Developing Sustainable Agricultural Systems: Case Study Examples, Determinants, Future Approaches, and Roles of Different Partners, as Viewed from the Cooperation Agency

Nobuyuki Samejima

Abstract

To alleviate poverty, JICA has adopted four new measures in its agricultural development cooperation. The first one consists of participatory project formulation. Issue analysis with broader stakeholders' participation enables to set up more focused project target. The second one is a baseline survey. To implement effectively a project, natural, economic and social conditions and constraints relevant to the agricultural target should be examined in advance and the determinants identified in the survey will be taken into account in the project implementation planning. The results of the survey also provide a platform on which project evaluation will be made. The third one is a FSR/E (farming systems research and extension) approach in which efficient, yet cost-saving extension methods are studied. The fourth one is a supporting system. The system includes micro-credits and grant aid to NGOs. To illustrate these new measures, case studies in El Salvador, Philippines, Ghana, and Bolivia are presented.

Introduction

World population, now numbering 6 billion, is expected to reach 8 billion in the next 25 years. Nearly all of this growth will take place in developing nations. Natural resources in those countries are increasingly exploited by slash-and-burn farming, overgrazing, excessive cutting of fuel-wood, etc., resulting in the deterioration of natural resources and impoverishment of the people who subsist on them. This poverty puts further pressure on scarce natural resources. To stop this vicious circle and alleviate poverty, we have no alternative but to enhance agricultural productivity and promote sustainable agriculture. International technical cooperation has to meet this objective.

However, the cooperation will never achieve its objective if the transferred technologies are not extended to the farmers in sustainable ways. While recognizing this importance, JICA has been sticking to the policy that agricultural extension services are to be provided by recipient countries themselves. Therefore JICA has traditionally implemented the actual cooperation either at research/development/training centers or universities and not directly with the rural communities. Financial and other constraints in the developing countries, however, allow only poor extension services. There are even countries where official extension services do not exist and NGOs play limited roles in the agricultural extension. Under these constraints, farmers gain little from what the international cooperation aims at. International cooperation can enhance agricultural productivity, thereby contributing to poverty alleviation in developing countries when and where extension systems are fully incorporated into the cooperation schemes.

Against this background, JICA has adopted four new measures. The first one consists of participatory

Managing Director, Agricultural Development Cooperation Department, JICA, JAPAN

project formulation. Issue analysis with diverse stakeholders' participation enables to set up a more focused project target. The second one is a baseline survey. To implement effectively a project, natural, economic and social conditions and constraints relevant to the agricultural target should be examined in advance and the determinants identified in the survey will be taken into account in the project implementation planning. The results of the survey also provide a platform on which the project evaluation will be made. The third one is a FSR/E (farming systems research and extension) approach in which efficient, yet cost-saving extension methods are studied. The fourth one is a supporting system. The system includes micro-credits and grant aid to NGOs. Case studies in El Salvador, Philippines, Ghana, and Bolivia illustrate these new measures. Characteristics of 4 projects are summarized in Table 1.

Table 1 Characteristics of case study projects

	Baseline Survey	Partners	Extension Methods	Support Systems	Irrigation
El Salvador	Whole-scale & Selective	R/E Center Keyfarmers	Demonstration & Training		No
Philippines	Whole-scale & RRA (Rapid Rural Appraisal)	R/E Center Municipality NIA*& IA**	Demonstration, Instruction & Workshops	Fertilizer-Credit	Yes***
Ghana	Whole-scale	R/E Center Cooperative	Demonstration & Training	Fertilizer-Credit & Joint-Use of Machinery	Yes
Bolivia	Selective & RRA	R/E Center Key Farmers NGOs	Dissemination, Demonstration & Training	Seed-Credit & Grant Aid to NGOs	No

*NIA : National Irrigation Authority
**IA : Irrigators' Association
***Incomplete system

Case Study I : Project for the Strengthening of Agricultural Technology Development and Transfer in the Republic of El Salvador

El Salvador is densely populated (272 persons/km^2) and approximately half of its population lives in rural areas. The agricultural sector absorbs 35.5% of the working population and accounts for 13.7% of the GDP (1995). Between 1991 and 1995, the growth rate of the agricultural sector was 2.5%, which is much lower than the average. As 46% of the rural population is estimated to live in poverty, alleviation of rural poverty is a major concern for El Salvador. El Salvador is characterized by a mountainous topography and seasonal rainfall(1,772mm/year). Sloping areas are often over-cultivated by small-scale farmers, which may result in soil erosion and deterioration of soil fertility. To address these issues, the Government of the Republic of El Salvador decided to complement sustainable farming systems as one of the national policy goals.

GyTT initiative

CENTA(The National Center of Technology on Agriculture, Livestock, and Forest) was established with a view to promoting research and extension services for the improvement of the livelihood of small-scale farmers. CENTA adopted the GyTT (Generation and Transfer of Technology) approach to achieve more profitable agriculture based on sustainable farming systems. GyTT is a unique approach in which closer linkage between technology development and extension services is sought. GyTT system has yet to be established, however. There is a need for monitoring and evaluating GyTT-related activities and feeding them back to the planning policy on regional agricultural development.

Toward this end, the Government of the Republic of El Salvador proposed the Project for the Strengthening of Agricultural Technology Development and Transfer, and requested technical cooperation from Japan. In response to this request, JICA dispatched a series of study missions to El Salvador to identify the assistance needs and discuss the details of the project. With a Record of Discussions signed in October 1998, the project started in February 1999 for a five-year period with four long-term experts, "Chief advisor", "Coordinator" and two in the fields of "Cultivation" and "Extension".

GyTT system consists of four-tiered activities, namely survey, planning, demonstration, and extension. In the survey section, the current situation of the target area in terms of socio-economic and agricultural aspects is studied through a baseline survey, in which farm-household economy and farming systems are of particular interest. Based on the information obtained by the survey section, the planning section proposes a plan of action to make current farming systems more profitable and sustainable. It also identifies a package of technologies necessary for farming systems improvement. A participatory approach is adopted in the planning process, where opinions of diverse stakeholders such as target farmers, researchers and extension officers are taken into account so that the farming systems become practical and operational, and are compatible with specific needs of the farmers. The demonstration section verifies the proposed farming systems at the station. Findings of the demonstration section are studied and fed back to the planning section for further improvement of the farming systems. Finally, model farming systems are disseminated to rural communities through training conducted by the extension section.

Participatory planning procedure

A JICA study team was dispatched to El Salvador from June 27 to July 23 in 1998, and it organized participatory workshops in order to examine the background of the proposed project and identify the needs of target farmers. Representatives of target farmers, extension officers, researchers of CENTA and CDT (Technology Development Center), top officers from the extension offices and CDT, and coordinators of GyTT participated in the workshops. Based on the findings and opinions expressed by the participants, the team, in consultation with their El Salvadoran counterparts, worked out a tentative Project Design Matrix (PDM). However, both sides considered that more information on current farming systems was needed and agreed to conduct a baseline survey as a primary activity in the first year of the project before finalizing PDM.

Baseline survey and PDM

A baseline survey had been conducted from September to December in 1999 involving 647 farmers at the two model sites. Collected data were analyzed to lay the basis for formulating a detailed plan of implementation. A Japanese Consultation Team, dispatched in March 2000, studied the outcome of the survey and finalized PDM as shown in Table 2.

Table 2 Outline of PDM

Summary	Objectively Verifiable Indicators	Basis of Indicators
Project Purpose		
The functions of CENTA for the development and transfer of technologies for sustainable farming systems to small-scale farmers will be strengthened.	1. By the year 2004, 20 selected small-scale key farmers of the model sites will implement sustainable farming systems.	Twenty extension officers are assigned to two model-sites. Each officer trains a selected small-scale key farmer for 4 years to help develop sustainable farming systems.
	2. By the year 2004, 400 small-scale key farmers of the model sites will adopt sustainable farming technologies.	Each extension officer carries a group training for 20 key farmers to disseminate sustainable farming technologies. 20 x 20 = 400

Case Study II : Bohol Integrated Agriculture Promotion Project in the Philippines

The Bohol Integrated Agriculture Promotion Project (BIAPP) has been implemented in Bohol province in the Philippines since November 1996. The implementing agency is the Bohol Agricultural Promotion Center (BAPC) under the Department of Agriculture and the project site was set in the Capayas Irrigation Project area. The role of baseline surveys in the project implementation will be described below.

Objective and activities of the project

The objective of the project is to enhance agricultural productivity by farming systems improvement at the project site. The main activities of the are as follows:

1) Formulation of a detailed work-plan based on baseline surveys ,
2) Development and dissemination of location-specific technologies for rice-based farming systems,
3) Capacity building of IAs(Irrigators' Associations),
4) Provision of efficient training, and
5) Strengthening of collaborative linkage of BAPC with LGU (Local Government Unit) and the concerned organizations in carrying out the activities of 1) to 4) above.

Baseline survey

The target area was studied through a baseline survey conducted in the first year. The objective of the survey was to collect information, share findings, and reach a common understanding on the socio-economic and agricultural conditions of the project site. The survey also provided benchmark data that would lay the basis for the project evaluation. Based on the findings, a tentative project implementation plan was reviewed and specific activities were defined. In addition, the need for qualitative studies on the role and functions of IAs was suggested.

Study on IA through RRA

To study the constraints on IAs' operation, a Rapid Rural Appraisal (RRA) (Semi-structured interview and observation of participants) was carried out by the short-term expert. In this method, questionnaires were not prepared in advance, and the persons interviewed were requested to answer freely on the questions asked. A total of 45 persons from various strata such as IA presidents, IA members (farmers), Board of Directors (BOD), a NIA gatekeeper, Vice Mayor were interviewed with respect to:

1) Farm activities,
2) Social activities & social relations,
3) Family relations, and
4) Irrigators Association activities.

Findings of the survey

New findings and information obtained in the survey are as follows:

(1) Unequal water distribution

1) Water is distributed upon the request made by the IA president, or BOD(Board of Directors), or specific IA members, not on common rule,
2) Upstream farms are the first to receive water,
3) Technical capacity of the NIA gatekeeper is insufficient,
4) Water gates are not equipped with gauges (operated by visual observation).

Successful water management is a key determinant for the rice-based farming system. Although IA is responsible for the water management under the supervision of NIA, it became evident that IA was not capable of carrying out its duties. To address this issue, capacity building of IA was added to the priority activities of the project.

(2) Lack of accountability and transparency in IA activities

1) Lack of financial reports and meeting records,

2) Improper system of Irrigation Service Fee (ISF) collection.

ISF was not collected properly as it was collected in kind (rough rice), not in cash.

Even before the survey, it had been recognized that water distribution was unequal and the ISF collection rate was very low. But the reasons were not known very well. Identification of the constraints was the most significant outcome of the survey.

Actions to be taken

The short-term expert recommended various actions to be taken by the project.

(1) Reform of the BOD election system

Inadequate election system of BOD made it difficult to reflect the need of IA members in water management. It was recommended that the BOD members should be elected from the Farmers' Irrigator Groups(FIG).

(2) Fair water distribution in FIG

Upstream farmers enjoyed more water than the downstream ones. This led to farmers' distrust of BAPC and NIA, which affected the project activities. Unfair water distribution among the beneficiaries should be alleviated to restore the credibility of the project.

(3) Change of ISF collection procedures

ISF collection forms should be changed in a way to make ISF collection procedures more transparent.

(4) Exchange of IA experiences

IA officials should visit successful IAs in neighboring regions in order to exchange views on IA management.

Lessons for future cooperation

A technical cooperation project is implemented in an area where the culture is so different from that of donor countries that it is not easy for outsiders to identify what are the major constraints. Decision making of farmers is often affected by human relationships associated with their community. Project may create additional problems or even adverse effects if the constraints are not fully taken into account. Timely use of surveys could be one solution to this problem. More importantly, acquisition of accurate information from beneficiary farmers through the continued dialogue is indispensable for the implementation of projects with extension component. The project should meet the farmers' needs, but not vice versa.

Finally, it must be noted that the success of the survey is largely attributed to the insight of the expert who is familiar with the rural communities. This expertise is particularly important when a survey needs to be conducted in a short period of time.

Case Study III : Small-Scale Irrigated Agriculture Promotion Project in the Republic of Ghana

The agricultural sector, which accounts for 50% of the GNP and absorbs more than 66% of the working population, plays an important role in Ghana where 85% of the farmers cultivate less than 2 ha , and the majority of them are small-scale subsistence farmers.

Irrigated agriculture in Ghana did not have a long history, starting with an irrigation development program in cooperation with EC in the 1960s. Ghana Irrigation Development Authority (GIDA) was established in 1977, with a mandate to conduct applied research and training for GIDA staff and the farmers in the irrigation projects. Successively, China, Korea and Japan had cooperated with GIDA for the technology transfer on irrigated rice cultivation . Despite these efforts, irrigated farming systems have not yet taken root

in Ghana.

There are 22 irrigation projects implemented by GIDA with a total area of nearly 10,000ha. Agricultural productivity remains low due to various reasons, including unskilled water management, inadequate technologies for irrigated agriculture, malfunctioning of irrigation facilities aggravated by poor maintenance, shortage of water, lack of supporting systems such as extension services. To address these problems, "Small-Scale Irrigated Agriculture Promotion Project (SSIAPP)" was started in 1997 aiming at developing sustainable irrigated farming systems, with an overall objective to improve small-scale irrigated agriculture in Ghana. This objective is to be achieved through the following approaches:

1) Research and development relating to farming technologies,
2) Development and strengthening of institutional support for farmers, and
3) Capacity building of GIDA staff.

Financial situation

The project started with sectional baseline surveys to study and evaluate the present farmers' situation and farming systems at two model sites, Ashaiman and Okyereko. Various recommendations were made by the sections to address the problems identified in the surveys. It was found that the farming season was often delayed due to lack of credit and machinery. The former would especially affect the timeliness of certain operations essential to achieve high yields, such as weeding and fertilizer application.

An average of 74.2 % of the respondents in Ashaiman and a total of 63.2 % of those in Okyereko pointed out lack of capital as the most crucial single factor that hindered the start of the cropping season. Under this situation, the majority of the farmers have no alternative but to borrow money from a variety of sources regardless of how high the interests are for their agricultural inputs, machinery or labor hire (Table 3).

Table 3 Farmers taking loans in Ashaiman and Okyereko

Site	No. of farmers	No of farmers taking loans	% of farmers taking loans
Ashaiman	78	68	87.2
Okyereko	68	42	61.8
Total	146	110	74.5

Most of these loans were contracted with so-called "market mammies". In addition to unfavorable lending terms including repayment period, the loans are often insufficient to meet the needs of farmers. Normally the farm gate price is reduced by 5,000 cedis (¢) per bag* of 84 kg paddy rice. Farmers have to hand over all the produce to the lenders, although they could enjoy favorable prices after the peak harvest season.

* ¢ 5,000 ≒ US$ 1.7 (US$ 1 ≒ ¢ 2,900)

Farm gate price for 1 bag of paddy = ¢ 63,000~67,200

Input micro-credit scheme

The project introduced machinery and fertilizer credit systems on a trial basis with the following objectives:

1) To secure production inputs for the farmers,
2) To give farmers the opportunity to manage their own input credit schemes,
3) To instruct farmers' cooperatives to learn how to jointly manage and use equipment and facilities,
4) To strengthen the cooperative in terms of human resources development, organization building, and business administration.

The project provided seed money to develop input credit schemes. The cooperative, then, lent agricultural inputs to the farmers with a profit margin. It also promoted business activities among the cooperative

members including women's groups. The seed money was to be paid back to the project and used as the revolving fund for the next cropping season.

Achievements under micro-credit scheme

Problems related to land development where proper credit systems do not exist and necessary steps to remedy the situation were identified in a Farming Systems Research/Extension (FSR/E) study conducted at the Ashaiman experimental field. In the study, two rice farmers with necessary inputs (farm machinery, fertilizer and other agro-chemicals) given by the project recorded increased rice yield by over 30% (from an average of 18 bags/acre to about 24 bags/acre).

The Ashaiman Women's Group, which was also given the necessary inputs for rice cultivation, increased the production by about 40%. These increases were attributed to the timely provision of production inputs, indicating that supporting systems, particularly input credits, have a tremendous impact on the yields.

In Okyereko, an input credit scheme was introduced on a trial basis for 28 female farmers producing groundnut. These women, who would not have been able to produce groundnut, gained an average net income of about ¢ 82,000 /acre. The loan recovery rate was 100%.

Perspective

Provision of adequate agricultural support systems would be the most effective measure by which small-scale farmers can increase their income and develop sustainable farming systems. Such support systems include agricultural credit systems, effective extension systems and the development of farmers' cooperatives. A good credit policy could extend additional employment opportunities to the farmers who otherwise would have to remain idle. If the cooperatives are able to manage their own input credit systems, the farmers are motivated to remain in the cooperative.

Case Study IV: Project for the Improvement of Dissemination of High-Quality Rice Seeds for Small-Scale Farmers in Bolivia

Bolivia is one of the poorest countries in South America, where a large population from the western mountain area *Altiplano* has migrated to the eastern plain area *Llano*, especially to Santa Cruz prefecture, due mainly to the economic difference between the two areas. Santa Cruz prefecture boasts large-scale farming, natural gas development and other flourishing industries while the economy in the *Altiplano* suffers from an ailing mining sector with little hope for the development of other industries. A migration policy, which had been in effect until the late 1980s, entitling an emigrant to 50ha of virgin land, further accelerated the migration.

In Santa Cruz, while there are large-scale commercial farms, more than 90% of the farmers subsist on shifting agriculture under 10ha, mainly growing rice. Many of those small-scale farmers are immigrants from the Altiplano. The average rice yield is as low as 1.5-1.8 t/ha, half the level of that of large-scale farmers. This low productivity is attributed to inappropriate land use, low-quality seeds, insufficient application of agricultural technologies, poor postharvest technology, etc.

To enhance the agricultural productivity of small-scale farmers, the Government of Bolivia proposed The Project for the Improvement of Dissemination of High-Quality Rice Seeds for Small-Scale Farmers and requested technical cooperation from Japan. Activities in this project include:

a) Improvement of selection system of rice varieties,

b) Improvement of rice seeds production system, and

c) Dissemination of high-quality rice seeds to the small-scale farmers with improved technologies.

Project formulation

In reply to the request, JICA dispatched a preliminary study mission in July 1997 followed by three study

missions in consecutive years. These missions, in collaboration with the Tropical Agriculture Research Center (CIAT) in Santa Cruz, analyzed the technical background of the request and farming conditions of small-scale farmers in Yapacani area, which was selected as a pilot area of the project. Participatory workshops were held in selected villages in the pilot area. Findings of studies and outcomes of the workshops culminated in the master plan of the project. Project started on August 1, 2000.

Collaboration with NGOs

Although the organization of agricultural extension services is the primary duty of municipalities in Bolivia, they are not always able to play their role because of financial difficulty or lack of human resources. While large and middle-scale farmers may afford private technical services, small-scale farmers have little opportunity to benefit from extension services. Therefore, collaboration with NGOs became essential for the project implementation.

In preliminary communications with NGOs, JICA had expressed its intention to entrust a part of the project activities to them, particularly those connected with the dissemination of high-quality rice seeds to small-scale farmers and training of potential seed growers. Under the contract with NGOs, JICA would share local expenses needed for the entrusted activities. These expenses include:

1) Technical personnel expenditure related to the project,
2) Procurement of small-scale machinery / equipment / material,
3) Small-scale construction / renovation of physical facilities,
4) Training / seminars / workshops,
5) Other costs necessary for the project operation.

How to collaborate with NGOs in the project

Extension activities of the project consist of two components. One is to disseminate high-quality rice seeds coupled with technical guidance, and the other is to train potential seed growers.

The first stage of the project will be "a shock treatment" in which the project disseminates high-quality rice seeds of new varieties developed by CIAT to small-scale farmers and let the farmers grow them. Once they realize that the high-quality seeds give a much higher yield, they are likely to use them more in successive cropping years.

At the second stage, in order to meet the increasing demand for high-quality rice seeds, potential seed growers will be trained so that they can supply high-quality rice seeds to small-scale farmers by themselves.

NGOs play a key role especially at the first stage. Without NGOs, extension activities in Yapacani area might be ineffective. Extension activities in the area will be implemented effectively in collaboration with NGOs, which have close linkages with the rural communities. A number of NGOs which are institutionally, financially and technically competent were designated and the modality of collaboration has been discussed.