methods to assess the technology needs of each section of the community. Special arrangements may be needed to ensure that the voices of the disadvantaged (women, ethnic minorities, the poor, subsistence farmers, child-headed households in HIV/AIDS-ravaged areas) are heard. Ensure that while all farmers are empowered to move towards eventual market orientation, the needs of subsistence producers, particularly those in areas with little market access, are catered for in the needs assessment, technology identification/development and dissemination process.
- Identify and target groups of farmers with similar characteristics and help empower them through the development of the internal capacity to assimilate, use and adapt process and product technologies. In areas with market access, provide market research services to ensure potential new technology-based livelihood opportunities are sustainable. Assist farmers' groups to forge new partnerships, including contractual arrangements, with traders and agribusiness as a means of reducing transaction costs by assuring delivery specifications such as variety, quality, quantity, timing of supply, are met. Supply information on market opportunities (e.g. through chambers of commerce) to encourage new entrants as a means of making input and produce markets more competitive.
- FAO is one actor among many working to foster appropriate agricultural technology. FAO does have some key areas of comparative advantage in this area however. The mandate of FAO is to 'raise levels of nutrition and standards of living, to improve agricultural productivity, and to better the condition of rural populations'. It has worked to alleviate poverty and hunger by promoting agricultural development, improved nutrition and food security – which it defines as the access of all people at all times to the food they need for an active and healthy life. It is the oldest agricultural development

organisation, the largest UN specialised agency, and the lead UN agency for agriculture, forestry, fisheries and rural development. FAO has 180 member countries and one member organisation – the EC. Its comparative advantage in introducing appropriate technology for addressing food security issues derives from its mandate, its long institutional memory, its widely-perceived political neutrality, its freedom from tied aid, and – perhaps most importantly – the sense of ownership of the organisation that is felt by its developing country member states. The FAO convenes the Technical Advisory Committee of the CGIAR, a role that gives it an influential role in steering international agricultural research agenda.

Notes

¹'Indigenous', whether applied to institutions or technologies, is used here in the sense of originating in local ('grassroots') initiatives, and does not necessarily imply traditional.