that phase 1 approach (joint residential training at KATC and outreach (field) training session) is not always successful.

One of the factors that determine whether techniques are disseminated appears to be the selection process of key farmers. In an irrigation scheme where techniques were disseminated, an extension officer gathered farmers in advance and told them that a few representatives would be chosen from among them to receive training at KATC, that these representatives would be selected according to the selection criteria recommended by KATC, and that these representatives have the responsibility to teach the techniques to other farmers after the training is completed. Therefore, other farmers anticipated learning the techniques from the key farmers when they returned from the training. In a scheme where key farmers were assigned through such a process, dissemination was later observed.

This factor is no more than one of the prerequisites for technology to be disseminated. Other factors are the ability to manage water (as water could not be managed in Mwega, the techniques learned in training could not be used), existence of competent (and also understanding and active) extension officer, existence of a functional farmer organization, and the continuous support of regional administration.

4.4 Transition from phase 1 to phase 2

4.4.1 End of phase 1

Phase 1 ended on June 30, 2001. During the seven-year period, 70 training courses were conducted and 1,428 individuals completed training. As initially planned, the trainees came from all across Tanzania. According to the evaluation at project completion, conducted in January 1999, the training has increased the capacity (grasp needs, create and execute training plans, prepare curriculums and texts) of the counterpart to the level that the counterpart is able to independently operate training courses without a problem. The evaluation also found that, as a result of this improvement, KATC has improved its functionality as an irrigated rice cultivation training institute.

4.4.2 Objectives and approach of phase 2

In phase 1, the objective of starting KATC, a training institute for irrigated rice cultivation technology, was achieved. Training activities alone, however, did not necessarily convey technology to farmers, and the yield could not be increased. Therefore, the decision was made to conduct phase 2 project with the objective of developing a training package that would actually appeal to farmers. In essence, the goal of phase 2 is to improve the training capacity of KATC by working closer with the field. It should be noted, however, that extension was not the direct goal of both phase 2 and phase 1.

Those involved in the project point out that the project was continued into phase 2 because at the time KATC was Japan's only project type technical cooperation in agriculture in Tanzania, and Tanzania had divided the Ministry of Agriculture and Cooperative into three ministries (November 2000), so the Ministry of Agriculture and Food Security could pay more attention to KATC.

Japan and Tanzania discussed how to address the problems that surfaced in phase 1 in phase 2. As a result, Tanzania government decided to allocate a larger budget for KATC, transfer some of the KATC tutors, and increase the number of tutors.

(1) Implementation of the model site approach

In phase 2, "model site" approach was implemented. A model site has two roles. One is to establish a new training technique and evaluate its training effectiveness. To this end, each model site is selected by reflecting the diverse natural and socioeconomic conditions of Tanzania. Increasing the crop yield and income rate of the model site and surrounding area were defined as the project's goal and overall goal. This goal does not mean that the project directly aimed for dissemination, but was designed to assess whether KATC has developed a training package that appeals to farmers.

The second role is to show irrigated rice cultivation technology. If the technology transfer to model sites succeeds, then KATC's know-how will be accumulated in the model sites. As long as the model sites use the techniques recommended by KATC, the farmers in the schemes and surrounding irrigation schemes can indirectly access KATC's training programs and irrigated rice cultivation technology. In the long-term, the model sites were intended to supplement the training of KATC, which is restrained by budget and many other factors, and contribute to achieving the overall goal of the phase 2 project.

The Japanese side had proposed that KATC establish approximately six model sites. JICA felt that by limiting the number of model sites, KATC would be able to completely transfer technology during the project period. On the other hand, the Tanzanian side proposed covering approximately 40 irrigation schemes in the interest of catering to as many irrigation schemes as possible. Although the Tanzanian side was reluctant to accept the small number of sites, in the end, it agreed to select one model site from each of six irrigation zones in the country.

(2) Implementation of the farmer-to-farmer extension approach[9]

While training was provided primarily to technicians of irrigation schemes around the country in phase 1, as local government could not even provide transportation to the sites for extension officers in each district, irrigated rice cultivation technology did not disseminate as much as had been expected. In phase 2, the project's goal is to improve rice cultivation productivity at irrigation schemes. Therefore, the farmer to farmer extension approach was implemented as a means to reach the goal even when extension services from local government are limited.

4.5 Phase 2 project implementation

4.5.1 Model site approach

(1) Model site selection

KATC convened extension officers, scheme managers, and farmer leaders from the 40 irrigation schemes on the short list, trained them at KATC, and collected information on each scheme. KATC created draft selection criteria for model sites, and forwarded the draft criteria to all the districts with jurisdiction over the 40 schemes. The draft selection criteria created and proposed by KATC are as described below. The priority was placed on infrastructure (i through iii). Because the project did not include infrastructure development such as irrigation facility repairs or road construction, such infrastructure had to be in place. On the other hand, KATC felt that criteria vi and vii could be changed, if necessary, after the project was

[9] The information provided in this section and the following section is based on Background Paper for the Mid-term Evaluation of the KATC Phase II Project (March 2004) (In Japanese). The mid-term evaluation was conducted in May 2004.

launched based on the will and attitude of the farmers and district.[10]

i Availability of irrigation water (25 points)
ii Access to the site (10 points)
iii Irrigation facility status (20 points)
iv Actions by farmers, farmer organization, scheme personnel, and district government (12 points)
v District government's support plan (8 points)
vi Is a village extension officer or irrigation officer assigned to the site? (10 points)
vii Degree of participation and activities of farmer organization (10 points)
viii Is consideration made for gender in the farmer organization? (5 points)

Later, 58 participants including the heads of district government, zonal irrigation officers, and representatives from the Ministry of Agriculture and Food Security, JICA, and KATC met for a two-day workshop to decide on the selection criteria for the model sites and to select the model sites from the candidates. Since the criteria were prioritized in a discussion by zone, in four zones, different model site candidates than those chosen by KATC's own prioritization were selected. Approximately one month later, a joint coordination committee was held, and model sites were selected formally. The selected model sites are listed below.

Kilimanjaro zone:	Mombo
Morogoro zone:	Mwega
Mtwara zone:	Nakahuga
Mbeya zone:	Mbuyuni
Mwanza zone:	Nduguti
Tabora zone:	Mwamapuli

It appears that Mwega was selected as a model site because the irrigation scheme there had been constructed with a grant aid from Japan and there was a need to follow up on the project.

(2) Model site approach [11]

Phase 2 has employed the approach based on farmer to farmer extension at each model site. This concept is shown in Fig. 4-2.

Step 1: Baseline survey and planning

This is positioned as the starting point for all training programs. A survey employing the PLA/PRA technique is conducted at the six model sites. The purpose of baseline survey is to determine specific training needs, gather base line data, and create a situation where farmers want to take part in the activities at each site. The activity plan is prepared according to the needs that are learned through the survey.

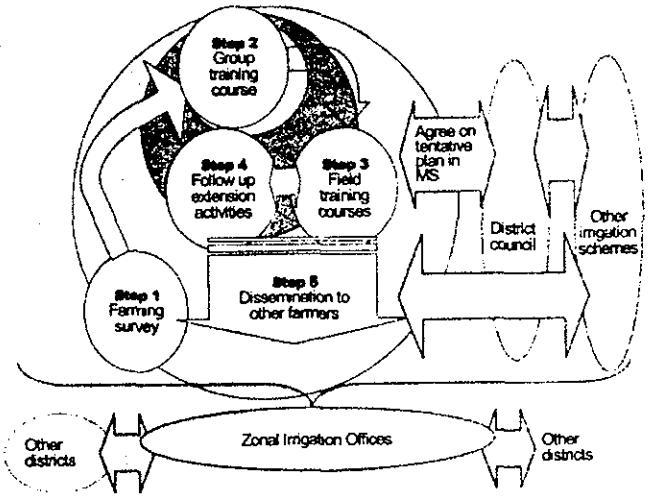


Figure 4-2. Phase 2 approach concept

Source: KATC NEWS Volume 1 Issue 1, July-December 2003

[10] KATC Phase II Newsletter "Rice and People in Tanzania" Vol. 1. (In Japanese)
[11] The information provided in this section is based on KATC Website (http://katc2.jmfi.com/) and KATC Phase II Project Progress Report (July 2003) (In Japanese).

Step 2: Training at KATC (Group Training Course)

In this step, group training catering to village leaders, extension officers, key farmers, irrigation scheme technicians, and water management officers is held at KATC by following a curriculum that was prepared according to the needs of each site. The training consisted of basic irrigated rice cultivation technology, method of improving farming tools, water management method, extension method, and basic planning to improve rice productivity.

Step 3: Field Training Courses at Each Site

Field training courses are held three times (before plowing, before heading, and upon harvest) at each site according to the rice growth stages. Extension officers and key farmers who received group training at KATC provided support with the field training courses. The purpose of this step is for intermediate farmers to acquire basic knowledge about irrigated rice cultivation, key farmers to train farmers with extension officers, and intermediate farmers to learn how to teach other farmers.

Step 4: Follow-up extension activities

In this step, extension officers and key farmers take the lead in setting up trial farms and demonstration farms and support local sessions to extend the knowledge gained in training to local farmers. The activities of extension officers are also monitored to provide appropriate guidance and advice.

Step 5: Dissemination to other farmers

In this step, the knowledge and technology gained in group training courses and field-training courses are disseminated from key farmers and intermediate farmers to other farmers.

4.5.2 Approach of extension

(1) Logic of dissemination

The purpose of this project is "productivity of rice increases in the model sites through the KATC's training", and the irrigation schemes serving as the model sites are the direct scope of the project. Accordingly, there is a logical link from key farmers to intermediate farmers and then to other farmers, and the possibility that the dissemination in the irrigation schemes will be achieved is high.

The overall goal of the project is "productivity of rice increases in the place where KATC training has been conducted and surrounding area." Therefore, the overall goal includes dissemination to surrounding irrigation schemes. In other words, this project's activities take into account dissemination beyond the model sites (irrigation schemes). To this end, the project consults with the district government or zonal irrigation office and invites farmers from other irrigation schemes on field days. KATC deserves praise for considering the logic for realizing the overall goal and actually engaging in activities in the project to realize that logic. Both the Japanese side and Tanzanian side realize, however, that it is difficult to extend technology beyond the irrigation scheme, which serves as the model site, within the framework of the project.

(2) Participation and cost sharing

Irrigated rice cultivation requires not only the extension of individual cultivation techniques, but also the

organized activities of the members of irrigation scheme. Therefore, it is important for many farmers to participate in the operation of the irrigation scheme. The participatory approach with an emphasis on the process is implemented in phase 2. KATC training alone is insufficient to improve the organization activities of farmers. Therefore, field-training courses are being held for this purpose.

Participatory technique is also implemented in other aspects of the project. For example, PLA/PRA techniques are used in the baseline survey, in which farmers take the initiative in analyzing the current status and problems of the irrigation scheme, and develop an action plan to improve the situation or solve the problem. The dissemination of technology from a model site to the surrounding schemes requires the involvement of many stakeholders, and the project actively calls on such stakeholders for their participation. Primary stakeholders include the District Executive Director (DED), District Agriculture and Livestock Development Officer (DALDO), Zonal Irrigation Officer (ZIO), Village Agricultural Extension Officer (VAEO), and Irrigation Technician (IT). As a result of such effort, some model sites have won the active involvement of their respective district government. For example, Songea District, where the Nakafuga model site is located, has actively supported the project. One of the reasons is that when farmers increase their income by improving their rice cultivation technology, the district stands to gain tax revenue.

In order to prevent farmers and stakeholders from becoming overly dependent upon aid and to reduce project expenses, KATC has actively shared costs with beneficiaries. For example, when training is held at a model site, KATC requests the village to supply part of the food, chef, and firewood. KATC has also asked each district to bear the expenses for farmers from other schemes to participate in field training courses. The experts have united in their effort to seek for such cost sharing.

(3) Roles of extension officers in extension

In this project, KATC has encouraged the active participation of extension officers. One of the reasons is that it is important to use the existing system, and extension officers play an important role in fostering extension on the grassroots level. Second reason is that, the project's activities should make the extension officers' own activities easier. In essence, if farmers take more initiative in their activities, the important points of extension should become clear, thus making it easier for extension officers to provide the necessary support. In addition, when farmers engage in group activities, extension officers can better help them instead of visiting one farmer at a time.

At an irrigation scheme where the study mission visited and conducted a questionnaire survey, the support provided by the extension officers to farmers was highly rated.[12] In a questionnaire replied by key farmers (including a few intermediate farmers) of Lekitatu, Mwenga, and Mombo, 56 out 63 respondents replied that the support has been useful (only one replied that the support was not useful, and the remaining six did not reply). Extension officers have visited farmers often. "At least once a month" was the reply of 48 respondents, and "once every two or three months" was the reply of 12 respondents. No farmer reported that they receive less frequent visits. When asked what type of support they felt was useful, the largest number of respondents, or 60, replied, "guidance on irrigated rice cultivation technology," followed by 45 who replied, "guidance on using agricultural equipment and materials," 33 who replied, "conveyance of information on other farms," and 23 who replied, "conveyance of market information." Other replies included, "use of fertilizers and pesticides" and "selection of seeds." While "market information" was picked by 19 respondents in Mombo, it was selected by fewer respondents at other model sites.

[12] As the questionnaire was distributed by extension officers, there may be bias in the farmers' evaluation of extension officers.

(4) Field training

Field training at model sites is held three times per cropping season (before planting, during growth stage, and upon harvesting) and provides hands-on experience. In addition, training session is held for the purpose of evaluation and monitoring after harvest. The plan calls for holding such activities for two consecutive cropping seasons. After the second cropping season, KATC plans to make simple follow-up calls. Each field training course is held for five days.

For example, in Mombo, field training courses were held according to the schedule below for the first crop.

September 2003	First training course (before planting)
February 2004	Second training course (during growth stage)
March 2004	Third training course (upon harvesting)
April 2004	Fourth training course (monitoring)

While field training courses cater to 20 key farmers and 100 intermediate farmers, since it is difficult to hold lessons and provide hands-on experience to all the farmers at once, they are divided into four groups of 30 farmers each (5 key farmers and 25 intermediate farmers). Table 4-9 shows an outline of the first field training course held in Nakafuga in July 2003.

Table 4-9. Field Training Course at a Model Site in KATC Phase 2 (Nakafuga, July 2003)

Section	Description of training		Form
Extension and farmers training	Outline of farmer-to-farmer extension		Lecture
	How to use demonstration farms		Lecture and hands-on training
	Participatory planning, implementation and evaluation of extension activities		Lecture and hands-on training
	Concept and approach of KATC 2		Lecture
Rice Cultivation	Basic knowledge of rice cultivation	Elements of yield, rice ecology , growth period, variety characteristics	Lecture
	Basic cultivation technology	Seed preparation, nursery preparation, sowing	Field training
	Special techniques for rice cultivation	Introduction of varieties, organic fertilizers, seed production, planting density, fertilizer ratios and time of application, usage of azolla	Field training
Farming Development	Basic knowledge of farm management	Work schedule, labor management, farm record keeping, production costs and profits	Lecture
	Basic farm management techniques	Farm preparation and management	Lecture and hands-on training
	Special techniques for farm management	Making push weeders, bookkeeping, demonstration method	Lecture and hands-on training
Water Management	Strengthening water users association	Fund management (e.g., water charges)	Lecture
	O&M of irrigation facilities	Construction of concrete diversions	Field training
	Activities for collecting data	Installation of a ventilated case for meteorological instruments, installation of a meter for water requirement in depth, flow measuring, drainage planning, O&M planning	Field training

Source: KATC Phase II Newsletter "Rice and People in Tanzania" Vol. 13 (2003) (In Japanese).

Field training course costs approximately $3,000 each time. The cost is broken down into roughly 40% for the payment of daily subsistence allowance (DSA) to KATC tutors, 30% for gasoline expenses, 20% for lunch for participants, and 10% for stationary supplies, etc. Little money is spent in the field in a field training course. The amount of DSA is based on an agreement between donors and is in compliance with the provisions of MAFS. One of the reasons that DSA is expensive is that the model sites are remotely located from KATC, and require considerable time to visit. Another reason is that four tutors, or one from

each of KATC's four sections, participate in the field training courses. One Japanese expert also attends each field training course in general.

(5) Highly transparent approach

One of the features of this project is that it attempts to ensure high transparency, such as by clarifying the process for training or extension in the beginning. For example, the selection criteria for key farmers and intermediate farmers are made clear in advance. Therefore, not only the selected farmers, but also other farmers know the criteria in advance. The policies for cost sharing and provision of inputs are also clear. Every activity is carefully planned in advance and notified the counterpart. Therefore, it is easy to see how the project will unfold, and participants are able to engage in activities by planning for the future.

(6) Emphasis on gender viewpoint

In the phase 2 project, a high priority is placed on gender. In Tanzania, women tend to work longer hours than do men. According to the baseline survey in Mombo, while there was little difference in roles that gender play in rice cultivation work, it was revealed that women perform the strenuous rice planting work and majority of household chores (Table 4-10). The tendency for male chauvinism is even more pronounced in Mwanza zone, where the Nduguti model site is located, so the discrepancy in labor by gender is likely to be even greater.

Table 4-10. Roles by Gender in Mombo Irrigation Scheme

Works		Male	Female	Children	Help	Machine
Rice Cultivation	Land preparation	●	●			
	Plowing					Tractor
	Harrowing/puddling	●	●		●	
	Nursery preparation	●	●			
	Sowing	●	●	●		
	Weeding	●	●	●	●	
	Transplanting		●		●	
	Fertilizer application	●	●			
	Chemical fertilizer application	●				
	Bird scaring				●	
	Harvesting	●	●		●	
	Transporting					Car, Bicycle
	Marketing	●	●			
	Storage		●			
Household Chores	Cooking		●			
	Raising children		●			
	Fetching water		●	●		Purchase water
	Gathering firewood		●			
	Laundry		●			
	Cleaning		●	●		
	Treating illnesses	●	●			
	House repairing	●				

Source: KATC Phase II Newsletter "Rice and People in Tanzania" Vol. 6 (2002). (In Japanese)

If rice cultivation is carried out by following the basic techniques as recommended by this project, there was a danger that women would be responsible for even greater amount of work. In the study team's interviews with farmers, however, no complaints were heard from women. [13] This is believed to be due to a number of reasons. First, the project recommended the use of tools that can be easily constructed such as push weeders, and provided training on the construction of such tools. Weeding is one of the most strenuous tasks, and women have been responsible for the task. When the push weeder was implemented

[13] As these reasons were derived from information and comments obtained in interviews that were also attended by men, it should be noted that women might have refrained from expressing criticisms.

and modified, men began to handle the task, so women were relieved of the work. In general, there is a tendency for men to perform a task when manual task is replaced by farming tools. The second reason is that the project stressed the gender viewpoint. As a result, in increasing number of cases, men look after the children while women are working. The third reason is that the introduction of the new technology at least doubled crop yield, and substantially increased income. The fourth reason is that, with the increase in income, it became possible for the farmers to hire labor during the busy seasons.

4.5.3 Farmer to farmer extension

This section describes the farmer to farmer extension method employed in phase 2.

(1) Selection of key farmers and transfer of techniques

Extension officers were first called to KATC, where they received training and received explanation on the selection criteria and process of 20 key farmers. The extension officers returned to their respective irrigation schemes, where they gathered farmers and explained the roles of key farmers and the selection criteria. Later, the extension officers and the selected key farmers received training at KATC. The selection criteria of key farmers are as follows:

i Representatives of each block / village
ii Able to read and write
iii Participating fully in rice farming with not less than two years experience
iv Able to transfer technology to other farmers
v Should have good cooperation and acceptance to fellow farmers
vi Should be a progressive farmer
vii Resident in the scheme
viii Age range between 15 to 65 years old
ix Gender balance (half men and half women)
x Active member in farmers associations/organization
xi Elected by majority of the scheme members / appointed by scheme executive committee
xii Endorsed by District Executive Director (DED)

Furthermore, the roles of key farmers are as follows:

i Attend training at KATC to acquire appropriate knowledge and skills
ii Practice the acquired knowledge and skills in their own fields
iii Disseminate the knowledge and skills to intermediate and other farmers
iv Establish good linkage and collaborate with village extension officers and scheme leadership
v Monitoring and evaluation of their activities

In a hearing of intermediate farmers by the study team, it appears that the key farmers were selected in a fair manner. In Mwega, while intermediate farmers want to become key farmers (because key farmers can receive training at KATC and have better access to new technology), they feel that all the selected key farmers are suitable as key farmers. Experts have also expressed that competent individuals have been selected as key farmers.

(2) Technology transfer from key farmers to intermediate farmers

Each key farmer selected five intermediate farmers. KATC presented the key farmers with the criteria for selecting the intermediate farmers. The selection criteria for intermediate farmers are as follows:

i Gender balance (half men and half women)
ii Age range between 15 to 65 years old

iii Participate fully in rice farming
iv Be able and willing to transfer technology to other farmers
v Progressive farmer
vi Anyone from member households of the scheme
vii Selected by key farmers and approved by scheme leaders and village extension officers

The roles of intermediate farmers are clarified as follows:

i Attend in-field trainings to acquire appropriate knowledge and skills
ii Practice the acquired knowledge and skills in their own fields
iii Disseminate the knowledge and skills to other farmers
iv Monitoring and evaluation of their activities

Each key farmer has transferred technology to five intermediate farmers by using the key farmer's farm and intermediate farmers' farms (six locations) as demonstration plots. Key farmers have held meetings with intermediate farmers twice a month to answer the questions. Extension officers have provided assistance with such activities of key farmers.

As these examples illustrate, key farmers play an important and busy role. It appears that every key farmer has aggressively performed his responsibilities. Key farmers are honored to have been chosen as key farmers, and this sense of honor has served as the momentum in their activities. Results of a questionnaire of key farmers in Mombo and Mwega, which are model sites in phase 2, reveal that key farmers are actively engaged in transferring technology to other farmers, including intermediate farmers. All 32 key farmers replied, "I am transferring technology to other farmers as a key farmer." When asked how they are supporting other farmers, 31 replied, "Visit the farms of other farmers and provide technical guidance," 30 replied, "Explain technology to farmers who visit my farm," and 30 replied, "Create a demonstration farm." When asked whether they transfer technology with their extension officer, all 32 replied, "Yes." When asked about the reason for working with their extension officer in technology transfer, 29 replied, "It also allows me to learn from the extension officer" and 27 replied, "That is the duty of key farmers."

Replies from extension officers appear to support this trend. In a questionnaire of five extension officers at Mombo and Mwenga, which are model sites in phase 2, all the extension officers replied, "I visit farms with key farmers to provide technical guidance." When asked about how they support farmers as extension officers, four replied, "I have installed a demonstration farm," five replied, "I visit farmers alone," while some extension officers answered that they hold meetings on monitoring and evaluation.

This project incorporates the mechanism of disseminating technology at each model site. For example, the farms of intermediate farmers are adjacent to the farm of the key farmer. As the farms are next to one another, competition arises between the key farmer and intermediate farmers to grow rice the best. "Field day" and "farmers' day" are also scheduled. On a field day, key farmers and intermediate farmers visit a trial farm managed by a key farmer, and exchange opinions on the status and results of the trial. On farmers' day, key farmers take the initiative in announcing the results of the first crop activities and demonstration, as well as the activity plan for the next season. One intermediate farmer was also selected to present the activities for the first crop as seen from the viewpoint of an intermediate farmer. Farmers regard being selected to give presentation a great honor.

(3) Technology transfer to other farmers in the same irrigation scheme

Other farmers, who are neither key farmers nor intermediate farmers, were initially dissatisfied that they could not take any part in the project. When this dissatisfaction among other farmers came to light,

KATC's tutors explained to these farmers at the model sites that the purpose of the project is improve the technology of all the farmers in the scheme. Upon hearing this, the dissatisfaction and sense of alienation were alleviated among other farmers. To promote dissemination to other farmers, KATC has taken two measures: 1) every intermediate farmer must be accompanied by two other farmers to participate in Farmers' Day, and 2) from the second crop, every intermediate farmer must select two other farmers, and transfer technology to them.

(4) Technology transfer to other irrigation schemes in the same district

Although dissemination to other irrigation schemes is not included in the purpose of this project, activities are being conducted with that in mind. To be more specific, KATC has consulted with such district officials as DED and DALDO to use the district budget to invite farmers from irrigation schemes other than the model sites to the Field Day or Farmers' Day. This has actually been done in all the schemes other than in Nduguti. Songea District, where the Nakafuga irrigation scheme is located, has prepared lodging facilities at the homes of key farmers in Nakafuga, invited extension officers and farmers from other schemes within the District to transfer technology. Agreement has also been reached with FAO on collaboration. According to this agreement, farmers of schemes in which FAO is involved are encouraged to take part in KATC's training. When another donor provides funding, farmers from other schemes are encouraged to participate in the field training courses at KATC. In fact, three donors (FAO (Mombo), WWF (Mbuyuni), and IFAD (Mwamapuli)) have sent farmers in their projects to participate in the field training courses.

Such mechanism, however, has its restrictions. First, a number of model sites are at inconvenient locations. For example, the Mwega irrigation scheme is located 180 km from the next nearest irrigation scheme. While Nakafuga is designated as the model site in the Mtwara zone, KATC's tutors have commented that it would be nearly impossible for technology to automatically disseminate from Nakafuga to Mtwara District or Lindi District in the same zone due to geographical conditions. Second, the high cost of transportation makes visits difficult. For example, gasoline costs $0.80 per liter (as of June 2004). Third, district governments lack the budget. Even an irrigation officer in Arumeru District, Arusha Region, which is comparatively affluent in Tanzania, is only occasionally able to visit the irrigation schemes that he is in charge of in the district. Considering such constraints, it is difficult for farmers and extension officers of other schemes to frequently visit the model site on the district's budget.

(5) Technology transfer to irrigation schemes in other districts

While dissemination to irrigation schemes in other districts is not an objective of this project, KATC's activities have taken such dissemination into account. Namely, KATC has encouraged zonal irrigation offices to send extension officers and farmers of other districts to visit the model sites.[14] While KATC has been in consultation with zonal irrigation offices, because the zonal irrigation offices have insufficient human resources and budget, they have had little involvement in field training courses.[15]

4.5.4 Reinforcing the functions of implementation agency

This section discusses how KATC's functions were reinforced in phase 2. Activities that were also

[14] The inherent role of zonal irrigation office is to provide technical support (backstop), as engineers, in order to standardize the technology on irrigation facilities and management at the district level.

[15] Background Paper for the Mid-term Evaluation for the KATC Phase II Project (March 2004) (In Japanese).

conducted in phase 1 are not mentioned here.

(1) *Institutional aspect*

1) Hiring of new tutors

Because there were not enough tutors in phase 1, and a few tutors were transferred to other organizations when phase 1 was completed, MAFS Training Division hired ten new tutors for KATC phase 2. The new tutors hold Bachelors' degree (in Tanzania, they are referred simply to as "graduates") from Sokoine University of Agricultural. Today, KATC has fifteen tutors who are graduates, or a higher percentage than at other training institutes. Many of these graduates had experience working as extension officers, and had extensive practical experience. They, however, lacked knowledge and experience in rice cultivation. On the other hand, although tutors who stayed from phase 1 only held diplomas, they had more experience in rice cultivation. Due to transfer of tutors, the Rice Cultivation Section was staffed solely by new tutors. As a result, Japanese experts have had to teach the new tutors in irrigated rice cultivation technology from the basics.

2) Organizational change at KATC

In phase 2, KATC's organization was partially changed. For example, the Agricultural Machinery Section was renamed Farming Development Section. The organizational chart of KATC as of January 31, 2004 is shown in Fig. 4-3.

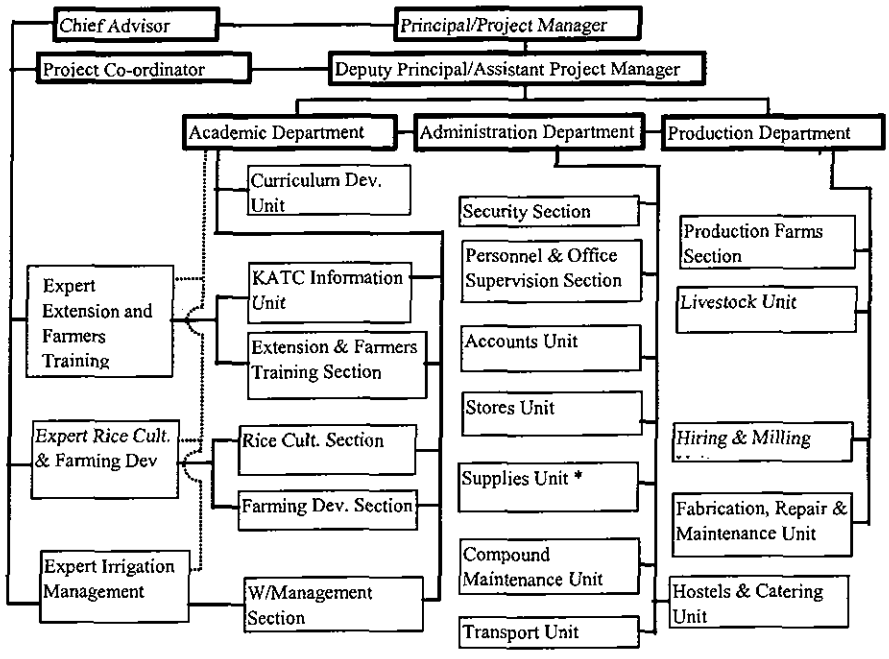


Figure 4-3. KATC Organizational Chart (in Phase 2, as of January 31, 2004)

3) Issuing newsletter

In phase 1, the newsletter was issued only in English (besides Japanese). In phase 2, the newsletter is also prepared and issued in Swahili to reinforce dissemination of information to farmers.

4) Improvement of facilities

In phase 2, new dormitory was constructed to increase lodging capacity form 40 to 60. Housing for staff was also constructed.

(2) Technical aspect

1) *Acquisition of training method suited to the field*

The purpose of phase 1 was to improve the capacity of KATC so it can provide training on basic irrigated

rice cultivation technology. The purpose of phase 2 is to provide training at each of the six model sites around the country that is suited to the situation of the model site and that establishes the technology among the farmers. Therefore, tutors have acquired training methods that are more attuned to the field.

2) Exchange of information between tutors and accommodating feedback

An academic committee meeting attended by the leader of each section/unit is held before and after a field training course to discuss the details of the training.[16] All the tutors have replied that they have revised details of training based on feedback from training participants.

(3) Financial aspect

1) Increasing budget allocation

In phase 1, the Tanzanian government allocated little budget to KATC. Once phase 2 began, the budget to KATC has increased. According to the director of MAFS Training Division, KATC has received the largest budget allocation for training activities, operation and maintenance among MATI. In fact, as shown in Table 4-11, the Tanzanian government has substantially increased its budget allocation to KATC in phase 2, although the breakdown by purpose is unknown.

Table 4-11. Budget Allocated to KATC by Tanzanian Government

(Unit: Million Shilling)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Expenditure	5.3	4.0	0.0	0.0	4.3	0.0	8.7	54.6	20.3	25.4

Source: 1994-2000: Noboru Koibuchi, 2002, Report of KATC Chief Advisor
2001-: The Mid Term Evaluation Report of the KATC Phase II Project in the United Republic of Tanzania (May, 2004).

Note: The expenditure include both routine and development budget from the Central Government and does not inclulde self help fund.

2) Training services

Table 4-12. Training Courses Provided for Other Organizations in Phase 2 (until March 2004)

Summary Report Period	Course	Duration	Target	Participants				Sponsor
				Male	Female	Total	Extension officers	
Apr.- Oct. 2002	Irrigation Rice Cultivation (once)	2 weeks		16	7	23	4	DED of KilomberoDistrict
Nov. 2002 - Mar. 2003	Irrigation Rice Cultivation (3times)	2 weeks	Farmers and extension officer in Kilombero and Songea Distrcits	27	11	38	11	DED of Kilombero District/UNDP/ DANIDA
Apr.-Sept. 2003	Key farmer/Extension officers (3 times)	2 weeks		28	19	47	9	SUA, World Bank, DANIDA
	Key farmer/Extension officers (once)	1 week		10	9	19	2	Kigoma District DC
Oct. 2003 - Mar. 2004	Hand tractor operator	1 week		4	0	4		Kahama District
	Water Management	2 weeks	Lake Zone	16	7	23		UNDP

Source: First-Forth, 2002-2004, Technical Cooperation Project (KATC II), Implementation Operation Summary

[16] Academic committee meeting is not yet a regularly held meeting.

KATC has continued to provide the training services below for other organizations (other than JICA and MAFS) in phase 2. In the training sponsored by DED in Kilombero District listed at the top of Table 4-12, a fund of approximately 6 million shillings was invested into the training.[17]

4.6 Sustainability of the project

4.6.1 Sustainability of KATC

Other donors (Ireland, Denmark, and World Bank) who have interviewed and consulted with the study team have praised the activities of KATC. World Bank's Tanzania Office has commented that, to farmers, KATC's training is an eye-opener. It adds that the advantage of KATC's training is that it is practical, the techniques are easily obtainable, and text materials are simple. While the World Bank has not quantitatively evaluated the effects of KATC's training, it claims that a scheme that has sent farmers to KATC with its support has more than doubled its crop yield.

As the phase 2 project has only passed the midway point, it is difficult to evaluate the sustainability of the project at this point. Described below are issues that may affect sustainability after the project ends, as learned through phase 1 and phase 2 project.

(1) Institutional aspect

1) Water shortage

There is a water shortage not only in Lower Moshi, but also at KATC's farm. Although diversion of water from the Lower Moshi irrigation channel to KATC began in 2003, it has not entirely solved the serious water shortage problem.

2) Renewal of training equipment

The computers, copy machines, and other equipment that JICA provided in phase 1 are becoming outdated. KATC is unable to replace the equipment due to the lack of budget provided by the Tanzanian government.

3) Management and operation of projects

In phase 2, six locations in Tanzania and four locations in neighboring countries, or total of ten irrigation schemes are serving as model sites. Due to the large number of model sites, all the staff members are kept extremely busy. As a result, in phase 2, there have been some problems. One is that insufficient technical guidance has been provided to the new tutors who joined KATC from phase 2. Another is that project management, which should be performed by the counterpart, is being performed by experts. It appears the current volume of activities exceeds the capacity of the counterpart, and it is uncertain whether the Tanzanian staff alone can continue this activity level after the project ends. Experts feel that while it is possible to continue such activities, it might be difficult to continue creative activities such as to develop new training courses.

[17] Second Technical Cooperation Project (KATC Phase II) Management Table, October 2002. (In Japanese)

4) Common understanding about the positioning of project activities

It is important for the stakeholders to share a common understanding of the significance of project activities in order to ensure the sustainability of the project. Based on the hearings held by the study team, it seems that there is a subtle difference in the positioning of field training between the experts and the Tanzanian side. The experts see the purpose of field training as to develop a training package that is likely to transfer technology to farmers. On the other hand, some KATC staff members appear to recognize that field training and extension in the irrigation scheme is the goal of the project. As these comments imply, the Tanzanian side does not seem to clearly recognize the positioning of field training as being responsible for developing a training package for model sites so KATC can hold effective training at another site in the future.

One of the reasons for this apparent discrepancy in the understanding of the significance of project activities between stakeholders may be the description of the overall goal, project purpose, and indicators stated in the project design matrix (PDM). The overall goal of the project is "productivity of rice increases in the place where KATC training has been conducted and surrounding area.", and project purpose is "productivity of rice increases in the model sites through the KATC's training." At first glance, it seems that the purpose of the project is extension. In general, to clearly understand the goal of a project, it is necessary to fully understand the background of the project and past events. In addition, in many cases, it is difficult for PDM's format to clearly show all such information. However, as PDM is a concise outline of the project, it is a convenient means for individuals outside of the project to learn the project profile. If the project's goal can easily be understood from PDM, it would facilitate the project stakeholders to share common awareness and the people outside of the project to gain a correct understanding of the project.

(2) Technical aspect

Through training, tutors are gaining knowledge and practical experience in irrigated rice cultivation, participatory training, and farmer to farmer extension, and are steadily building confidence. Experts feel that by the time the intensive training and technical support over the three cropping seasons end, the tutors will have gained the necessary technology and techniques, and will be capable of conducting all the training courses without the help of experts.[18]

Many of the tutors were hired as new staff in phase 2. Compared to the tutors who have been with KATC since phase 1, the new tutors have less experience in irrigated rice cultivation. Since they have received higher education, it appears that there is a division between the new and senior tutors. In addition, the senior tutors are too busy with phase 2 activities to teach the new tutors. It is concerned that this division might restrict technology transfer between tutors.

(3) Financial aspect

KATC has serious financial restrictions. Although the budget for KATC was given a large boost for phase 2, as most of the allocated budget is spent on managing the facilities, KATC frequently has difficulties paying fuel and utility expenses. In addition, as KATC has a smaller farm than does other MATI and has little source of independent funds, it would be difficult for KATC to continue operations

[18] Background Paper for the Mid-Term Evaluation for the KATC Phase II Project (March 2004) (In Japanese).

solely on the budget allocated by the Tanzanian government after the project ends. KATC has successfully provided training services for other donors and districts. The proceeds from the training services can be used within KATC as a self-help fund. It is difficult, however, to depend on sporadic orders for training from other donors.

It is extremely important for the future direction of KATC to position KATC within the framework of the Agricultural Sector Development Programme (ASDP) and District Agricultural Development Plan (DADP) currently under way in Tanzania. The objective of the Tanzanian government under its Agricultural Sector Development Strategy (ASDS) is to improve agricultural productivity and profitability, reduce poverty in rural areas, and realize food security at the household level, and is promoting ASDP to realize this objective. As a facet of donor coordination, the Tanzanian government plans to harmonize all the agricultural projects supported by donors within the framework of ASDP. To be more specific, each projects is planned on the district-level (DADP), and the fund flows there from ASDP's basket fund. If training by KATC is requested in DADP, then KATC can use ASDP's basket fund. Although ASDP's funding mechanism has yet to be finalized, the plan calls for allocating 75% of the ASDP fund to district-level projects, 20% to national-level projects, and the remaining 5% to cross-sectional projects. Furthermore, 20 to 30% of the district-level project budget is earmarked for non-investment projects (e.g., research and training)[19]. In other words, KATC will have a chance to secure a fund other than the budget from the central government.

The phase 2 project aims to reduce the expenses of field training courses to a level that would be affordable within the framework of DADP. As ways to reduce expenses, KATC is considering eliminating unnecessary elements from training, having each tutor handle multiple sections to reduce the number of tutors who participate in training courses (would also reduce DSA and gasoline expenses), and delegating monitoring to local extension officers. Such cost reduction efforts have already been incorporated into the PDM revised in May 2004. The project plans to use the field training course for the last cropping season as a trial for low-cost field training course. The use of other donors' funds through the framework of ASDP/DADP may serve as a model in African nations whose governments are strapped for cash.

4.6.2 Sustainability of model sites

(1) Dissemination of technology

It is impossible to say how much technology has been disseminated through the KATC project because a detailed study has not been conducted. However, the overall degree of dissemination appears to be high. Japanese experts and many observers feel that the extension within model sites (including to other farmers) will succeed. For example, although Mombo has only finished the training for the first cropping season, approximately 90% of the farmers have implemented the techniques recommended by KATC.[20] Line planting is already implemented by all the farmers. Yield increased from 8 to 12 bags per acre (approximately 1.6 to 2.4 tons/ha) to 10 to 20 bags per acre (2.0 to 4.0 tons/ha) after a modern irrigation

[19] United Republic of Tanzania, March 2003, Agricultural Sector Development Programme Framework and Process

[20] One of the reasons that the technology was rapidly disseminated in the irrigation schemes is the characteristic of irrigated rice cultivation. As the water management technology recommended by KATC results in conservation of irrigation water, when the new technology is implemented, the scheme as a whole can increase rice planting area. Therefore, some irrigation schemes restrict water supply (Lekitatu and Kwemazandu) or impose a penalty (Mombo) to farmers who do not implement the new technology. At Mkindo, a rice cultivation calendar is distributed to farmers in the scheme to coincide the cultivation periods of all the farmers and improve the efficiency of water management. As these examples illustrate, irrigated rice cultivation requires group water management, and it is this characteristic that is promoting the dissemination of technology in the irrigation schemes.

facility was constructed with the aid from GTZ and is now (after training at KATC) more than 34 bags per acre (6.8 tons/ha). In Mwega, approximately 50% of the farmers have already implemented a part of the techniques. Yield has increased from 9 to 12 bags per acre before the training to 18 to 20 bags per acre after the training.

In a questionnaire of 63 key farmers (including some intermediate farmers) of three irrigation schemes (Lekitatu, Mombo, and Mwega), when asked to name the principal reason that technical dissemination is making progress, 50 replied, "The technology is suited to the local needs." It was followed by 41 who replied, "Support of extension officer is available," 39 who replied, "Key farmers play an important role (in technical dissemination)," 37 who replied, "The technology is simple," and 33 who replied, "The technology is inexpensive." When asked to name factors that are restricting the dissemination of technology, 7 replied, "The new technology requires much labor," 6 replied, "The input is expensive," and 4 replied, "The irrigation facility is ineffective."

(2) Sustainability of model sites

In order for model site activities to be sustainable without the support of KATC, it is important that the farmers improve the technology themselves. To this end, it is necessary to create cultivation standards. KATC plans to hold intensive field training courses for one more season at each model site. According to experts, the irrigated rice cultivation technology should take firm root in the country if field training courses are held for two or three more seasons.

There are two issues confronting sustainability. One is the deterioration of soil fertility. As majority of farmers does not return organic matters to their farms, soil fertility is declining. This may turn into one of the obstacles to sustainability. To promote the input of organic materials as much as possible, the project is recommending the use of azolla, which fixes nitrogen, controls weed, and controls evaporation. The other issue is that of farmers' organizations. Each model site has farmers' organizations such as water users association, but they are not necessarily fully functional. Even in Japan, it is not easy for farmers organizations to be fully functional and maintained. As farmers organizations are the primary caretakers of irrigation facilities and agricultural machinery, the degree to which farmers organization develop in the future will have a large impact on the sustainability of the model sites.

4.6.3 Dissemination to other schemes

Dissemination from model sites to surrounding schemes is likely to take place if those schemes are relatively close. In fact, KATC's technology is disseminated through farmer to farmer extension even in areas where KATC have had no involvement. For example, Manyata village in Arumeru District learns rice cultivation technology from neighboring Lekitatu. Likewise, farmers of Dihombo, Morogoro Rural District have learned irrigated rice cultivation technology from farmers in the neighboring village, Mkindo. The technology has already been disseminated considerably in Dihombo. Even in Hembeti, which is a 45-minute drive from Mkindo, farmers from Mkindo have helped disseminate the technology. Therefore, achievement of the overall goal is very possible, although it would depend on the definition of "surrounding areas."

On the other hand, dissemination to irrigation schemes other than surrounding schemes may be difficult due to greatly varying natural conditions and the limited means of transportation to such schemes. Such dissemination would also require government support, but the government has been unable to provide sufficient support.

Chapter 5. Lessons drawn from Synthesis Study

This chapter summarizes the lessons that can be drawn from the synthesis study in FY2002 and the synthesis study (including case study) in FY2003-2004. The projects that are subject to analysis in this chapter are listed below. The projects marked with a circle are case studies of the FY2003-04 Synthesis Study.

	Country	Project	Stated in this Chapter
	Indonesia	Project for Improvement of Agricultural Extension and Training System	Indonesia Project
	Laos	Agricultural and Rural Development Project in Vientiane Province	Laos Project
	Philippines	Training Services Enhancement Project for Rural Life Improvement	Philippines Project
	Sri Lank	*Agricultural Extension Improvement Project in Gampaha*	*Sri Lank Project*
	Dominican Republic	Pepper Culture Development Project Phase 1and 2, Project for Agricultural Development on Sloped Terrains	Dominica Project
○	Tanzania	Kilimanjaro Agricultural Training Centre Phase I Project	Tanzania I Project
○	Tanzania	Kilimanjaro Agricultural Training Centre Phase II Project	Tanzania II Project
○	El Salvador	Project for the Strengthening of Agricultural Technology Development and Transfer	El Salvador Project

Section 5.1 shows the lessons pertaining to the formulation of extension projects. Section 5.2 shows the lessons on how to design a model for dissemination. In a narrow sense, the extension model shows how a project has approached farmers (e.g., farmer to farmer extension approach). In a broad sense, the model is pertaining to how to select the technology to be extended, how the equipment and supplies that are required for implementing the technology are supplied, how the target group is selected, and how the extension project is implemented. In order to realize dissemination, it is important to view the model from a broad perspective. Thus, this chapter summarizes the lessons concerning extension models in a broad sense. Sub-question 2 (approach (model) that is effective for establishment and dissemination) of study items matches this purpose. Section 5.3 summarizes Sub-question 1 (approach for improving the capacity of implementation agency) and Sub-question 3 (environmental conditions) in the study items. It is important that environmental conditions be addressed from two viewpoints. One is to grasp the environmental conditions in the project implementation area upon formulating the project and to reflect the environmental conditions in the project. This lesson is described in Section 5.1. The other viewpoint is how to handle the environmental conditions while implementing the project. The lessons on this point are described in Section 5.3. Viewed from a chronological time frame of the project, sections 5.2 and 5.3 are lessons pertaining to the implementation stage of the project.

The lessons provided here are not intended to be comprehensive on formulating and implementing a project that involves extension as its element. Instead, this chapter provides lessons obtained from case study projects. Furthermore, this chapter does not present any sections on project sustainability. This is based on the recognition that sustainability should be considered from the formulation and implementation stages of the project.

5.1 Lessons on the formulation of extension project

5.1.1 Cooperation over the long-term

Extension is generally a time-consuming process. For example, before a farmer can be convinced of the advantage of a new technology, he must see it with his own eyes. Depending on natural conditions, some crops are cultivated only once a year. In addition, implementing a new technology carries a risk, and farmers need time to make the decision. The transmission of information on a new technology also

takes time. If the government provides little support with extension or farmers are remote from one another, the speed of dissemination slows even more. Even more time is required if the project begins by developing the technology, as was the case in El Salvador project. As these examples illustrate, extension is a time-consuming process, and it is necessary to take this into account when planning an extension project.

5.1.2 Clarification of project goal

When planning a project that includes extension as an element, it is important to clarify what the goal of the project is. Typical types of extension projects are those that emphasize the results and those that are intended to reinforce the extension system. A project that emphasizes results aims to solve the problem in the target area when the project is implemented (e.g., the productivity of a crop increases, the income of farmers increases or stabilizes, or the lives of residents improve). On the other hand, when a project that reinforces an extension system is implemented, it reinforces the organization, personnel of the organization that is involved in the extension (e.g., extension organization or training organization). These classifications are based on the final goal of the project. The project that emphasizes results and the project that reinforces extension system are also distinguished by whether the target area is limited. The former limits the target area of the project in advance and making a positive impact of some kind in the area is the final purpose. While the size of the target area and the size of the beneficiary population may differ, if the target area is too small, it would not be appropriate as JICA's technical cooperation project. Therefore, the target area must be of reasonable size. One example of such a project is the project being conducted by the Belgian government in Suchitoto, El Salvador, because many former guerilla soldiers live there.

On the other hand, the goal of a project to reinforce an extension system is to reinforce the organization or personnel of the extension organization. The reinforcement of such organization or personnel leads to extension of technology in the future. In this case, the target area is not limited. Both the El Salvador project and Tanzania project reinforced the capacities of extension organizations, and are therefore considered as projects to reinforce extension systems. The distinction between a project that emphasizes results and one that reinforces extension system is not always clear. It depends on the size of the project target area and the importance of reinforcing the extension organization. The distinction between the two types of projects is made in this chapter as one way to view the formulation of projects.

Table 5-1. Overall Goal and Means of the Project

Means of the Project	Overall Goal of the Project	
	Result-Oriented	Reinforcing Extension Sytems
Strengthen the Capacity of Extension Organization	Sometimes necessary	Necessary
Establish the technology	Necessary	Necessary
Disseminate the technology	*Sometimes necessary, but* depends on the size of the target	Necessary

In general, improving the capacity of the implementation agency, establishment of technology, and dissemination of technology are some of the means (goals) of an extension projects. The relationship between the overall goal and the project means can be roughly summarized as shown in Table 5-1. If the project is intended to reinforce the extension system, then it is necessary to first develop the capacity of the extension organization, then attempt to establish the technology, and finally conduct activities that take into account dissemination. While reinforcing the capacity of the extension organization, it is necessary to consider which organization to choose and examine whether the organization has sufficient resources. It is also necessary to incorporate into the project, in the planning stage, those activities and ideas that would disseminate the

technology even outside of the project's target area. It would be difficult to incorporate all these elements into one project, and the project would need to be divided into a number of projects to actually aim for dissemination. On the other hand, if the project emphasizes results, then it may not be necessary to put so much priority on improving the capacity of the extension organization or the dissemination. As the target area is limited, if initial capital investment is required for the technology recommended by the project, it may be possible to provide all the farmers in the target area with the initial capital investment.

As these examples show, when formulating a project, it is important to clarify the final goal of the project, and use the means suitable for the goal. For example, a project for reinforcing an extension system requires improvement of the capacity of the extension organization, establishment of technology, and dissemination of technology. Where to place the emphasis would differ according to the needs that the project is trying to address. If inadequate extension organization is hindering dissemination, then reinforcement of the extension organization should come first. On the other hand, if dissemination is not taking place although not many problems can be found with the extension organization, then establishment or direct dissemination should be the primary goal.

5.1.3 Selection of project activity and linkage between activities

(1) Clarifying the constraints to dissemination

In general, there is a series of steps that must be taken between when a farmer adopt a new technology and when the implementation results in income increase. These steps include, for example, development of technology, improvement of capacities of extension officers, acquisition of technology by farmers, financing of purchases of production equipment and materials and inputs, and marketing and processing. Unless the series of steps is consistently developed, the effort will not result in additional income for the farmer. On the other hand, if too many such elements were incorporated into a project, it would require a diverse range of project activities, and the project would exceed the capacity of the counterpart. It would also become difficult to coordinate the activities. Therefore, when formulating a project that includes extension elements, it is important to identify the constraints within the series, and cast the focus of the activities. The El Salvador project focused on technical aspects since the greatest constraint concerning vegetable production by farmers on mountain slopes was the cultivation.

In the meantime, when there is insufficient information upon project formulation, then it is not necessary to narrow down the project content without reason. In fact, in the El Salvador project, although various activities were shown in the PDM at first, they were narrowed down in the process of executing the project. This does not imply, however, that PDM should be as general as possible upon project formulation. In this case, there are two major problems. One is that, unless the activities are properly narrowed down while the project is being executed, the project activities will become too dispersed and unable to produce the desired output. The other is that the counterpart may anticipate many activities to be conducted, and may become dissatisfied when the activities are narrowed down. Although the counterpart praised the narrowing down of activities in the El Salvador project, the same response may not occur in other projects. A realistic action to take would be to consider conducting activities within the scope to which the activities have been narrowed down in the preliminary study.

(2) Support based on linkage between activities

When selecting the project activities, it is also necessary to fully consider the linkage between the

activities. For example, if a distribution facility is created before farmers begin full production activity, the facility is unlikely to be of much use. In addition, if finance is extended before farmers acquire the new technology, they may find themselves unable to repay the loan should they fail with the cultivation. In fact, PRODAP, which was supported by IFAD, in El Salvador provided farmers with technology and credit at the same time. As a result, farmers who failed technically became unable to repay the loan. Therefore, the JICA El Salvador project considers financing farmers when they have become reasonably adept at technology

(3) Considering the logic of dissemination

While the discussion above focuses on the development from production to sale on the farmer-level, it is equally important to consider how to create a mechanism for dissemination and how the government should support the project. In the Tanzania II project, the logic of dissemination was studied from key farmers to intermediate farmers and other farmers in an irrigation scheme and then to dissemination beyond irrigation schemes. By studying the logic of extension in advance, it was possible to point out the bottleneck, and take early action. In fact, the project identified the stakeholders who play vital roles in dissemination across irrigation scheme boundaries, and has consulted with the stakeholders to seek for their participation.

(4) Formulation of project with emphasis on program approach

As extension requires numerous elements for it to be realized, the program approach is considered as suitable for extension projects. As the subject of the Dominica project was pepper, a new crop to the area, the approach of building on output (research and development and technical development → cultivation test and trial → extension to other farmers and establishment of farm management system) was taken. Since the 1970's, the project in Tanzania has also taken the program approach of (development of rice farming technology → training of extension officers and farmers on regional-level → establishment of a national training organization → development of a training package that appeals to farms around the country). Such program approach is particularly important in LLDCs and African nations where resources are limited and aid coordination with other donors is becoming increasingly necessary. In order for a project to be called a program approach, however, the overall picture of "what needs to be done" should be clarified and the project should be systematically defined based on that overall picture.

5.1.4 Formulation of project suited to the environmental conditions of target area

(1) Designating the project emphasis based on environmental conditions

When formulating a project, it is essential to clarify the emphasis based on the environmental conditions of the country or area. If the purpose of the project is technical development, then environmental conditions are not a major concern. In an extension project, unless the conditions of the target area are carefully analyzed, however, the technology cannot be disseminated and the project cannot attain the goal.

When designating the project emphasis, it is important to determine whether the farmers segment that are the target of the project (often, small farmers) have comparative advantage to surrounding countries and regions (that import the crop) in the crop the project will focus. If the target farmers do have comparative advantage, then it should be possible to implement a market-oriented approach of specializing in cash crop. On the other hand, if the target area has little comparative advantage in the target crop, then it would be appropriate to take the so-called self-sufficiency promotion (social compensation) approach (Fig. 5-1).

These are two extreme cases, however, and a project would often be a mix of both elements. For example, the El Salvador project aimed to extend technology on vegetable cultivation to small-scale farmers. Today, much of the vegetables consumed in El Salvador are imported from neighboring Guatemala. Compared to Guatemala, El Salvador has poor natural conditions for cultivating vegetables, and the costs of infrastructure and input are high. There is no systematic support for small-scale farmers from the government, either. Combined with the dollarization of its own currency, there seems to be little comparative advantage for El Salvador to grow vegetables. Under such environmental conditions, the project was a hybrid of market-oriented approach and self-sufficiency promotion approach. While the project recommended well-balanced cropping through diversification and year-round cultivation, it also advanced activities that stressed market sales. If only a market-oriented approach that specialized on a small number of cash crops were implemented without fully considering the circumstances of the farming in El Salvador, the project's sustainability in the mid- to long-term may have been hindered.

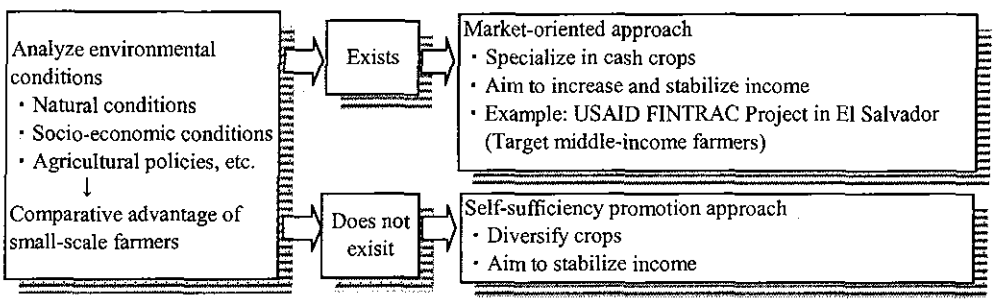


Figure 5-1. Designing the proejct emphasis based on environmental conditions

(2) Determining the environmental conditions using the "five capitals"[42]

It is important to the planning and formulation of a project to accurately determine the local environmental conditions under which the project is placed. While environmental conditions include human resources, natural resources, and socio-economic conditions, an efficient way to analyze such conditions is to focus on the "five capitals" and on market access. The "five capitals" are human capital, social capital, natural capital, physical capital, and financial capital. By analyzing the target area of the project from these viewpoints, it is possible to clarify the characteristics and comparative advantage of the area. As it would be difficult to conduct such analysis entirely in the preliminary study, it is advisable to collect as much information as possible in the preliminary study, formulate the project, then develop the details while the project is under way.

5.1.5 Review of past experience and designation of a cooling-off period

Before formulating a new project or a new phase, it is important to perform an extensive review of past similar projects conducted by JICA and other donors. In El Salvador, other donors have conducted projects for supporting small-scale farmers and for vegetable cultivation in the past. By collecting sufficient information on experience with such past or current projects in the preliminary study stage, the information can benefit the project formulation process.

In the Tanzanian project, there was insufficient verification of the "KATC residential training + field (outreach) training courses" approach used in phase 1 when moving on to phase 2. Normally, the approach employed in phase 1 should have been analyzed, and the approach in phase 2 should have been

[42] For more information on the "five capitals," refer to JICA, 2002, The Guidelines for Rural Development Methods for Africa, page 36.

decided based on the lessons learned from the analysis.

There are a number of methods for verifying the output of previous phases. One method, as used in the El Salvador project, is to designate a follow-up period (one year) and assign one expert. As only one expert is available, the counterpart is more autonomous. The activities during this period can also be used to evaluate how much the capacity of the counterpart has been improved. Substantially reducing the number of experts from four or five that are assigned during the project period to verify the sustainability of the counterpart is considered to be an effective method. Furthermore, the expert need not necessarily be assigned with the counterpart. For example, in the Tanzania project, individual experts could be assigned not to KATC, but to the Ministry of Agriculture and Food Security, and only financial support could be extended to KATC to verify the technical and institutional sustainability. Another method would be to entirely suspend cooperation activities for a fixed period of time. If this method may interfere with the execution of the following phase, then the training institute could provide third country training, domestic field training, etc., to maintain continuity.

By allowing some time between phases, the focus of the following phase may become clearer. The El Salvador project, for example, is currently in a one-year follow-up period. During this period, constraints to dissemination, such as the need for financing for small-scale farmers, have become evident. Furthermore, after some time, the competitiveness of small-scale farmers in vegetable cultivation also becomes clear. A variety of information becomes available if some time is allotted between project phases.

5.1.6 Selection of implementation agency

(1) Selection of implementation agency according to its resources

When selecting an implementation agency, it is necessary to fully consider the resources of the agency.[43] There are generally four project formulation patterns according to the resources of the implementation agency. The first pattern is when the implementation agency has sufficient resources. If it does, JICA may star the project with the implementation agency without much problem.

The second pattern is when the implementation agency has insufficient resources but is deemed to have potential for expansion in the future. In this case, although JICA must provide relatively more input during the cooperation period, as the capacity of the implementation agency will be improved, future dissemination can be anticipated. The main points in determining the potential of an implementation agency are the positioning of the agricultural sector in the country's development policy (to be more specific, refer to the changes in budget and the number of employees), trends in decentralization or privatization of extension services, and employment trends of workers who are educated and trained with donor support. It is not easy, however, to determine potential. In the case of El Salvador, CENTA was chosen as the implementation agency, since CENTA had paid wages to its personnel and it had a budget for activity expenses. Some donors, however, felt that, considering the agricultural policies of El Salvador and the budget allocation to CENTA, the organization has insufficient resources, and even if technology were transferred to CENTA, it would be unable to materialize the effects. As the decision on the resources of an implementation agency is directly linked to the success or sustainability of the project, it must be considered with care. Furthermore, when dissemination is intended, it is necessary to provide

[43] Resources are a comprehensive concept, and include the government's motivation, in addition to capital, people, and organizational ability.

cooperation with the possibility of having to provide support for a long time. If a project is executed without sufficient resources or commitment on the part of the implementation agency, even an enormous input may return no output.

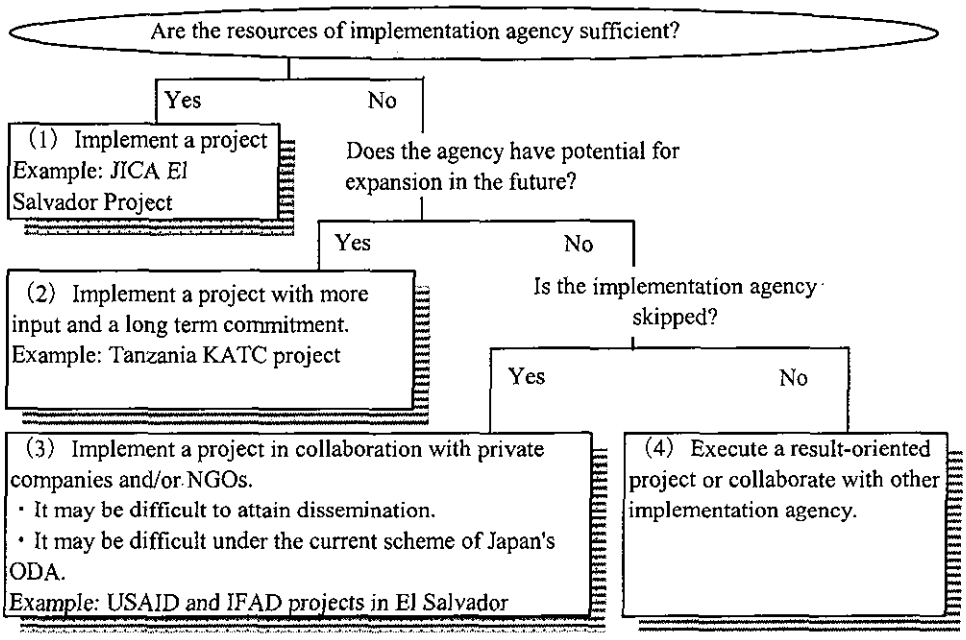


Figure 5-2. Selection of collaboration method according to the resources of implementation agency

The third pattern is when the *implementation* agency has insufficient resources and is not expected to expand its resources in the future. In this case, one approach is to skip a government organization and use a private company or NGO to directly approach farmers. If the project emphasizes results, then it would be possible to achieve the goal. On the other hand, while an approach using a private company or an NGO with high dependency upon donors may deliver high technology transfer effect during the project period, after the project ends, farmers have no one to consult with their problems because private companies or NGO may no longer able to provide assistance since donor funding to them has already ceased.

The fourth pattern is when the implementation agency is unlikely to expand its resources in the future, but the project is executed (must be executed) without skipping the implementation agency. In this case, a project intended to reinforce the extension system would have a sustainability problem, and it would be difficult to achieve the goal even if the project were executed. Therefore, it would be advisable to execute a project that emphasizes results or collaborate with another organization.

(2) Collaboration with an organization other than extension organization (especially if extension is decentralized)

Although implementation agency has been handled as a homogeneous organization in the preceding discussions, in fact, the implementation agency may not only be the extension organization of the central government, but may also be a research organization, training organization, or local government. As can be seen from Table 5-2, even if a project includes the extension element, it is rare to designate an extension organization that belongs to the central government as the implementation agency, as was the case in El Salvador. Various organizations have worked as an implementation agency. In many countries such as Tanzania, extension has been transferred to local governments by decentralization. Since it is impossible to collaborate with all the local governments, in this case, it may be feasible to 1) designate the training organization that trains extension officers as the implementation agency, and reinforce the capacity of the training organization to indirectly improve the extension capacity, 2) designate a research organization as

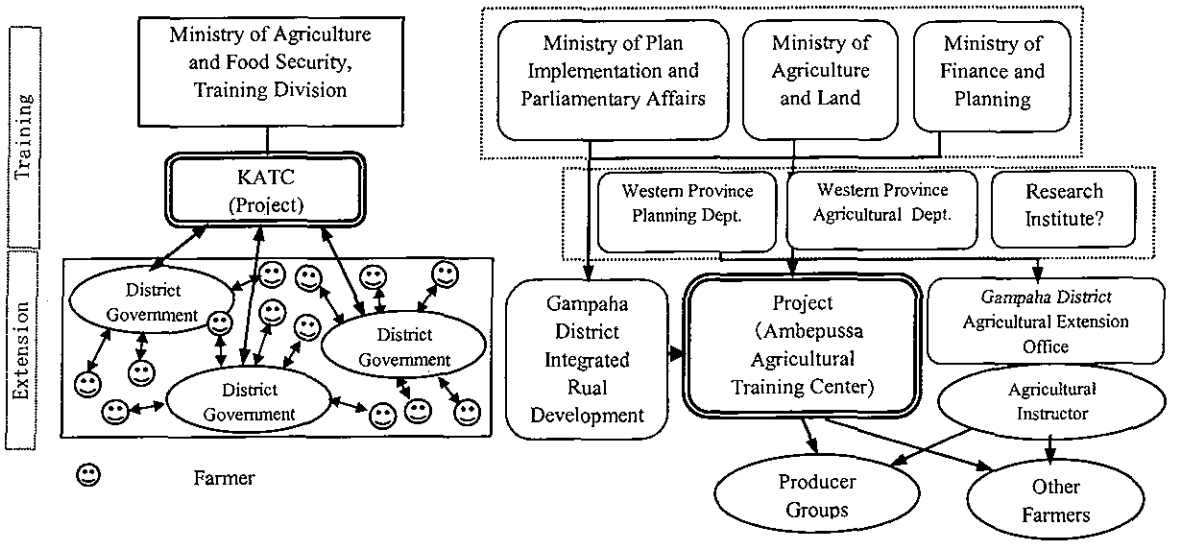
the implementation agency, and improve the collaboration between the research organization and extension officers, 3) designate the extension policy unit of the central government as the implementation agency and reinforce the entire decentralized extension officer system, and 4) based on an agreement with the central government, designate a certain local government as the implementation agency, and feed back the output to the central government. The Tanzania project falls under 1). In all cases, the activities to foster collaboration between the implementation agency and extension officers must be incorporated into the project to ensure dissemination. In particular, in the case of 4), dissemination cannot be expected unless the activities to feed back output to the central government and the activities to standardize the technology and systemize the feedback are clearly incorporated into the project.

Table 5-2. Implementation agencies for the case study projects

Project	Indonesia Project for Improvement of Agricultural Extension and Training System	Laos Agricultural and Rural Development Project in Vientiane Province	Philippines Training Services Enhancement Project for Rural Life Improvement	Sri Lanka Agricultural Extension Improvement Project in Gampaha	Dominica Republic Pepper Culture Development Project Phase 1 and 2, Project for Agricultural Development on Sloped Terrains	Tanzania Kilimanjaro Agricultural Training Center Phase 1 and 2 Project	El Salvador Project for the Strengthening of Agricultural Technology Development and Transfer
Responsible Agency	Ministry of Agriculture	Ministry of Agriculture and Forestry	Ministry of Agriculture	Ministry of Plan Implementation and Parliamentary Affairs (MPIPA)	State Secretariat of Agriculture (SEA)/ Dominican Agrarian Institute (DAI)	Ministry of Agriculture and Food Security	Ministry of Agriculture and Livestock
Implementation agency	BDP Kayuambon, Agency for Agricultural Human Resource Development, Ministry of Agriculture	Special Unit that consists of staff members from Ministry of Agriculture and Forestry and Vientian Province	Agricultural Training Institute (ATI)	MPIPA, Regional Development Dept./ Western Provincial Council Agricultural Dept./ Gampaha District Agriculture Training Center/ Extension Office	Northeastern Agricultural and Livestock Technical Development Center (CENDETECA) (SEA) Joint Organization (SEA and DAI)	Kilimanjaro Agricultural Training Center (KATC)	National Center of the Agricultural, Livestock, and Forestry Technology (Centro Nacional de Tecnologia Agropecuaria y Forestal: CENTA)
Decentralization Policy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
In charge of Extension	District Government Agricultural Information Center (BIPP)and Extension Office (BPP)	?	Local Governments	Provincial Government	SEA's Extension systems and officers are inadequate and there is no extension officer / system in DAI	Local Governments (District, village)	CENTA

In Tanzania, extension was transferred to local governments (e.g., districts and villages) after phase 1 began. Therefore, active efforts were made to draw district governments into the project in anticipation of dissemination during and after the project period. These efforts include requesting the district government to select training participants, considering the district government's support measures when selecting the model site, having the head of the district government approve the key farmers selected at the model site, requesting the district government and village to provide food and fire logs for field training, and requesting the district to bear expenses for farmers of another irrigation scheme to participate in the field training (Fig. 5-3 (1)).

On the other hand, the Sri Lanka project was begun when state governments were responsible for extension and technology development after the push for decentralization began in the late 1980's. The project planning was led by the central government (Ministry of Plan Implementation and Parliamentary Affairs), the project was designated as a provincial-level project, and the actual project activities were conducted primarily by Agricultural Training Center and Agricultural Extension Office in Gampaha. Since the responsibility for implementing the project was ambiguous between the central government, which wished to continue the cooperation with the integrated rural development project, and the provincial government, which wished to promote extension and training, a problem with sustainability remained when the project ended (Fig. 5-3 (2)). The method of selecting the implementation agency and the method of collaboration with (incorporation of) associated organizations are important to dissemination.



(1) Tanzania Kilimanjaro Agricultural Training Center Project

(2) Sri Lanka Agricultural Extension Improvement Project in Gampaha

Figure 5-3. Collaboration with local governments in extension project under decentralization

5.1.7 Consistency between the mandate of implementation agency and the scope of project

(1) Revision or addition of implementation agency according to the scope of project

It is extremely important that the activities of the project match the mandate of the implementation agency. There have been cases, however, when the mandate of the implementation agency did not match the scope of the project. For example, the Sri Lanka project's activities were designed to improve the research activities on selecting the proper crop and the extension method through extension officers and key farmers. As the implementation agency was an extension and training organization, it did not have a

research department. Consequently, the approach of the project had to be changed during the project period. When the mandate of the implementation agency and the scope of the project do not match, the implementation agency should be changed to an organization that matches the activities of the project (or an appropriate implementation agency should be added). In the case of the Philippine project, training and extension were included in the scope. As a result of decentralization, however, the implementation agency became responsible for only training, and no longer for extension. Therefore, a local government that is in charge of extension was incorporated into the project during the project period.

In the case of an ongoing project, when the scope of the project is changed, it may also be necessary to change the implementation agency. For example, the Dominica project was essentially executed in three phases. The primary implementation agency has changed, according to the development of the activities, from "Northeastern Agricultural and Livestock Technical Development Center (CENDETECA) under the State Secretariat of Agriculture (SEA)" to "CENDETECA and Dominican Agrarian Institute (DAI)" to "SEA, DAI". In the Tanzania I project, the target area was expanded from Kilimanjaro Region, where JICA had provided cooperation for nearly twenty years, to the entire country. Consequently, the Kilimanjaro Regional Government was replaced by the Ministry of Agriculture and Food Security (at the time, Ministry of Agriculture and Cooperatives) of the central government as the implementation agency. Although the Kilimanjaro Regional Government was reluctant for the change, the Japanese side insisted that the change must be made.

(2) When multiple implementation agencies exist

An extension project sometimes caters to multiple organizations and areas and more than one organization may be involved in the extension project as implementation agency. In such a case, organizational sustainability may be an issue after the project ends. For example, the Dominica project's target areas included an area of farmers who had been engaged in farming from the past and an area where farmers had just moved in. Different government agencies and organizations governed the areas, and the extension activities of the two areas were conducted by different organizations on separate budgets. Consequently, the project was internalized as part of the country's national development plan and developed cross-organizational action plans. As this example shows, an extension project tends to be joined by several types of organizations including research, training, and extension. For activities to continue under adequate collaboration between the relevant organizations even after the project ends, it is necessary to build an adequate mechanism. To this end, it would be advisable to clarify the goal and activities in national development plan and sector or area plan, clarify the activities as duties of line organization, secure the budget, and set rules for budget allocation.

(3) When the implementation agency is subject to a new mandate during the project period

In some cases, the implementation agency may be subject to an additional mandate, but only during the project implementation period. For example, in the Laos project, the government organization created a special unit just for implementing the project. Establishment of a new implementation agency for a project or adding a mandate is not necessarily desirable in terms of sustainability. If it is unavoidable, attention should be paid to the points below. First is the division of roles with other organizations responsible for extension. If an organization whose scope of activities includes the mandate already exists, then it is necessary to clarify the division of roles with that organization. Second is to clarify the future benefits to the organization of assuming the new mandate. In the Laos project, it was not necessarily made clear how the mandate that was added during the project period would be used effectively after the

project ends. Third, when a mandate is added, the budget must also be allocated properly. An activity cannot be conducted without a budget and becomes a mere "pie in the sky." The Tanzania II project considered having the zonal irrigation office provide coordination of for extension activities across district boundaries. Because of lack of budget, however, it has actually been engaged in almost no activity.

5.1.8 Designating the preparation phase and exit phase

When implementing a project, it is essential to understand the current situation and needs. To this end, a preparation phase may be necessary. Both the El Salvador and Tanzania projects failed to start as planned, and ended up reducing the project activity period. Designating a preparation phase serves as a hedge against such risk. In fact, in the Laos project, the preparation phase was used to thoroughly learn the needs of farmers. This has led to the smooth startup of phase 2. It may also be advisable to designate an exit phase to ensure a smooth transfer to the implementation agency after the project ends. When a project is composed of three phases, including the implementation phase, the content and characteristics of each phase can be described as below.

Preparation phase: Conduct a fact finding study to clarify the current status and needs. While it is ideal to complete this process in the preliminary study, it would be difficult to complete all the tasks. If the technology to be extended has not been developed, then develop the technology. If the implementation agency is a training organization, then train the tutors and prepare the training text. If the implementation agency is an extension organization, then train the extension officers. This is a period for improving the capacities of the extension organization and extension officers, and such activities should not require a lot of budget.

Implementation phase: This is a period when the developed technology is fully extended. Full-fledged training activities are also conducted. As extension officers and training participants become active, the need for capital increases. As there are multiple stages of extension, it may be possible to approach the implementation phase as a program, and shift the emphasis to divide the phase into a number of sub-phases such as technical transfer, provision of credit, and marketing support.

Exit phase: *This is a period when activities are conducted in anticipation of what will happen after* the project ends. While the sustainability of the project should be taken into account from the project formulation and implementation stages, this is a period when specific activities are taken for this purpose. For example, in the Tanzania II project, KATC is aiming to conduct activities within the framework of the country's Agricultural Sector Development Program (ASDP). To this end, KATC plans to cut the cost of field training. In addition, the exit phase is a period when the involvement of the donor gradually decreases. The funding from the donor is expected to decrease.

5.1.9 Evaluating the capacity development of extension organizations

In the case of an extension system reinforcement project, the goal of the project is to develop the capacity of the extension organization. It is difficult to evaluate to what degree capacity development has been accomplished. This section provides three ideas as examples. The first idea is a technique devised by an expert to the El Salvador project. This is a qualitative evaluation for the capacity development of extension officers (Table 5-3). As such qualitative evaluation is based on the subjective views of experts, maintaining objectivity is an issue. To this end, it would be necessary for experts to set common criteria and that more than one expert evaluates each case.

The second idea is for farmers to evaluate the extension organization. As farmers stand to receive services from extension and training organizations, they should recognize an improvement in the capacity of such organizations. If the farmers do not recognize an improvement in the capacity, then the capacity

development effort can be deemed insufficient. In fact, farmers have highly praised the improvement of the capacities of extension officers and training officers *in the El Salvador and* Tanzania projects. One way to conduct such evaluation by farmers is the double differences: to conduct the survey before and after the project or in the area where the project is executed and in an area outside of the project area.

Table 5-3. Qualitative Evaluation of Extension Officers

Project		Before	After
Basic Technology	Basic techniques of agricultural production	2	3
	Basic techniques of agricultural management	1	3
Crop Cultivation Technology	Basic crop cultivation knowledge	3	4
	Basic crop cultivation ability	2	3
	Vegetable cultivation knowledge	3	3
	Vegetable cultivation ability	1	3
	Technical applications	1	2
Grasp and analyze current status of farmers	Grasping current status	1	3
	Analyzing current status	1	2
Extension Capacity (1)	Ability to plan demonstration farms	-	3
	Ability to guide demonstration farms	-	3
	Capacity to prepare a farm management improvement plan	-	2
	Capacity to guide farm management	-	2
Extension Capacity (2)	Capacity to prorate extension activity plan	2	3
	Capacity to execute extension activities	2	3
Extension	Comprehensive guidance capacity	2	3
Dependability	Personal character	3	4
	Technical ability	3	4

Note: Evaluation is based on maximum of 5 points.
Boxes showing "–" indicate that these items could not be evaluated.

The third idea is to designate an indicator that takes into account the extension that would be achieved if the capacity of extension organizations is developed. One example of such an indicator is yield increase at the model site. Such idea has actually been adopted in the Tanzania II project. When the capacity of the training institute is developed, technology is actually extended to farmers, and this result can be measured. Compared to the two indicators described above, this is an indicator that is associated with the outcome. In this case, as yield is generally affected by other factors, it is also necessary to clarify the external conditions (important assumptions).

5.2 Lessons on designating a model for extension project

This section summarizes the lessons on designating a model for an extension project. Here, "extension model" is seen not only as a technique for approaching farmers, but also as including the method of selecting the technology, method of providing the equipment and supplies that are necessary for implementing the technology, method of selecting the target group, and method of executing the extension project.

5.2.1 Selecting the technology suited to the target group

The target group differs depending on the purpose of the project. As a rule, a technology that suits the selected target should be developed or selected. When large-scale or medium-scale farmers are the targets, the technology is likely to be adopted, even if initial capital investment is sizable, as long as the profitability is high. If small-scale farmers are the targets, however, the initial capital investment must be small and the technology must be relatively easy. Described below are the methods for selecting the technology when small farmers (or poor farmers) are the targets and the method for providing the infrastructure that is necessary for using the technology.

(1) Simple technology that requires no initial capital investment

When selecting a technology for extension, it is important to take into full account the current situation and constraints of the farmers, and develop a technology that meets those conditions. In the case of the El

Salvador and Tanzania projects, the farmers only had modest levels of technology and education. As there was also no financing mechanism, capital was a major constraint. On the other hand, the farmers had ample labor. Considering these circumstances, the Tanzania project recommended technology that can increase crop yield with almost no initial capital investment, by increasing input of family labor, and more appropriate and timely management. In addition, this technology helped correct the gender gap. The farming equipment required for production was already available in the area. Such characteristics are mostly responsible for the rapid dissemination of the recommended technology in Tanzania.

The vegetable cultivation technology developed in the El Salvador project was also easy for the farmers. While the technology recommended in the project is composed of a number of components, the key component is the use of a greenhouse to protect seedlings from virus. The greenhouse was relatively expensive. A greenhouse cost approximately $1,000, which is equal to income from one year of harvest for a farmer engaged in conventional farming.[44] In addition, as the project recommended the use of a high yielding variety, the cost of input was also relatively high. The considerable expense of input and infrastructure has been a constraint to dissemination. Based on the cases in El Salvador and Tanzania, the technology must have the following characteristics to disseminate among small-scale farmers (poor farmers).

- Simple
- Requires little initial capital investment
- Improves yield by increasing the input of labor, a surplus resource
- Decreases gender gap (or does not increase the gender gap)
- Can be accomplished with existing farming equipment

Another characteristic of a technology suitable for dissemination is a technology that leads to more efficient use of water. The water management technology recommended for dissemination in the Tanzania project leads to conservation of irrigation water compared to the conventional method. Therefore, an irrigation scheme has implemented a system of supplying water on the condition that the farmer implements the new technology or of penalizing a farmer who does no implement the new technology, to increase the irrigated rice cultivation area in the entire irrigation scheme. A technology with such characteristic is easier to be disseminated.

A technology that is disseminated does not have to be a new technology. In the Indonesia project, extension officers find excellent cases from farmers, analyze them, and use the findings to solve problems in their areas. Local excellent cases are believed to be suitable for dissemination.

While the focus in this section has been placed on the technical aspect, it is also important to fully consider the sales of agricultural products. Vegetables in the El Salvador project and rice in the Tanzania project are both marketable products. As a result, farmers increased and stabilized their income by implementing the technology recommended by the project.

(2) Technology that requires initial capital investment and technology that requires little initial capital investment

As described above, a technology that is simple and that allows the farmer to earn a large return without much cost is ideal. It may be difficult, however, for experts to develop such a technology within the time frame of a technical cooperation project. It is also uncertain whether such a technology remains

[44] Project for the Strengthening of Agricultural Technology Development and Transfer in El Salvador, Farming Technology: Crop Cultivation Techniques, November 2003 (In Japanese)

undeveloped to this date.[45] In fact, the Sri Lanka project attempted to implement a catch crop for the coconut farms, but was unable to find an appropriate crop or technology.

When the ideal technology cannot be found, there are two options for the second best technology to be selected for project. One is a technology that requires a sizable initial capital investment, but generates a sizable return. The other is a technology that requires little initial capital investment, and generates a small return. An example of the first type of technology is the greenhouse and irrigation system in El Salvador.

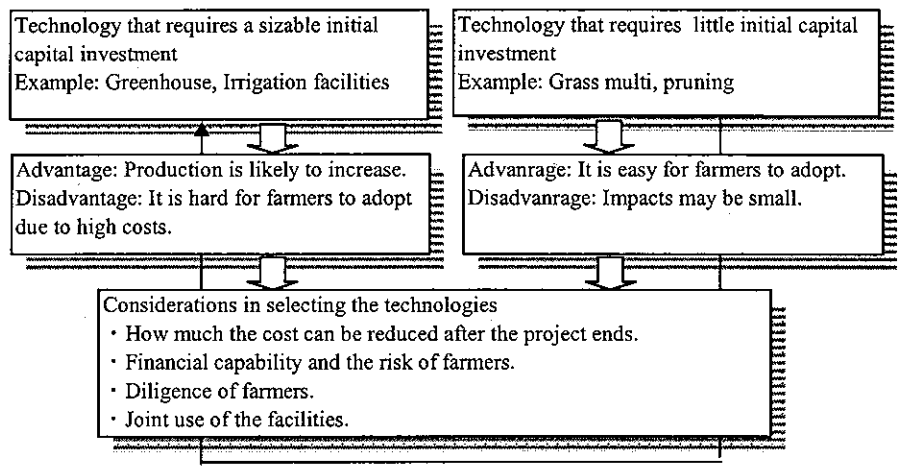


Figure 5-4. Selection of Technology and Step-by-Step Approach

As such technology requires a sizable initial capital investment, it would be difficult for farmers to accept the technology without some help. Therefore, it is necessary to reduce the cost to a level that is acceptable to the farmers or provide financing for small-scale farmers at the same time. Normally, as technical development faces time constraint, how much the cost of capital investment can be reduced after the project ends is an important consideration in selecting a technology. If cost reduction is difficult, then it is important to provide a loan. If it is impossible to reduce cost or extend a loan, then the technology recommended by the project is not likely to be disseminated. It should be noted that even if an agricultural credit system is implemented, the technology might not be adopted if the risk is too great for small-scale farmers. USAID supported vegetable cultivation by small-scale farmers in El Salvador, and attempted a measure to reduce the cost of greenhouses incurred by the farmers. Still yet, the small-scale farmers refused to engage in the highly risky vegetable cultivation. It is necessary to analyze in detail based on a farm household survey, how much risk farmers are willing to take.

The second option is the so-called low risk, low return technology.[46] The technology is developed to meet the level that is acceptable to farmers. In this case, the profit to farmers tends to be small, so they may be reluctant to increase the labor input for the small benefit. At the very least, it is a measure that is acceptable to diligent farmers who are willing to give the new technology a try.

When selecting a technology, it is difficult to say which option is better. It is necessary to consider a wide range of factors such as the possibility of reducing the cost of initial capital investment, diligence and

[45] Tanzania project has 20 years of experience in irrigated rice cultivation. Therefore, the technical foundation had already been in place when the KATC project began. In addition, the project was targeted primarily at areas where irrigation facilities were already in place. On the other hand, as the target group of the El Salvador project was small-scale farmers without even basic infrastructure, everything had to be started from scratch. The ease of selecting a technology is also affected by such historical background of projects.

[46] While there may be a low risk, high return technology, the assumption of this discussion is that there is not (cannot be found). The measure when a low risk, high return technology is available is discussed under (1).

risk tolerance level of farmers, comparative advantage against surrounding regions / countries, and agricultural policies of the country. While the second option may be more desirable as the technology is acceptable to farmers, it should be noted that if the initial capital investment can be reduced sufficiently under the first option, farmers would become receptive to the technology. In fact, in El Salvador, even after the project ended, CENTA researchers have continued cost reduction efforts. Today, the initial capital investment is about one-half of the original cost.

In the actual dissemination process, the two measures may be executed in stages. For example, in the El Salvador project. The greenhouse can be shared among farmers. Therefore, in the first stage, a greenhouse is shared by farmers and a technology that requires no expense (e.g., pruning or grass mulch) is used to increase income. Then, after a reasonable amount of profit has been saved, each farmer could make an investment in his own greenhouse. While this technique consumes farmers' time, it allows them to overcome the capital shortage and risk associated with infrastructure investment. Also by showing a possibility of success in the future, this method motivates farmers.

(3) Provision of equipment and supplies by taking into account the risk for farmers

When taking the approach as described above, another important point is how the infrastructure that is necessary for agricultural production is provided to the farmers. Whatever it may be, a new technology poses a risk to farmers. In this case, the role of the project is to 1) increase the farmers' interest in the technology, and 2) reduce the risk of implementing the technology. Small-scale farmers tend to avoid taking risks, even if they can afford the initial capital investment. Therefore, it is important to incorporate into the way to alleviate the risk.

There are generally three ways to alleviate risk. First is to demonstrate the new technology on a trial farm and tell the farmers of the possibilities. No infrastructure or input is provided to the farmers, and the project waits until the farmer voluntarily implements the new technology. Second is to provide a preferential loan through the project. Third is to provide the infrastructure and input on a cost-sharing basis. Which method is desirable would depend on the characteristics of the technology to be transferred and the circumstances of the target area (e.g., farmers' income level). The first method may be possible if the infrastructure and input cost little or nothing. If a relatively high initial capital investment is required, as was the case with the El Salvador project, farmers cannot tolerate the risks, and are unlikely to make the investment. As for the second method, while the monetary constraint is eliminated, how the technical risk is perceived becomes an issue. It is too risky for a farmer who knows nothing about the new technology to take on a loan in excess of his annual income to finance the infrastructure and input and immediately engage in cultivation. Therefore, it was appropriate for the El Salvador project to select the third method. This third method is based on the idea that the burden on farmers should be minimized during the stage when they are learning the new technology. The extensive support provided during the learning process was of considerable help in key farmers and intermediate farmers learning the technology. As key farmers and intermediate farmers served as the core and demonstration for technology transfer to other farmers, they have a positive external effect. This benefit justifies that part of the equipment and supplies is provided by the project. On the other hand, it is necessary to consider whether the method can be sustainable in the long-term within the policy framework of the El Salvadorian government.

(4) Supply of equipment through cost sharing

It is also important to provide equipment and supplies on cost sharing basis. If the equipment and

supplies are merely given to them, farmers would not develop a sense of ownership and would fail to properly maintain and manage the equipment and supplies. Farmers would also fail to devise ways to modify the equipment and supplies to better suit their own farms. In addition, in many developing countries where subsidies to the agricultural sector are being abolished or cut, a large equipment or supply aid through a project may create inconsistency with the overall agricultural policy.

Another method is to have farmers who have received equipment and supplies return part of the income to a revolving fund. In fact, in a hearing of key farmers of the El Salvador project, many farmers replied that they would agree to return part of the profit from vegetable production (not a fixed amount, but a fixed percentage of profit) to the project as a fee for having received the infrastructure. It is unclear whether such repayments are sufficient to serve as a revolving fund for extending loans to other farmers, but such a mechanism is worth a consideration.

5.2.2 Selection of farmers with suitable conditions in the target group

Considering the diversity of farmers and areas, it is generally difficult for a technology to be disseminated to all the farmers in the target area. Technology tends to be disseminated primarily to farmers with the most suitable conditions. Therefore, in an extension project, selecting target farmers and areas from the target group and region would facilitate the project implementation. In the Dominica project, pepper cultivation technology was transferred only to farmers with suitable farms. In a project whose purpose is to extend technology and requires some initial capital investment, if the target group is small-scale (poor) farmers, the poorest farmer segment (extremely impoverished segment) should be avoided as the target (Fig. 5-5). While the implementation of a new technology carries some sort of risk, it is difficult for the extremely impoverished segment to assume that type of risk. In the El Salvador project, the medium-level segment among the small-scale farmers was chosen as the target. Naturally, this does not mean that a project should ignore the extremely impoverished segment or farmers whose farms are not suitable. It is absolutely important to extend support to them. What is important here, however, is that it is rare for a technology to benefit all the farmers if the region is heterogeneous. Therefore, it is necessary to focus on the target farmers.

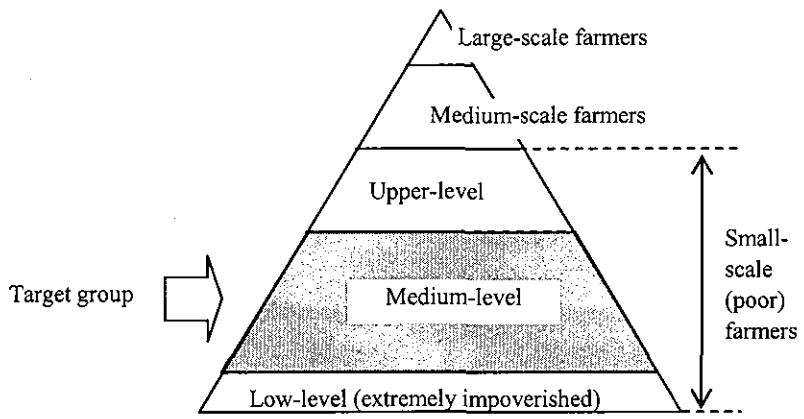


Figure 5-5. Target of Extension Project Incurring Initial Capital Investment

In a project catering to a large region, one effective method is to start with the regions where the situations are well known. In the Tanzania I project, rice-farming situation was not well known in areas outside of Kilimanjaro. Therefore, in the first half of the project, training was given primarily to the extension officers and farmers in the Kilimanjaro and its nearby regions. As the information on surrounding regions was collected, the extent of the training was gradually spread to the rest of the nation.

5.2.3 Project implementation method

(1) Grasping the current situation and needs by survey

When implementing a project, it is essential to accurately grasp the current situation. While a survey of the target area is conducted via a preliminary survey, it is often insufficient. Therefore, detailed surveys were conducted at the startup of both the El Salvador and Tanzania II projects. These surveys laid the foundation for various activities in the projects. When conducting a survey, it is important to first clarify the framework. In the El Salvador project, it took one year to survey all the farmers designated in advance. As a result, the survey put a time constraint on the successive activities. The size and items of the survey should be decided by the experts by taking into account the details and period of the project. By continuing the survey during the project (if possible, also after the project), it is possible to not only show the project's quantitative output, but also to determine and analyze the extent of dissemination and the reasons for it. In fact, a farm household survey has been continuously conducted in El Salvador to closely monitor changes in key farmers and intermediate farmers even in the follow-up period.

(2) Implementation of highly transparent process

One of the distinctive features of the Tanzania II project is its high transparency, such as the clarification of processes from training to extension from the outset. For example, the selection criteria and roles of key farmers and intermediate farmers are clarified in advance. Not only the selected farmers, but also other farmers are well aware of the information. The policy concerning cost sharing is also clear. On the other hand, in the El Salvador project, some extension officers and farmers did not seem to have understood the purpose of the provision of inputs and infrastructure by the project. Likewise, even after farmers had agreed to become key farmers, they were not certain how much personal expense they would have to bear. Although it is difficult to clarify all the intervention processes in advance, it is important to make the process as transparent as possible to improve the project's accountability and facilitate farmers to make decisions.

(3) Material support for a fixed period

The El Salvador project cut material support (provision of input) to key farmers when the principal subject of the activities moved to intermediate farmers. As key farmers had received support with infrastructure and input (on cost sharing basis) from the project, there were concerns over the lack of the sense of ownership and increasing dependency upon the project. After the support for key farmers was cut off, their sense of ownership of infrastructure increased and they began to adjust their activities in anticipation of the end of the project. In fact, some key farmers began to conserve the net for greenhouse provided by the project, and used remnants to expand or repair their nursery house. As the support was cut off before the project ended, it was also possible to observe the sustainability of the key farmers during the project period. Cutting off support for key farmers also helped to instill awareness in intermediate farmers that the project support is only temporary. This is believed to have increased the incentive among intermediate farmers to quickly acquire the technology.

5.2.4 Farmer to farmer extension

Farmer to farmer extension is an important approach for realizing dissemination. Farmer to farmer extension was used in both the El Salvador and Tanzania projects. When farmers consider implementing

a new technology, they place high priority on whether other farmers that they are familiar with have succeeded with the new technology. Furthermore, due to financial constraints, extension officers and extension organizations in developing countries tend to be feeble. Farmer to farmer extension is an approach that can accommodate such characteristics of farmers and the environment surrounding extension officers and extension organizations. As a farmer who receives transfer of technology then serves as the center of extension and transfers technology to many other farmers, farmer to farmer extension is a highly efficient approach. Described below are the important points in implementing the approach.

(1) Key farmer to intermediate farmer to other farmer dissemination process

In both the El Salvador and Tanzania II projects, the approach of "key farmers to intermediate farmers to other farmers" was taken. Technology was first transferred to key farmers, then key farmers transferred the technology to intermediate farmers with the support of extension officers. Next, intermediate farmers transferred the technology to other farmers (Fig. 5-6). In the Dominica project, too, a farmer to farmer extension approach using key farmers was employed.

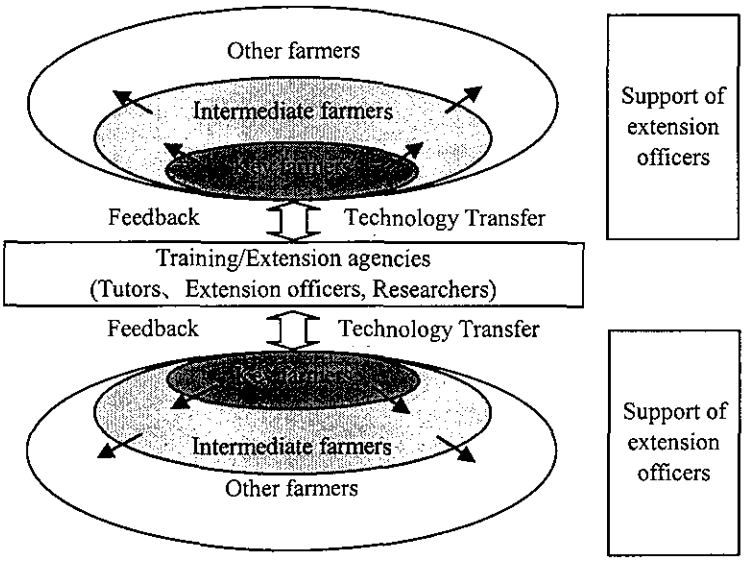


Figure 5-6. Farmer to Farmer Extension Approach

(2) Highly transparent key farmer selection process

As is clear from the farmer to farmer extension process, the selection of key farmers is very important. In the Tanzania II project, the selection criteria and roles of the key farmers were clarified in advance and notified to all the farmers in the irrigation scheme. As a result, not only the key farmers, but also other farmers gained an understanding of the roles that key farmers play. This understanding is believed to have made a large contribution to the dissemination of technology through key farmers. In addition, the selected key farmers were required to receive the endorsement of the DED. This requirement helped weed out inappropriate key farmers and grant a sense of authority to key farmers.

In El Salvador, a different approach from Tanzania was taken to select key farmers. To be specific, the conditions were first designated (gross farm income, farm area, education level, time spent on farming). From farmers who satisfied these conditions, the key farmers were selected to reflect the diversity of the farmers in the target area in terms of cultivation pattern (whether vegetables are grown), inclination of farmland, and availability of well. The El Salvador project employed this selection method as the intention was to verify whether the technology recommended by the project would be accepted by the diverse range of farmers in the target area, more so than to select a core for dissemination. Consequently, activity experience with farmers' organization is not one of the selection criteria. As a result, compared to Tanzania, some of the key farmers were not suitable to play the core roles in farmer to farmer extension. These farmers were replaced during the project. Table 5-4 shows the important points in the selection of key farmers as derived from the Tanzania and El Salvador projects.

Table 5-4. Selection Criteria for Key Farmers

		El Salvador	Tanzania II
Selection Process	Selection criteria are clear	○	○
	Selected by farmer organization		○
	Roles of key farmers are shown to those selected as key farmers	○	○
	Other farmers are also informed of the roles of key farmers		○
Selection Criteria	Can read and write	○	○
	Exclusively engaged in farming	○	○
	Can transfer technology to other farmers		○
	Can cooperate with other farmers		○
	Is an advanced farmer		○
	Lives near the farm		○
	Owns land	○	
	Is in a certain age group (15 or older but 64 or younger)		○
	Actively involved in farmer organization		○
	Can receive approval of district government		○

(3) Selection of intermediate farmers left to the discretion of key farmers

In Tanzania II project, the key farmers were selected by a farmers' organization, and in El Salvador project, they were selected by experts and counterpart. On the other hand, intermediate farmers in both projects were selected by key farmers, and certified by the project according to selection criteria. This measure was taken to facilitate the joint activities between the key farmers and intermediate farmers. Selection criteria of intermediate farmers were designated for both projects, such as the residence or farm being near the key farmer. These criteria were also set to facilitate the technology transfer activities. In the meantime, in both projects, technology transfer to intermediate farmers was conducted based on group activities. This is an effective technique to improve the efficiency of technology transfer and to lay the stepping stone for future joint activities (e.g., joint purchase or joint sales).

(4) Improving the capacities of extension officers and farmers

In farmer to farmer extension, there is a heavy burden on the farmers who serve as the core of the extension activities (key farmers and intermediate farmers). Although the key farmers at model sites feel an honor to be chosen as key farmers and are fulfilling their responsibilities, but as the activities last over a long period of time, they may find that they cannot fully play their roles. In addition, even key farmers may not be versed in all the techniques, they require technical support. Therefore, extension officers also play an important role in farmer to farmer extension. In general, extension officers work under various constraints, and it is difficult for them to engage in sufficient extension activities. As farmers raise their awareness, and farmers form groups, however, extension officers will find it easier to engage in extension activities. In Tanzania, as an extension officer lives in each village, the extension officers have relatively easy access to farmers. The activities of the extension officers and farmers are a win-win relationship. When the extension officers improve their technical capacity, it would contribute to the technology transfer to the farmers. Consequently, it is important to improve the capacity of extension officers even if farmer to farmer extension approach is employed.

(5) Use of demonstration farms

Demonstration farms play an important role in technology transfer. In a hearing of intermediate farmers, they were asked what convinced them of the effectiveness of the new technology. The most popular

answer was "actually seeing the cultivation at the farm of a key farmer." This indicates that farmers are most likely to be convinced of the effectiveness of a new technology when a farmer that they have known well, and not a public experimental farm, succeeds with the technology in cultivation.

It is important to create as many demonstration farms as possible. Ideal locations for a demonstration farm include a lot along a road often traveled by farmers and a lot near a meeting place. The size of a demonstration farm should be the basic unit (e.g., 0.5 acre) generally used in the region. This helps convert the fertilizer input volume, for example, into the volume necessary for one's own farm.

(6) Fostering sense of competition between farmers

Measures to promote competition between farmers have been implemented in both the El Salvador and Tanzania projects. In Tanzania, for example, the farm of each intermediate farmer is adjacent to the farm of a key farmer. This proximity fosters competition to improve rice cultivation techniques and ultimately increase crop yield. On Farmer's Day, three key farmers with superior techniques are selected at each model site and awarded in front of a large crowd. To the farmers, to be selected at such a venue is a great honor. Therefore, each farmer strives to improve his/her techniques so he may be selected. In El Salvador, too, key farmers frequently visited other key farmers and observed how the technology was being implemented. Such reciprocal visits (observations) helped develop a sense of competition between the key farmers. If it becomes excessive, such competition can hinder technology transfer. In both projects, however, the competition raised the incentive for farmers to implement technology and helped expedite the technology transfer.

5.2.5 Training of farmers and extension officers

Training is one method of extension activities. In the Tanzania project, technology transfer through training was the principal method. In El Salvador, too, training of extension officers and farmers was one of the project's principal activities. Key points of training are summarized below.

(1) Development of training package with emphasis on technical soundness and receptivity

When developing a training package, it is important to develop a training package that securely transfers the technology, while considering the cost. If cost is given the priority while developing a package that is receptive to the recipient country, the outcome may be a training package with uncertain technology that is cheap and useless. Therefore, the first priority should be given to developing a training package that securely transfers the technology. When this is accomplished, the content of the training package can be carefully examined, and unnecessary elements can be deleted to the level that is acceptable to the counterpart. In fact, in the first half of the Tanzania II project, the experts worked on developing a training package that transfers the technology to the farmers at a high probability. In the latter half, the experts plan to delete elements to reduce training costs so the package will be accepted by the framework surrounding agriculture in Tanzania. This is the same pattern as in El Salvador, where the project first established a sound technical system, although at a high initial capital investment, then reduced costs once the technology was established. As this example illustrates, it is advisable to maintain a dynamic viewpoint even in a single project, first giving priority to technical aspects, and then reducing costs once the technology is established. This does not mean, however, that costs can be ignored for technology development in the first stage. It is necessary to give adequate consideration to costs from the beginning to enable cost reduction later in the project.

(2) Simple and practical training

In the Tanzania project, the experts worked on making the training as simple as possible. For example, tutors explained to trainees that it is important to "standardize" many of the tasks concerning rice cultivation. The farmers also saw actual work in a training on the farm. Such simple and practical training has been highly evaluated.

(3) Joint training of extension officers and farmers

The Tanzania project has conducted joint training of extension officers and key farmers. The advantage of joint training is that by living together in a dormitory for the training period, extension officers and key farmers develop a relationship of trust and they will be able to collaborate in disseminating the technology in their irrigation schemes after the training. In the Tanzania project, training of only extension officers, training of only farmers, and joint training have been evaluated as shown in Table 5-5.

Table 5-5. Conceptual Evaluation of Joint Training of KACT Extension Officers and Farmers

	Extension Officers Only	Farmers Only	Farmers-Extension Officers Joint Training
Number of areas covered by the training	Many	Different from one case to another	Few
Number of participants per area coverd by the training	Few	Different from one case to another	Many
Collaboration between extension officers and farmers after training	No change	Weakened	Strengthened
Potential for improvement of irrigated rice cultivation	Normal	Normal	Strong

Source: KATC Newsletter, 1999, Rice and People in Tanzania Vol.11 (In Japanese)

(4) Combination of residential training and in-field training

In Tanzania I project, KATC visited irrigation schemes that sent extension officers and farmers to attend training at KATC during the follow-up period to hold field-training courses. Farmers were given the opportunity to question what they missed in the training at KATC or on problems that arose in actual practice. In phase 2, infield training has been held after holding joint training at KATC. Farmers and extension officers who have received such training and other donors alike have highly praised this combination of training at KATC and field training at their own irrigation scheme as an effective approach.

(5) Holding multiple field training courses per cropping season

In the Tanzania II project, three field-training courses (before planting, during growth period, and upon harvest, one week each time) have been held in each cropping season. As the required work differs by the rice growth stage, it is an effective measure to hold multiple training courses per cropping season.

5.3 Capacity development of the institutions and coping with the environmental conditions

This section summarizes the lessons regarding Sub-Question 1 (capacity development of the institutions), Sub-Question 3 (coping with environmental conditions), and JICA's roles. From a chronological viewpoint of a project, this section and the preceding section are designated as lessons for project implementation.

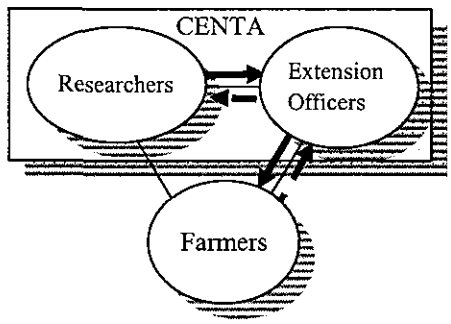
5.3.1 Capacity development of the institutions

The implementation agency of a project that includes an extension element may be any one of various entities such as an extension organization or training organization. In a project intended to develop the capacity of the extension system, it is extremely important to develop the capacity of the extension organization. Provided below are important points in capacity development of a counterpart by referring to the El Salvador and Tanzania projects as examples.

(1) Institutional aspect

1) Reinforcing the organization through research and extension collaboration

In the El Salvador project, the organization was reinforced through the research and extension collaboration system (Generation y Transferencia de Technologia, or GyTT). CENTA, which is the implementation agency, is an organization in charge of research and extension. In extension activities, too, the research unit plays an important role in supporting the technical aspects. By reinforcing the collaboration between extension and research, researchers began to conduct research according to the needs of farmers, and extension officers find it easier to receive the help of researches when they come across a technical problem.



As a result of implementing the research-extension collaboration system, it became possible to conduct technology development and extension activities at the same time. While the normal flow of technology development and extension is "researcher → extension officer → farmer" (the solid line in the *illustration*), researchers often tend to conduct research and development without considering the needs of farmers. On the other hand, the process under this system is represented by the broken line in the illustration. In essence, the extension officer and researcher jointly create a demonstration farm for a key farmer and provide technical training there. At the same time, the researcher conducts a vegetable cultivation experiment to suit farmers' needs at the experimental farm. The use of such system has also conserved time.

There may be requirements in implementing this system. For example, in many countries extension and research are conducted by different organizations (in some countries they are privatized), researches and extension officers are not necessarily friendly with each other, and researchers do not fully meet the needs of extension officers. One of the reasons that the system succeeded in El Salvador is that it had been implemented with the support of World Bank before the project started, and the gap between extension officers and researchers in education levels and wages was not so large. By fully taking such factors into account and creating a relationship of cooperation between the two parties wherever possible, the system can contribute to facilitating the extension.

2) Developing a system for sharing feedbacks from farmers (training participants)

In an extension activity, it is important to effectively use feedbacks from farmers. Systems have been created for the El Salvador and Tanzania projects to share the feedbacks from farmers among relevant parties. In Tanzania, for example, participants review each training course. Then, depending on their feedback, the training courses are modified if necessary. In El Salvador, all extension officers gather once

a week to exchange and share information.

3) Guidance on creating reports

In the past, activities were rarely recorded as reports in El Salvador or Tanzania. After receiving guidance from experts, they have begun to record their own activities in reports. The reports facilitate learning from past experience, and help strengthen the organization.

(2) Technical aspect

1) Reinforcing the practical aspect

In El Salvador and Tanzania alike, the primary problem of researchers, extension officers, and tutors (hereafter referred to as technicians) was their lack of practical skills or experience. When they teach farmers, regardless how much they emphasize theory, farmers are not willing to listen. Practical skills are essential. Therefore, in both projects, the Japanese experts developed the practical skills of technicians. To be more specific, the experts created a farm, and jointly cultivated crops with the technicians. This allowed the technicians to fully acquire the practical skills before showing them to farmers. As a result, farmers improved their evaluation of the technicians.

2) Farm management guidance

Guidance on farm management and vegetable cultivation techniques represent the wheels of a vehicle, and neither can be removed from agricultural guidance. Farmers consider the implementation of a new technology based on how it would affect the entire farm management, and such a view is also essential to the transfer of a technology. In essence, it is important not only to implement a new technology, but to prepare a farm management plan by accurately analyzing the income and revenue of each crop. Such guidance was emphasized in the El Salvador project.

3) Grasping the needs of farmers

It is important for extension officers and tutors of training organizations to understand the needs of farmers and engage in activities (training) to suit those needs. As extension officers and tutors have historically felt that they are above farmers, they had little interest in learning from farmers. After receiving the guidance from experts, extension officers and tutors began collecting information from farmers. For example, the Tanzania I project was targeted at all the farmers in the country. Tutors, however, had insufficient knowledge of irrigated rice farming around the country. So they gathered information primarily from the extension officers and farmers who participated in the training. Grasping the needs of training in such a fashion not only helped tutors to improve their capacity, but also played an important role in improving the training courses at KATC.

(3) Financial aspect

Many extension organizations in developing countries are under severe financial constraints. Improving the financial conditions will not only facilitate the project, but also ensure sustainability after the project ends.

1) Internalization into government organization

The first step in achieving financial sustainability is for the project to be internalized into the recipient country's government organization. The Dominica project was successful in writing the promotion of extension of pepper cultivation in the country's five-year development plan. As a result, it became possible for the government agency in charge of the project to secure a budget for the project. Although such internalization does not immediately lead to budget allocation, a project cannot expect to be allocated a budget without being internalized.

2) Support of self help fund

If government budget allocated to the project is insufficient, the implementation agency may earn an income on its own. In Tanzania, the revenue that each training institute earns on its own is designated as a "self help fund," and the institute is given the discretion to use the fund. Therefore, KATC is actively marketing its training services to other organizations, and they have received high praises from other donors.

3) Participation in the framework of aid coordination

Agricultural Sector Development Programme (ASDP) is currently under way in Tanzania. It is extremely important to the future of the KATC to position KATC within that framework. As a facet of aid coordination, all agricultural projects supported by donors will be integrated and unified within the framework of ASDP. On the district level, ASDP's activities will be conducted through the District Agricultural Development Plan (DADP). Funds will flow to DADP from ASDP's basket fund. Therefore, if DADP requests for KATC's training, KATC will be able to use ASDP's basket fund. In fact, KATC has already provided training service for Morogoro farmers and extension officers using DADP's budget. Using the funds of other donors through the framework of ASDP/DADP does present a model for African nations whose governments are strapped for cash.

5.3.2 Coping with environmental conditions

It is important to grasp the environmental conditions that surround the project upon project formulation, and incorporate the findings into the project. At the same time, in the project implementation stage, it is important to incorporate the environmental conditions into the project, compensate deficiencies, and effectively use suitable points. This section summarizes how the project coped with environmental conditions by analyzing from the perspective of the "five capitals" and market access.

(1) Human capital

1) Selection of technology considering education level

In general, farmers are not highly educated. Even in El Salvador, where educational standard is relatively high, more than 30% of farmers cannot read or write. Therefore, this project strove to develop a technology that is as simple as possible and training that is as easy as possible to appeal to the farmers.

2) Selection of key farmers considering education level

The ability to read and write was one of the selection criteria for key farmers in both the El Salvador and Tanzania projects.[47] This is because the lack of ability to read and write would not only make learning the technology difficult, but also prevent the farmer from performing his responsibility as a key farmer for disseminating technology. Such selection criteria contributed to the technology transfer to and dissemination from key farmers.

(2) Social capital

1) Consideration of a farmers' organization in selecting the model site

Organized farmer activities such as water management are important in irrigated rice cultivation. As the example of the irrigation scheme in Mahenge, Kologwe District shows, an unorganized farmers' organization cannot manage an irrigation scheme[48]

Appropriate operation and maintenance of irrigation facilities through a farmers' organization is not necessarily easy. It is difficult to form a farmers' organization and make it functional within the project period. Therefore, in the Tanzania *II* project, the existence of a functional farmers' organization was included as one of the selection criteria for the model site. This is believed to have been effective in deriving the project's output during the short period of time.

2) Gender considerations

In Tanzania, women generally work longer than men do. Therefore, if the rice cultivation technology recommended by the project caused women's work hours to further increase, it may turn into a constraint of dissemination of technology. Therefore, the project made sure that women's work hours did not increase by instructions through training and by creating simple farm tools.

3) Overcoming farmers' reluctance by providing equipment and supplies

In El Salvador many farmers once attempted to grow tomatoes but failed. Therefore, the project provided key farmers with the equipment and supplies (including cost sharing) required for tomato cultivation and made an effort to overcome their reluctance at an early stage.

4) Measures to facilitate group activities

In El Salvador, group activities are recommended as a facet of farmer to farmer extension. Farmers have traditionally little experience working as groups. Therefore, to facilitate group activities as much as possible, the project recommended that intermediate farmers form voluntary groups. The same was recommended in Tanzania.

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[47] In El Salvador, the criteria were that the individual have had at least three years of education.

[48] Mahenge irrigation scheme was constructed by RBMSIIP of World Bank in 2001. It has not been managed well, and the facility is already damaged. One of the reasons for the problem is that the farmers' organization does not service the facility. Hearing by the study mission found that the farmers' organization is not functioning partly because the irrigation scheme is constructed to overlap five villages. In addition, some areas of each village are part of the irrigation scheme while others are not. In addition, while multiple tribes live in these villages, there is lack of communication between the tribes.

(3) Natural capital: increasing cropping season to take an advantage of price fluctuation pattern

In El Salvador, vegetable prices fluctuate greatly according to rainfall pattern. Based on this knowledge, farmers have the option of increasing the cropping season and benefit from higher prices to earn greater income.

(4) Physical capital

1) Consideration of irrigation facility in the selection of a model site

The largest constraint to rice farming in Tanzania is water (natural capital). The technology recommended by the project is difficult to accomplish at a rain-fed paddy filed. It is essential that the farm be part of a relatively well-serviced irrigation scheme. Therefore, in selecting the phase 2 project model sites, the availability of irrigation facility and stable access to water were designated as the selection criteria.

2) Selection of technology and execution of training that require no special tools

In Tanzania, farmers have limited variety of farming tools. Therefore, the project developed a technology that can be implemented with the limited range of tools owned by farmers. This had a large contribution to the dissemination of the technology. In training, tutors avoided using equipment that cannot be used in the field, but opted primarily for posters.

(5) Financial capital: selection of technology suited to the capital level of farmers

In both El Salvador and Tanzania, farmers have little capital and small-scale farmers have limited access to loans. Therefore, it is difficult to implement any technology that requires initial capital investment. Therefore, in the Tanzania project, a technology that requires very little investment was developed.

(6) Market access

1) Selection of a model site close to market

In El Salvador, two model sites were selected. As both are close to cities, the project was able to avoid the problem of difficult market access.

2) Selection of crop variety left to the discretion of farmers

In Tanzania, cities (primary consumption centers) are dispersed, road conditions are poor, and means of transportation is limited. Therefore, market access is fairly limited. As the best variety of crop to cultivate would differ depending the market access and location, the project left the selection to the discretion of farmers. For example, the Mbyuni model site in Mbeya is close to Kyela, which produces the most expensive rice in the country. As a high yielding variety with short growth period but poor flavor would not sell well, farmers in the model site chose an existing variety whose growth period is long but flavor is desirable. On the other hand, the Nakafuga model site in Rbuma is located in an area with poor access to any large market. Therefore, even less tasty rice can be sold on local market. Consequently, the site chose to cultivate a high yielding variety that can be harvested twice a year.

5.3.3 JICA's roles

(1) Role of connecting the project with other organizations

Extension covers a wide range of fields, and often requires the collaboration of other organizations. In the case of the Tanzania project, for example, these organizations include the Training Division, Ministry of Agriculture and Food Security, which is the responsible agency, Crop Development Division, which is in charge of extension, District governments where the model sites are located, Zonal Irrigation Offices that are engaged in the dissemination to irrigation scheme across district boundaries, and Irrigation Technology Service Division, Ministry of Agriculture and Food Security, which is responsible for the zonal offices. Furthermore, for KATC to receive orders for training services from other donors, it must actively negotiate with other donors. It is difficult for KATC, which is located far from the capital, to take the initiative in such discussions and collaborations with other organizations. Therefore, the project feels that it is desirable for JICA Tanzania Office to become more dynamically involved in this project than in the past, and actively work on such collaborations (Fig. 5-7).

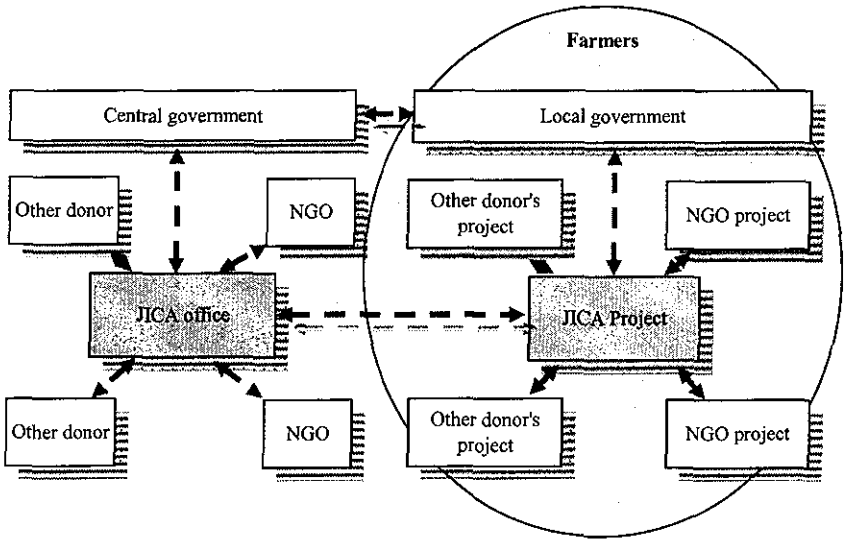

Figure 5-7. Collaboration between JICA Office and Project