# Scaling up of natural resource management technologies: Experiences and issues

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**Abstract**

There is an observable dynamism of technology development and transfer approaches in the Ethiopian Agricultural Research Institute (EIAR), as well as in the National Agricultural Research and Extension System (NARES) of Ethiopia. Using some of the critical elements to compare approaches, it is obvious that scaling up is superior to pre-extension and other participatory approaches for technology development and transfer. As such, scaling up is getting more momentum and synergy. Since scaling up aims to provide 'more quality benefits to more people over a wide geographical area more quickly, more equitably and more lastingly', this approach is gaining constantly more acceptance and popularity in EIAR, among both its partners and stakeholders, to develop and transfer crop, livestock and, to a limited extent, natural resources management (NRM) technologies and knowledge. Improved technologies and innovations are essential to support an increased productivity of natural resources in watershed management. Many research and development programmes and projects on NRM have been conducted in Ethiopia and potential technologies and knowledge for scaling up have been generated. However, very few of the recommendations from research have been put to use by the target end-users. Therefore, there is a huge potential for utilizing scaling up approaches in the area of NRM. The nature of interventions in NRM, lack of institutional and professional commitment to scale up NRM technologies and knowledge, and the failure of research projects to have a communication strategy of research findings to stakeholders other than farmers are some of the challenges that must be dealt with in order to successfully scale up NRM technologies. This paper will evaluate the importance of a scaling up approach for NRM technologies and knowledge development, as well as transfer, and the challenges in the area of NRM scaling up.

## 1. Introduction

Ethiopia's current development strategy, known as Agricultural-Development Led Industrialisation (ADLI), was designed with the objective of transforming the traditional economy into a modern economy closely linked with the rest of the world. In a nutshell, the strategy by and large shows the direction towards an improvement of the productivity of smallholder agriculture and industrialisation, based on the utilisation of domestic raw materials and labour-intensive technology.

In this regard, agricultural research and technological improvements, therefore, significantly contribute to the alleviation of poverty by improving agricultural productivity and raising the income of rural community. However, the policy comes with challenges as well as opportunities for agricultural research and development programmes. A major challenge for agricultural research and development is to create an impact on a wider level.

Consequently, various agricultural research results that could help to increase agricultural production and productivity have been developed and are being generated. Nevertheless, these useful research results have not reached the intended target/ goal efficiently and effectively. Among the different factors constraining agricultural development, lack of effective agricultural technology development and transfer is one of the constraining elements among the different factors impeding agricultural development. To overcome this constraint, various methods, viz. pre-extension demonstration, popularization, training, field days, workshops, production of extension materials have been devised and utilised so as to strengthen technology development and transfer activities. However, these mechanisms mainly have served to introduce new agricultural technologies to a very small number of client farmers with limited areas.

Even though one cannot underestimate the contribution of this approach towards the promotion of improved technologies, significant and visible impacts have not been observed as yet. In other words, it cannot go beyond creating awareness of the improved technologies, which means that a full utilisation of the technologies' potential is not adequately realised. Hence, once the successful technologies are established and awareness is created, the issue is how to disseminate the technology and information on a wider scale. Cognizant of this fact, EIAR has recently designed a comprehensive and innovative approach to develop and transfer its research outputs with the aim to create a wider impact on users' livelihood through the technology SCALING-UP initiative. However, there are still many issues to be dealt with, such as the dimensions of NRM technologies/ information scaling up.

## 2. Scaling up of agricultural technologies in EIAR

Using some of the critical elements to compare approaches, more than pre-extension and participatory approaches for technology development and transfer scaling up has superiority over the former once. Therefore scaling up as an approach of technology development and transfer is getting more momentums and synergy. Since scaling up aims to provide 'more quality benefits to more people over a wide geographical area more quickly, more equitably and more lastingly' this approach is getting more acceptance and popularity in EIAR, among its partners and stakeholders to develop and transfer crop, livestock and to a limited extent NRM technologies and knowledge. The very nature of this approach is that strong and synergistic collaboration among relevant stakeholders and coordination of activities with immense follow-up are the determinant factors of success to the approach.

As an entry point, before launching a full-scale scaling up project, EIAR has implemented the scaling-up approach on a pilot level by some agricultural research centers (Debre Zeit, Holetta and Melkassa) with few crops and technologies (lentil, durum wheat, potato and haricot bean). They have also established confidence in the success of the approach as it has recorded remarkable achievements.

Given the benefits and advantages of such initiatives, scaling-up these initiatives to enable a wider impact is highly important. Therefore, EIAR is promoting the scaling-up of agricultural technology, principles, approaches and techniques from the already successful experiences to reap the potential benefits through the scaling up of selected proven agricultural technologies to attain the ultimate goal: improving the livelihood of the rural poor people.

The activity of scaling up has been launched throughout the country and around 15,000 farmers have been addressed. Concerning regional coverage, five regions have been covered. However, the Oromia region has taken the major share of the scaling up activities, as many of EIAR's centers are located in this region. To a limited extent SNNP, Tigray, Amhara, Benishangul Gumuz and Afar regions are also addressed. The different technologies scaled up through the project include: malt barley, pyrethrum, haricot beans, maize (melkassa-1), finger millet, striga resistant sorghum, soybean, coffee rejuvenation (stumping), highland maize, durum wheat, lentil, chickpea, forage (oats and vetch mixture-little storey), shallot (little storey), poultry, multi-nutrient block (urea molasses), ground nut, finger millet, dairy cows, potato, sesame, hides and skins, aquaculture, arthimesia, rock phosphate, lime, bio-fertilisers, sweet potato, linseed, field pea, faba bean and wheat. Out of all the scaled up technologies/information, only few are related with NRM.

Organizing field days and programmes for the scaling up activities have provided a series of mass media coverage. The media has proved its partnership in this regard. The scaling up activity has received appreciation and support from higher officials and policy makers (some participated in the field days and most watched it through, heard and read about it in the mass media), as informal observation indicates.

The scaling up project of EIAR has clearly indicated the activities as well as their components in its documentation before implementation (and most of them are executed). Some of them are the following:

- Selection and identification of proven potential agricultural technologies
- Site selection and identification of participant farmers and other collaborative stakeholders
- Description of the role of important stakeholders
- Conducting a baseline survey about the target areas and clients
- Implementation of scaling up activities and enhancement of the active participation of farmers
- Provision of technical support, organization of training, field days, visits, experience sharing
- Organization of participatory monitoring and evaluation.
- Dissemination of the results

In different forums EIAR has presented the comparative advantage of the present scaling up approach, in comparison with different approaches that have been practiced in the research system, and has shown the superiority of the scaling up approach for technology development and

transfer. The major elements and criteria that can be used to compare approaches include: primary goals of the approach, institutional setting, type of technology, information or innovation provided, level of farmer participation in decision-making for priorities and activities and resource allocation. The research and extension methods that were used include the investigation of how farmers participate, as well as of costs, funding mechanisms and control of funding, programme geographical coverage (area), qualitative impact and change, assumptions and impact assessment.

## 3. Issues of scaling up NRM technologies / information

The issue of scaling up has been the center of much recent debate within research and development (R&D) institutions, especially those concerned with NRM. This interest has arisen in the context of several important developments in thinking about R&D. First, government, donors and civil society are increasingly pressuring that money spent in R&D must bring about a lasting impact on the lives of the rural poor. Second, the recognition that many relevant technologies and approaches are not achieving their full potential impact because of low levels of adoption has led to more emphasis on the effectiveness of research to produce adoptable technological options.

Besides, in the past, agricultural R&D institutions traditionally adopted a technology-focused approach (Biggs 1990). This implies a system in which scientists in institutions develop and test the technologies, such as germplasm, which they consider relevant to farmers, and once this process is complete, disseminate them, often through national agricultural extension services. Farmers were often involved in this process; however, their participation was usually not systematic nor were they in a position to make decisions over research priorities or activities. In this type of system, increasing impact implies disseminating material, and making sure it reaches as many people as possible. A significant amount of research was done on technology adoption/diffusion with the goal of improving the extension/ dissemination process (Rogers 1995, Ruttan 1996). The result of the research indicates that there are barriers for innovations to be scaled and that may not reflect a fault in the innovation itself.

In cases where there is a high diversity of environmental conditions, and users' preferences are poorly defined (as is generally the case with poorer smallholders), the technologies developed may not be useful or desirable to large numbers of the rural poor. This, in turn, leads to lower levels of adoption, which implies limited impact. Key restrictions of adoption include the small farmers' inability to be flexible with land, labor, and capital inputs. Often one or all are in short supply, so the technology cannot be adopted. Moreover, small-scale farmers need to protect household welfare; hence they are very cautious about changing established practices. Marketing challenges of products also limit their adoption. For innovations to be adopted, these constraints must be addressed. The heterogeneous characteristics of small farms and families make vertical scaling up especially challenging, and perhaps impossible without adaptation or fine-tuning. These challenges have led to the development of new ways of working with end-users in order to both develop and scale up innovations.

### 3.1. Systems' approaches

Confronted with the complexity of the problems facing farmers, an integrated approach often needs to be taken which works with different components of the system, including social, economic, biophysical, and policy dimensions. The farming systems' research initiatives of the 1970s and 1980s, which introduced

social science inputs, and more recent participatory and gendered approaches, seek to address both the complexity and equity challenges (Collinson 2000). This change was also accompanied by a shift in focus from global or regional scales towards expanding efforts into local and intra-household perspectives. Partly as a consequence of the development of research methods and perspectives, the types of innovations that centers are producing evolve from relatively easy-to-use technologies (e.g., seeds) to more knowledge- and management-intensive innovations, such as guidelines for soil management or integrated pest management (IPM), or methods for organizing adaptive research or watershed management. Integrated natural resource management and integrated soil fertility management are examples of this (Amede *et al*. 2003). An integrated approach also implies involving other actors, and including end-users in the research process in order to address multiple dimensions of a problem.

Part of the interest in going to scale—as opposed to disseminating technologies—has arisen in the context of these changes, which have led to more complex research outcomes and new ways of working with end-users. Scaling up these more knowledge- and management-intensive innovations has created new challenges. The knowledge of breeders is effectively "packaged" into the seed, so in order to transfer this knowledge it may be necessary only to make sure that the farmer has access to the seed and some basic technical knowledge. To pass on the knowledge a scientist has about how to evaluate different varieties (in the case that the seed is not appropriate to the farmer), or about other topics, such as soil nutrient flow and management is far more complex (Simon Cook, personal communication 2002). Thus, going to scale is similar to extension/dissemination in the sense that they both aim to get more benefits to more people more quickly.

Interest in going to scale with these types of innovations also has to do with how integrated systems research is conducted. In order to integrate research on many aspects of a problem, work often must focus on a single or very small number of physical sites. Large impact may be observed in a site, but it is difficult to identify causality, given the high and often sustained level of intervention of researchers and others. Observed results are often due to both the research process and the technologies, so to some extent both must be replicated to achieve a similar impact elsewhere. How to do this is the essence of the scaling up challenge. This problem is faced not only by research projects working in field sites, but also by NGOs who work in a limited number of communities yet hope to achieve impact in many.

### 3.2. Types and definitions of scaling up

Scaling aims to provide"more quality benefits to more people over a wide geographical area more quickly, more equitably and more lastingly" (IIRR 2000, Gundel *et al*. 2001). However, there are different types of scaling up and they are provided as follows:

#### 3.2.1. Quantitative scaling up

*Spread:* increasing numbers of people spontaneously adhere to the organization and its programmes, perceiving them as serving their interest/preferences.
*Replication:* a successful programme (methodology and mode of organization) is repeated elsewhere.
*Nurture:* a well-staffed and well-funded outside agency, using a specific incentive-based methodology, nurtures local initiatives on an increasingly large scale.
*Integration:* a programme is integrated into existing structures and systems and in particular government structures after it has demonstrated its potential.

### 3.2.2. Political scaling up

*Information and mobilization:* an organization's members or local communities are encouraged to participate in the body of politics.
*Aggregation:* federative structures designed to influence policy making are created.
*Direct entry into politics:* grassroots organisations, or their leaders, either create a political party or join an existing one.

### 3.2.3. Organizational scaling up

Diversification of donors; increase in the degree of self-financing, through subcontracting, consultancy or fees-for-service; and creation of institutional variety, both internally and externally.

### 3.2.4. Functional scaling up

*Horizontal integration:* unrelated new activities are added to existing programmes, or new programmes are undertaken by the same organization.
*Vertical integration:* other activities related to the same chain of activities as the original one is added to an existing programme.
However, for the interest of this paper, only horizontal and vertical scaling up will be dealt with. An example of horizontal scaling up (often referred to as scaling out) could be the adoption in different communities of a tool for managing soil nutrient content. Vertical scaling up may mean moving from individual to collective decision making, or it may involve moving from simple organisations based on face-to-face interaction to complex, hierarchical organisations. An example of this is if the same integrated soil nutrient management tool goes from being used by individual farmers to being used in a coordinated way by a group of farmers in the same community, or by an association of farmer groups in many communities. Such vertical scaling up might allow farmers to deal with soil management problems beyond the plot level.

### Vertical scaling up

Vertical scaling up is higher up the ladder. It is institutional in nature and involves other sectors/stakeholder groups in the process of expansion—from the level of grassroots organisations to policymakers, donors, development institutions, and investors at international levels. Scaling up therefore implies adapting knowledge and innovations to the conditions of different end-users, which requires understanding the principles underlying an innovation. For this to be done successfully, those doing the scaling out, whether extension agents or farmers will need more training and support networks in order to work with communities to adapt innovations to their needs.

In addition to technologies, methodologies can also be end products of research. The farmer participatory research (FPR) methodologies, such as Committees for Local Agricultural Research (CIALs, the Spanish acronym), participatory plant breeding modules, or farmer field schools (FFSs), are also research outputs that can be horizontally, and in some cases vertically, scaled up. A CIAL is a model for involving specified actors in a structured process with set objectives.

### Horizontal scaling up

Horizontal scaling up of the more complex research outcomes referred to above differs in many respects from the process of disseminating a new variety. Because these complex research outcomes involve the end-users and work with several different components of a complex system, immediate research outcomes will be less applicable for others. In terms of geographical spread, more people and communities are covered through replication and adaptation, which also involves expansion within the same sector or stakeholder group. Decision making takes place on the same social scale.

As one goes higher up the institutional levels (scaling up), the greater the chances are for horizontal spread; likewise, as one spreads farther geographically (scaling out), the greater are the chances of influencing those at the higher levels.

Horizontal scaling up almost certainly will involve adaptations and unexpected impacts; however, the general process is well defined. Replicating CIALs according to the methodology, but allowing and even encouraging adaptation, is an example of scaling out.

A similar argument could be made in favor of methodologies for organizing watershed management associations, or implementing FFSs. Thus, replication of these methodologies is complicated because in order to scale up these innovations horizontally, it will be necessary to adapt them to the conditions and demands of other communities. Again, this implies building capacity and transferring understanding about the underlying principles rather than just the methodologies themselves.

### 3.3. Institutionalization

Where the principles underlying an innovation and the adaptive capacity mentioned above become an internal part of an institution in a sustainable way, we can refer to this process as institutionalization. This implies not only a change in the way people work, but also a change in the written and unwritten rules of the institution, as well as a change in the way people within that institution think. This is the subject of much debate within participatory literature.

Often these processes of institutional change are a necessary precondition for successfully going to scale on an innovation. As mentioned above, many innovations now involve a multi-disciplinary approach that incorporates a variety of stakeholders into the research process. Many institutions are structured in a way that does not easily allow for the creation of multidisciplinary teams or direct interaction with end-users.

### 3.4. Elements of effective scaling up

The following section discusses key strategies for scaling up:

#### 3.4.1. Incorporating scaling up considerations into project planning

Scaling up must be considered from the beginning of the research and planning process. This implies:

- *Building scaling up strategies into* the technology development process and including them in project proposals can ensure that these considerations are given full attention throughout the life of the project. The likelihood of scaling up can be increased if key opportunities and challenges are identified at an early stage, thereby allowing key channels for scaling up research activities and development outcomes to be identified. In this way, it forms an integral part of the technology/methodology development process, and much work can be done during the research process to lay the groundwork for going to scale.
- *Involving stakeholders as decision makers* from the beginning of the innovation process: This is crucial in identifying real priorities and in developing appropriate solutions to problems. Therefore, research outputs (technologies, processes, methods) are shaped at an early stage of the project in collaboration with stakeholders and users, and can subsequently be adapted throughout the project.

### 3.4.2. Capacity building

In order for complex innovations, such as a soil nutrient management tool, to be adapted and applied in a variety of different contexts, those involved need to have a good understanding of the knowledge and principles underlying the innovation. This implies rigorous capacity building of staff in local institutions and building the adaptive capacity mentioned above within local institutions and local communities.

Capacity building is an important strategy, especially in the implementation and exit stage, to internalise new ideas within communities and institutions. This involves building the capacity of farmers and scientific personnel and the institutional systems to sustain and replicate the process.

Building and strengthening the capacity of communities to innovate may often be just as, or even more important than, the technologies themselves. It is critical for stakeholders to understand that the underlying principles behind a technology can help communities cope with changing environments, and in addressing arising problems. Finally, strengthening local capacities empowers farmers and local communities, and helps create broad-based support and effective local implementation of scaling up activities.

In addition to building the capacity of communities, it is important to develop a critical mass of R&D personnel with skills and experience in modalities for conducting agricultural and NRM research. This can include skills in consulting and collaborating with stakeholders, skills in working across disciplines, and an understanding of scaling up strategies, amongst others.

### 3.4.3. Information and learning

In order to ensure informed, effective, and appropriate decision making by a wide range of stakeholders in the scaling-up process, it is important to invest in a process of documenting, drawing lessons and experiences, and also undertaking corrective measures throughout the project cycle. Learning and corrective loops should be central to scaling up processes, in deciding what should be scaled up and how this might be achieved, and in providing validated evidence to influence policymakers. This involves several aspects:

*a) Participatory monitoring and evaluation (PM&E)*, which involves identifying indicators of change and building a process to monitor and evaluate change, and to measure impact and process of scaling up/out. PM&E ensures that learning and corrective loops are built into the innovation process.

*b) Effective impact assessment* will also be necessary in order to learn from, and gain credibility on, the effectiveness and extent of impact of innovations, and to provide validated evidence to influence decision makers at different levels. Furthermore, impact assessment will help to identify factors that are important for adoption that may contribute to the success of innovation. However, if innovation occurs as the result of the interaction of the results of many simultaneous and independent (or perhaps only loosely coordinated) research initiatives, the traditional concepts of diffusion, adoption, and impact (especially attribution of impact to a specific research investment) may not be appropriate.

### 3.4.4. Building linkages

Developing partnerships and strategic alliances with other stakeholders (private sector, NGOs, governmental organisations [GOs], communities) is one of the essential strategies for successfully scaling up innovation. This will increase pathways through which the innovation can be scaled up, and thus leverage scarce resources to achieve greater impacts. These linkages have to be robust, ideally with direct

participation of the other stakeholders in the research process, in order to ensure local ownership and to ensure that the necessary adaptive capacity is developed. This can involve several strategies, such as developing partnerships and strategic alliances, and linking with other stakeholders (private sector, NGOs, GOs, communities). This includes expanding and strengthening links amongst institutions and organisations with complementary agendas, expertise, resources, and "reach", as leverage resources. Inter-institutional collaboration and coordination is not only important, it is crucial, and a prerequisite for maximizing impact.

### 3.4.5. Engaging in policy dialogue

It is necessary to engage in dialogue with policymakers, not only to gather support for innovations and projects, but also to create the right institutional environment for innovations to be scaled up. For example, it may be necessary to convince managers of the need to work with end-users, but it may also be necessary to encourage the changes within the institutional structure necessary to overcome the institutional barriers mentioned above. Engaging in policy dialogue on pro-poor development agendas is critical in achieving impacts.

### 3.4.6. Sustaining the process (funding)

For the process to be sustainable reliable funding is required. Thus, donors need to be lobbied to obtain long-term flexible funding, which allows for a learning process to take place. Appropriate mechanisms also need to be developed to sustain capacity for expansion and replication. This involves paying special attention to mechanisms for self-financing, input/output markets, capacity building, and local and regional networking.

## 4. Conclusions and recommendations

The authorities responsible for the research system should take the following points into consideration and try to improve the scenario in relation to NRM technologies' scaling up:

- At present only few technologies/ information of NRM are scaled up by EIAR's scaling up project and this situation needs attention in the future. To change this scenario both professional and institutional commitment is crucial.
- The role of the research system (through its extension directorate wing) and researchers (in allocating their time for promotion activity) in scaling up is rarely recognised or promoted in policies and strategies that guide research on NRM.
- The mind-set of most of research planners, managers and researchers in soil and water management are still fixated in a linear dissemination approach of reaching the ultimate beneficiaries through extension services.
- Research programmes and projects rarely include scaling up plans during their inception.
- Research programmes and projects are rarely evaluated for communication, knowledge sharing, uptake and utilisation of knowledge and technologies produced.
- A very small proportion of programmes and project budgets and activities are committed or used in the communication and uptake promotion of research results.
- Research outputs rarely include specific advice to farmers, input suppliers (e.g. fertiliser suppliers, manufacturers, extension services, policy makers and other clients).
- Researchers are not adequately

trained for communication and uptake promotion.

– The rewards and incentives systems for researchers do not demand evidence for the utilisation and impact of their research.

## Definitions and terminologies

(1) Information (relating to natural resources) has been defined as "patterned data allowing us to give meaning to the environment" (Röling and Engel 1991).

(2) Technologies refer to the application of such information to the activities of human goals, either in the form of hardware (tools, equipment, machines), or as software (knowledge, experience, skills).

(3) Information and technology may be derived from scientific research or from farmers' own experimentation.

(4) Promotion is the activity of making potential users aware of the information or technology, and increasing its accessibility.

(5) Dissemination is the act of distributing information to various audiences in forms appropriate to their needs. Dissemination aims to increase the wider awareness of research products and, in turn, to enhance the speed of up-take, i.e. the use of research products.

(6) Uptake is the application of the information or technology by users. There are two basic categories: 'end users', which in this case include farmers and others (individuals, households, communities) who engage in grain storage, and 'intermediate users', who may use the research findings to produce information, technology and products for end-users, including those needed to create a favorable institutional/policy environment for uptake (e.g. service providers, policy actors, private sector suppliers, educators and researchers).

(7) Pathway for dissemination or up-take refers to the routes or channels by which information and technologies reach the 'users'. Pathways are multiple and complex, especially with respect to reaching poor people and responding to their needs.

(8) Stakeholders are considered to include all those who affect and/or are affected by the policies, decisions and actions of a given system (Grimble *et al*. 1995). This definition should alert us to the possibility that stakeholders in a given venture may not necessarily share the same interest (e.g. grain protectant manufacturers are both stakeholders in post-harvest storage issues and competitors).

(9) Scaling-up aims to provide 'more quality benefits to more people over a wide geographical area more quickly, more equitably and more lastingly' (IIRR 2000, Gundel *et al*. 2001).

## References

Amede T., Amézquita E., Ashby J. *et al*. (2003) Biological nitrogen fixation: A key input to integrated soil fertility management in the tropics. *Position paper presented at the International Workshop on Biological N Fixation for Increased Crop Productivity, Enhanced Human Health and Sustained Soil Fertility,* 10-14 June 2002, Ecole nationale supérieure agronomique (ENSA)-Institut national de recherche agronomique (INRA), Montpellier, France. International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, India. [Online] Available from: http://www.icrisat.org/bnf/Presentation.htm.

Biggs, S. (1990) A multiple source of innovation model of agricultural research and technology promotion. *World Dev*: 18(11): pp. 481-1499.

Collinson, M. (ed.) (2000) *A history of farming systems research.* Food and Agriculture Organization of the United Nations (FAO), NY, USA. 432 p.

Grimble R. and Chan M.K. (1995) Stakeholder analysis for NRM in developing countries. *Nat Resour Forum*, 19(2): pp. 113–124.

Gündel S., Hancock J. and Anderson S. (2001) *Scaling up strategies for research in NRM: A comparative review.* Natural Resources Institute, Chatham, GB.

IIRR (International Institute for Rural Reconstruction) (2000) *Going to scale: Can we bring more benefits to more people more quickly?* IIRR Workshop, Silang, PH. 114 p.

Röling N. and Engel P. (1991) Information technology from a knowledge systems perspective: Concepts and Issues. In: *Knowledge in Society: the international Journal of Knowledge transfer.* Special Issue, February 1991: pp. 6-18.

Ruttan, V. (1996) What happened to technology adoption-diffusion research? *Sociol Ruralis*: 36(1): pp. 51-73.

**Table 1. Dynamism in approaches, the past, the present and future scenario in EIAR.**

| | Approaches in EIAR at various levels | | |
|---|---|---|---|
| Elements | The conventional approach [Pre-extension technology transfer] | The participatory approach [Participatory research and extension approaches: COR, FRG,FEG] | Scaling up and out approach |
| Primary goals of the approach | Just letting few farmers and woreda ARDO what technologies does we have, productivity through yield increases, if technologies are further disseminated (scaled up) | - Increase household productivity through agricultural and other livelihood improvements.<br>- Encourage farmer participation and community mobilization in research and extension.<br>- Build skills and capacity for local empowerment (especially farmer leaders/promoters).<br>- Create (or strengthen) relation with district BOARDO. | - Impact creation through value-chained approach (generation, transfer, marketing, policy, and other related issues)<br>- Value chain can be achieved through institutional networking<br>- Going beyond little success stories or aiming at bringing wider impact of research |
| Institutional setting | - At a separate base<br>- Government extension service<br>- University<br>- Research institutions<br>- Local and international | At a separate base but invitation for participation<br>- Government extension service<br>- University<br>- Research institutions<br>- Local and international | - MOU, signed agreement<br>- Beyond institutional empire building<br>- Strategic alliance with synergy and complementarity's<br>- Role sharing<br>- Institutions collaboration, networking, planning together for a common goal<br>- Resources towards one commonly agreed value-chained impact,<br>- Experience, value and expertise of each institution will be shared<br>- Wider horizontal (all relevant developmental institutions, GOs, NGOs, private firms, industries, financial institutions, unions and vertical (policy making, decision making bodies, top management) institutional networking<br>- Sustainable and chained move of institutions<br>- Joint evaluation |
| Type of technology, information or innovation provided | - Improved seed varieties<br>- Cropping recommendations<br>- Market information<br>- Soil and water conservation<br>- Intensive animal production<br>- Cash crop production (coffee, tea, vegetables) | - Relevant to almost any technology, production system or regime<br>- Farmer-centered approaches tend to focus more on pro-poor needs, priorities and contexts<br>- Approaches appear to be more appropriate for extension programmes that focus on food production/food security and sustainable livelihoods<br>- Approaches appear to be more appropriate for complex, integrated farming systems which require more complex NRM strategies, or more information-intensive production systems, e.g. organic agriculture<br>- Approaches appear not to be well-suited for more commercial, overtly market-based production settings | - Pre-success stories and proven technologies<br>- Actors' and partners' (market, GOs, NGOs, farmers, all involved partners) agreement<br>- Approaches appear to be well-suited for more commercial, overtly market-based production settings<br>- Approaches focus more on change and impact on the farming community<br>- Impact and change through value-chained approach, beyond participation, empowerment |
| Level of farmer participation in decision-making for priorities and activities, resource allocation | None to minimal<br>Minimal to medium<br>High level when it is participatory extension and research approach | Medium to high | High |

| | | | |
|---|---|---|---|
| Research and extension methods used | - Lectures, demos<br>- Films, videos and other audio-visual -- Pamphlets and other written materials<br>- Farmer training<br>- Radio programmes<br>- Farmer field days<br>- Exhibitions, fairs | - Almost any extension method may be applicable<br>- Effective use of any particular method is more dependent upon the emphasis that is given to the specific and active role of farmers, e.g. farmers as trainers<br>- Several methods have proven to be more effective for eliciting farmer participation, e.g. farmer cross-visits or exchanges; farmer field days and exhibitions; demonstrations; films, videos and other audio-visual media; shared labor work groups.<br>- Active farmer participation in on-farm experimentation for technology demonstration is a proven method that effectively channels farmer inputs and perspectives | - Role documentation of each actor and programme preparation<br>- The media is a critical partner in this respect<br>- Expanding the impact of technologies through partnership building |
| How do farmers participate? | - Participate in external assessment of community problems, or assist in community problem analysis<br>- Assist in pre-extension planning<br>- Receivers of technical messages<br>- Provide feedback to extension activities and new technologies<br>- Participate in (researcher-led) on-farm experiments | - Participate in and/or facilitate community problem analysis<br>- Determine pre-extension priorities and are actively involved in extension planning<br>- Provide feedback to the pre-extension activities and/or new technologies<br>- Conduct small-scale experimentation and/or participate in on-farm experiments<br>- Monitor and evaluate pre-extension accomplishments<br>Participate in (and often organise) networking and information exchange mechanisms | In addition to participatory research and extension approaches (COR, FRG, FEG)<br>- Market orientation<br>- Networking skill empowerment |
| Costs, funding mechanisms and control of funding | - Generally entails medium to high costs<br>- Control of funding resources is usually through the technology provider | - Entails low to medium costs compared with conventional extension programmes, but is not a no-cost mechanism for service provision<br>- The assumption is to participate in resources mobilization | - Resources sharing among partners<br>- Low cost compared to its impact, if all partners participate actively |
| Programme geographical coverage (area) | - Usually covers small geographical areas with few farmers, e.g. 4- 12 farmers per PA | - Appears to be most appropriate on a limited scale<br>- Target woreda ARDO and farmers | - Large scale vertically and horizontally<br>- Covers regions and nation<br>- Targets all possible partners, vertically as well as horizontally<br>examples of haricot bean and Soya bean in rift valley, south and pawe addressing more than 8700 farmers |
| Assumptions | | | - Participatory, value-chained, impact and change oriented, market oriented, collaborative, institutional and partnership network for sustainable change, coping with changing dynamism and global change<br>- Availability of proven and working technologies<br>- The availed technologies are not well pushed for to create value-chained impact<br>- Development of a system that facilitates joint intervention from generation to marketing continuum is required working |
| Impact assessment | | | Inbuilt system as a strategy |