TRANSFERRING AGRICULTURAL TECHNOLOGIES TO FARMERS: TOWARDS STRONGER RESEARCH-EXTENSION LINKAGES

K.J.B. Keregero

Institute of Continuing Education,
Sokoine University of Agriculture, Morogoro, Tanzania

ABSTRACT

This paper is an attempt to underscore the importance of operational and effective linkages between research and extension. One of the major impediments to the strengthening of such linkages has been the orientation and perceptions of researchers and extension professionals. In this paper it is argued that although there are other mechanisms for enhancing research-extension linkages that merit attention, in the final analysis techniques that encourage the empowerment of farmers have a better chance of demonstrating that research and extension belong to a continuum.

INTRODUCTION

It has increasingly been recognized and accepted that increased farmer productivity requires access to new and improved technologies. These technologies derive largely from agricultural research. The role of agricultural extension becomes one of adapting research recommendations to suit the changing and varying needs of farmers. Extension also provides a delivery service to speed up farmers' access to, and adoption of, new technologies (Cernea *et al.*, 1985).

Indeed, the roots of improved agriculture can be traced in the history of systematic enquiry and the development of effective outreach systems for transferring agricultural technologies to farmers. The development of hybrid maize in the 1930s, and the expanding use of fertilizers and improved weed and pest control technology following the Second World War are a few examples of the first major breakthroughs in the biological sciences.

THE NEED FOR STRONGER LINKAGES

It is now generally acknowledged that in order to contribute to development, agricultural research needs to be innovative and relevant and its results must be widely disseminated. A key aspect is the maintenance of close contact between the creators and users of agricultural knowledge and technology. This calls for the development and sustenance of four complementary and partially overlapping sets of links: direct links between researchers and farmers; links between on-farm and on-station researchers; links between researchers and technology transfer workers; and links between technology transfer workers and farmers (Merrill-Sands and Kaimowitz, 1989).

According to Merrill-Sands and Kaimowitz (1989), strong research-extension-farmer linkages help ensure that: research tackles users' priority needs and problems; farmers and technology transfer workers keep up with research development; research results from experiment stations are applied to solving farmers' problems and expanding their opportunities; available technologies are adapted to suit local agro-ecological and socio-economic conditions; and researchers can capitalize on users' knowledge and obtain feedback on the relevance and performance of technologies.

Although no systematic study has been done to determine the actual contribution of linkages between research and technology dissemination in agriculture in most countries, experiences from private sector industrial companies provide clues as to the impact of linkages in the agricultural sector.

Studies of 150 randomly selected research and development projects in 38 firms in USA showed a clear impact of links between industry and research on performance (Merrill-Sands and Kaimowitz; 1989). Successful linkages led to complete commercial success. Mild linkage problems led to partial commercial success in projects. Severe linkage problems led to complete commercial failure.

These findings have implications for the effect of linkages between research and extension, because the functions performed by these two services have a similarity to those of marketing in industrial firms that carry out research and development. It is thus argued that strong links are not only a matter of efficiency and cost recovery but are also vital for successful technology development and delivery systems (Merrill-Sands and Kaimowitz, 1989).

ISSUES OF CONCERN

It has been observed that research recommendations applied and advocated at research stations are often not adopted, even by communities just outside the research stations (Keregero *et al.*, 1977). The reasons for this vary:

> 'Some claim that farmers are at fault, arguing that preferences based on traditionalism lead farmers to reject unfamiliar technologies; some point to extension, arguing that the utility of improved technologies has not been demonstrated to farmers. Others claim that inadequate credit limits farmers' ability to adopt technologies. Some emphasize that inputs are not available in a timely way and at appropriate prices. Finally, but less frequently encountered, some contend that recommended technologies are often not appropriate for farmers' (Winkelmann and Moscardi, 1982).

It has been observed that research and extension in most developing countries are usually not well coordinated. In most cases, these important and vital services are considered as performing parallel functions. Consequently, both functions may be considerably weakened:

> 'Without a continual flow of new technologies and tested recommendations from research, extension can run out of technologies to extend; and without close links with extension to provide feedback from farmers, researcher's work can lose much of its relevance' (Shaner *et al.*, 1982).

According to Shaner *et al.* (1982) researchers have usually compounded this problem by their perceptions that farmers cannot generate and provide information that is useful for improving technologies and that technology disseminators (extension workers) are professionally inferior and thus have little to contribute. Given that research has little merit unless it leads to the adoption of technology by farmers, the challenge facing research institutions becomes one of developing the capacity to enhance linkages between researchers, technology disseminators and farmers. This has been found to require: shifts in research policies and priorities; changes in the organization and management of research and technology transfer agencies; and the development of strong links between these agencies and farmers (Merrill-Sands and Kaimowitz, 1989).

Critics of research have increasingly raised concern about the dominant perception that research outputs must originate from the 'top' and diffuse towards the 'bottom' of society. It has been argued that research and technology transfer must be viewed more and more as catalytic processes of 'freeing the creative forces of the impoverished and exploited of any given society and enabling those forces to come to grips with the problems of underdevelopment' (Hall, 1982). This perspective has prompted a search for alternative approaches, reflecting several concerns: the argument that quantitative research methods are not providing an adequate understanding of complex reality; the desire for practical research that can be used as a basis for setting policy and developing programmes which will promote social justice and greater self-reliance; the view of human behaviour which sees individuals as active agents in their environments rather that passive objects to be researched.

Typically, experimentally-based research work bears a number of attributes:

1. It begins with a question in the mind of the researcher. This could be, among other things, a result of curiosity, inquisitiveness, speculation and uncertainty. In the quest for truth, the researcher must ask the right and relevant questions. New facts will, in turn, lead to yet new questions.

2. It requires a plan since it is not an aimless, undirected process. While a number of discoveries have been made by accident, researchers do not set out hoping naively that somehow the truth will come somewhere along the way. Since research is purposeful, the process must be guided by a well defined cognitive map of systematic inquiry.

3. It should be based on a clearly defined statement of the problem. This is necessary in order for the researcher to understand the problem clearly right at the outset. The main research problem is normally associated with problem areas of lesser importance. Careful survey of literature has been found to contribute greatly towards problem definition.

4. Research sub-problems are conceptualized through logical constructs called hypotheses. The latter, being logical suppositions, provide direction towards thinking with respect to the research problems, ultimately facilitating problem solving.

5. It deals with facts and their meanings. Having identified the problem, sub-divided it into appropriate sub-problems, and proposed hypotheses that pre-suppose the direction in which the facts may lie, it is necessary then to collect whatever facts seem to be pertinent to the problem and process, and analyse and organize them into meaningful aggregates that can be interpreted. Interpretation aids the discovery of what the facts actually mean.

6. The discovery of meanings must lead to problem solving, which provides an answer to the question that gave rise to the research in the first instance.

In a number of situations research concerning the transfer of agricultural technologies to farmers has utilized the survey approach. This approach has been criticized by Hall (1982), among others, who argues that it has a number of shortcomings:

1. *It oversimplifies social reality and is therefore inaccurate.* This criticism is based on a tendency towards the arbitrary construction of research instruments which extract information from individuals in isolation and hence lose touch with the complexity and richness of human experience. It is also argued that information sought through interviews or questionnaires, which provide a pre-set framework for responses, forces choices on respondents and presents a static picture of reality.

2. *It is often alienating, dominating and oppressive in character.* The assumption that research and extension are ideologically neutral and value-insensitive is increasingly being questioned. The regard for research respondents as sources of information and possessing bits of isolated knowledge that are needed by the researcher downplays the ability of research and extension clientele to analyse their reality. It tends to

   '... create the illusion among those from whom information is obtained that research is rigorous, highly technical, scientifically 'pure' and that the work can only be done by those who are university-trained. The abilities of people to investigate their own realities are not stimulated or developed' (Hall, 1982).

3. *It is not conducive to subsequent action.* Research leading to the transfer of agricultural technologies is intended to be action-oriented. However, as already noted, research which tends to

alienate or marginalize respondents, or which merely treats them as sources of raw information, has little likelihood of creating the human environment that is conducive to innovation, change and technology transfer.

4. *Its methods are not consistent with the principles of learning.* Technology transfer is a function of extension. Extension is concerned with the provision of education, that is premeditated efforts intended to enable people to *learn* (change their behaviour or the way they think, feel and act). Extension work ought to be guided by principles of learning which put the farmer first and hold faith in humanity.

Since extension starts from farmers' needs, research intended for transferring technologies to farmers ought to reflect this principle as well. That is, we ought to recognize that farmers have much of importance to say to researchers and that farmers' methods of practical systematic enquiry complement those of researchers.

However, the problem is that research and extension methods have been inconsistent with the principles that put the farmer first:

> 'We have long accepted that scientists have something worthwhile to say and give to farmers and have advocated the transfer of technology from scientists to farmers: international agricultural research centres, national agricultural research systems and extension agencies are based on the experts' authority' (Rhoades, 1989).

This is not to suggest that researchers have nothing worthwhile to offer to farmers but rather to recognize the enormous but latent contribution of farmers in research and technology transfer. Rhoades has observed that:

> '... farmers' knowledge, inventiveness and experimentation have long been undervalued and that farmers and scientists can and should be partners in the real and full sense of that word in the research and extension process' (Rhoades, 1989).

The domination of scientists/researchers in research and technology transfer over the years has been partly rooted in scepticism about farmers' innovation, knowledge, potential and capabilities. The problem is that farmers have not been able to share their discoveries with researchers using the ground rules that are best known to researchers:

> 'Researchers simply have not seen hard evidence to prove or disapprove its existence and value. This is partly because farmers seldom record their accomplishments in writing, rarely write papers on their discoveries and do not attach their names and patents to their inventions. As a result, the history of agriculture is written without reference to the main innovators in the long-term process of technological change' (Rhoades, 1989).

FARMERS AS A COMMON DENOMINATOR IN RESEARCH AND TECHNOLOGY TRANSFER

Farmers have, over the years, been served by researchers and extension workers through what can be described as a 'delivery-oriented' approach whereby there has been a concentration on deliveries to farmers without corresponding efforts to enhance the capacity of farmers to make claims on these deliveries and become self-reliant (Tilakaratna, 1985). The 'Green Revolution' strategy is a good case in point, whereby the focus was on the modernization of peasant agriculture, using a delivery package consisting of subsidized inputs, special rural credit schemes and a network of agricultural extension services.

The delivery-oriented approach has been criticized for marginalizing and disempowering the farmer. The approach is based on the assumptions of conventional research and extension which are in sharp contrast with the emerging liberating assumptions of participatory research and extension (Table 1).

It follows from the assumptions in Table 1 that farmers are perceived differently in conventional and participatory research and extension and are, therefore, served differently. According to Sagar and Farrington (1988:10-11), the factors constraining the generation and dissemination of technologies appropriate to the needs and opportunities of farmers include:

- the fact that farmers are frequently spatially and politically marginalized and hence poorly served by research and extension;

- the tendency for researchers and technology disseminators, through their top-down professional orientation, to be dismissive of farmers' apparent reluctance to change;

- the likelihood that 'reductionist scientific methods', which examine individual commodities or technologies without a holistic outlook, will produce misleading recommendations where systems interactions are strong;

- the apparent negligence of the importance of farmers' indigenous knowledge of their complex and highly variable real-life environment.

The overall assessment by Sagar and Farrington (1988) is that farmers' 'demand pull' on the research agenda has been weak and little attention has been given to designing the interface between researchers' formal and farmers' indigenous knowledge in order to take advantage of the best of each. A prescription that has normally been made in relation to enhancing the linkage between research and extension is that the two sides should meet regularly and try to understand each other's objectives, interests and capabilities (Shaner *et al.*, 1982). It is argued that in this way each party will be aware of its dependence on the other and this will create some incentive for developing stronger ties. The establishment of liaison positions and offices in research and extension organizations has also been frequently recommended and implemented as a necessary step towards the enhancement of effective and operational linkages.

It is now becoming increasingly evident that since farmers are the common denominator in the research-extension continuum, they ought to serve as the foundation for the linkage between research and extension. Experiences with farming systems research and extension, participatory rural appraisal, research committees and animation have demonstrated the unique and important role of farmers in facilitating genuine and realistic linkages between research and extension.

FARMING SYSTEMS RESEARCH AND EXTENSION

Farming systems research and extension (FSR/E) involves the development and dissemination of relevant improved technologies in agriculture in order to improve productivity and, consequently, the well-being of individual farm families. The use of on-farm research in development and dissemination of technologies provides the opportunity for scientists to work directly with farmers.

The key stages in the farming systems research/extension process demonstrate crucial areas of involvement by farmers:

1. *The descriptive or diagnostic stage,* in which the actual farming system is examined in the context of the 'total' environment - to identify constraints farmers face and to determine the potential flexibility in the farming system in terms of timing, unused resources and other factors. It is also necessary at this stage to explore the goals and motivation of farmers that may affect their efforts to improve the farming system.

Table 1. Underlying assumptions of conventional and participatory approaches to research and extension

Conventional	Participatory
Research concept	
Systematic inquiry is an activity of professionals and scientists who are specially trained for the purpose in order to bring about development	Systematic inquiry is a process of creation of knowledge, attitudes, innovations and skills that are necessary for the liberation and empowerment of human beings so that they can develop themselves
Researchers	
Have professional authority which they confuse with authority of social investigation	Have professional standing which they utilize in enhancing the ability of the rural poor to create and make use of new knowledge
Choose research topics and problems, determine objectives and methodologies, interpret the findings in their own framework and develop recommendations for others	Facilitate the process of systematic inquiry by posing problem situations, guiding the process of investigation in which researchers and rural poor work together to question underlying causes, collecting and analysing data, developing relevant recommendations and taking action to solve identified problems
Determine the research target audience and end-users of recommendations	Identify the people to work with as partners in the research process and also constitute part of the end-users of research outputs
Constitute a distinct social group with rigid rules of the game	Strive to create homogeneity with rural people and operate with substantial flexibility in order to accommodate their experiential resourcefulness
Dominate the research process	Serve as animators who make rural people more aware of their potential in order to stimulate participation; animators work towards their own progressive redundancy in the process
Rural poor	
Usually considered to be static and increasingly passive	Actually known to be dynamic and perceptive in their real life environment
Have to be researched over and over for their own good by others	Must constantly reflect on their own situation and challenge this reality in order to create a better world
Have to adopt knowledge, innovations, technologies and wisdom possessed by others almost without question	Must bring experience and indigenous knowledge to bear on constraints for development while taking advantage of available and evolving institutionally organized knowledge
Perceived as typically reactive and thus must be carefully controlled for better results	Are, by nature, proactive and therefore capable of taking initiative, reflection and action
Research environment	
Biased in favour of scientists in terms of resources, decision-making and authority	Mutual, collaborative and conducive to the creation of a common research programme
Rigid, formal and almost exclusive	Flexible and non-formal to respond to practical realities
Creates dependency of rural people on scientists	Creates strategic alliance between rural poor and scientists, empowering the former in the process
Not easily sustainable	Easily sustainable
Research methodology	
Top-down, authoritarian and manipulative	Bottom-up, encouraging dialogue and interaction
Subject or discipline oriented	Problem-oriented with adaptive and multidisciplinary focus
Philosophy of learning	
The rural poor are objects of research and learning	Both rural poor and scientists are subjects of research and learning
Scientists will learn from new knowledge, innovations and technologies arising from research and they will in turn impart the same to the rural poor	Learning will occur as a result of activities engaged in by the rural poor and scientists in the process of systematic inquiry
Agricultural technology	
Considered as the exclusive domain of researchers and presumed to be too complex for farmers to comprehend	Considered as a product of joint reflection, analysis and action on the part of researchers and farmers, hence within farmers capability to handle
Technology transfer	
Regarded as a parallel function to the research process	Carried out as part of the research-extension continuum, utilizing indigenous knowledge and emerging innovations

2. *The design stage,* in which various strategies are identified that are thought to be relevant in dealing with the constraints determined in the descriptive or diagnostic stage. Information for designing such strategies comes from experiment station work, researcher managed and researcher implemented (RMRI) type work on farmers' fields, and from other farmers.

3. *The testing stage,* in which a few promising strategies, arising from the design stage, are examined and evaluated under farm conditions to determine their suitability for producing desirable and acceptable changes in the existing farming system. This stage usually consists of two steps:

   (a) researcher managed but farmer implemented tests (RMFI) to establish whether transferred technical relationships are altered by farmers' management of non-treatment variables;

   (b) farmer managed and implemented (FMFI) tests, when it is established that the transferred technical relationships will hold but that there is a need to evaluate the proposed technologies under local socio-economic circumstances.

4. *The dissemination stage,* during which the strategies identified and screened during the design and testing stages are brought to the attention of farmers.

FSR/E has important characteristics that have implications for research-extension linkages and adaptive research:

1. *It puts farmers first.* The approach puts farmers - the ultimate consumers of agricultural technology - at the centre of the research process. The opportunity is taken for researchers to learn from farmers and vice versa, hence providing a mechanism for farmers' input into the research process. In this way, conditions, that would enable farmers to adopt and utilize technologies can be built into the process of research and hence facilitate adoption.

2. *It works with representative farmers.* Given that FSR/E does not work with all farmers, the involvement of a few, carefully selected individuals ensures that a cross-section of farmers' interests can be incorporated. It is possible to ensure that farmers who benefit from FSR/E are also enabled to reach their peers, thereby enhancing dissemination.

3. *It is interdisciplinary.* Farmers' problems vary from the simplest to the most complex. Their real-life environment constitutes complex farming systems. This calls for interdisciplinary research teams in order to address the wide range of issues pertaining to farming systems. Agronomists, animal scientists, agricultural economists, anthropologists and sociologists have typically all been involved. Ironically, at the beginning, there seems to have evolved some notion that there is no role for extension professionals in FSR/E. As argued by De Vries, this misguided notion may have arisen from an apparent misconception of extension and its philosophy.

   > 'The feeling that extension has little if anything to contribute to FSR seems ... largely a result of a misunderstanding of extension's role in agricultural development. One role of agricultural extension is often seen as one of getting farmers to adopt the new practices or innovations generated by research. Extension agents are seen as technical advisers to farmers who prescribe solutions to farmers' problems which the agents define in the first place, much in the same way as the doctor prescribes medicine for a disease he has diagnosed' (De Vries, 1981).

De Vries' observations point to the fact that extension, if perceived and carried out with a top-down, authoritarian, expert-client orientation, bears little in common with the FSR/E approach. However,

when perceived from a bottom-up, people-centred orientation, it links very well to FSR, as illustrated in Table 2.

4. *It involves complementarity.* The research process is generally perceived as progressing as follows:

(a) It begins with work on basic components and processes in a particular production system. This stage usually takes place on-station and provides an opportunity for a broader understanding of the basic principles and issues.

(b) With more and more of the basic issues addressed, research becomes increasingly interactive and applied and requires a multidisciplinary approach in order to address key components which, when put together, form an agricultural technology that is suitable for an identified situation in the farming system.

(c) Technologies are then tested in adaptive trials as a pre-requisite for wide scale dissemination.

It is evident from this progression that as the agricultural research thrust moves from basic to interactive and ultimately to adaptive types, the focus on extension's clientele (farmers) increases. In fact, research gradually moves from the agricultural research stations to farmer's fields, and at this stage the involvement of the farmer becomes increasingly critical and important in the research-extension continuum. Hence, with the focal point being placed on farmers, research and extension operate as complementary, rather than parallel, functions.

PARTICIPATORY RURAL APPRAISAL

Participatory rural appraisal (PRA) has grown out of rapid rural appraisal (RRA). In the context of agricultural research and extension, RRA constitutes evolving methodologies which make use of a multidisciplinary team, working with clients (farmers) and community leaders to develop, in a quick but systematic way, a series of hypotheses relating to agricultural development. RRA can be said to have evolved in the 1970s partly from, and partly alongside, FSR (McCracken *et al.*, 1988).

RRAs constitute a response to the limitations of conventional methods. Often, the latter generates biased information from short visits to rural areas, sometimes dubbed 'rural tourism'. RRAs are also:

> 'the result of the growing recognition by professionals of the obvious fact that rural people were themselves knowledgeable on many subjects that touched their lives. What became known as indigenous technical knowledge (ITK) was then increasingly seen to have a richness and value for the practical purposes of outsiders' (Chambers, 1992).

According to Chambers, RRAs began as a better way for outsiders to learn, and in addressing the question 'whose knowledge counts?' RRAs focused outsiders' attention on rural people and their indigenous technical knowledge. However, RRAs have had one major weakness:

> 'Outsiders go to rural areas and obtain data from the local people, *bring it away* and process it, sometimes to see what they (outsiders) thought would be good for them (villagers). The outsider or development worker was still *central, the main actor. The knowledge of rural people counted but for the outsider's use.* They were the ones that could carry out the analysis and provide the solution' (Chambers, 1992, with emphasis added).

PRA is thus an extension of RRA and reflects the consciousness of professionals about the weakness of putting outsiders at centre stage. According to Chambers, PRA is a new form of RRA which has increasingly shifted the initiative from outsiders to villages:

Table 2. Interrelationship between farming systems research (FSR) and extension

Potential contribution by extension to FSR	Farming system research stage	Potential benefit of FSR to extension
Help identify and understand priority problems	1. Description or diagnosis of present farming system	Careful diagnosis of farmers' problems
Help define and understand farmers' objectives		Better understanding of farmers' objectives and farming systems
Assist in gathering data - e.g. sampling, supervision		
Help define research parameters	2. Design of improved systems	Critical problems are researched
Help identify innovations tried by some		Scientific analysis of possible innovations
Maintain link to farmers	3. Testing of improved systems	Research results relevant to farmers' situation and carefully field tested
Help select and arrange sites for field trials		
Assist in conducting field trials		Training of extension workers and farmers
Provide link to other farmers		Help with in-service training
Encourage and facilitate testing by farmers		Encourage farmers to continue to innovate and learn
In-service training for extension workers	4. Extension of improved systems	Help with in-service training
Adaptation of recommendations to local conditions		Advice on adaptation of recommendations
Teaching new systems to farmers		Obtain demonstration materials
Obtain feedback from farmers		Obtain simple written materials, publications
Provide practical help to facilitate adoption		Back-up support

Source: Adopted from De Vries, 1981.

'Outsiders still go to rural areas, but more and more as learners, conveners, catalysts and facilitators. The goal is to enable rural people to do their own investigations, to share their knowledge and teach us, to do the analysis and presentations, to plan and to own the outcome' (Chambers, 1992).

PRA puts farmers at the centre of the research process. Knowledge is generated and articulated in more participatory ways. The methods and techniques for PRA are carried out more by villagers themselves. The following methods have been increasingly used:

- Secondary data review
- Direct conversation, including wandering around
- DIY (do-it-yourself), taking part in activities
- Key informants
- Semi-structured interviews
- Group interviews and discussions
- Sequences of interviews
- Key indicators
- Workshops and brainstorming
- Transects and group walks
- Mapping, modelling and aerial photographs
- Diagramming
- Wealth ranking
- Other ranking and scoring
- Quantification
- Ethnohistories and trend analysis
- Time lines (chronologies of events)
- Stories, portraits and case studies
- Team management and interactions
- Key probes
- Short simple questionnaires, late in the PRA process
- Rapid report writing in the field

Thus, PRA contrasts substantially with conventional approaches (Table 3), particulary with respect to the way farmers participate in technology creation, transfer and utilization.

Table 3. Comparison of conventional and participatory rural appraisal (PRA) approaches

Techniques employed	Conventional	PRA
Statistical analysis	Often a major part	Little or none, use of triangulation
Formal questionnaires	Often included	Avoided
Interviews with local farmers and key informants	Through formal questionnaire, if at all	A major component using semi-structured interviewing
Qualitative descriptions and diagrams	Not as important as the 'hard data'	Considered at least equally as important
Sampling	Statistically acceptable sample sizes regarded as necessary; often random sampling	Often small sample size, selecting 'key' areas, farms, households etc; 'statistical' requirement not always adhered to
Consulting secondary data sources	Yes	Yes
Measurements	Detailed, accurate	Qualitative or indicators used
Group discussion	Informal unstructured sessions	Via semi-structured workshops and brainstorming

Source: McCracken *et al.*, 1988.

PRA in Kiteto

Like FSR, the approach of PRA involves semi-structured activities in the field involving a multi-disciplinary team but with farmers taking ultimate control and ownership of the research and dissemination process. A recent PRA experience in Kiteto District, Arusha Region, Tanzania can serve as an illustration.

The experience involved the author along with a multidisciplinary team of 'professionals' from Tanzania and Kenya. The team was guided by Robert Chambers, a renowned proponent of PRA. The experience was arranged by the Arusha Diocesan Development Office (ADDO) in which the Maasai, ADDO staff and the visiting 'professionals' took part.

The PRA experience with the Maasai people of Olmoti, a small cluster of three contiguous *bomas* (settlements) in Namalulu village, revealed the following:

1. The Maasai people are very resourceful in terms of indigenous technical knowledge concerning agriculture and their environment.

2. The Maasai people can develop their own perspective of their real-life situation if provided with the opportunity to do so. For example, they were able to:

   (a) Draw their own resource map showing key boundaries, hills, grassland, seasonal rivers, roads, tracks and footpaths, water wells and settlements.
   (b) Draw an agro-ecological zone map of their village. Five zones were drawn first on the ground and then on paper.
   (c) Develop a fodder matrix with local names of fodder plants growing in the area. The criteria for the most important fodder plants were developed on the basis of their value to cattle.

3. Maasai women drew a social map of their *bomas* on the ground indicating:

   (a) The people who live in each hut.
   (b) The number of children per hut.
   (c) The number of women, pregnant women, blind women, deaf women.
   (d) The number of husbands and disabled men.
   (e) Cattle, goats.
   (f) Traditional birth attendants.

4. The people did some wealth ranking

5. A young illiterate Maasai man drew a map of the village.

The Olmoti experience is one among many that demonstrate the viability of PRA. Experience elsewhere (Box, 1989) has shown that PRA can enable villagers to engage in three techniques which are complementary to agricultural research:

1. Biographical analysis: reconstructing farmers' biographies with respect to a particular crop, thus learning about the discontinuities in crop cultivation and the experiments done to adapt to changing circumstances or improve available technology.

2. Adaptive trials: translating farmer experiments into scientific designs and adapting scientific trials to the real life local environment.

3. Knowledge network transformation: translating local knowledge about crops into more general statements and developing local knowledge networks with a flexible interface.

RESEARCH COMMITTEES

The idea of research committees at village level evolved from the experience of unsuccessful 'research teams' under the Sokoine University Extension Project (SEP). Research teams were composed of village extension workers and other local functionaries, in accordance with conventional research and extension practice.

After half a year of operation, the following weaknesses were evident (Kimbi *et al.*, 1992):

1. Very few research teams consulted with village leaders.

2. Villagers were left out of the teams.

3. In most villages, no meetings of village teams were held to carry out team functions.

4. There was inadequate follow-up of team activities, hence calling into question the concept of the sustainability of such activities.

5. Some members of the research teams had not been trained in the identification of needs.

Consequently, research committees were introduced to replace research teams. The research committees were composed of: village extension workers, other village functionaries, village leaders, and farmers' representatives - at least one from the local production committees. The farmers' representatives included women. Research committee members were provided with training in data collection in the context of the identification of village needs and people's involvement in data collection, data analysis and programme planning.

Experience with research committees as currently constituted has led to the following observations:

1. Villagers feel more free to discuss village problems and needs. Villagers tend to have more confidence in 'people of their own kind' than in outsiders.

2. The relationship between village leaders and village functionaries has improved in view of the fact that the work of research committees heavily relies on cordial relations, harmony and team spirit.

3. The participation of women in research work has been enhanced.

4. Plans of action and innovations arising from priorities developed by research committees are more readily accepted by villagers than those brought to their attention by outsiders.

5. Villagers have become more pro-active and increasingly more inquisitive and analytical than was the case before the research committees started operating.

ANIMATION

The traditional role of change agents

In Tanzania, the change agents who were expected to play a key role in ensuring positive outcomes from *ujamaa* (the movement, in some cases enforced, of people into villages) were extension workers. Agricultural extension workers, commonly known as *bwana shamba*, in particular were expected to take a lead. Yet the image of the *bwana shamba* has not been good in the public eye:

> 'Historically peasants in Tanzania have not had a good image of the *bwana shamba*. During the colonial period the *bwana shamba* was one of the colonial government agents who complemented the many agricultural enforcement acts, and was often very ruthless with the peasants' (Ndonde, 1975).

This perception among people did not improve much after independence. The emphasis on progressive farmers as a matter of Government policy and the *bwana shamba's* own class alliance dictated close working relationship with these rich farmers as opposed to the poorest of the poor who were the majority. It was hoped that *ujamaa* with its quasi-socialist features, would create the kind

of revolutionary environment that would bring the *bwana shamba* much closer to the peasants. However, this was not often the case (Ndonde, 1975).

The ambivalent and contradictory role of the *bwana shamba* can be explained by several factors. First, when the resettlement of rural people into clusters became mandatory, it was the *bwana shamba* who worked with other change agents and with the Government machinery to move people. In areas where people were moved forcibly, resentment against the *bwana shamba* was, and remains, considerable. The *bwana shamba,* who was expected to be a catalyst for change and a peasants' companion was, in this case, regarded as the oppressor.

Secondly, it can be argued that the *bwana shamba* is, by nature, a product as well as a part of the generally anti-participatory orientation of the predominant educational and administrative systems. This aspect was noted even during colonial times. Yeager (1982), for example, quotes a colonial agricultural officer admitting the need for such change agents to move away from being policemen to being teachers and advisers of farmers. This particular officer was critical about the approach of agricultural improvement through legislation, on the grounds that it makes the change agent unpopular and serves as a platform for opposition.

Thirdly, the anti-participatory orientation of change agents can also be traced back to the way these agents are prepared for the job. It has been noted that schools tend to foster competition rather than co-operation and solidarity. For example, Bugnicourt (1982) laments that in nine out of ten schools in Africa today, the children are taught not participation but rivalry. Despite all the organizational changes that the Government of Tanzania has spearheaded, including a reorientation of the curriculum towards 'education for self-reliance', education is still elitist and bourgeois in philosophy. The education of extension workers is no exception. Extension workers are prepared for the job through a subject orientation that leads them to 'profess' on subjects and operate in a top-down instructive and regulatory fashion (De Vries, 1978; Keregero, 1981, 1988, 1989).

Fourthly, one characteristic of the *ujamaa* drive as observed at the time was its lack of genuine political mobilization. This was because *ujamaa* gradually came to be regarded as an administrative task rather than a political process, requiring genuine education to make people aware of its purpose and value. The results of this are well summarized by Ndonde:

> '... since bureaucrats have their own notions of development in keeping with their own class interests, the type of educational methods they use are those that lend themselves to manipulation, domestication and control of the peasants. They cannot educate the peasant to be critical of his social and natural reality around him and thus enable him to act against those elements which dominate him, for this would challenge the very essence of their existence' (Ndonde, 1975).

Fifthly, and closely linked to the arguments already given, there has been little genuine interest among administrators who are usually in contact with the grassroots in encouraging a more participatory approach. In a way, this can be explained by the fact that the administrative system is generally a continuation of the anti-participatory attitude of the schools and training institutions. In the words of Bugnicourt (1982):

> '... government workers seem to believe that by disseminating a particular idea or a particular technique, they will automatically obtain a particular result. They think they can do without a dialogue with the grassroots groups, which in fact would give them access to the inside system of communication, the real place where opinions are shared'.

The stereotype of the villager

Coupled with this image of the change agent is the stereotype of the villager or farmer. The villager has typically been perceived as belonging to a sub-culture of peasantry (Rogers and Shoemaker, 1971). Those belonging to this sub-culture are said to portray such characteristics as: mutual distrust in interpersonal relations; a perception that there is only a finite supply of good (so that to gain means someone has to lose out); dependence on and hostility toward government authority;

strong family bonds; lack of innovativeness; fatalism; limited aspirations; lack of appreciation of deferred (long term) benefits; limited view of the world; and low empathy for outsiders. Experience has shown that even the extension service has sometimes regarded farmers as naive, traditionalistic and irrationally resistant to change (Keregero *et al.*, 1977).

According to De Vries (1980), the traditional extension approach portrays farmers as passive objects rather than active subjects and as individuals who know nothing and, therefore, have to be taught. This is partly a reflection of what Bugnicourt (1982) calls a scorn for traditional knowledge by government functionaries:

> 'Presenting themselves as "specialists" situating themselves in the hierarchical system of "modern" society, the majority of government agents show little appreciation of the experience and knowledge of the people, little awareness of the creative potential of the peasants ... and little ability to examine their behaviour in relation to the majority of the population ....'

Bugnicourt argues that this indifference towards participation is the stereotype of the peasant as seen from an elitist perspective. Those who hold this view entertain serious doubts about the ability of people at the grassroots to understand situations, analyse them and propose solutions, translate these into action and evaluate the outcomes.

There are several examples that show that a number of innovations introduced in the communal production system failed to take root because they were incompatible with the common interest of villagers. In a number of situations their real needs and problems had not been adequately understood.

Animation

The concept of 'animation' has been derived from 'animation rural' which emerged as a coherent strategy in the mid-1950s as part of the French effort to promote rural modernization as a prerequisite for transferring power to independent states (Uphoff *et al.*, 1979). The philosophical basis of this approach can be traced back to socialist literature and development inclinations embraced by the French Catholic humanist school of thought. Animation rural is considered to be the counterpart of the community development approach which emerged from British and later from American thinking (Charlick, 1984). Both concepts shared the premise that rural development cannot be defined merely in terms of economic productivity and efficiency and that effective and sustainable development ought to embrace the participation of rural people, especially the poor and women who are frequently marginalized.

Over the years, animation rural as applied in rural development literature has come to mean various things to various people, conveying such notions as an ideology, a far-reaching strategy for social change and a wide range of techniques for promoting rural socio-economic change. What seems to be the common core in animation, according to Charlick (1984), is the notion of 'a set of educational and organizational techniques which attempt to stimulate local-level participation in development'.

Experience in Tanzania has demonstrated that animation has derived increasingly practical interest from the liberationist approach to development. The operational character of this process can thus be described in the following way:

> 'Animation is an educational and organizational method for promoting self-reliant development. As an educational approach to change, liberation animation stimulates reflection among the people so that they can enhance their capacity to understand and overcome the obstacles which underlie their present condition. From this reflection comes a sense of what needs to be done which is guided, not by sharing in a diffusion of world technology or values, but by self-analysis. The task of animation is to assist in the transformation of people's attitudes which deny their right or ability to participate in this kind of reflection, and to support the formation and functioning of substantially autonomous organizations in which people can make responsible decisions and begin to carry them out' (Charlick, 1984).

Local groups have been found to constitute effective autonomous organizations in rural communities. Animation techniques are bottom-up in nature and, by definition, concentrate on the formation and development of local groups as a panacea for group action, participation and empowerment. Groups are said to be animated if members' consciousness has been sufficiently raised to the extent that they are enabled to assess their situation, analyse their problems and needs, and take necessary corrective action.

Animated groups are formed through participatory processes and therefore have characteristics which distinguish them from more common structures of local organization and grassroots development:

- *Shared common interest.* Animated groups are formed voluntarily. That is, group members themselves create the groups after they are convinced about the importance, necessity and utility of the groups. Awareness of development needs and problems normally prompts the formation of groups. In this case individuals co-operate on the basis of shared common goals and interests. Animated groups are therefore said to enjoy a reasonable degree of homogeneity. This, along with the resultant cohesion, enhances commitment and discipline towards problem-solving and self-reliant initiatives.

- *Small size.* Unlike *ujamaa* villages and primary co-operatives that normally involved large populations, animated groups are generally small. They generally range from 5 to 30 people per group. This small size enhances interaction among members and facilitates management and enforcement of member discipline.

- *Group leadership and decision-making.* Animated groups are non-hierarchical and democratic in their operation and organization. Group members are themselves managers of the groups. Leaders are chosen democratically and generally their responsibilities and functions are diffused as widely as possible among members. Thus groups serve as instruments of the members who exercise effective power and control over their operations. Decision-making is by active and close consultation among members and usually results from consensus.

- *Emphasis on self-reliance.* Groups are generally formed after a realization of the potential for the collective power of individual members in attaining development goals. Members therefore strive to influence their own environment, using whatever resources are available to them.

- *Continuous reflection and action.* Animated groups are a basis for reflection and action on the group's real-life situation. Thus groups provide opportunities for members to learn from one another and to take joint action without having to face any repercussions individually. Sometimes change agents are recruited to serve as promoters or catalysts for the process of learning through reflection and action.

The animation process is a move away from the top-down approach towards people's involvement and self-initiatives for development. Animated groups therefore ought not to be reduced merely to structures for making claims and demands for basic needs or consumption. They should be seen as a manifestation of a creative process which ultimately changes and transforms human beings, enabling meaningful development.

The animation process also stimulates people to think, reflect and move on to investigate and analyse the social reality they live in, understand the causes of poverty, deprivation and exploitation and investigate possibilities for action, after which they can take initiatives to transform the situation. In other words, this process seeks to facilitate the building up of people's self-confidence and their ability to organise and manage self-reliant actions. This further fulfils the policy of people's involvement in the determination and execution of decisions on matters that affect them and of the direct or indirect selection, as well as control, of the leaders (Maeda, 1976). Ultimately, people's

involvement can effect the transformation of the peasantry to a better level in the whole rural development scenario because then the rural population would not only be moving towards increased productivity but would also be in a position to realize their economic well-being. This is development that would rid them of exploitation and poverty and clear the way for a socialist construction (Shao, 1980). The concept of participatory development initiatives within the framework of animated groups is based on the assumption that a process of dialogue between a change agent and the villagers takes place. This process of dialogue is intended to:

- Identify the constraints to village development
- Assist the villagers to work out solutions to problems which they encounter, using their own skills, knowledge and resources
- Identify the potential of the villages in terms of resources
- Evaluate the resources available in the village environment and the villagers' ability before seeking help
- Lay the foundation for technical assistance for villagers to help design appropriate plans and projects to tackle the real village problems

Emerging experiences with animation in Tanzania point to the following benefits:

- Promotion of people's awareness - it is concerned with the liberation of the creative potential and initiative of people through *investigation, reflection, analysis* and action
- Creation of participatory organizations - these are villager-controlled and villager-owned
- Choice of genuine participatory projects and initiatives
- Utilization of science and technology arising from both indigenous knowledge and institutionally organized knowledge
- Increased participation of women and the disadvantaged
- Enhancement of opportunities for the replicability and sustainability of initiatives
- Creation of opportunities for learning and experiencing together for professionals and villagers

CONCLUDING REFLECTIONS

Recognition of the importance of farmers in the development, transfer and utilization of technologies has stimulated increased effort and innovation in research and extension. Farming systems research and extension, participatory rural appraisal, research committees and animation are all examples of approaches that reflect the continual search for more effective and sustainable linkages between research and extension. Other examples of such initiatives include (Molnar, 1989):

1. The *sondeo*, whereby teams of five agronomists or other technical agriculture specialists and five social scientists spend some five days in the field, interviewing in pairs (technical and social scientist), and summing the results at the end.

2. The *farmer-back-to-farmer* technique, whereby informal surveys are used to define the problem and identify solutions by an interdisciplinary team. The intervention is tested, using farmer evaluation, and farmers deliver the 'last judgment'.

3. *Recommendation domains*, whereby farmers are grouped by various criteria into 'domains' for the purpose of field surveys and applied research. These domains can also determine the scope for disseminating recommendations and technology.

4. The focus on *resource-poor farmers* whereby this disadvantaged client category becomes the special target for informal surveys and extension research in order to record more accurately their own perceived needs and problems.

5. The *diagnosis and design* technique, whereby agroforestry strategies are outlined through surveys which encompass trees and crops and broad production and conservation objectives that are usually omitted in conventional research. These include such aspects as the sustainability and adoptability of technologies.

These and other similar initiatives are part of a continuing and on-going process of learning, whereby the results of every attempt are used to assess the projected solutions and contemplated actions.

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