Japan Bank for International Cooperation

The Effectiveness of Farmer Participation in Alleviating Poverty

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KRI International Corp.

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CHAPTER 1 BACKGROUND AND OBJECTIVES

1.1 Background

The Japan Bank for International Cooperation undertakes yen loan operations on the basis of its delineation of seven priority areas for its official development assistance. Among those operations, JBIC believes that in comparison to other public investment activities, projects in the irrigation sector have strong outreach aspects, and make significant contributions to poverty reduction, one of the priority areas of its ODA loan operations. Therefore, high importance is assigned to using a participatory approach in all stages of the project cycle, to thereby contribute to a better realization of project objectives and, eventually, to poverty reduction. It has been reported that previous JBIC-funded projects in this sector have shown that participatory approaches, such as farmers' participation in the construction and maintenance of small-scale irrigation facilities, generally can reduce construction costs and enhance the sense of ownership felt by beneficiaries. However, the cause-and-effect relationship between participatory approaches and outcomes still remains elusive, particularly in quantitative terms, and efforts are being continued in a quest to define the effectiveness and impact of participatory approaches.[1]

Through project supervision experience and various studies, JBIC has accumulated a fund of knowledge and information regarding the effectiveness and impact of participatory approaches,[2] but it is nevertheless beneficial for JBIC to continue to enhance its understanding of the realities of the participatory approach (under what conditions, at what stage, at what level for project participation), and to continue to be

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1 The Asian Development Bank, having decided in December 1996 to support participatory processes in development assistance, has undertaken a special evaluation study in 2003 to understand the effectiveness and impact of participatory approaches addressing the following questions: (i) what are the limitations of participatory approaches; (ii) what are the constraints hindering the implementation of participatory approaches; (iii) how can participatory approaches be further promoted for more effective intervention; and (iv) have participatory approaches added value to natural resources management operations? This study sorts out the effects and impacts of participatory approaches and incorporates cost-benefit analysis, in reviewing irrigation projects and forestry projects in Lao PDR, Sri Lanka and Viet Nam. (See http://www.adb.org/Evaluation/¥Documents¥SES¥REG¥sst_reg_200332.pdf).

2 In a research paper, "Cost Benefit Analysis of Participatory Approaches – Conceptual Review and Framework for Quantitative Analysis (JBICI Paper No. 21, January 2003), the following are stated as general lessons learned from use of the participatory approach. They are: (1) The dangers of "market failure" and "administrative failure," that often detract from the effectiveness of public works investment projects, can be avoided by effectively mobilizing the knowledge and resource endowments of the residents of the community involved, effectively raising the return on the undertaking. (2) Despite this advantage, the limited significance possessed by the participatory approach, namely that it "only increases benefits when properly deployed in the proper place," in general it requires that study be made of "in what activity is there to be participation," "who is to participate," and "how should they participate," in the context of the relevant social environment. (3) Although the return in the community may be maximized by use of a participatory approach, this same approach may become a factor impeding overall development of the economy when in the course of economic development economic activities proliferate beyond the limits of the community proper, to become regional in scope. In other words, maximizing internal benefits may impair benefits received by society at large. (4) It is desirable for the implementation arrangement for the yen loan portion of a project's investment cost to be constructed in such a way as to maximize benefits accruing to the society as a whole.

aware of the necessity of gauging the effectiveness of participatory approaches by, to the greatest extent possible, quantitative means. Altogether, it is thought that by analyzing and understanding the costs and benefits of the participatory approach, a subject that up to this time has not been given a great amount of attention, it will become evident that there is significance and value in analyzing and examining the financial and economic impacts that the participatory approach has on all parties having an interest in relevant projects, namely governments, implementing agencies, and beneficiaries.

1.2 Objectives

With the foregoing as background, two issues are faced in the approach to the task of evaluation, that is

1) To gain hints useful for enhancing the efficiency and effectiveness of irrigators associations (water users associations) by means of the participatory approach, through empirically perceiving and analyzing the content and effect of the participatory approach.
2) To validate and observe the participatory approach from the viewpoint of economic efficiency, through arranging and tabulating data on costs associated with the participatory approach, and analyzing the relation of the costs to the anticipated effects (for farmers, increased production of rice; for implementing agencies, operation and maintenance costs, and collection of irrigation service fees).

The intent of the first issue is to use case studies to verify the type of activity and the extent of that activity in the participatory approach at each stage of a project, and the intent of the second is ensure economic efficiency of costs borne under the participatory approach. It is characteristic of this evaluation that in both instances a quantitative measure is expressed in the form of an index or in monetary terms.

For the evaluation performed as reported below, irrigation projects that have been completed with the assistance of a yen loan, in the Philippines and in Pakistan, were selected for cross-section analysis (comparison of one to the other at the time of evaluation)[3] with the objective of accomplishing the above-stated two issues or

[3] The timing was made identical for work in both countries; data for cross-section analysis was recorded for each geographic location, precise location, and groups. This method is the counterpart of time-series analysis where data collected for a single location (or function, etc.) over a period of time is analyzed. The element of duration of time enters into time series data, whereas in cross-section analysis it is the point of measurement or place, a spatial element, which is all-important. "Monthly sales data for the past 5 years" and "monthly industrial production index data for the past 10 years" are examples of time series data, and "this month's sales data, by branch office," and "the current period's industrial production index data, by sector" are examples of cross-section data.

working objectives of evaluation, to thereby enable recommendations and guidance for use when application of the participatory approach is considered for similar projects in the future, as well as to contribute to the advancement of evaluation methodology for projects in which the participatory approach has been employed.

The Development Assistance Operations Evaluation Office of JBIC defines participatory approaches as follows:[4]

> To involve the direct beneficiaries of a project in various stages of the project—i.e., planning, design, implementation, and subsequent operation and management—to enhance the project's effects and impacts.

This study broadly categorizes the project stages into (1) capacity building at the time of the irrigation association's establishment, (2) re-strengthening at the time of the recent rehabilitation/construction, and (3) the current or ongoing operation and maintenance stage after completion. The effects and costs of the participatory approach are analyzed for each of these stages, particularly focusing on those approaches initiated by government as the implementing agency ("participatory approach[es]"), and on the beneficiaries activities.

1.3 Subjects Evaluated

This study evaluates irrigation sector projects. The first reason for this is that in comparison to other sectors, irrigation is a sector in which operation and maintenance by beneficiaries is of paramount importance, and the participatory approach would enhance that importance. A second reason is that this is a sector in which it is relatively easy to measure the relationships of costs and effects (benefits) of a project. If for example we consider instead the forestry sector, not only are the effects realized over an extremely long period, but the environmental impacts are spread over a wide area, so that even several years after conclusion of a project it remains difficult to perform measurements. Or, in the case of projects in the health and hygiene sector, a situation of trans-generation costs and benefits may be readily encountered (e.g., in the form of the benefits accruing to a child whose mother who experienced an earlier improvement of her health), and it is extremely difficult to measure the effects (benefits) on the current generation and on future generations of improvement in hygienic conditions. That is, in the forestry and in the health and hygiene sectors there are substantial

[4] In carrying out this evaluation study, discussion on the definition of participatory approach to be used included the following statements. "A clear definition of participatory approach [for this project] was lacking. Inasmuch as the original concept is vague, it is essential that there be a unification of views in order to be able to proceed with the study (Social Development Team, Development Sector Department)." In response to this, the definition adopted was "directly involving beneficiaries in the series of processes of planning, implementing and managing a project, for the purpose of maximizing its effect and impact."

externalities in place and in time associated with the effects (benefits) of a project. Measuring those externalities is difficult. Because of this, the irrigation sector, where temporal and locational externalities are relative minor, has been selected for the present study.

This study examines irrigation sector projects (currently in operation) in the Philippines and Pakistan, and uses cross-section analysis to compare conditions in each country. In the Philippines, the subjects of the study were 11 irrigation systems in three regions of the Visayas (Visaya Regions 6, 7 and 8; they include one completed project supported by a yen loan, in Bohol), for which studies were made of governmental institutions at the irrigation system level, irrigators associations (60 in all), and of members of the associations (30 persons at each of 60 associations, totaling 1,800 persons). In Pakistan, the subjects were 10 surface water irrigation sub-systems in the Upper Jehlum Canal Irrigation System, in Punjab State (including one water users association where turnout service area facilities were repaired with the assistance of a yen loan), for which studies were made of government institutions at the irrigation sub-system level, and water users associations (60 in all). Although the present study encompasses two countries, comparative analysis spanning two countries is not performed. This is because the number of samples collected at the level of the irrigators association – which is the primary target of the study – is limited to several dozen and there is the need for using the same type of group in comparisons. [5]

1.4 Organization of the Report

Chapter 1 (the present chapter) deals with the background, objectives, and subjects of the study. Chapter 2 presents the framework of the evaluation, and the methodology used. As stated above, because there are extremely few existing studies that quantitatively analyze the content and effects of the participatory approach, new methods were created for this project, as presented in the second chapter. In Chapter 3, empirical results are presented. Results are given in the sequence of the Philippines first and Pakistan second.[6] Finally, Chapter 4 incorporates the lessons learned and recommendations formed as the content obtained from the results of the empirical analysis, as well as points deserving attention and points that may be improved in the future concerning the quantitative analysis work.

5 When two national samples are compared using the sample sizes as above, and differences are found between the two sample populations, the differences are explicable on the basis of differences between the two countries. When undertaking a quantitative comparative analysis it would be necessary to make a valuation of samples from the same country and the same region with respect to the delicate nuances of the effects of participatory approaches.

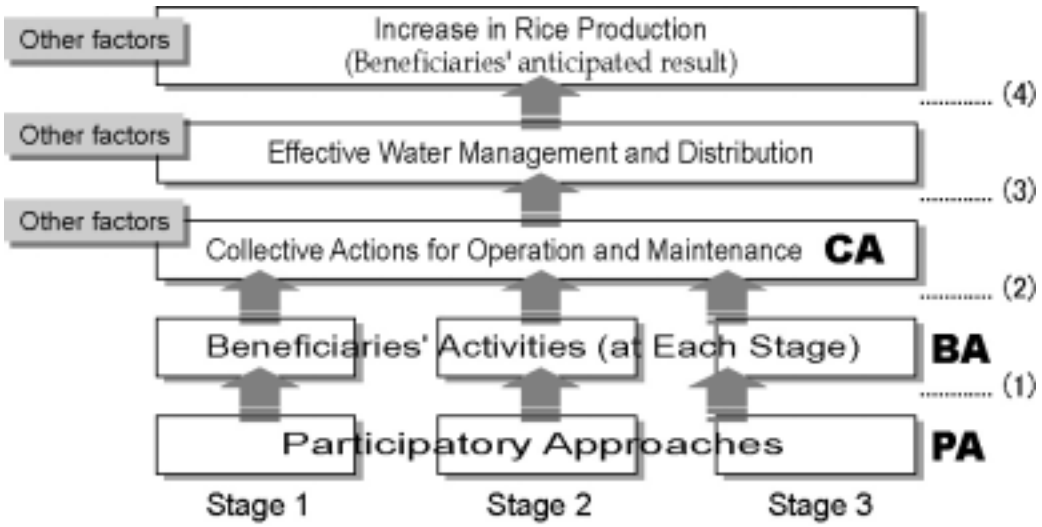
6 Owing to restriction in the resources available for the study, this evaluation study, a degree of emphasis was given to irrigation projects in the Philippines. The content of the study in the Philippines consequently is more replete than that of Pakistan, as was permitted by the relative volume of data collected for evaluation and analysis, and the relative scale of the research work. It is desirable, for the improvement of the content available for Pakistan, that a study at the level of the water user associations, and field study by a Japanese consultant (a Japanese evaluator) be performed.

CHAPTER 2 FRAMEWORK AND METHODOLOGY

2.1 Framework

When the intention is to evaluate a participatory approach in an irrigation project, it is necessary to consider this as a sequence starting with how participatory approaches by the governmental institution or implementing agency ("PA" in the diagram below) and the corresponding beneficiaries activities ("BA") work in the collective actions in connection with allocation of water and operation and maintenance by the beneficiaries consisting of existing farmers groups and irrigators association members (i.e., of the "Effective water management and distribution"), and then how these lead to results in the form of improved or elevated performance of farm production on the behalf of which the irrigation is performed ("Increase in rice production").

Fig. 2.1.1 Framework for Evaluation of a Participatory Approach in an Irrigation Project



Source: KRI International Corp.

The above sequence is in the cause-and-effect order of (1) to (2) to (3) to (4). The method for analysis at each process may be usefully reviewed in the reverse order.

First, regarding the productivity of rice cultivation, from a microeconomic viewpoint, one could take an approach of quantifying the agricultural productivity function comprising the explanatory values of land, labor and capital, and then to measure the various input coefficients. However, no formula is known to exist that includes the factor of water as a variable. Moreover, there are no analyses of the degree of contribution made by water to rice production in a given project (as far as could be determined in the preliminary study for this evaluation project), nor has a methodology for doing this been established. In order to undertake quantitative

analysis of process (4), therefore, it is necessary to construct a hypothetical model that incorporates consideration given to externalities, and by that means measures the contribution made the water factor. After that, the problem to be faced is related to how the farmer groups' and irrigators associations' collective actions (CA) are related to the efficient distribution and assurance of supply of irrigation water (the third process). In this regard, it can be assumed that the greater the degree of ordinary interaction between the persons involved, and the greater the closeness of their relations, the greater the likelihood that a sufficient supply of irrigation water will be ensured. If the concept of social capital,[7] which has been widely discussed in recent years, is applied here, the hypothesis can be given that the higher the level of social capital, the greater the ease with which efficient, effective distribution of water, as one cooperative activity, can be accomplished. For analysis of the processes of (3) in the above figure, it is conceivable that in addition to measuring the indicator value for social capital of a irrigators association, a model can be constructed that allows for externalities arising from assurance of irrigation water supply, and the relationship between the magnitude of social capital and degree that water supply is ensured could be examined by its use, but no documentation that this has been accomplished is known to exist.

Moreover, there is the matter, in the processes (1) and (2) above, in the participatory approach, of by what form or manner, and to what extent, the participatory approaches promote beneficiary activities, and how the existence of results of that elevate or augment the collective actions. This corresponds to the primary intent of this evaluation, "To gain hints useful for enhancing the efficiency and effectiveness of irrigators associations by means of the participatory approach, through empirically perceiving and analyzing the content and effect of the participatory approach." Under the rubric of sustained development and development with participation by the beneficiaries, many international aid agencies and donor countries seek to organize the intended beneficiaries at the implementation stage of a development project (including the preliminary stage thereof), and facilitate participation in the planning process as well as the construction process. This is done in the belief that the formation and realization of the projects will thereby better reflect the "true needs" of those beneficiaries. Further, it is also understood that by cultivating the spirit or attitude of ownership among the beneficiaries by having them participate in various activities, their proactive involvement will be facilitated in the stage of operation and

7 Social capital is variously defined academically as "the structure and institutions of society created by the cooperative actions of individuals," or "the social and cultural combinations, norms, and values determined by interaction of individuals and the organizations and systems with which they are affiliated," and the like, and a variety of analyses of the causal factors of social capital have been made. We know from the results of research to date that given fundamental elements of a society such as its culture, values, institutions, norms and trust, and characteristics (qualitative and quantitative) of the networks of individual persons, that social capital demonstrates certain relationships between quantitative and qualitative aspects of organizations that individuals participate in and the strength of interpersonal cooperative relations on one hand and income and wealth on the other. (See numbers 10 and 16 in References.)

maintenance of facilities once they have been constructed. Whereas there are instances of qualitative analysis and evaluation of the effects and impact of such a participatory approach, by the use of methods such as Participatory Rural Appraisal (PRA) including therein interviews with and observations of beneficiaries, there are but few instances of quantitative measurement of the inputs and outputs of participation at each stage of the project cycle.

Thus, to attempt a quantitative analysis of the four processes, (1) through (4) above, means entering a little-explored area. In the diagram shown above, the evolution of the project according to the participatory approach is from the bottom of the diagram to the ultimate objective, the increase in rice production shown at the top, but it should not be overlooked that there are other factors having an influence on the causal processes at all four levels. Of course, other factors than water will figure in an increase in rice production: the variety cultivated, fertilization, and farm techniques among them. It may be implied, then, that the water factor is merely a marginal influence. The same may be said of concerted activities of an irrigators association on behalf of realizing efficient distribution of irrigation water; results may be good even if there is weak control over the association's activities, provided that the supply of water is plentiful and the channels for it are in good condition. Moreover, if there is a tendency for both the degree of strength of social cement that has provided the bonds of a community, and ethnicity, to determine the level (activity) of group activities by an irrigators association, there may be little need for a deliberate participative approach to move them to act. When considering the evaluation of a participatory approach in an irrigation project, then, it is necessary to give attention to the broad historical, cultural, and ethnic background, and to the nature of activities and techniques used for agricultural production, and so on, in addition to matters directly related to the participatory approach.

2.2 Methodology of Quantitative Analysis

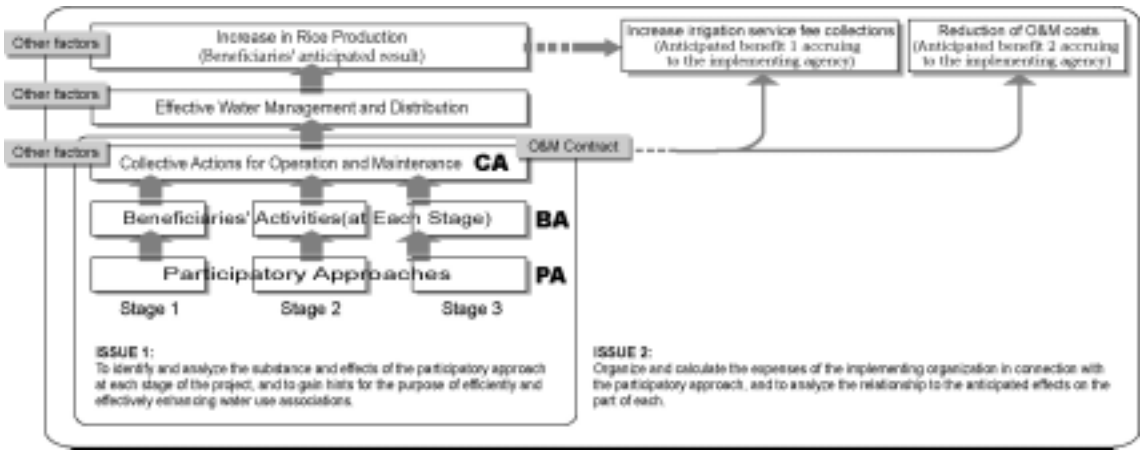
Rather than adopt a blanket approach to evaluation of the participatory approach in irrigation projects, whereby all factors that can be thought of as involved in the process of achieving the objective of the project through the participatory approach are taken up together, it is believed to be appropriate in the present evaluation to separate the overall process into a number of stages for discrete analyses. It is also possible, as a consequence of the development of mathematical analysis programs in recent years, to undertake quantitative analysis, as long as all project input and output data can be inputted to the program. Nevertheless in the intermediate processes of calculation, the significance of these figures is not taken into consideration, and the mathematically optimal result is sought, extreme care is necessary concerning the method of interpreting the context of the results achieved. Moreover, as suggested by the expression GIGO (Garbage In, Garbage Out), a mathematically optimum solution is

not necessarily a result that has relevant meaning. In comparison to such approaches, this evaluation employs relatively simple methods (correlation and regression analysis) for the analysis of the input and output, in discrete applications for each stage, with confirmation of the meaning possessed by both input and output. Given the prevailing situation, of there being but few similar studies, it is deemed desirable to use this discrete approach in that while confirming the meaning of the values used, it will be relatively easy to interpret the results according to the proper context.

2.3 Focus of the Evaluation

This evaluation study seeks to quantitatively analyze and observe, in particular, focal issues related to the two issues identified above in connection with the evaluation (in section 1.2). Fig. 2.3.1 has been developed as an extension of Fig. 2.1.1, by the addition of the focal issues. In this diagram, "To gain hints useful for enhancing the efficiency and effectiveness of irrigators associations by means of the participatory approach, through empirically perceiving and analyzing the content and effect of the participatory approach" is shown as Issue 1, and "To validate and observe the participatory approach from the viewpoint of economic efficiency, through arranging and tabulating data on costs associated with the participatory approach, and analyzing the relation of the costs to the anticipated effects (for farmers, increased production of rice; for implementing agencies, operation and maintenance costs, and collection of irrigation service fees)" is shown as Issue 2.

Fig. 2.3.1 The Focus of the Evaluation



Source: KRI International Corp.

2.3.1 Analysis of the Content and Effects of the Participative Approach

In order to arrive at the response for Issue 1, two viewpoints may be given.

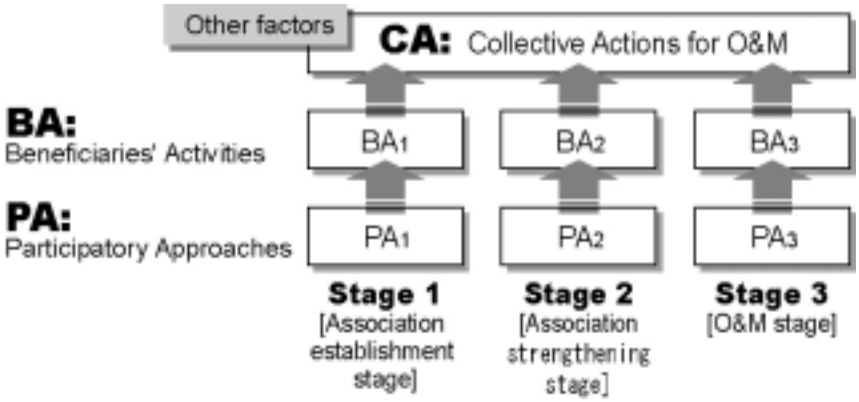
1) At each stage of the project cycle, what are the activities of the beneficiaries at each stage that correspond to the participatory approach being advanced by the government or implementing agency?
2) How is the experience gained in the participative actions in ① elevating or augmenting the activities of the irrigators association in its operation and maintenance of the completed facilities?

In connection with the first of these, the study collects and organizes data on the type and extent of participatory approaches by the government or implementing agency at each stage of the project cycle on behalf of the irrigators associations which are the subject of the study, and on the extent that those associations carry out specific beneficiary activities in response to the participatory approach.[8] For the second, the extent that each association undertakes collective actions for the distribution of water and for the operation and maintenance of facilities at the stage (time) of operation and maintenance of the project will be expressed through use of multiple indicators,[9] and the experience gained in relation to the first issue and other externalities will be used for quantitative analyses. The diagram below is a representation of the hypothetical construct of the three stages of a project, namely association establishment, association re-strengthening (or capacity building), and operation and maintenance, at each of which there is the input of moves by government or implementing agencies on behalf of participatory approaches (PA_1, PA_2, PA_3), activities by beneficiaries (the associations; BA_1, BA_2, BA_3), and then ending with the current collective actions (CA) on behalf of water distribution and the operation and maintenance of facilities. This is based on the perception that collective actions (CA) are influenced by external factors which are not dependent on the participatory approach, in addition to the experiences of participatory activity in the form of BA1 through BA3.

8 The comments that "Isn't it inherent in participatory approaches (PA) and beneficiary activities (BA) that there is a correlation between the two?" and "Is there really any meaning in showing this?" were made at the time of studying the analytical approach to be employed. In response to this it may be stated that under the assumption that in advance (following adequate preparations) certain BA are induced, if all of the PA are made, there is no need to see a correspondence between PA and BA . However, in actuality, PA and BA do not necessarily occur in tandem. For example, a meeting may be planned as a PA, but this does not necessarily mean that it will lead to the BA expected in the form of attendance at the meeting. For these reasons, it is necessary to view PA and BA as having a correlation.

9 Professor Fujiie of Takushoku University, in "The Conditions for Collective Action for Local Commons Management: The Case of Irrigation in the Philippines," uses a similar method of estimation (factor analysis, using whether irrigation canals are cleaned, cropping times are coordinated, water distribution is rotated, and organized supervision is performed, all at the level of association activities).

Fig. 2.3.2 Induction of the Beneficiary Activities by Participatory Approaches at Each Stage, and Linkage to Collective Actions [Schematic]



Source: KRI International Corp.

It is difficult, nevertheless, to think that all beneficiary activities feed into the current collective actions. A given participatory act as a momentary event may be little more than a flash in the pan and bear no relation to the current collective actions (or, it simply may be difficult to discern a relationship). Or, it may be thought that an act of participation may not be directly reflected in current water distribution for, and facilities operation and maintenance by, a group (an example of the former would be a unilateral explanation of plans, and an example of the latter would be training in the operation and maintenance of facilities). It is necessary to ascertain the nature of beneficiary activities that are effectively linked to the current or ongoing collective actions, and moreover, to verify whether the participatory approaches have worked to effectively facilitate or promote those beneficiary activities. This may be said to amount to verification of the effectiveness of the participatory approach. Further, for example, if training in the operation and maintenance of irrigation canals is effective for the current distribution of water to the users association, and for the performance of operation and maintenance work, doubt can arise as to determination of whether training is best done at the time that the association is formed, or at the time of the next rehabilitation of facilities. This is a matter of verification of the effectiveness of timing in the participatory approach. Through the analysis and evaluation for Issue 1, it is believed that hints can be obtained regarding "what participatory approaches should be carried out at what stage to effectively promote the irrigators association in its work of water distribution and the operation and maintenance of the facilities."

2.3.2 Analysis of Costs and Benefits of Implementing Agencies and Irrigators Associations in the Case of a Participatory Approach

There are two relevant issues that can be stated for the entities related to the project, in conjunction with Issue 2, namely the determination of the economic efficiency of

expenses associated with the participatory approach. That is,

1) How well are the costs of participation by irrigators associations (or members) rewarded in terms of increased rice production, which is their anticipated benefit? The cost effectiveness of the participatory approach should be observed and verified from the perspective of the associations (members) in the participatory approach.
2) If there is an increase in the costs borne by the implementing agency in connection with the participatory-approach, will this achieve a corresponding reduction in expenditures for operation and maintenance (post-completion), or an increase in collections on irrigation service fees? The cost effectiveness of the participatory approach should be observed and verified from the perspective of the implementing agencies.

Regarding 1), for each item of the content of the participatory approach, the expenditures for beneficiary activities by irrigators associations, as "direct costs" and "personnel and opportunity costs" will be tabulated for each association separately and comparative analysis will be made to determine the extent that the objective of increase in rice production is achieved as a result of bearing those costs (comparison of the increase in production by association members who have been in a participatory activity effort to the level of production by an association that has not been so involved).The studied associations will be grouped for each type of participatory activity according to the level of expenses each has borne, and observations will be made of the level(s) which are most efficient in terms of expenditures and corresponding increase in rice production.

For 2), the same as for 1), for each aspect of the participatory approach, the "direct cost" and the "personnel and opportunity cost" incurred by the implementing agency for its participatory approaches will be tabulated for each agency separately and compared to the expected return to the agency in the form of "reduced expenses of facility operation and maintenance" and "increased collection of irrigation service use fees."

2.4 Methodology of Evaluation Analysis

2.4.1 Method of Analyzing Content and Effects of a Participatory Approach

Concerning the first issue, namely "To gain hints useful for enhancing the efficiency and effectiveness of irrigators associations by means of the participatory approach, through empirically perceiving and analyzing the content and effect of the participatory approach," work has proceeded according to the following steps.

Step 1: Collection of Data Related to Participatory Approaches and Beneficiary Activities

Data were collected and arranged for the participatory approaches undertaken by the government or implementing agency and for the beneficiaries activities by the members of the irrigators association in response to the participatory approaches, at each of three stages at irrigators associations that were implementing irrigation projects. Those stages are (1) establishment of an association, (2) the subsequent strengthening of the association, and, after project completion (3) operation and maintenance of the system.

Work related to Issue 1 entailed quantitative analysis of how participatory approaches initiated by the government or implementing agency affected the activities of the irrigators association that was the beneficiary of those efforts. In undertaking this analysis, the following is postulated with regard to the project stage and related entities.

Relevant stage: The three stages of the irrigators association, namely "establishment," followed by "strengthening," and then by "post-completion operation and maintenance." Identified as major activities in the strengthening stage are "participation in training courses," and in relation to rehabilitation and other construction work, "participation in the planning and design processes," and "participation in the construction work." This stage is further subdivided into "participation in training courses," "participation in the planning and design processes," and "participation in the construction work."

Relevant entities: The "irrigators associations (agricultural cooperative)" that is the objective of efforts by "government and implementing agencies."

Fig. 2.4.1 Matrix Showing Activities by Stage and Entity Involved

Stage and content / Principal entity		Government; implementing agency (PAi)	Irrigators associations (BAi)
Association establishment stage	PA1	BA1	BA2-a
Association strengthening (or capacity building) stage	Participation in training	PA2-a	BA2-b
	Participation in the planning and design processes	PA2-b	BA2-c
	Participation in construction	PA2-c	BA2-c
Post-completion O&M stage		PA3	BA3

Source: KRI International Corp.

Using the existing documents and information, the content of activities at each stage and by each entity were anticipated, and by means of a preliminary study of actual operations, the existence and nature of these activities were ascertained and confirmed. Indicators were devised to enable judgment as to whether the extent of each activity was suitable, and a quantitative understanding was acquired of the extent of the participatory approaches by the government or implementing agency, as well as the beneficiaries activities by the irrigators associations engendered by those activities. For example, a meeting is held by the government or implementing agency, to explain the process of planning and design of the facilities (∈ PA2-b), and a certain number (percentage) of the beneficiaries participated in that meeting (∈ BA2-b). It is thought, further, that as a result, individual beneficiaries' understanding of the plan, and their sense of ownership, will be enhanced, and on that occasion their anticipation of changes in the plots that they cultivate will be expressed in a next-level request for revision or changes in the facilities plan made by the government or implementing agency (∈ BA2-b). The "participation in explanatory meetings" and "generation of action in the form of requests for revision or change in the plan" are taken as observable indicators of beneficiaries activities (BA) directly resulting from participatory approaches (PA) by the government or implementing agency. Data collection is made by use of questionnaires distributed to the irrigators associations. The data that cannot be readily obtained from the irrigators associations, such as data for expenditures made in connection with the project, and rice production and farm income of the association's members, are sought from the irrigation system office of the government or implementing agency, or separately from irrigators associations members.

[Procedure 1] Measuring the Content and Extent of Participatory Approaches by the Government or Implementing Agency

In Procedure 1, an understanding in quantitative terms is obtained of the content and extent of each category of the participatory approaches by the government or implementing agency as organized in the above matrix. For example, in the process of planning and design of facilities, quantitative data was collected on the extent that meetings were held for exchange of opinions with the farmers and for hearing their requests, specifically in terms of the number of meetings and number of participants. In addition, qualitative data are collected, such as information on how the meetings were conducted (were there dialogues or just lectures, or were they held in the manner of a workshop, etc; see Fig. 2.4.2).

[Procedure 2] Measuring the Content and Extent of Beneficiaries Activities of Association Members at Each Stage

The beneficiary entities, namely the irrigators associations, are of concern in Procedure 2. Parallel to Procedure 1, an understanding is obtained of the extent of participatory approaches at each stage of the project cycle in terms of the beneficiaries activities that are implemented in response to those promotional efforts of the government or implementing agency. For example, in the process of planning and designing of facilities, to what extent was there participation in explanatory meetings (e.g., the percentage of association members who attended, the cumulative number of attendees, etc.). More advanced than this is the collection of information on whether or not there was a relation to the so-called participatory type of planning and designing work. (see Fig. 2.4.2).

Fig. 2.4.2 Representative Indicators of the Participatory Approaches and Beneficiaries Activities at Each Stage of the Project

Project Stages		Participatory Approaches by Government / Executing Agencies (PA)		Beneficiaries Activities in Response to each PA (BA)
IA Establishment	PA1	- Duration for Establishing IA (Days, Man-days)	BA1	- Participation in Training (No. of participants, %)
IA Strength-ening	PA2-a	- Personnel Dispatched (Days, Man-days) - Providing Training Course (Hours, Cost)	BA2-a	- Participation in Training (No. of participants, %)
	PA2-b	- Duration of Planning / Design (Days, Man-days, Cost)	BA2-b	- Extent of Involvement (Indicator of Involvement, No. of participants, %)
	PA2-c	- Meeting Held (No. of times, Cost) - Personnel Dispatched (Days, Man-days)	BA2-c	- Extent of Involvement (Indicator of Involvement, No. of participants, %)
Current O&M	PA3	- Personnel Dispatched (Days, Man-days) - Providing Training Course (Hours, Cost)	BA3	- Participation in Training (No. of participants, %)

Source: KRI International Corp.

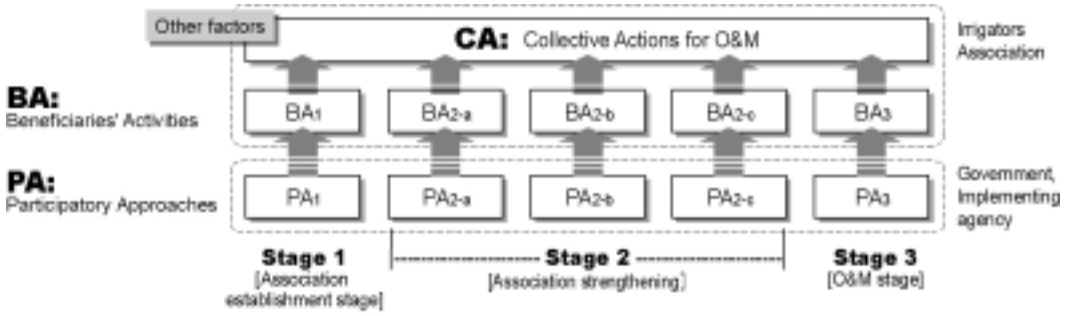
[Procedure 3] Calculation of Unit Activity Quantities of Participatory Approaches by the Government or Implementing Agency, and Beneficiaries Activities by the Irrigators Associations

Specifically concerning the participatory approaches, the data collected through Procedures 1 and 2 are used to calculate the unit quantities of inputs (activities) per area unit of irrigation, and per single beneficiary (person). Similarly, units are calculated for beneficiaries activities. While there are among the data collected some qualitative elements that are difficult to express in units, such as "during rehabilitation work, participated in the construction of main canals and feeder canals," consideration is given to using them as "weighted" values in order to add a qualitative aspect when the units are calculated. When making the quantitative analysis in Step 2, these underlying units that have been calculated are then used as fixed values of the participatory approach (PA) and the beneficiaries activities (BA) on the part of each association.

Step 2: Quantitative Analysis Relating to the Relations Between and Participatory Approaches, and Between Beneficiaries Activities and Collective Actions

The second step, using data obtained in Step 1 for the purpose of quantitative analysis, is characterized by examination of the nature of the relationship between the series of participatory approaches (PA) taken by the government or implementing agency and the beneficiaries activities (BA) by the irrigators associations, in addition to undertaking quantitative analysis of the current collective actions (CA) for the distribution of water and the operation and maintenance of the facilities.

Fig. 2.4.3 Analysis of Five Pairs and Three Stages



Source: KRI International Corp.

Analysis is conducted as per the following procedures.

[Procedure 1] Calculation of the Current Level of Collective Actions (CA) by the Irrigators Associations for Water Distribution, and for Operation and Maintenance of Facilities

Specific responses to the questionnaire surveys performed during Step 1 were sought, besides responses for obtaining numerical indicators for participatory approaches and beneficiaries activities at each stage of the project cycle, for conditions related to holding of and participation in meetings (by type), labor and participation rates for operation and maintenance of facilities, degree that the cropping calendar was followed, and degree that the water distribution schedule (rotation) was followed. In Procedure 1, a compound indicator is derived for current collective actions, using these data sets. Simple accumulation of scores derived for each of the individual, above-named indicators, are added to obtain the compound indicator, or they are combined by other simple means. The problems that arise when this method is used, however, are, first, that there may be arbitrariness in scoring and differences in score intervals, and, second, whether to use raw numbers or weighted numbers when they are added or multiplied. There is no method to adequately address these difficulties. In terms of analytic method, however, suitable results can be obtained by using principal component analysis, which is a form of multivariate analysis that eliminates the potential problem of weighting and score intervals (but not arbitrariness). For derivation of the compound indicator for collective actions in this procedure, therefore, once provisional scores have been obtained through addition and multiplication, principle component analysis is employed.

<Background in Brief> Collective Action in the Philippines

We calculated four performance indicators for the level of collective actions undertaken by irrigators associations for the operation and maintenance of irrigation facilities including canals: (1) holding of and participation in meetings of association members, (2) participation in facilities operation and maintenance tasks, (3) adherence to the cropping calendar, and (4) adherence to the water distribution (rotation) schedule. Based on this we derived a principal component score and deviation values (average = 50), The four independent variables used were as follows.

[1] Holding of and participation in meetings of association members

The average number of times a meeting was held during a year at the level of the turnout service area, multiplied by the participation rate, was used base value (logarithm value was adopted). Data was not used from the annual general assembly as this is understood to very much have the characteristic of a meeting for forms sake and not to be a forum for substantive discussion or coordination. Moreover data on monthly meetings of the board of directors also was not used, as in general these are held by all irrigators associations, and there is no difference between the samples.

[2] Participation in facilities operation and maintenance tasks

The base value used was taken from the average number of times maintenance (cleaning) of lateral canals was performed, multiplied by the participation rate (logarithm value adopted).

[3] Adherence to the cropping calendar

The value used was the ratio of association members who adhered to the cropping calendar as determined by the association.

[4] Adherence to the water distribution (rotation) schedule

The value used was the ratio of association members who drew irrigation water for their own plantings, in observance of the water distribution schedule.

The principal components used consisted of a contribution rate of 39.5%, and the eigenvectors were [1], 0.190; [2], 0.432; [3], 0.674, and [4] 0.568. The data for 52 associations were used (data from 8 were invalid). The principal component score (average, 0; divergence, 1) for the 52 associations, calculated using these eigenvectors, was increased by 10 fold, and 50 was added to the result, for the collective actions deviation (the variance average was 50). Using the collective actions deviation thus derived, associations were separated into a “High CA” group comprised of those having scores higher than the average and a “Low CA” group having scores below the average. The averages for each group were as follows.

High CA Group average CA deviation: 57 (n = 33)
Low CA Group average CA deviation: 37 (n = 19)

The table below shows averages for the four independent variables making up the CA deviation, by group. A large difference is not observed in the case of the turnout service area meetings, but in the case of the participation in operation and maintenance, adherence to the cropping calendar, and adherence to the water distribution schedule, the High CA Group had higher scores than the Low CA Group.

Components of CA deviation (independent variables) / Group		[High CA] Average CA = 57	[Low CA] Average CA = 37
Meetings held at the turnout service area level ※1	(times・%)	6.0	5.7
Participation in operation and maintenance ※2	(times・%)	5.5	3.2
Adherence to the cropping calendar	(%)	84	59
Adherence to the water distribution schedule	(%)	84	64

※1 Logarithm value was used. 6.0 corresponded to about 80% participation, and 5.7 for 60% participation, both at 5 annual meetings.

※2 Logarithm value was used. 5.5 corresponded to about 80% participation on 3 occasions, and 3.2 for about 8% participation, both on 3 occasions.

<Background in Brief> Collective Action in Pakistan

The same as done for the Philippines, we calculated four performance indicators for the level of collective actions undertaken by water users associations for the operation and maintenance of irrigation facilities including canals: (1) holding of and participation in meetings of association members, (2) participation in facilities operation and maintenance tasks, and (3) adherence to the water distribution schedule (taken as equivalent to the cropping calendar), and derived a principal component score and deviation values (average = 50). The three independent variables used were as follows.

[1] Holding of and participation in meetings of association members

An annual general assembly (by only 7 associations) and meetings of the association board of directors (by only 4 associations) were held but not used for data samples in order to stabilize the overall trend of the samples.

[2] Participation in facilities operation and maintenance tasks

Information from 49 responding associations, on operation and maintenance of the water courses (cleaning), were used.

[3] Adherence to the water distribution (and cropping calendar) schedule

Almost every one of the associations followed its water distribution schedule (such schedules not necessarily being formally determined) and there was little dispersion in the sample data, so this variable was not appropriate for use.

Thus in the case of Pakistan there were no principal component scores comprised of multiple variables, so only [2], participation in facilities operation and maintenance tasks, was used to represent collective actions. This was standardized (average, 0; divergence, 1), multiplied by 10 to which 50 was added to derive the collective actions deviation (average, 50). The annual average number of times was multiplied by the participation rate for the 49 associations of the sample. Using the collective actions deviation thus derived, associations were separated into a "High CA" group comprised of those having scores higher than the average and a "Low CA" group having scores below the average. The averages for each group were as follows.

High CA Group average CA deviation: 58 (n = 20)
Low CA Group average CA deviation: 44 (n = 29)

The table below shows the extent of participation in operation and maintenance, by group.

Components of CA deviation (independent variables) / Group		[High CA] Average CA = 58	[Low CA] Average CA = 44
Participation in operation and maintenance※1	(times・%)	442	144

※1 442 corresponded to about 80% participation on 5 occasions, and 144 for about 70% participation on 2 occasions.

[Procedure 2] Construction of a Database Enabling Ready Reference to the Participatory Approaches by the Government or Implementing Agency, Beneficiaries Activities by the Irrigators Associations, and Collective Actions Associated with Water Distribution and Operation and Maintenance of Facilities

A irrigators association database is to be prepared which lists the quantitative indicators and other important in connection with the participatory approaches (PA), beneficiary activities (BA) and collective actions (CA) and other important factors consolidated and organized in the procedures above. The following is a schematic simulation of this database.

Fig. 2.4.4 Irrigators Association Database (Simulation)

	①	②									③		
		PARTICIPATORY APPROACHES FACTOR									OTHER FACTOR		
		CAPACITY BUILDING IN IA ESTABLISH-MENT		STRENGTHENING IN THE RECENT REHAB. / CONST.						CURRENT O&M STAGE AFTER COMPLETION	EXTERNAL FACTOR		STATUS OF O&M CONTRACT
				TRAINING / INSTITUTION-AL BUILDING		INVOLVEMENT IN PLANNING/ DESIGN		INVOLVEMENT IN CONSTRUC-TION WORK			Location of IA	Size of IA	
Name of IA	Score of CA	PA1	BA1	PA2-a	BA2-a	PA2-b	BA2-b	PA2-c	BA2-c	PA3	BA3	-1: Upstream 0: Midstream 1: Downstream	-1: Large 0: Medium 1: Small	0: w/o Contract 1: w/ Contract
CCCCC IA	54.5	1.9	1.3	1.2	0.6	-0.2	2.0	-1.1	0.3	0.4	1.3	1	1	1
GGGGG IA	54.4	1.4	1.3	1.7	1.2	0.5	-0.3	-0.3	1.3	1.7	1.3	0	0	0
IIII IA	54.0	1.9	0.7	0.7	1.7	1.3	0.8	-1.9	-0.8	0.4	-0.3	1	0	0
XXXXX IA	53.5	0.9	0.7	1.2	1.2	2.0	0.8	-1.1	0.3	1.7	1.3	0	1	1
AAAAA IA	53.3	0.9	1.3	0.7	0.6	0.5	-1.4	-1.1	-0.8	-0.8	-0.3	0	1	1
DDDDD IA	53.2	0.5	0.1	0.2	0.6	-0.2	-0.3	-0.3	1.3	-0.8	1.3	1	0	0
MMMMM IA	53.0	0.5	0.7	0.2	0.0	0.5	0.8	0.6	1.3	1.7	-0.3	0	0	0
OOOOO IA	53.0	0.2	0.7	-0.3	0.0	0.5	-1.4	1.4	-0.8	-0.8	-2.0	0	-1	0
EEEEE IA	49.5	-0.5	0.7	0.2	1.2	-0.2	0.8	0.6	0.3	-0.8	1.3	-1	0	1
BBBBB IA	49.4	0.0	0.1	1.2	0.6	-0.9	-0.3	-0.3	-1.9	1.7	0.3	-1	1	0
NNNNN IA	49.3	0.0	0.1	0.7	0.0	-1.6	0.8	-1.1	0.3	0.4	1.3	1	0	0
UUUUU IA	48.9	-0.5	0.1	0.2	0.6	-0.9	0.8	0.6	0.3	-0.8	-0.3	-1	0	0
EEEEE IA	48.9	0.0	0.7	-0.3	-0.6	-0.2	-1.4	-1.1	-1.9	-0.8	-0.3	1	-1	0
YYYYY IA	48.8	-1.0	-0.4	-0.3	0.0	0.5	-1.4	0.6	-0.8	-0.8	-2.0	0	0	1
GGGGG IA	48.6	-0.5	-1.0	-0.3	-0.6	-1.6	-0.3	1.4	-0.8	-0.8	-0.3	-1	1	0
HHHHH IA	48.5	-1.0	-1.0	-0.9	-0.6	-1.6	-0.3	-0.3	1.3	0.4	-0.3	0	0	0
LLLLL IA	48.3	-1.0	-1.5	-1.4	-0.6	1.3	0.8	0.6	0.3	-0.8	-0.3	-1	-1	0
JJJJJ IA	48.0	-1.4	-1.5	-0.9	-1.8	-0.9	0.8	1.4	-0.8	-0.8	-0.3	0	-1	0
PPPPP IA	47.7	-1.0	-1.0	-1.9	-1.8	0.5	-0.3	-0.3	0.3	-0.8	-0.3	-1	0	0
KKKKK IA	46.0	-1.4	-2.1	-1.9	-1.8	0.5	-1.4	1.4	1.3	0.4	-0.3	0	-1	1

Source: KRI International Corp.

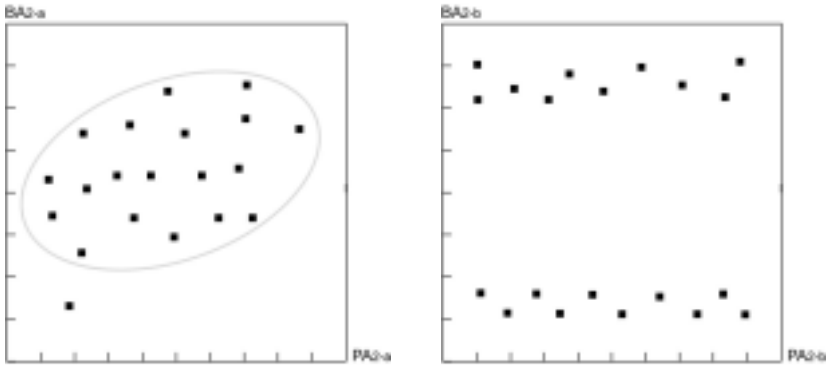
In this simulation, the irrigators associations studied are listed vertically and the indicators for each are shown horizontally, namely, (1) the indicator value for the current collective actions (CA) by irrigators association for distribution of water and operation and maintenance of facilities, (2) the indicator value for participatory approaches (PAi) by the governmental institution or implementing agency at each stage, and (3) factors external to activities intrinsic to the participative approach

(external factors such as the position and scale of the irrigators association, or the status of the operation and maintenance contract).

[Procedure 3] Performance of Analysis and Making of Observations on the Correlation of Participatory Approaches and Beneficiary Activities, on the Basis of the Irrigators Association Database

Using the database analysis is undertaken and observations are made of how participatory approaches by the government or implementing agency have an influence on activities by the beneficiaries or irrigators associations. For example, this includes examining how the holding of training courses (number of courses, man-months expended, etc.) on canal maintenance at the stage of strengthening of the association correlates with irrigators association members' efforts at participating in the courses (cumulative number of attendees, attendance ratio, etc.) (see right-hand diagram in Fig. 2.4.5.). In this case, it can be stated that the participatory approaches had the nature of making it easier to engage in beneficiary activities. Moreover, at the stage of planning and design, there may be cases in which almost no design work was done with the involvement of the irrigators association, while at the same time there may also be cases in which the association has been actively involved in design even when little effort at encouraging this had been made (right hand diagram). It can be said that in such a case, the work of planning when a participatory approach has been adopted has the nature of not being conducive to promotion of beneficiary activities through participatory approaches. Here, a detailed investigation is made from the above viewpoint as to whether there is a substantive correlation of pairs of participatory approaches and beneficiaries activities at each stage.

Fig. 2.4.5 Scatter Diagrams of Correlation of Participatory Approaches (PA) and Beneficiary Activities (BA) at Each Stage



Source: KRI International Corp.

[Procedure 4] Performance of Analysis and Making of Observations on the Influence at Each Stage of Beneficiaries Activities on Current Collective Actions for Water Distribution and the Operation and Maintenance of Facilities

Next, on the assumption that beneficiaries activities can be expected to directly lead to collective actions, analysis is performed and observations are made regarding the correlation between these two sets of activities. Then, the average values for beneficiaries activities for both the group of associations for which favorable collective actions scores were obtained and the group for which favorable scores were not obtained is to be sought, and the beneficiaries activities indicator value that can be thought as the threshold value for favorable collective actions is determined. At this time, there is to be indication of any presence of influence from external factors (such as the size of the association or its position; degree of urbanization; or whether there is a contract for facilities operation and maintenance) as well as the factors intrinsic to the participatory approaches (as per the above-mentioned study by Professor Fujiie). By performing a weighted regression analysis using beneficiaries activities as well as the external factors, the contribution[10] made by beneficiaries activities to collective actions is to be measured.

[Procedure 5] Performance of Analysis and Making of Observations on, Generally, What Type of Participatory Approaches Are Appropriately Carried Out, at What Stage, When Collective Actions for the Current Water Distribution and Facilities Operation and Maintenance Activities Are Increased by Means of the Government's or Implementing Agency's Participatory Approaches

Analyses are made and observations drawn in Procedure 3 regarding how participatory approaches have an influence on activities by the beneficiaries, and in Procedure 4, regarding at what stage and what sort of beneficiaries activities will influence current collective actions for water distribution and the operation and maintenance of facilities. Here, on the basis of the results of those two procedures, a discussion is made of what the participatory approaches should be in order to promote collective actions. Fig. 2.4.6 shows the separation of four categories of beneficiaries activities according to whether participatory approaches are efficacious with regard to beneficiaries activities and whether collective actions is contributive, or less contributive, to beneficiaries activities.

[10] That is, the marginal increment of beneficiaries activities that is thought to be necessary to achieve a one point increase in the score for collective actions.

Fig. 2.4.6 Categories of Beneficiaries Activities (Including External Factors) in a Matrix of "Efficacy of PA to BA" and "Relation Between BA and CA"

Efficacy of PA to BA / Relation between BA and CA	Controllable	Uncontrollable
Contributive	Category A	Category B
Less Contributive	Category C	Category D

In the case of the beneficiaries activities of Category A, participatory approaches are contributive to the beneficiaries activities, and as a result the relation to collective actions is strong. It can be surmised that the offering of training opportunities has worked appropriately. In the case of Category B, participatory approaches is less contributive to beneficiaries activities, but a relation to collective actions is recognized. It can be surmised that rather than a participatory approaches factor, an external factor such as the scale of the association or the degree of urbanization was relevant for this category. The beneficiaries activities in the case of Category C although being controllable by the participatory approaches, are less contributive to collective actions. No doubt this corresponds to weak involvement of the association (members) in regularly scheduled meetings and the like. Further, in the case of Category D, beneficiaries activities are less controllable by participatory approaches, and a contribution of beneficiaries activities to collective actions is not discerned. Thus, study of where emphases in participatory approaches should be placed, when government or an implementing agency is to be involved in a participatory approach, is aided by this sort of arrangement and classification of beneficiaries activities. In the present study, at the stage when certain results are obtained concerning the content and efficacy of the participatory approach, the information thus gained was provided as feedback to the implementing agency and irrigators association, and discussion meetings were scheduled.[11] The understanding obtained as a result of quantitative analysis was reconciled with the views and experiences they had, with the objective of verifying the appropriateness of the analytic result.

2.4.2 Analytic Methodology for Costs and Benefits of the Implementing Agencies and the Irrigators Associations under the Participatory Approach

In order to approach the second issue, that is "arranging and tabulating the costs borne by the implementing agencies and irrigators associations, and analyzing the relation between those costs and the expected benefits," analysis and observation work proceeded as follows, according to two viewpoints, namely ① how well the costs of participation by irrigators association members pay off in terms of increased rice

[11] In view of the conditions as described in note 6 above, feedback to the implementing agency and irrigators association was provided in the Philippines.

production, which is the anticipated benefit, and ② whether an unexpected increase in costs engendered in the participatory approach and encountered by the implementing agency are offset by "a decrease in post-completion operation and maintenance expenses," or "an increase in irrigation service fees collected," or both.

Viewpoint ①	How well are the costs of participation by irrigators associations (or members) rewarded in terms of increased rice production, which is their anticipated benefit? The cost effectiveness of the participatory approach should be observed and verified from the perspective of the associations (members) in the participatory approach.

Estimates are made at the level of the association for the "direct costs" and "personnel and opportunity costs) of each type of activity borne in connection with beneficiaries activities by the irrigators association, and comparative analyses are made using the increase in rice production which was the objective of the efforts (whether rice production was greater for irrigators associations that bore higher costs, relative to the production by irrigators associations that did not make any expenditures). At this time, the data for the associations are grouped according to the magnitude of expenditures made for each type of activity, and, from the viewpoint of cost-benefit effects (relation of participation costs to increased production of rice) observations were made as to where expenditures are made that are efficacious.

[Procedure 1] Estimating the Economic Costs of Irrigators Associations' Participation

The economic cost of irrigators association participation is estimated, once their costs are arranged and tabulated by type of activity. As shown in Fig. 2.4.7 (below), estimates of "direct costs" and "personnel and opportunity costs" are combined to give data for each association.

Fig. 2.4.7 Cost Components of Participatory Activities by a Irrigators Association

Project Stage		IA and IA Members	
		Direct Costs	Personnel and Opportunity Costs
IA Establishment		- IA Enrollment Fee: B1	
		IA enrollment fee x # of present IA members	
			- Time Spent in Explanatory Meeting: B2
			IA member shadow wage x # of participants
			- Time Spent in Training Program: B3
			IA member shadow wage x # of participants
IA Strengthening	Training & Institutional Building		- Time Spent in Training Program: B4
			IA member shadow wage x # of participants
			- Time Spent in Re-echo Training Program: B5
			IA member shadow wage x # of participants
	Participation in Planning & Design		- Time Spent in Explanatory Meeting: B6
			IA member shadow wage x # of participants
			- Time Spent in Consultation Meeting: B7
			IA member shadow wage x # of participants
	Participation in Construction Works		- Time Spent in Explanatory Meeting for Construction: B8
			IA member shadow wage x # of participants
			- Time Spent in Construction Works: B9
			IA member shadow wage x # of participants
Operation & Maintenance	Participation in IA	- IA Annual Membership Fee: B10	
		IA annual membership fee x # of present IA members	
	Training & Institutional Building		- Time Spent in Training Program: B11
			IA member shadow wage x # of participants
	Participation in Meeting	− Incentive for Participants: B12	- Time Spent in GA Meeting: B13
		Incentive x # of present IA members	IA member shadow wage x # of participants
		− Incentive for Participants: B14	- Time Spent in BOD Meeting: B15
		Incentive x # of present IA members	IA member shadow wage x # of participants
		− Incentive for Participants: B16	- Time Spent in TSA Meeting: B17
		Incentive x # of present IA members	IA member shadow wage x # of participants
	Participation in Maintenance & Repair	− Incentive for Participants: B18	- Time Spent in Maintenance & Repair: B19
		Incentive x # of present IA members	IA member shadow wage x # of participants
	Participation in Compliance with Cropping		- Time Spent in Meeting for Compliance with CCL: B20
			IA member shadow wage x # of participants
	Participation in Compliance with Water		- Time Spent in Meeting for Compliance with WDP: B21
			IA member shadow wage x # of participants
			- Time Spent in Water Gate Operations: B22
			IA member shadow wage x # of participants
			- Time Spent in Monitoring: B23
			IA member shadow wage x # of participants

Most of the irrigators association costs of participating are made up of, in the case of direct costs, the entrance fee and annual membership fee for joining and belonging to the association, incentives paid to members to participate in operation and maintenance work, and the like, and the opportunity cost of farmers who take part in association activities. The opportunity cost was calculated by multiplying quantitative data for work, obtained through questionnaires, by opportunity income taken to be the average cost of labor.

[Procedure 2] Confirmation of the Correlation between Expenses and Rice Production Value

For each type of activity, the increase in rice production (separately for dry and rainy seasons), that was the objective of the undertaking, was examined in the relationship to calculated costs of the irrigators association obtained in Procedure 1.

[Procedure 3] Making of Observations on the Cost-Rice Production Relationship (Economic Efficacy) for Each Activity within the Participatory Approach

Cases where a correlation could be confirmed by work done in Procedure 2, analysis was made of the relationship between the cost of activities and the consequent increase in rice production (cost-benefit analysis; economic efficacy).

Specifically, the associations were separated into four groups according to the expenditure they had made (least expenditure, small expenditure, large expenditure, largest expenditure) and the average expenditure for each group was obtained for analysis through comparison to the average amount of rice production. Attention was then given to the variance between the increase in the average cost for each cost cluster (least expenditure, small expenditure, large expenditure, largest expenditure), and the differences in production amounts, to thereby gain an understanding of how incurred costs lead to increases in rice production. This was how the efficacy of the participatory approach was confirmed.

View point ②	If there is an increase in the costs borne by the implementing agency in connection with the participatory approaches, will this achieve a corresponding reduction in expenditures for operation and maintenance (post-completion), or an increase in collections on irrigation service fees? The cost effectiveness of the participatory approach should be observed and verified from the perspective of the implementing agencies.

In the same manner as for ①, for ② the expenses associated with each activity by the implementing agency in connection with the participatory approach are estimated as aggregates for "direct costs" and "personnel and opportunity costs" at the level of the association, and comparative analysis was performed according to the following procedures to examine the relationship between those costs and the benefits anticipated by the implementing agency, namely "a decrease in post-completion operation and maintenance expenses," or "an increase in irrigation service fees collected," or both. At this time, attention is also given to the collective actions, which are considered to intervene between the expenses and the effects.

[Procedure 1] Estimation of the Economic Costs of the Implementing Agency in a Participatory Approach

After structuring data for economic costs that the implementing agency bears at each project cycle stage when utilizing a participatory approach, with the data in groups according to type of activity, economic costs of the implementing agency were determined. As shown in Fig. 2.4.8 below, "direct costs" and "personnel and opportunity costs" were calculated for the activities undertaken by the implementing agency.

Whereas the costs of the irrigators associations were primarily the opportunity costs of the farmers, in the case of implementing agencies, expenses are more diverse, encompassing the costs of holding explanatory meetings and providing training, the

direct costs of incentives provided to encourage participation in construction, the personnel costs of Institutional Development Officers (IDOs) whose job it is to strengthen the irrigators associations.

Fig. 2.4.8 Cost Components of Participatory Activities by an Implementing Agency

Project Stage		Implementation Agency	
		Direct Costs	Personnel and Opportunity Costs
IA Establishment			- IDO Personnel Costs for Dispatch: P1 IDO wage x time dispatched for IA establishment
		- Explanatory Meeting for IA Establishment * Incentive for Participants: P2 Incentive x # of participants	* IDO Personnel Costs for Explanatory Meeting: P3 IDO wage x time dispatched for explanatory meeting
		- Training Program for IA Establishment * Incentive for Participants: P4 Incentive x # of participants	* IDO Personnel Costs for Training Program: P5 IDO wage x time dispatched for training program
IA Strengthening	Training & Institutional Building		- IDO Personnel Costs for Dispatch: P6 IDO wage x time dispatched for training & institutional building
		- Training Program for IA Strengthening * Incentive for Participants: P7 Incentive x # of participants	* IDO Personnel Costs for Training Program: P8 IDO wage x time dispatched for training program
	Participation in Planning & Design		- IDO Personnel Costs for Dispatch: P9 IDO wage x time dispatched for planning & design
		- Explanatory Meeting for Planning & Design * Incentive for Participants: P10 Incentive x # of participants	* IDO Personnel Costs for Explanatory Meeting: P11 IDO wage x time dispatched for explanatory meeting
		- Consultation Meeting for Planning & Design * Incentive for Participants: P12 Incentive x # of participants	* IDO Personnel Costs for Consultation Meeting: P13 IDO wage x time dispatched for consultation meeting
	Participation in Construction Works	- Explanatory Meeting for Construction * Incentive for Participants: P14 Incentive x # of participants	* IDO Personnel Costs for Explanatory Meeting: P15 IDO wage x time dispatched for explanatory meeting
		- Incentive for Participants: P16 Incentive x # of participants	
Operation & Maintenance	Training & Institutional Building		- IDO Personnel Costs for Dispatch: P17 IDO wage x time dispatched for training & institutional
		- Training Program for Operation & Maintenance * Incentive for Participants: P18 Incentive x # of participants	* IDO Personnel Costs for Training Program: P19 IDO wage x time dispatched for training program
	Participation in Compliance with Cropping	- Incentive for Participants: P20 Incentive x # of participants	
	Participation in Compliance with Water Distribution Plan	- Incentive for Participants: P21 Incentive x # of participants	

[Procedure 2] Confirmation of the Relationship between the Costs Borne by the Implementing Agencies and Reduction of Operation and Maintenance Costs, to Improvement of the Irrigation Service Fee Collection Rate

The effects that the implementing agencies can anticipate in the case of a participatory approach are "a decrease in post-completion operation and maintenance expenses," or "an increase in irrigation service fee collected," or both. This Procedure uses costs calculated in Procedure 1 and verifies the impact they have on each type of activity. Alternately, this Procedure confirms the economic efficacy of those costs.

CHAPTER 3 EMPIRICAL ANALYSIS

3.1 Evaluation of the Participatory Approach in the Philippines' Irrigation Sector

3.1.1 Overview of the Regions Studied

The irrigation system of the Philippines covers a total area, including both surface water irrigation and groundwater irrigation, of 1.7 million hectares (as of 2002). Classification is possible into three ownership modes: national (NIS, the National Irrigation System), community (CIS, the Community Irrigation Systems), and private.[12] The total service area of the NIS (as of 2002) was 689,000 hectares organized into 196 systems. Sixty-five percent are concentrated in the Luzon region; the remaining 35% are in Visaya and Mindanao. In terms of area, the majority of systems are smaller than 1,000 hectares (see table below).

Fig. 3.1.1 Summary of National Irrigation Systems (Service Area and Number of Systems), by Region

Region / Area level	Luzon		Visaya		Mindanao		Nation	
	Area (ha)	No. of systems	Area (ha)	No. of systems	Area (ha)	No. of systems	Area (ha)	No. of systems
1,000ha or less	28,947 (4.2%)	50	6,017 (0.9%)	10	3,283 (0.5%)	5	38,247 (5.6%)	65
more than 1,000ha; 2,000haor less	38,499 (5.7%)	28	14,322 (2.1%)	9	6,346 (0.9%)	4	60,167 (8.7%)	41
more than 2,000ha; 3,000ha or less	54,682 (7.9%)	23	9,780 (1.4%)	4	27,513 (4.0%)	11	91,975 (13.3%)	38
more than 3,000ha; 6,000ha or less	25,038 (3.6%)	7	22,216 (3.2%)	5	55,300 (8.0%)	14	102,554 (14.9%)	26
more than 6,000ha	304,586 (44.2%)	17	21,526 (3.1%)	2	69,955 (10.2%)	7	396,067 (57.5%)	26
Total	452,752 (65.7%)	125	73,861 (10.7%)	30	162,397 (23.6%)	41	689,010 (100.0%)	196

The large national systems are located in the five great river basins, which are well endowed with water resources: northeast Luzon's Cagayan Basin (25,469 sq km); the Mindanao Basin (23,169 sq km) and Agsan Basin (10,921 sq km), in Mindanao; and the

[12] The NIS was built using funds from the national budget and is owned by the National Irrigation Administration (NIA). The NIA collects Irrigation Service Fees (ISF) from farmers in the irrigated regions, and uses the funds in operating and maintaining the system. The CIS are well-established systems that have been developed at the initiative of the farmers in the region serviced as well as systems that had been developed by the NIA and entrusted to CIS for operation and maintenance. Of the more than 6,000 CIS in the country, nearly half are in Ilocos, northwestern Luzon. Many of the CIS draw water from rivers; the CIS systems vary greatly in scale (from 40 to 4,000 hectares; average, about 115 hectares). Privately-owned systems are small and usually operated by and for a single farm.

Pampanga Basin (9,759 ssq km) and Agno Basin (5,952 sq km) in Luzon. In the Visaya Region even the largest basins are relatively small, at some 1,000 sq km in area, and in all the region has only two basins in Panay and one in Negros. As suggested by this, the Visaya Region is less well endowed with water resources than Luzon and Mindanao, and it is characteristic of the region that high importance must be assigned in irrigation affairs to securing and maintaining water resources. The present study took up several irrigation projects in the Visaya Region including the Bohol Irrigation Project (I) undertaken and completed by JBIC.

Overview of the Bohol Irrigation Project (I) (PH-P63)

- Evolution of the project

  The soil of Bohol Island, where agriculture is the major industry, is suitable for crop cultivation, and the potential level of agricultural production is high. Nevertheless, the improvement of yields has been disappointing, largely because of underdeveloped irrigation systems. This has made it difficult for farmers there to escape from poverty. Moreover, insufficient employment opportunities have led to the outflow of worker population to the nearby Cebu and to Manila and other cities in search of jobs. These are powerful reasons for developing the agricultural infrastructure of Bohol, and the improvement of irrigation facilities in particular will contribute to greater food production and be a significant factor helping to improve the standard of living of farmers.

  JBIC's Bohol Project (I) (BHIP-1) was begun in August 1986, following the signing of a yen loan agreement in January 1983 (The loan was for ¥4.6 billion and disbursement was completed at the end of March 1998.). Of the total cost, 48% was funded by JBIC and the remainder by the Government of the Philippines. Completion of the project was delayed by 8 years and 7 months owing to inclement weather, difficulties in budgeting the domestic-funded portion, technical problems (measures turned out to be required in connection with poor subsoil conditions), and inadequate performance by a contractor. Even though the measures taken by the implementing agency included changing contractors, with special regard to construction of the dam, watercourses and drainage canals, this extremely long delay could not be avoided. Moreover, although construction of the irrigation facilities (civil works) was completed in December 1996, preparation of the fields was not completed until a year later, in December 1997. This is because farmers delayed work on fields because of the delays in construction of the facilities. The implementing agency then participated in completion of the fields and began operating the irrigation facilities. Thirteen irrigators associations, in which 2,673 farmers participate, were organized in the area irrigated, for purposes of operation and maintenance of those facilities. Contracts were signed between the associations and NIA for operation and maintenance (cleaning) of the main canals. (Adapted from the Project Evaluation Report of March 2000)

- Objectives of the project

  The project had the following objectives:

  - To undertake the development of an irrigation region by means of construction of a dam, water courses (irrigation canals and drainage canals) and roads, as well as related improvement of farms, so that agricultural development in Bohol can be promoted.

- Scope of the project

  - Civil works and improvements: (1) earth-fill dam (storage capacity, 5.99 million cu m; irrigated area, 4.973 hectares), (2) main canals (26.88 km), (3) laterals (35.99 km), (4) main drainage canals (93.27 km), (5) lateral drainage canals (93.27 km), (6) service and access roads (78.6 km), and (7) field improvement (turnout service canals, 129.87 km; earthmoving, 2,645 hectares, by NIA). [N.B. All figures are actual results.]
  - Consulting services: assistance for the tender; supervision of work.

3.1.2 Study Procedures

The questionnaire survey of the irrigators associations in the Philippines was done as follows.

[Procedure 1] Identification of the Target Study Areas

As a result of discussions with the National Irrigation Administration and the Regional Irrigation Office in the target area, the following irrigation systems in the Visaya region were selected on the occasion of the first field study. The systems include 11 locations where the target irrigation system had been completed with assistance under the Bohol Irrigation Project (I), and all systems were part of the NIA administrative organization.

Region 6 (West Visaya)	Jalaur-Proper, Sibalom-San Jose, Sibalom-Tigbauan, Aganan, St. Barbara (5 systems)
Region 7 (Central Visaya)	Bohol 1, Capayas (2 systems)
Region 8 (Northeast Visaya)	Bito, Pongso, Gibuga, Mainit (4 systems)

Fig. 3.1.2 Location of the Irrigation Systems Studied

In the selection of the irrigation systems to be studied, consideration was given to the following points in order to ensure variation among the selected associations, inasmuch as the study requires comparative analysis.

1) Initiation of irrigation should have been no later than about 1980 (if irrigation had been begun earlier than that, difficulties would be expected in data collection and

in relying on the memories of the beneficiaries). In practice, however, as this requirement was difficult to observe, areas where irrigation system rehabilitation had been performed most recently within the required time frame were taken to qualify for selection.

2) Rather than acquire a bias in the form of systems all of similar scale, both large systems with more than 3,000 hectares and small ones with less than 1,000 hectares were taken as eligible. As it turned out, many systems in Region 6 are large, having more than 3,000 hectares, and many of those in Region 8 are from small to medium in scale. Because of this, it is difficult to ensure variation in scale for measurement using a uniform measure. Consideration was given to the situation when Region 3 is included as this means balance is provided, because that region has both large and small systems.

3) Both those irrigators associations where (it was judged that) the government had used a participatory approach when there was intention to make improvements by expanding the service area or in terms of relevant human resources, and associations where that was not the case, were selected. It is known that in recent years in the case of irrigation systems that had undergone large-scale rehabilitation, which had been done with assistance in the form of loans from the World Bank or Asian Development Bank, the participatory approach had been employed. Therefore, systems that had undergone large-scale rehabilitation were deemed acceptable for inclusion in the study.

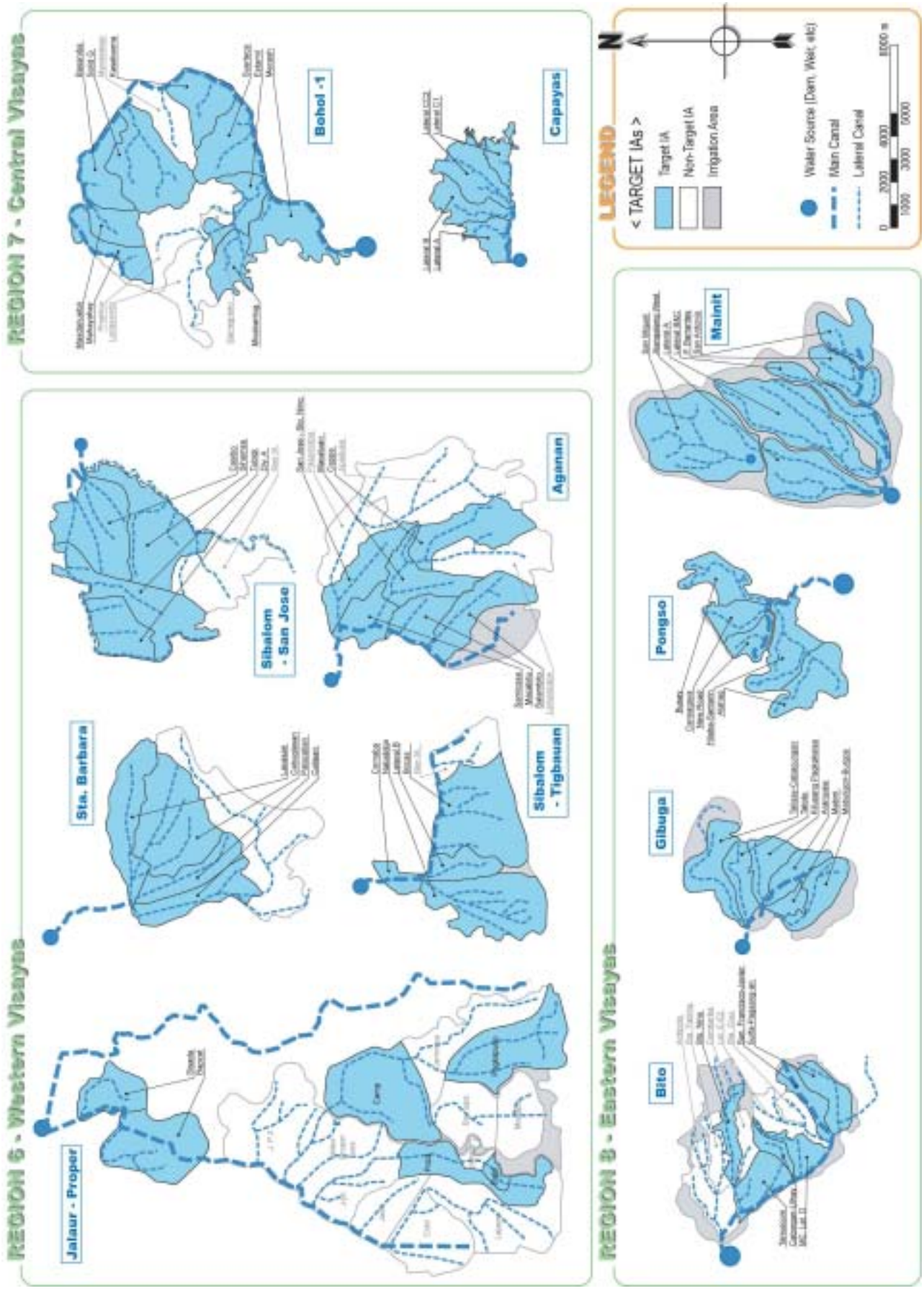
4) Selection was made of both associations where performance of activities, and farm production, were (judged to be) good, and associations where they (were judged to be) not good enough. In selecting the associations to be studied, use was made of the results of the NIA's annual Functionality Surveys[13] and discussions with the NIA.

[13] Irrigators associations have been subjected to an annual Functionality Survey implemented by the NIA's Institutional Development Department, since 1996. The objectives of this Survey are (a) to evaluate the status of the associations, (b) to classify the capabilities of the associations, (c) to accumulate information for use in programs for strengthening the associations, and (d) to identify the associations that on a national scale are deemed as superior. The Survey employs the following criteria and scores system.

Criteria	Score
OPERATION & MAINTENANCE	**68**
- O&M Planning	8
- O&M Implementation	48
- O&M Performance Outputs	12
ORGANIZATION	**20**
- Membership	4
- Board of Directors (BOD) Meeting	4
- General Assembly (GA) Meeting	4
- Record Files	8
FINANCIAL PERFORMANCE	**6**
- Net Worth	3
- Income vs. Expenditure	3
ORGANIZATIONAL DISCIPLINE	**6**
- Holding of Regular Meetings	2
- Imposition of Discipline and Sanctions	2
- Attendance at Meetings	2
TOTAL	**100**

There are indications, however, that the Survey results lack objectivity for the following reasons ("Survey of the Program for Strengthening Water User Associations in the Irrigation Districts of the Philippines," JICA, July 2003): (a) there are wide variations in attitudes and scoring standards among the persons who assign the scores to associations, and (b) there is a tendency to make arbitrary judgments, owing to inadequate supervision. The present study makes reference to the performance scores of the Functionality Survey, but does not evaluate associations on the basis of those scores.

Fig. 3.1.3 The Target Irrigation Systems and Irrigators Associations



[Procedure 2] Pre-Testing the Survey Forms

After the irrigation systems were selected, a pre-test of the questionnaire forms that had been prepared was done and results were used to refine the forms. For this purpose visits were paid to the Bohol and Capayas systems in Region 7, the Bito, Pongso, Gibuga, and Mainit systems in Region 8. There, preliminary interviews were held at the local NIA offices (NISO) and several irrigators associations (IA).

Consequently, the questionnaire was improved by (1) arranging its contents along a timeline, according to categories of the associations' "establishment stage," "strengthening stage" in connection with the most recent construction or rehabilitation work, and post-completion "operation and maintenance stage," (2) open-ended questions were made easier to respond to by converting them to questions giving choices, and (3) less important items were eliminated to enable the questionnaire to be completed within 3-4 hours.

[Procedure 3] Implementation of the Study of Irrigators Associations

Following the first field study phase, a questionnaire survey was carried out, using a subcontractor, from mid-January to late February 2004. Six associations were selected in each system, with a balance maintained among associations up-, mid- and downstream, and with attention given to the evaluation scores obtained in the NIA surveys, after which study teams were formed for each region, and the interviews were conducted. After that a local consultant was used to conduct the questionnaire surveys, and from late March to early April the second field study was conducted, to follow up on matters at the target associations.

Fig. 3.1.4 Schedule for the First Field Study in the Philippines

Date			Place (City)	Activity (Place to visit)	Stay
Jan	5	Mon	Tokyo -- Manila Manila	AM: Transportation (Tokyo 09:40 → Manila 13:30, JL741) PM: Meeting with JBIC (late in the afternoon)	Manila
	6	Tue	Manila, Q.C.	AM: Team Meeting at PKII PM: Kickoff Meeting with NIA Headquarters	Manila
	7	Wed	Manila -- Tacloban Tacloban	AM: Flight for Tacloban (Manila 06:00 → Tacloban 07:15, PR191) PM: Meeting with RIO in Region VII & VIII PM: Meeting and Site Inspection of NIS in Leyte (Mainit RIS)	Tacloban
	8	Thu	Tacloban	Site Inspection of NIS in Leyte (Gibuga, Bito and Hindang Hilogos RIS)	Tacloban
	9	Fri	Tacloban	AM: Site Inspection of NIS in Leyte (Pongso RIS) PM: Meeting with RIO in Region VII & VIII	Tacloban
	10	Sat	Tacloban -- Manila Manila	AM: Flight for Manila (Tacloban 08:05 → Manila 09:15, PR192) PM: Data Compilation	Manila
	11	Sun	Manila -- Tagbilaran Tagbilaran -- Ubay	AM: Data Compilation PM: Flight for Tagbilaran (Manila 15:00 → Tagbilaran 16:15, PR177)	Tagbilaran
	12	Mon	Ubay	AM: Inland Transportation for Ubay Meeting with NISO of Bohol Irrigation Project 1 PM: Interview to IAs of Phase 1	Ubay
	13	Tue	Ubay	Interview of IA members of Phase 1	Ubay
	14	Wed	Ubay Ubay -- Tagbilaran -- Manila	AM: Interview to IAs of Capayas Irrigation System PM: Transportation for Manila (Tagbilaran 17:00 → Manila 18:15, PR178)	Manila
	15	Thu	Manila	AM: Team Meeting at PKII PM: Meeting with ADB and JBIC	Manila
	16	Fri	Manila, Q.C.	AM: Team Meeting at PKII PM: Wrap-up Meeting with NIA	Manila
	17	Sat	Manila -- Tokyo	Transportation (Manila 09:50→ Tokyo 14:50, JL746)	–

Fig. 3.1.5 Schedule for the Second Field Study in the Philippines

Date			Team Leader (Region)					
			Okada (Region 6, 7)		Saikawa (Region 8)		Fujino (Region 6)	
			Activity	Stay	Activity	Stay	Activity	Stay
Mar	23	Tue	Narita (18:15) - Manila (22:05) by JAL745	Manila				
	24	Wed	Meeting at PKII	Manila				
	25	Thu	Workshop with ADB	Manila	Narita (09:40)- Manila (13:30) by JAL741	Manila	Narita (09:40) - Manila (13:30) by JAL741	Manila
	26	Fri	Meeting at PKII	Manila	Meeting at PKII	Manila	Meeting at PKII	Manila
	27	Sat		Manila		Manila		Manila
	28	Sun	Manila (15:00) - Tagbilaran (16:15)	Tacloban	Manila (13:30) - Tacloban (14:45)	Tacloban	Manila (15:15) - Iloilo (16:20)	Iloilo
	29	Mon	Interview with IAs	Ubay	Interview with IAs	Tacloban	Interview with IAs	Iloilo
	30	Tue	Interview with IAs	Ubay	Interview with IAs	Tacloban	Interview with IAs	Iloilo
	31	Wed	Interview with IAs	Ubay	Interview with IAs	Tacloban	Interview with IAs	Iloilo
Apr	1	Thu	Interview with IAs	Ubay	Interview with IAs	Tacloban	Interview with IAs	Iloilo
	2	Fri	Tagbilaran (17:00) - Manila (18:15)	Manila	Interview with IAs	Tacloban	Interview with IAs	Iloilo
	3	Sat	Manila (15:30) - Iloilo (16:35)	Iloilo	Interview with IAs	Tacloban	Interview with IAs	Iloilo
	4	Sun	Interview with IAs	Iloilo	Interview with IAs	Tacloban	Interview with IAs	Iloilo
	5	Mon	Interview with IAs	Iloilo	Interview with IAs	Tacloban	Interview with IAs	Iloilo
	6	Tue	Iloilo (17:15) - Manila (18:15)	Manila	Tacloban (15:25) - Manila (16:35)	Manila	Iloilo (17:15) - Manila (18:15)	Manila
	7	Wed	Team Meeting	Manila	Team Meeting	Manila	Team Meeting	Manila
	8	Thu	Data Verification	Manila	Data Verification	Manila	Data Verification	Manila
	9	Fri	Data Verification	Manila	Data Verification	Manila	Data Verification	Manila
	10	Sat	Manila (09:30) - Narita (14:45) by JAL746	---	Manila (09:30) - Narita (14:45) by JAL746	---	Manila (09:30)- Narita (14:45) by JAL746	---

Fig. 3.1.6 Schedule for Feedback Workshops for Implementing Agencies and Irrigators Associations

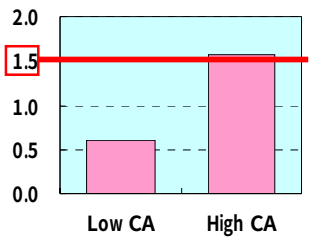
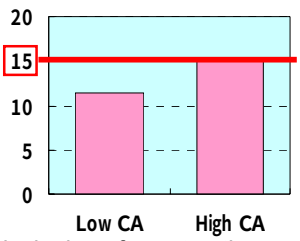
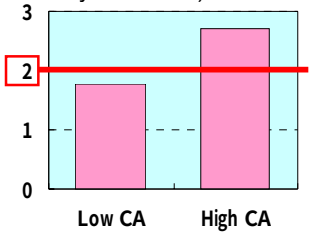
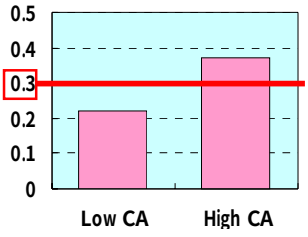
Date			Place (City)	Activity (Place to visit)	Stay
Aug	9	Mon	Tokyo – Manila	AM: Transportation (Tokyo 09:40 → Manila 13:00, JL741) PM: Meeting with JBIC (late in the afternoon)	Manila
	10	Tue	Manila – Tacloban	AM: Meeting with NIA-HQ (09:00 – 11:00) PM: Tansportation (Manila 13:30 – Tacloban 14:45, PR193)	Tacloban
	11	Wed	Tacloban	Full day Workshop with NIA Regional Office (09:00 -)	Tacloban
	12	Thu	Tacloban	Workshops with IAs in Gibuga and Bito	Tacloban
	13	Fri	Tacloban – Manila	AM: Transportation Tacloban 08:05 – Manila 09:15, PR192) PM: Meeting with NIA-HQ / Reporting to JBIC Manila	Manila
	14	Sat	Manila – Tokyo	AM: Transportation (Manila 09:30 → Tokyo 14:45, JL746)	--

3.1.3 Results of Evaluation Analysis

1) Hints for Efficient, Effective Use of the Participatory Approach

On the basis of the collected data, analysis and evaluation as described in section 2.4, Evaluation Methodology, yielded results as shown in the table below (see next page).

Fig. 3.1.7 Effectiveness of the Participatory Approach in the Philippines:
(From the Quantitative Analysis of **PA→BA→CA**)

Stage of association establishment	Stage of Strengthening of association	Operation & Maintenance Stage
① The study was unable to confirm that there was a PA→BA correlation (and one for BA→CA) despite the use of a participatory approach in the form of dispatching a government official to promote the holding of explanatory meetings and promoting of attendance at training sessions, at the time of establishment of the association.	② Training: (Dispatch of an IDO; training): PA→BA →CA correlation confirmed. →At associations where there was much collective actions, participation was 1.5 man-days/member ③ Construction work: PA→BA→CA correlation confirmed. →At associations where there was much collective actions, participation in construction was 15 man-days/hectare ④ Planning and designing of construction work: PA→BA→CA correlation confirmed. →At associations where there was much collective actions, participation was 2 times per member Quantity (man-days/member) of participation in training  Quantity (man-days/ha) of participation in construction  Participation in planning and designing of construction work (man-days/member) 	⑤ Training: (dispatch of an IDO; training): PA→BA CA correlation confirmed. →At associations where there was much collective actions, annual participation was 0.3 man-days/member Quantity (man-days/member) of participation in training  ⑥ Correlation was not confirmed in the case of attendance at meetings related to the planning of operation and maintenance, the cropping schedule and water distribution schedule for either PA→BA or BA→CA

Note) Graphs in the above figure compare the indicators for associations where collective actions were high (High CA) and those where it was low (Low CA) to the average.

That is,

(1) We found that there was a strong statistical relationship of "Participation in planning and designing" at the stage of strengthening of association and "Participation in construction work," at the stage of post-construction operation and maintenance to the level of collective actions.[14]

(2) External to the participative approach, two external factors, "a small scale of the association," and "low degree of urbanization of the farm economy" as well as "existence of a contract for operation and maintenance of facilities" were confirmed as working to raise the level of collective actions.

On the basis of these results, feedback workshops were held for the implementing agency (the NIA) and the irrigators associations, at which discussions were as shown in the table below (see next page). In the table, the numerals ① to ②correspond to the numerals in the preceding table.

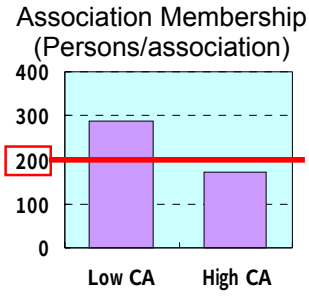
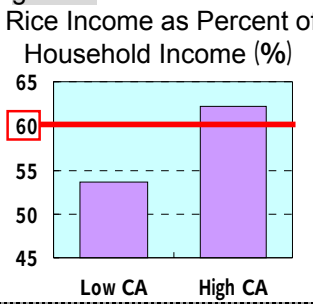
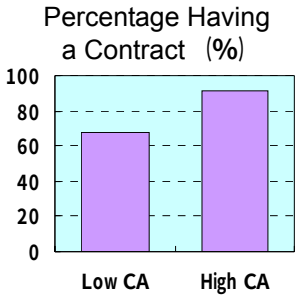
[14] With the objective of verifying the suitability of the calculated divergence value of collective actions, when we calculated the correlation between the questionnaire results for "Evaluation of status of the facilities of lateral canals" and "Evaluation of satisfaction with irrigation water supply" to that divergence, we confirmed that there was a positive correlation for the two at both levels of 1% and 5% significance (positive correlation at the level of 1% was also found for satisfaction with the status of channels). It is believed that this result provides strong proof that "When there is a high level of participation by irrigator associations (members) in operation and maintenance of existing facilities, in conjunction with proper action to distribute water, ensures an adequate supply of water" holds. It is believed, moreover, that ensuring an adequate supply of water raises rice production. In this connection, when a comparison was made of "Evaluation of satisfaction with irrigation water supply" and "Rice yield, by season," a correlation significant at the 1% level was found for the dry season. A significant correlation was not evident during the rainy season. We can hypothesize from these results that with particular regard to the dry season when there is a shortage of water that ensuring a supply of water by means of the logic given above does contribute to the rice crop results. Nevertheless, it is thought that other factors have an impact on rice production that is by no means small; these factors include "variety of rice," "level of fertilization," "and farming techniques." Strictly speaking, it is necessary, therefore, to make a comprehensive study of the contribution made by all factors, in conjunction with study of the extent that irrigation water is being supplied (such analysis is not possible using only the data obtained in the present study).

Fig. 3.1.8 Discussions at Workshops Related Efficacy of the Participatory Approach

Elements of the Participative Approach	Issues
① Encouragement through Dispatching Government Officials at the Time of Establishment of the Association	Both the NIA and the irrigation associations think this element was "effective." The following two points are important for raising the efficacy of the participatory approach at this stage. 1) It is very important to indicate to the beneficiaries the benefits of the project in terms that are easy to understand. 2) Consideration should be given to the timing of implementation of the organization of the farmers. It should not be too early, or too late. According to the experience of staff who had been assigned to Institutional Development Officers (IDOs), the start of organizing the farmers should be about 8-12 months prior to the commencement of system operation.
②, ⑤ Training	Both the NIA and the associations think this element was "effective." Among the diverse subjects of training, the "program relating to water management," and "program for strengthening leadership" are considered to be important in terms of influence on how good the collective actions for water management are. Also, it is desirable for "refresher courses" to be given on a regular basis after completion of the project, so that the associations can sustain a suitable level of knowledge and skills.
③ Participation of Association Members in the Planning and Designing Processes	It is thought that association member participation in the planning and designing processes "is effective." For the NIA, participation by farmers in the planning and designing phase serves to improve the effectiveness and the efficiency of designing and planning work by means of the beneficiaries' acquisition of understanding of the channel route and boundaries of the association. For the irrigation associations, participation in the designing and planning work is desirable because of it enables them to accept the NIA as a partner, and helps develop a sense of responsibility.
④ Participation of Association Members in the Construction Work	Participation in construction work is thought "effective" in the following sense. 1) Association members are paid for their work in cash, and their employment is a valuable opportunity for the association (members) to gain funds (part of the money goes to the association, the rest to members). 2) A feeling of attachment to and attitude of being responsible for water courses and other structures that have been built are cultivated. 3) It is a splendid opportunity for association members to have the experience of working together. 4) (Participation by association members) contributes to building good-duality structures. 5) This leads towards early solution of the problem of land acquisition (Incentive for item 1 above).
⑥ Holding of Meetings About, and Stimulating Participation in, the Operation and Maintenance stage	It is thought that participation of the association in the operation and maintenance task planning, crop calendar planning, and water distribution planning are necessary conditions for developing actual collective actions. There are some association members, however, who attend meetings but do not join in collective actions, which is unfortunate. (←There is a question as to what constitutes sufficient conditions)

Also, when we examined the relationship between other factors influencing the participatory approach, namely externalities such as the scale of the association, and degree of urbanization, and the content of the contract for operation and maintenance of the facilities, results obtained are as shown below. They are shown together with subjects that came up during the above-mentioned workshops.

Fig. 3.1.9 Impact of Factors External to the Participatory Approach on Collective Actions

Influence of External Factors		Influence Imparted to the Operation and Maintenance Contract
Scale of the Association	**Degree of Urbanization**	
A small scale of the irrigation association is preferable for the promotion of collective actions in water management. → A scale smaller than 200 members is preferable 	It is easier to facilitate collective actions by the association if the region is not urbanized (i.e., household income in the region is highly dependent on the rice crop) → It is easier to promote collective actions by the association if dependency on rice income is 60% or greater 	There was a tendency for associations using a Type 1 or Type 2 JSM contract to have greater collective actions → 90% of the associations with a high level of collective actions had a contract of one kind or another 
<Workshop Discussions> Because the scale that can be covered by a given leadership is intrinsically limited, it is advantageous ion terms of water management to have a small-scale undertaking. If we turn our attention to matters relating to the finances of an association, however, it is evident that the amount of funds that a small association can collect is correspondingly small, and at least to an extent the larger association is at an advantage over the smaller one.	<Workshop Discussions> Members of an association that is located near a metropolitan area will have numerous opportunities to earn non-farm income, that makes it less likely that they will participate in collective actions. In regions like these facilitating participation alone will not enable a participatory approach to succeed; additional measures or special conditions are needed, such as crop diversification and a shift towards higher value-added crops in order to make the participation more attractive. N.B. When dependency on rice crops is high, it may be thought that a high level of collective actions is not necessary. It is also thought that a different type of collective actions is needed when a cash crop is grown (in that case, it is likely that assistance from the DA or CDA rather than the NIA would be needed).	<Workshop Discussions> In JSM contracts in particular, because the majority of the fees collected by the association for water use is allocated to the association, the practice of collecting fees serves as an incentive to join in the collective actions. This is the reason for the tendency to prefer JSM contracts. The NIA, for its part, is of the opinion that the JSM is effective because it enables collection of a larger amount of ISF.

Note) Graphs in the above figure compare the indicators for associations where collective actions were high (High CA) and those where it was low (Low CA) to the average.

2) Analysis of Costs and Benefits of the Participatory Approach (Refer to Fig, 3.1.13)

An effort at cost-benefit analysis was undertaken, as another aspect of empirical analysis in the Philippines, by taking the costs of the irrigators associations and the implementing agencies, separately, and examining the relationship they had to the expected benefits of each of the two groups.

① For the irrigators associations, what was seen was that the greater the costs, the greater the expected benefits in the case of the dry season.[16] Yet, rather than the tendency's becoming stronger with an increase in the amount of expenditures for the association, it gradually declined. In the workshops, the viewpoint that was expressed was that "We cannot begrudge the expenditure of time and transportation cost for attending training sessions, considering that having knowledge and skills in water management, and not only the cost of seed and fertilizer, is vital for increasing the production of rice." Thus, the awareness exists that it is important for the association to accept costs (including opportunity costs).

② For the implementing agencies, it was not confirmed that expenditure on behalf of the participatory approach tended to reduce the post-construction cost of operation and maintenance. The following factors are thought to be responsible for this.

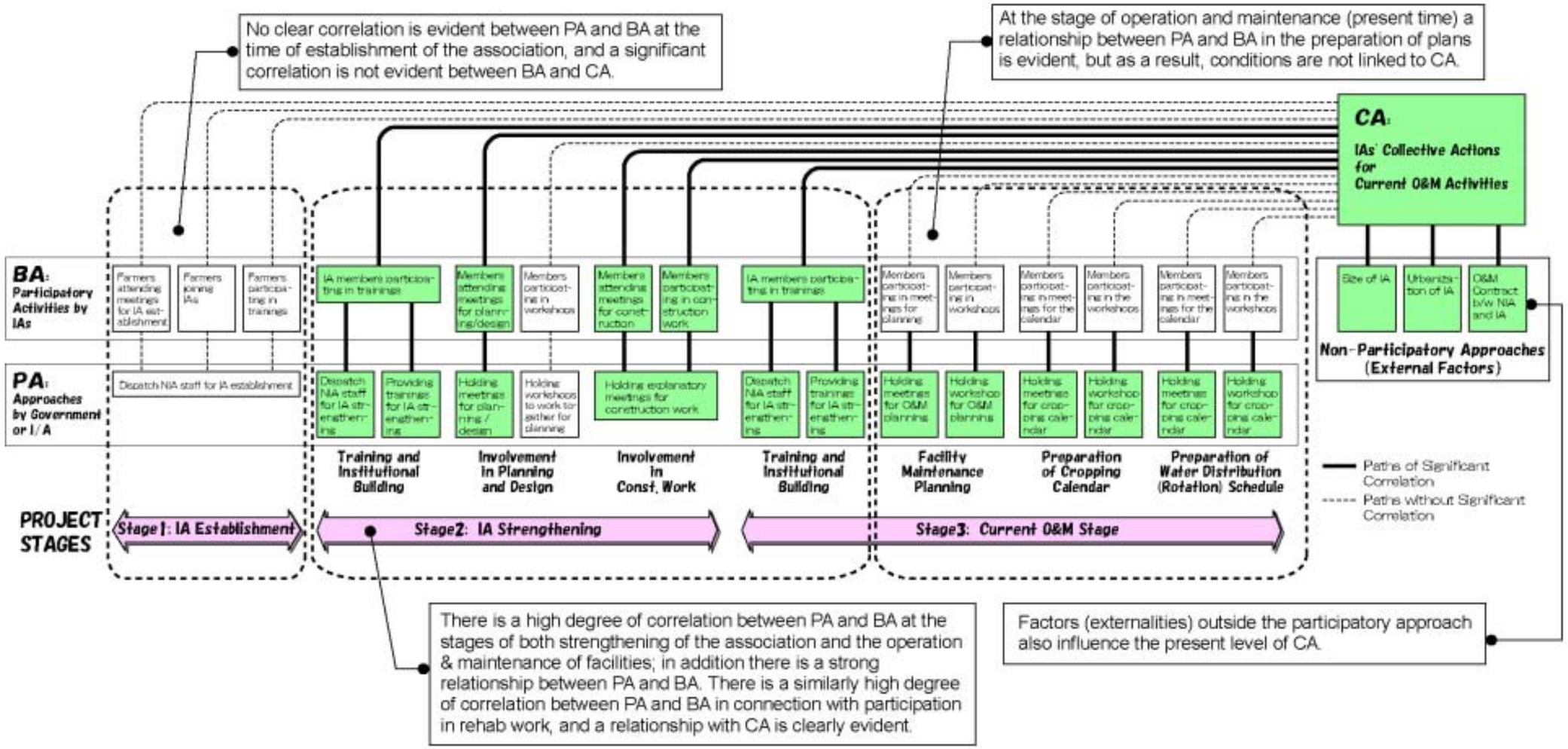
- Because it is the total cost of operating and maintaining the irrigation system that is measured, no measurement was obtained for change in operation and maintenance costs at the level of the irrigation association.
- Insufficiency in association activities is made up for by the NIA (opinion of an NIA employee at a workshop).

With regard to irrigation service fees, a tendency for the amount collected to raise consonant with the expenditures for participation was confirmed. The activities undertaken to collect the fees are related to the institutional factor of use of a contract, and associations using a JSM contract showed considerably better results than those not having a contract.[17] Consequently with respect to collection of irrigation service fees, it appears that association members were able to achieve higher levels of rice production by means such as the participatory approach and at the same time it appears that this is effective in granting an incentive through the JSM system.

[16] It appears that, between the costs for participatory activities and the anticipated results, as a result of making expenditures and taking action, the present level of collective actions (CA) is favorable in connection with the present maintenance and management, and that this will take the route of improving the ability to obtain water during the dry season and consequently lead to increased rice production.

[17] The average annual amount for associations having a JSM contract (2003 dry season) was 640 PHP/ha, while the average for associations not having a JSM contract was 430PHP/ha.

Fig. 3.1.10 Participatory Approaches (PA), Beneficiaries' Activities (BA), and Collective Actions (CA) in the Philippines



N.B. See Fig. 3.1.11 and Appendix 3 for the results of correlation analysis of these processes.

Fig. 3.1.11 Summary of Analysis of PA-BA and BA-CA in the Philippines

Project Stage		PA		BA		PA-BA analysis				BA-CA analysis			
		Indicator	Unit	Indicator	Unit	Coeff. of correl.	Sam-ple (n)	Significance [p value]	Sym-bol	Coeff. of correl.	Sam-ple (n)	Significance [p value]	Sym-bol
1. Establishment		No. of man-days of personnel dispatched at time association was established	man-days/ha	Association membership rate	%	-0.293	(54)	[0.0313]***	NG	-0.096	(50)	[0.5059]	NG
				Times of per- person attendance, meetings related to establish-ment of the assoc.	times/member	-0.140	(56)	[0.3041]	NG	0.209	(52)	[0.1362]*	OK
				Cumulative no. of times of attendance at training programs	man-times/ ha	0.055	(56)	[0.6899]	OK	0.085	(52)	[0.5479]	OK
2. Strengthening the association	a. Training	No. of man-days of personnel dispatched for strengthening of association (IDO, IDO + WM)	i) man-days/ha ii) man-days/ member	Cumulative no. of times of attendance at training programs	i) man-times/ha ii) man-times/ member	IDO (i)) & BA2a (i)) :				BA2a (i)) & CA			
						0.754	(46)	[0.0000]***	OK	0.280	(47)	[0.0566]**	OK
						IDO (ii)) & BA2a (ii)) :				BA2a (ii)) & CA			
						0.853	(46)	[0.0000]***	OK	0.227	(47)	[0.1243]*	OK
						IDO+WM (i)) & BA2a (i)) :							
						0.728	(48)	[0.0000]***	OK				
						IDO+WM (ii)) & BA2a (ii)) :							
						0.770	(48)	[0.0000]***	OK				
		Cumulative no. of association training programs	i) times/ha ii) times/member			Training (i) & BA2a (i)) :							
						0.869	(50)	[0.0000]***	OK				
						Training (ii)) & BA2a (ii)) :							
						0.907	(50)	[0.0000]***	OK				
	b. Planning, Designing	No. of meetings	times/ha	No. of meetings ×participation rate	times ・ %	0.822	(36)	[0.0000]***	OK	0.307	(33)	[0.0818]**	OK
		Total no. of CA workshops	times/ha	No. of occasions for CA × participation rate	times ・ %	0.095	(16)	[0.7258]	OK	-0.064	(33)	[0.7258]	NG
		Total no. of meetings + CA workshops	times/ha	Total of above	times ・ %	0.542	(41)	[0.0002]***	OK	0.253	(34)	[0.1482]*	OK
	c. Construction	No. of construction -related meetings	times/ha	No. of times construction- related meetings were held × participation rate	times ・ %	0.813	(43)	[0.0000]***	OK	0.275	(50)	[0.0537]**	OK
				No. of persons joining in construction work ×No. of days (all facilities, Main + Lateral, Lateral)	man-days/ha	All facilities (including PHF)				All facilities (including PHF)			
						0.578	(31)	[0.0007]***	OK	0.345	(30)	[0.0622]**	OK
						Main + Lateral				Main + Lateral			
						0.280	(37)	[0.0937]**	OK	0.263	(36)	[0.1209]*	OK
						Lateral				Lateral			
						0.175	(40)	[0.2788]	OK	0.102	(42)	[0.5192]	OK

Project Stage		PA		BA		PA-BA analysis				BA-CA analysis			
		Indicator	Unit	Indicator	Unit	Coeff. of correl.	Sam-ple (n)	Significance [p value]	Sym-bol	Coeff. of correl.	Sam-ple (n)	Significance [p value]	Sym-bol
3. Operation & Maintenance	a. Training	No. of man-days of personnel dispatched for strengthening of association (IDO, IDO + WM)	i) man-days/ha ii) man-days/ member	Cumulative no. of times of attendance at association training programs (person times)	i) man-times/ ha ii) man/times/ member	IDO (i)) & BA3a (i))				BA3a (i)) & CA			
						0.223	(18)	[0.3728]	OK	0.363	(25)	[0.0737]**	OK
						IDO (ii)) & BA3a (ii))				BA3a (ii)) & CA			
						0.110	(18)	[0.6642]	OK	0.407	(25)	[0.0433]***	OK
						IDO + WM (i)) & BA3a (i)) :							
						0.458	(22)	[0.0322]***	OK				
						IDO+WM (ii)) & BA3a (ii)) :							
						0.308	(22)	[0.1637]	OK				
		Total no. of meetings + CA workshops	i) times/ha ii) times/ member			Training (i)) & BA3a (i)) :							
						0.657	(26)	[0.0003]****	OK				
						Training (ii)) & BA3a (ii)) :							
						0.563	(26)	[0.0027]****	OK				
	b. Facilities maintenance planning	Total no. of meetings	times/ha	No. of meetings×participation rate	times・%	0.834	(19)	[0.0000]****	OK	0.039	(25)	[0.8530]	OK
		Total no. of CA workshops	times/ha	No. of CA workshops×participation rate	times・%	0.145	(12)	[0.6520]	OK	0.081	(27)	[0.6883]	OK
		Total no. of meetings + CA workshops	times/ha	Total of above	times・%	0.771	(23)	[0.0000]****	OK	0.245	(23)	[0.2608]	OK
	c. Crop calendar	Total no. of meetings	times/ha	Total no. of meetings× participation rate	times・%	0.380	(32)	[0.0321]***	OK	0.106	(39)	[0.5205]	OK
		Total no. CA workshops	times/ha	No. of CA workshops× participation rate	times・%	0.388	(20)	[0.0911]**	OK	-0.180	(40)	[0.2658]	NG
		Total no. of meetings + CA workshops	times/ha	Total of above	times・%	0.179	(40)	[0.2680]	OK	-0.356	(38)	[0.0282]***	NG
	d. Water distribution schedule	No. of meetings	times/ha	No. of meetings× participation rate	times・%	0.538	(28)	[0.0031]****	OK	-0.001	(34)	[0.9973]	NG
		No. of CA workshops	times/ha	No. of CA workshops× participation rate	times・%	0.542	(16)	[0.0300]***	OK	-0.163	(35)	[0.3494]	NG
		Total no. of meetings + CA workshops	times/ha	Total of above	times・%	0.364	(35)	[0.0318]***	OK	-0.106	(34)	[0.5513]	NG

Note) An asterisk (or asterisks) at the right of the p-value given as the result of PA-BA and BA-CA analysis stands for the following levels of significance.

* 15%, ** 10%, *** 5%, **** 1%

Note that the levels of significance used for the evaluation results were 10%,5%,and 1%, for which "OK" is given as meaning that the corresponding values were so judged.

Fig. 3.1.12 Average PA and BA Scores for Association Groups Having High- or Low-Value CA

Project Stage			Indicator		High-CA-Value (50 or higher) Association Average		Low CA-Value (under 50) Association Average	
Establishment of Association		**PA**	**No. of man-days of persons dispatched for est. of association**	**(man-days/ha)**	**0.39**	**(n=30)**	**0.16**	**(n=18)**
		BA	Association membership rate	(%)	75.3	(n=32)	78.6	(n=18)
			Times of per- person attendance, meetings related to establishment of the assoc.	(times/member)	3.54	(n=30)	3.71	(n=18)
			Cumulative no. of times of attendance at training programs	(man-days/ha)	1.79	(n=33)	1.74	(n=19)
Strengthening of association	Training	**PA**	No. of man-days of personnel dispatched for strengthening of association (IDO)	(man-days/ha)	0.63	(n=27)	0.35	(n=17)
			No. of man-days of personnel dispatched for strengthening of association (IDO + WM)	(man-days/ha)	1.12	(n=28)	0.72	(n=18)
			Cumulative no. of training programs	**(times/ha)**	**0.05**	**(n=27)**	**0.03**	**(n=18)**
			〃	**(times/member)**	**0.07**	**(n=27)**	**0.04**	**(n=18)**
		BA	Cumulative no. of times of attendance at training programs	(times/ha)	1.05	(n=30)	0.44	(n=17)
			〃	(times/member)	1.58	(n=30)	0.61	(n=17)
	Planning & Design-ing	**PA**	Total no. of meetings related to planning, designing	(times/ha)	0.02	(n=18)	0.01	(n=12)
			Total no. of CA workshops related to planning, designing	(times/ha)	0.01	(n=8)	0.01	(n=8)
			Total no. of meetings + CA workshops	(times/ha)	0.02	(n=19)	0.01	(n=15)
		BA	No. of participants in meetings rel. to planning, designing × participation rate	(times･%)	272	(n=19)	178	(n=14)
			No. of participants in CA workshops × participation rate	(times･%)	83	(n=18)	115	(n=15)
			No. of participants in meetings + CA workshops × participation rate	(times･%)	437	(n=19)	335	(n=15)
	Con.	**PA**	No. of construction -related meetings	(times･%)	0.02	(n=24)	0.01	(n=12)
		BA	No. of times of attendance at construction-related meetings × participation rate	(times･%)	198	(n=32)	163	(n=18)
			Cumulative no. of members' man-days of participation in construction work (all facilities)	(man-days/ha)	15.3	(n=20)	11.4	(n=10)
			Cumulative no. of members' man-days participation in construction work (Main + Lateral canal)	(man-days/ha)	8.4	(n=24)	7.3	(n=12)
			Cumulative no. of members' man-days participation in construction work (Lateral canal)	(man-days/ha)	7.9	(n=28)	5.4	(n=14)
Operation & Maintenance	Training	**PA**	No. of man-days of personnel (IDOs) dispatched for strengthening of association	(man-days/ha)	0.17	(n=19)	0.22	(n=15)
			〃	(man･days/ member)	0.29	(n=19)	0.27	(n=15)
			No. of man-days of personnel (IDOs + WMs) dispatched for strengthening of association	**(man･days/ha)**	**0.60**	**(n=28)**	**0.36**	**(n=19)**
			〃	**(man･days/ member)**	**0.98**	**(n=28)**	**0.52**	**(n=19)**
			Cumulative no. of training programs	(times/ha)	0.02	(n=19)	0.01	(n=8)
			〃	(times/member)	0.04	(n=19)	0.02	(n=8)
		BA	Cumulative no. of times of participation in training programs	(man･times/ha)	0.25	(n=17)	0.17	(n=8)
			〃	(man･times/ha)	0.37	(n=17)	0.22	(n=8)

Project Stage		Indicator			High-CA- Value (50 or higher) Association Average		Low CA- Value (under 50) Association Average	
Operation & Maintenance	Facility、Mainte-nance Planning	PA	Total no. of facility planning meetings	(times/ha)	0.02	(n=12)	0.01	(n=7)
			Total no. of facility planning CA workshops	(times/ha)	0.01	(n=10)	0.00	(n=2)
			Total no. of meetings + CA workshops	(times/ha)	0.02	(n=16)	0.01	(n=7)
		BA	No. of participants in meetings × participation rate	(times･%)	243	(n=18)	291	(n=7)
			No. of participants in CA workshops × participation rate	(times･%)	68	(n=20)	27	(n=7)
			No. of participants in meetings + CA workshops × participation rate	(times･%)	380	(n=19)	317	(n=7)
	Crop calendar	PA	Total no. of crop planning meetings	(times/ha)	0.01	(n=20)	0.01	(n=9)
			Total no. of crop planning CA workshops	(times/ha)	0.01	(n=13)	0.00	(n=5)
			Total no. of meetings + CA workshops	(times/ha)	0.01	(n=27)	0.01	(n=10)
		BA	No. of participants in crop planning meetings × participation rate	(times･%)	165	(n=29)	216	(n=10)
			No. of participants in crop planning CA workshops × participation rate	(times･%)	60	(n=29)	56	(n=11)
			No. of times members participated in meetings + CA workshops × participation rate	(times･%)	190	(n=28)	278	(n=10)
	Water distributi on	PA	Total no. of water management meetings	(times/ha)	0.01	(n=18)	0.01	(n=9)
			Total no. of water management CA workshops	(times/ha)	0.01	(n=9)	0.00	(n=6)
			Total no. of meetings + CA workshops	(times･%)	0.01	(n=23)	0.01	(n=10)
		BA	No. of participants in water management meetings × participation rate	(times･%)	138	(n=24)	171	(n=10)
			No. of participants in water management CA workshops × participation rate	(times･%)	56	(n=25)	77	(n=10)
			No. of times members participated in meetings + CA workshops × participation rate	(times･%)	196	(n=24)	248	(n=10)

Fig. 3.1.13 Cost-Benefit Situation for the Participatory Approach

Irrigators Associations — Participation Costs and Rice Production (Dry Season)

	A. Stage of Establishment of the Association				B. Stage of Strengthening of the Association: Participation in Planning and Designing				C. Stage of Strengthening of the Association: Participation in Construction				D. Stage of Operation and Maintenance of the System: Participation in Training Programs				(Reference) Total, A+B+C			
	Average rice production increases from ① and ② to ③ and at 120 PHP/ha, for ③, production is at the maximum. Average cost, however, peaks at 30 PHP/ha and economic efficacy declines after that.				Rice production falls from ① to ②, then increases to ③ and again to ④. But average cost peaks at 400 PHP/ha and economic efficacy declines from that point.				From ① to ②, ③ and ④, average rice production increases. Average costs peak, however, at 2,300 PHP/ha and economic efficacy declines from that point.				From ① to ②, ③ and ④, average rice production increases. Average costs peak, however, at 40 PHP/ha and economic efficacy declines from that point.				From ① to ② average rice production declines but rises to ③ and to ④. Average costs peak, however, at 500 PHP/ha and economic efficacy declines from that point.			
(PHP/ha)	① Min.	② Low	③ High	④ Max.	① Min.	② Low	③ High	④ Max.	① Min.	② Low	③ High	④ Max.	① Min.	② Low	③ High	④ Max.	① Min.	② Low	③ High	④ Max.
Avg. cos	7.6	30.5	123.5	606.6	58.9	169.2	408.0	1,422.9	129.7	571.9	2,322.2	13,602.7	1.7	12.5	37.3	197.9	125.1	495.3	1,986.7	12,979.7
Avg output	30,139.4	31,953.0	33,179.0	32,682.9	32,499.5	29,365.2	31,676.4	34,434.3	29,845.9	30,663.9	33,162.7	34,723.8	29,983.9	30,246.1	31,645.7	36,030.9	31,629.3	29,794.9	31,825.1	34,685.7

Implementing Agencies — Participation Costs and Collection of Irrigation Service Fees (Dry Season)

	A. Stage of Establishment of the Association				B. Stage of Strengthening of the Association: Participation in Planning and Designing				C. Stage of Strengthening of the Association: Participation in Construction				D. Stage of Operation and Maintenance of the System: Participation in Training Programs				(Reference) Total, A+B+C			
	From ① to ② and to ③ average revenue rises. At 40 PHP/ha, for ③, production is at the maximum. Average cost, however, peaks at 15 PHP/ha and economic efficacy declines after that.				From ① to ②, ③ and ④, average revenue increases but differing from other stages there is no decline in economic efficacy attributable to increase in average cost				From ① to ②, ③ and ④, average revenue increases. But at 25 PHP/ha average cost peaks and economic efficacy declines from that point.				From ① to ②, ③ and ④, average revenue increases. But at 6 PHP/ha average cost peaks and economic efficacy declines from that point.				From ① to ②, ③ and ④, average revenue increases. But at 90 PHP/ha average cost peaks and economic efficacy declines from that point.			
(PHP/ha)	① Min.	② Low	③ High	④ Max.	① Min.	② Low	③ High	④ Max.	① Min.	② Low	③ High	④ Max.	① Min.	② Low	③ High	④ Max.	① Min.	② Low	③ High	④ Max.
Avg. cos	3.0	13.7	39.3	154.2	8.1	22.7	51.3	158.5	23.0	87.1	266.5	1,508.4	1.2	6.1	16.2	47.3	23.0	90.7	298.1	1,494.1
Avg output	279.1	511.3	634.2	587.6	356.8	399.8	411.9	643.2	290.9	517.2	559.8	639.4	131.0	499.7	593.1	636.4	374.8	417.9	524.2	638.5

3.2 Evaluation of the Participatory Approach in the Pakistan

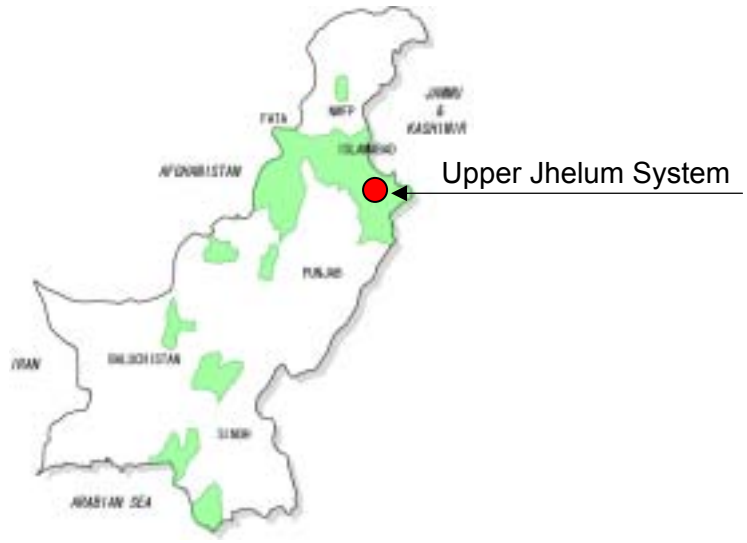
3.2.1 Overview of the Regions Studied

The Upper Jhelum System, a part of the Indus Basin Irrigation System, is a large-scale system in the province of Punjab. In this region there are about 1,200 water courses serving as many turnout service areas. To date a total of 455 water users associations (khal punchait) have been formed, of which JBIC (strictly speaking, OECF, predecessor of JBIC) has assisted 219 to improve their facilities by means of its On-Farm Water Management Project (PK-P32), while the remaining 236 have improved facilities and joint-use wells with assistance from other sources. In this irrigation region, in general the crops are primarily rice and cotton during the dry season referred to as Kharif (June-September) using runoff from melted snow, and wheat and sugar cane during the wet season, Rabi, (October-May).

The On-Farm Water Management Office under the provincial agricultural bureaus is responsible for maintenance of the watercourses, and upstream from that the main, distributary, and minor canals are the responsibility of the provincial irrigation bureau. The arrangements made for improvement (including repairs) of facilities are that the government pays the construction cost, and the water users association pays for the cost of labor. The ratio of these costs is 7 to 3, and unless the association agrees to bear its share, work is not undertaken. Maintenance of the watercourse after improvement or repair is entrusted to the water users association (facilities are the property of the government), and the association is obligated to pay a fee for use of the water, to the provincial government. It may be mentioned in this connection that in Pakistan ”watercourses” in terms of scale and function may be considered as equivalent to the laterals of the Philippines.

The demarcation between government and association in connection with the operation and maintenance of irrigation facilities at least up to the present time has been clear, and such that the main, distributary and minor courses were the responsibility of the government, and the watercourses supplied by those were the responsibility of the associations. In other irrigation locations, agricultural cooperatives called Nehli Punchait have been formed, each being made up of a group of water users associations, and they undertake to operate and maintain the distributary and minor courses (this is being implemented as a NDP project supported by JBIC), but such an arrangement has yet to spread widely (it is being tried in 13 districts in Sindh and one in Punjab).

Fig. 3.2.1 Location of the Upper Jhelum System, Pakistan



Overview of the On-Farm Water Management Project (PK-P32)

- Overview of the Project

  After the March 6, 1992 signing of an agreement for a yen loan by JBIC for an On-Farm Water Management Project (OFWMP; see www.jbic.go.jp/english/oec/post/2002/pdf/118_full.pdf), the project was begun in July of that year with funding of Rp. 1,274 million from the loan (85% of project cost; the remainder was provided by the Pakistan Government [Asian Development Program budget]; loan period was 64 months, by the end of June 1997). Because of delays related to the selection of a consultant and governmental staff, the schedule for procurement of vehicles and equipment was delayed, causing the construction phase to be extended to 94 months until completion in December 1999 (Ultimate project cost, Rp 4,112 million including Rp 786 million for the land, labor and wages that comprised the contribution or share of the beneficiaries). The government departments in charge of on-farm water management, for the Federal Water Management Cell, Ministry of Food, Agriculture and Livestock, Federally Administered Tribal Areas, Islamabad Capital Territory Administration, and four provinces (Punjab, Baluchistan, Sindh, and Northwest Frontier), were the implementing agencies.

- Objective of the Project

  The project had the objective of improving on-farm water management, that is, improvement of the irrigation water distribution facilities at the turnouts, other works related to farmland and water, introduction of modern farming techniques, and the formation of water users associations by organizing farmers, in order to improve the productive efficacy of the land and water resources available. This was expected to contribute to increase farm production. The ultimate goal of the project was to improve the standard of living of the beneficiary farmers through the augmentation of their farm income.

- Scope of the Project
  - Civil works: (1) repair of watercourses, (2) construction of reservoirs, (3) precision leveling of farmland, (4) construction of a training center, (5) drilling a well for association/common use, (6) installation of pumps, (7) improvement of small-scale irrigation systems, (8) storage of rain water, (9) on-farm water management in Rodkohi and Sailaba regions (traditional techniques for floodwater irrigation in Baluchistan and Punjab), and (10) construction of Farmer Training Centers
  - Machinery and equipment
  - Consulting services
  - Project management

3.2.2 Study Methodology

The procedures used for the questionnaire for water users associations in Pakistan were as follows.

[Procedure 1] Selection of Study Regions

Consequent to discussions at the Punjab Agricultural Bureau, Water Management Department, water users associations, all in the Upper Jhelum Irrigation System, and comprising associations using water provided by facilities that had been improved with the assistance provided by a JBIC-OFWMP project, and associations using water not supplied by facilities that had so benefited. This region is large in scale, encompassing 150,000 hectares overall, and was developed during the Raj, in about 1870. There are about 470 water users associations in the region at present of which about half are using facilities that had been improved by the JBIC-OFWMP project. Water users associations are organized by the final water route referred to as a watercourse, that is, tertiaries (there are about 800 watercourses which do not have water users associations); the average size of an association is between 40-50 households and each association covers an area of about 150 hectares. The watercourses may be thought of as corresponding to laterals in the Philippines.

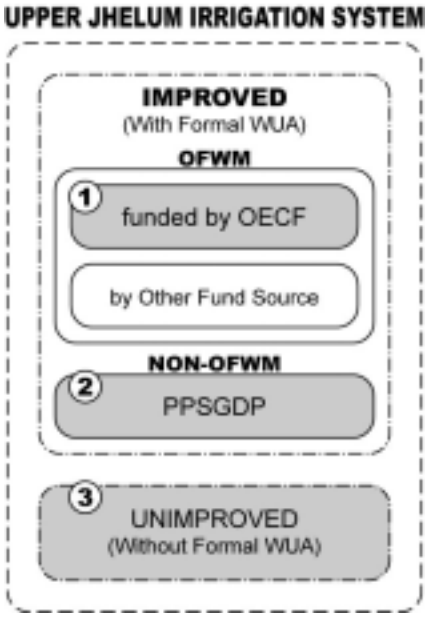
The Mandi Bahauddin OFWMP District Office was visited in order to select the specific associations, as this office is in charge of watercourse management (facilities maintenance) of the tertiaries in this irrigation region. There, both a briefing on irrigation region and a list of water users associations were provided.

The associations were screened and selected made according to the following procedures and criteria.

1) The Upper Jhelum Irrigation System comprises the main canal, distributaries, minors and watercourses. The water users associations are organized at the level of watercourses, and selection was done according the following criteria.
   - ① Ten distributaries, from up-, mid- and downstream on the Main Canal were selected. Five each were selected from Mandi Bahauddin and Gujrat, in order to account for regional variations.
   - ② Two associations from each of the up-, mid- and downstream locations were selected for each of the 10 distributaries selected in ① above. That is, six associations per distributary for a total of 60 associations were selected.
2) When the 60 associations were selected using the procedure set forth in 1) above, care was taken to select associations that were using facilities that had been improved under the JBIC-OFWMP project, as well as associations that were not availed of such facilities. As shown in the figure below, the beneficiaries located in the target irrigation regions can be divided into two groups, namely they can be taken as belonging to either an “Improved or With Formal WUA” or an

"Unimproved or Without Formal WUA." The first group can be further divided into two groups according to whether they have or have not been included in the scope of JBIC-supported improvements, i.e., an "OFWM group" and a "Non-OFWM group." The Non-OFWM group, differing from the OFWM associations, which have the objective of utilizing surface water supplies, are for the most part associations using common wells fed by groundwater and developed under the aegis of the Punjab Private Sector Groundwater Development Project (PPSGDP). The PPSGDP associations were judged to be acceptable for inclusion in the present study because they had been the objective of a World Bank project that employed the participative approach. For the present study, 15 to 25 associations were selected from each of the three groups, (1) OFWM associations, using facilities that had been improved with JBIC support (① in the figure below), (2) those using common wells improved by the PPSGDP (② in the figure below), and (3) those that were using non-improved facilities (③ below).

Fig. 3.2.1 Types of Water Users Associations in the Irrigation Region Studied (The Three Groups)



3) In addition to the effort made to ensure balance in the selection of the associations as described in item 1 above, consideration was also given to the size of the associations (number of members, and service area) to further ensure balance.

4) It was considered to also be important that there be a variation in terms of the present performance of operation and maintenance tasks undertaken by the associations. In Pakistan, however, because there is no performance evaluation by the government or implementing agency that is similar to the Functionality Survey in the Philippines, it was difficult to obtain data in advance to confirm the

performance of the associations. Nevertheless, the International Water Management Institute, that had been engaged as a subcontractor, had undertaken selection on the basis of discussions with state and province agriculture departments, and efforts were made to avoid the selection of associations that all possessed similar levels of cooperativeness, by utilizing the outcome of meetings to ascertain the opinions of government and implementing agency officials.

Fig. 3.2.3 Location of Water Users Associations Subjects of Study, Upper Jhelum System

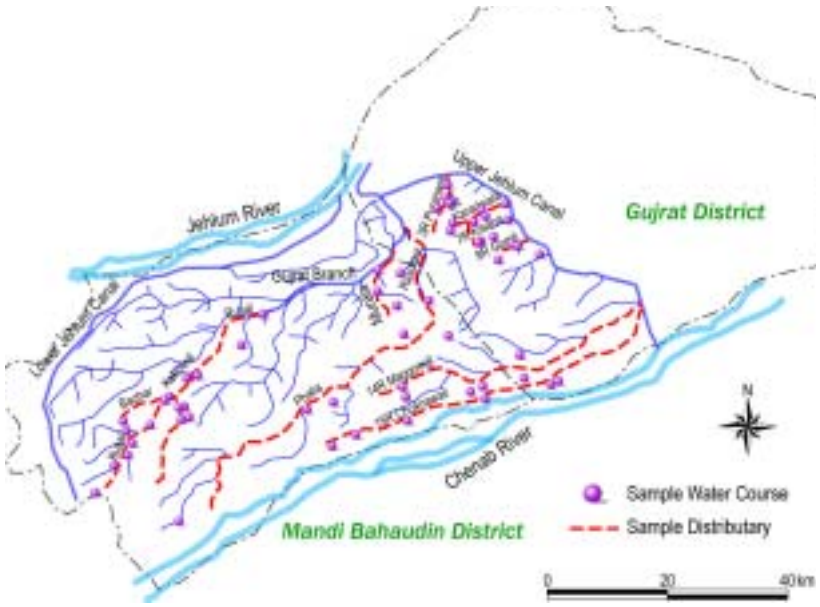


Fig. 3.2.4 Conditions at Selected Water Users Associations (By Basin, by Funding)

Hydrological Location / Funding Source / System/ Distributary	Head				Middle				Tail			
	Total	OECF Improved	Non-OECF Improved	Unimproved	Total	OECF Improved	Non-OECF Improved	Unimproved	Total	OECF Improved	Non-OECF Improved	Unimproved
UJC System	10	5	2	3	10	5	3	2	10	5	3	2
3-R Pauranwala	2	1		1	2	1	1		2	1	1	
6-R Karariwala	2	1		1	2	1	1		2	1	1	
8-R Gumti	2	1		1	2	1		1	2	1		1
14-R Magowal	2	1	1		2	1	1		2	1		1
15-R Chukanwala	2	1	1		2	1		1	2	1	1	
Gujrat System	10	5	4	1	10	5	3	2	10	5	2	3
Murala	2	1		1	2	1	1		2	1	1	
Phalia	2	1	1		2	1	1		2	1		1
Kakowal	2	1	1		2	1		1	2	1		1
Busal	2	1	1		2	1		1	2	1	1	
Bachar	2	1	1		2	1	1		2	1		1
Total	20	10	6	4	20	10	6	4	20	10	5	5

Source: KRI International Corp.

[Procedure 2] Pretest of Survey Forms

Preliminary interviews were held when visiting water users associations in the Upper Jhelum Irrigation System that were in the OFWM Program supported by JBIC. That has enabled the following observations to be made.

1) The associations contributed labor cost (equivalent to 30% of total project cost) at the time of implementation of the OFWM Project.
2) After completion of the OFWM Project there does not appear to have been any material activities by the associations. If need existed, meetings would be held but there were no regularly-scheduled meetings on the order of a general assembly, or a board of directors meeting.
3) Cleaning of watercourses was done two or three times a year, as collective actions.
4) Water use fees were collected by an official of the irrigation department of the local government and in general the collection rate was high (nearly 100%).
5) Less than half of the total irrigated area used surface water from the watercourses, and the remainder used groundwater from private wells. It is believed that compared to prior conditions (when only groundwater was used for irrigation) there has been an economic improvement in that the cost required to ensure a supply of water has been reduced.

Thus, it is a precondition in the case of the OFWM Project that at the stage of improvement or repair of watercourses there was to be participation in the form of the contribution of labor. There were no special efforts by the government or implementing agency to encourage activity after completion, nor can it be said that the water users associations were active as such. From the reliance on private wells for most of the water required, it can be surmised that it would be difficult to quantitatively gauge the extent that surface water obtained through irrigation canals contributed to improvement of farm output or to economic improvement.

The same as in the Philippines, the survey forms were prepared in such a manner that the questions were organized in groups matching the chronological stages of establishment of the association, recent rehabilitation or construction, and current operation and maintenance. Wording was in conformity to the terms used in Pakistan's irrigation sector.

[Procedure 3] Implementation of the Survey of Associations

After completion of the fieldwork, the questionnaire survey was implemented by the local contractor engaged for the purpose, in Mid-March, and by the end of April the results were tabulated and the data for evaluation purposes was prepared.

Fig. 3.2.5 Schedule for Field Study Work in Pakistan

Date			Place (City)	Activity (Place to visit)	Stay
Mar	8	Mon	Tokyo – (Beijing) – Islamabad	Travel (Tokyo 13:55 → Islamabad 21:50, PK853)	Islamabad
	9	Tue	Islamabad – Lahore	AM: Meeting with JBIC Islamabad Office PM: Travel to for Lahore (Islamabad 15:10 → Lahore 16:00, PK387)	Lahore
	10	Wed	Lahore	AM: Meeting with the IWMI Survey Team PM: Meeting with the OFWMP, Punjab	Lahore
	11	Thu	Mandi Bahauddin District	AM: Meeting with the OFWMP District Office in Mandi Bahauddin PM: Site inspection on the Upper Jhelum Irrigation System	M. Bahauddin
	12	Fri	Sub-Project Sites in Mandi Bahauddin District	AM: Meeting and site inspection on the WUA and the W/C Improved under OFWMP (PK-P32) PM: Meeting with the OFWMP District Office in Mandi Bahauddin	Lahore
	13	Sat	Lahore	Meeting with IWMI for finalizing the questionnaires	Lahore
	14	Sun	Lahore	Data compilation	Lahore
	15	Mon	Lahore	Meeting with IWMI for finalizing the questionnaires	Lahore
	16	Tue	Lahore	-- ditto --	Lahore
	17	Wed	Lahore	-- ditto --	Lahore
	18	Thu	Lahore -- Islamabad Islamabad – (Beijing) – Tokyo	Inland transportation for Islamabad Travel (Islamabad 22:55 → Tokyo 12:50, PK852)	In flight
	19	Fri			--

3.2.3 Results of Evaluation Analysis

1) Possibility of Collective Actions on the Basis of Informal Cooperation Among Farmers

As had been expected from the results of the pretest, there is a well-established practice of water users associations' bearing part (a third) of project costs when turnout work is done in irrigation projects in Pakistan, but there is little by way of the participatory approach wherein there is training that contributes to the improvement of knowledge and techniques.[18] Further, as of the time after completion of improvement and repair of watercourses, the water users association as a formal organization lacked substance and undertook no activities and there were almost no activities by the association that went beyond the established one of the community (e.g., a general assembly or a board of directors meeting). It deserves our attention, nonetheless, that the level of joint

[18] According to the follow-up evaluation of the "On-Farm Water Management Project" in 2001, there were no instances of the holding of training programs so that officials and members of the water users association could be ensured of having the techniques for suitable operation and maintenance of the turnouts, but in reality about farmers in the ratio of about six out of 100 had received training. Further, the survey of beneficiaries conducted at the time of the present evaluation disclosed that with regard to the question on the demonstration plot, out of 100 responses, 47 had visited the plot, and 23 of the 53 who did not visit it were not aware that it existed, so that it was judged that the impact the plot would have had been over-anticipated.
It is thought that it would be effective to conduct a survey of farmers according to the concept of social capital as mentioned in Chapter 2, section 2.1 ("Framework for Evaluation").

activities at the present time is in overall terms high (it is high regarding the water distribution schedule, and the degree of participation in watercourse operation and maintenance is relatively high.

In comparison to the quantitative results obtained in the Philippines, a full quantitative evaluation could not be done in Pakistan, because of the situation wherein the water users associations were not being sustained as formal, active organizations, and because of the relative absence of a participatory approach utilizing training. The consequences of undertaking analysis and evaluation using the data collected by means of the questionnaire survey were that it was found that while the approach was the same as used in the Philippines, it was difficult to obtain an understanding of how government or an implementing agency actually facilitated or motivated farmers to join in the participatory approach. This made it incumbent to extract for analysis only the two collective actions (CA)_related* factors of participatory approaches (PA) by the officials dispatched by the government at the stage of association strengthening, and of the external factor of the scale of the association.

* *In Pakistan, only the extent of participation in maintenance activities was taken as an indicator of CA. (Data for the extent that meetings were held were uniform, and there was virtually no disparity among associations with regard to the observance of the water distribution or crop schedule.)*

It is judged that there are no association members in a formal sense, as in the case of Pakistan the water users associations do not function as such. Because of that it was not possible to undertake analysis of participatory approaches, beneficiary activities, and collective actions at the stage of establishment of the associations. There was no awareness on the part of the associations (or their members) of training or institution-building in a participatory approach at the time of either strengthening of the association or of operation and maintenance of the irrigation system. Consequently it was not possible to undertake analysis of the relationship between participatory approaches, beneficiary activities, and collective actions as related to training and institution building. Moreover, none of the target associations possessed a written facilities management plan, crop calendar or water distribution schedule, nor were meetings held to review one year's experience and plan for the next. At the time a crop is to be planted, a schedule for the distribution of water and related adjustments would be made, but as an extension of ongoing community activities. In any event, it can be asserted that collective actions are undertaken on an informal basis. It did not prove possible to undertake quantitative analysis of informal activities on the occasion of the following survey, of the implementing agencies in question and (several) leaders of water users associations.

2) External Factors Influencing Collective Actions

Under the conditions wherein as judgment has it there were not full efforts at facilitating efforts within a participatory approach, the influence of external factors is considered to be one reason or background element of the autonomous performance of

joint activities on behalf of ensuring a supply of irrigation water. If we take this up while keeping in mind the results of analysis and evaluation of water users associations in the Philippines, it appears that the small number of members in a given association is a strong external factor. A significant, negative correlation is evident for the relationship between the level of collective actions (CA divergence) and the number of association members, and it is presumed that a small number of members in an association works as an influential factor. Specifically, when "CA divergence" & "Number of farmers per watercourse," and "CA divergence" & "Irrigated area per watercourse" were compared to determine the correlation, the former showed a negative correlation at the level of 5%, but there was no correlation in the case of the latter (see table).

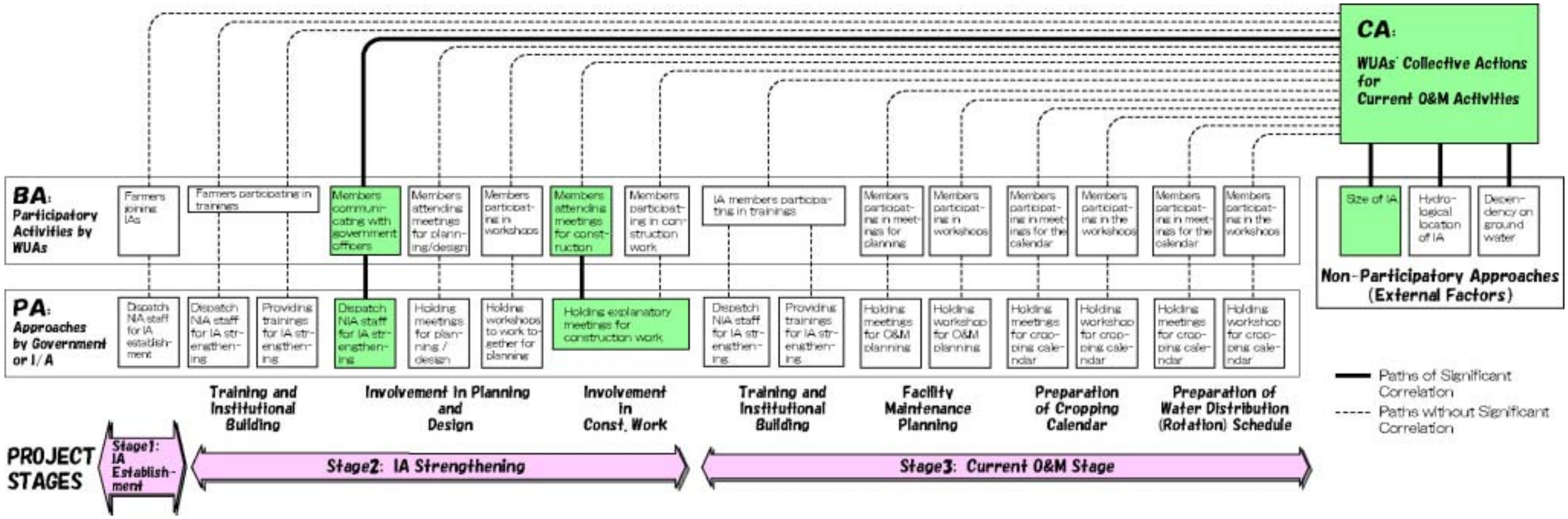
Fig. 3.2.6 Correlation Between CA Divergence Values and Scale Indicators

Combination	Coefficient of correlation	Significance probability	Sample size
"CA divergence" & "Number of farmers per watercourse"	-0.312	0.029	n=49
"CA divergence" & "Irrigated area per watercourse"	0.108	0.460	n=49

Further, concerning "CA divergence" & "Number of farmers per watercourse," if the CA scores are divided into two groups, an α group having average scores of 50 or higher, and a β group having less than the average, the existence of a difference is confirmed at the 5% significance level for the average number of farmers in group α, 42, and the average number in group β, 58. From these results, it may be considered that there is an intimate relationship between the CA divergence that is an indicator of the level of collective actions, and both the number of farmers and the above-mentioned informal cooperative arrangement that exists between the farmers. It is thought, in addition, that influence is exerted by the survival of the large land-holder system (with some of the association leaders being owners of large areas of land), and by the fact that both rice and cotton are cash crops grown for self-consumption as well as for export (arable land per household is 3-4 hectares, triple that of the Philippines farmers), which are two aspects of the social background in Pakistan.

Thus, joint activities for management of water in Pakistan may be thought of as dependent on informal cooperation of among farmers, and in order to explain this it would be useful to undertake a study based on the concept of social capital as briefly mentioned above. If, by such means, the cooperative relationships between individual farmers, and the strength of their trust in each other, among other values and norms, could be quantitatively measured, comparison of the results of such a study with the level of cooperative activities would enable analysis of the influence of this informal factor in the participatory approaches.

Fig. 3.2.7 Flow Diagram Participatory Approaches (PA), Beneficiaries Activities (BA), and Collective Actions (CA) in Pakistan



※ Re the results of correlation analysis of each process, see Fig. 3.2.8 and Annex 3

Fig. 3.2.8 Summary of Analysis of PA-BA and BA-CA in Pakistan

Project Stage		PA		BA		PA-BA Analysis				BA-CA Analysis			
		Indicator	Unit	Indicator	Unit	Coeff. of correl.	Sam-ple (n)	Significance [p value]	Sym-bol	Coeff. of correl.	Sam-ple (n)	Significance [p value]	Sym-bol
1. Establishment of Association		Man-days spent by dispatched officials in relation to establishment	man-days/ acre	*Association membership rate*	%	Not Applicable				Not Applicable			
2. Strengthening	a. Training	Man-days spent by dispatched officials for strengthening	man-days/ acre	*Cumulative no. of times of participation in training programs (man-times)*	man-times/ acre	Not Applicable				Not Applicable			
		Cumulative no. of training programs	times /acre			Not Applicable				Not Applicable			
	b. Planning and Designing	Total no. of times of contacts with officials	times /acre	Total no. of times of contacts with officials × participation rate	times・%	0.446	(46)	[0.0019]****	OK	0.401	(45)	[0.0063]****	OK
		Total no. of meetings	times /acre	No. of meetings × participation rate	times・%	0.646	(6)	[0.1659]	OK	0.061	(6)	[0.9089]	OK
		Total no. of contacts + meetings	times /acre	Total of above	times・%	0.142	(6)	[0.7885]	OK	0.010	(6)	[0.9856]	OK
	c. Con-struction	No. of meetings for explanation re construction	times /acre	No. of meetings for explanation re construction × participation rate	times・%	0.738	(38)	[0.0000]****	OK	0.019	(37)	[0.9100]	OK
				No. of persons joining in construction work × no. of days (watercourse)	man-days/ acre	0.194	(38)	[0.2421]	OK	0.101	(48)	[0.4965]	OK
3. Operation & Maintenance	a. Training	Man-days spent by dispatched officials in strengthening (2003)	man-days/ acre	*Cumulative no. of times of participation in training meetings (man-days)*	man-times/ acre	Not Applicable				Not Applicable			
		Cumulative no. of training meetings (2003)	times/ acre			Not Applicable				Not Applicable			
	b. Facilities Maintenance Plan	Not Applicable		Not Applicable		Not Applicable				Not Applicable			
	c. Crop. Calendar	Not Applicable		Not Applicable		Not Applicable				Not Applicable			
	d. Water Distribution Plan	Not Applicable		Not Applicable		Not Applicable				Not Applicable			

CHAPTER 4 LESSONS LEARNED AND RECOMMENDATIONS

Under the present an empirical analysis was made of irrigation conditions in the Philippines and Pakistan, using as the definition of the participatory approach "To involve the direct beneficiaries of a project in various stages of the project—i.e., planning, design, implementation, and subsequent operation and management—to enhance the project's effects and impacts." This chapter summarizes the lessons learned through doing the study, and recommendations made possible by it, and, further, offers suggestions for those undertaking similar studies in the future as well as mentioning points requiring attention at such times.

4.1 Lessons Learned and Recommendations

(1) Lessons Learned and Recommendations from Analysis of the Nature and Effects of the Participatory Approach (The Philippines)

The quantitative analysis undertaken in this study enabled the conclusion that the participatory approaches (PA) to encourage participation in research and construction, within the stages of strengthening the association as well as operation and maintenance (O&M), increased the level of collective actions within the O&M stage, through beneficiaries activities (BA) on the part of members of irrigators associations. At the stage of establishing an irrigators association, however, a correlation could not be found between participatory approaches and beneficiary activities. The judgments about this (PA at the stage of establishment of the association) that were made as a result of the workshops with the implementing agencies and irrigators associations were that i) at about 8-12 months prior to the start of operation of the irrigation system, participatory approaches were effective, and ii) in cases when the association was formed at a relatively early time (more than a year in advance of the start of operations) it is essential to make the benefits that will accrue from the project easy for association members to grasp. The workshop experience also enabled the conclusion that the participatory approach (participation in construction) contributed to early resolution of difficulties in acquisition of land.

Regarding meetings during the operation and maintenance phase (meetings concerning operation and maintenance planning, crop calendar, and water distribution schedule) a correlation was found between participatory approaches and collective actions (PA and CA), but not between beneficiary activities and collective actions (BA and CA). Also, it was found through the workshops that there were some association members who attended meetings but did not join in collective actions. There is a need for measures (such as refinements to PA) that would link attendance at meetings with greater participation in joint activities.

It was judged, in relation to factors external to the participatory approach, that need exists to study the appropriate scale of an irrigators association from both the viewpoint of water management (small-scale associations are desirable) and that of financial aspects (the larger association is desirable). Further, it is desirable to study support for associations of irrigators (i.e., implement participatory approaches that match their needs) for associations near urban areas, meaning associations where joint activities are difficult to stimulate (because of low dependency on rice income). (For example, in order for such farmers to grow and sell cash crops, more than NIA involvement is desirable; support from agricultural authorities is required.)

(2) Lessons Learned and Recommendations from Analysis of the Costs and Benefits of the Implementing Agencies and the Irrigators Associations in Connection with the Participatory Approach (The Philippines)

Regarding irrigators associations, the greater the expenditure by farmers on beneficiary activities (BA), the greater the effect (improved productivity during the dry season). Thus, it was judged that while participation by farmers in a project is important for their being able to realize future benefits. Nevertheless the productivity improvement effect gradually diminishes.

Regarding the implementing agencies, it could not be confirmed that there was a link between participatory approaches (PA) and a reduction in subsequent costs of operation and maintenance of irrigations systems, although to some extent this may have been due to data limitations. As to irrigation service fee, however, it was confirmed that fee collection was improved as a consequence of the participatory approach and that associations that had signed a joint system management (JSM) contract had greater ability to pay fees. The collection of irrigation service fees was increased by the rise in agricultural productivity engendered by use of the participatory approach and the accompanying improvement in farmers' ability to pay the fees, as well as the incentive provided through institutional ways in terms of the use of a contract for management of the irrigation system.

(3) Other Matters (Pakistan)

At the stage of reinforcing the association, participatory approaches (PA) and as an external factor the scale of the water users association, were found to have a relationship to collective actions (CA). Also, (despite PA being weaker than in the Philippines) it is thought that the social background promoted joint activities through the informal cooperative relations existing within it.

4.2 Suggestions and Possible Improvements for Similar Studies

(1) Evaluation Using the Concept of Social Capital

Although the occurrences were limited, in the Philippines there were occasions when the certain loss of farmland resulting from construction of a farm ditch encouraged the farmer in question to oppose construction, with the result that it could not be built, and the irrigation skipped over some land. Such an occurrence of opposition of interests among farmers leads us to give attention to the outlook for subsequent hampering of joint actions in connection with operation and maintenance, and encourages the giving of attention to matters internal to the association, such as the degree of mutual trust among members of an association, and association governance.

In Pakistan, on the other hand, despite use of the same approach as used in the Philippines, in practice it proved difficult to obtain an understanding of the activities by the government and implementing agencies. Nevertheless it is a fact that the level of collective actions for the operation and maintenance of irrigation facilities is relatively high, indicating that it is highly probable that the informal cooperative relationships among the beneficiaries are supporting that level. In contrast to this, NIA authorities in the Philippines are of the opinion that "the absence of informal cooperation among farmers is a serious problem in the irrigation sector of the Philippines (is a factor injurious to the effectiveness of a participatory approach).[19] The importance of informal cooperative activities has not as yet been fully studied and the matter remains in the realm of the possible, but is extremely interesting just the same.

Through the analysis and evaluation work done in the two countries, the understanding that was thus obtained was that inherent organizational capabilities of farmer groups and irrigators/water users associations do constitute an influence on joint activities. On this basis, when in the future similar studies are undertaken, it is thought that it would be effective to adopt a broader definition of participatory approach, such as undertaking a project on a manifold basis by "first, having secured a true and proper understanding of the beneficiaries' a priori relationships of mutual cooperation and of mutual trust, i.e., their social capital, and second, going through a series of processes involving the beneficiaries of the project in the phases of project planning, implementation, and operation, with the objective of augmenting the effects and impacts of the project in question."

(2) Technical Issues in Quantitative Analysis (Primarily from Results Gained in the Philippines)

While the quantitative analysis performed for the present study yielded results conforming to qualitative observations made in the past with regard to the participative approach, part of the study led to analytic results wherein efforts such as at the stage of establishment of an association appear to have failed to bring about

[19] This was the comment by Mr. Domingo of the NIA after a workshop.

results. It is thought that this is a reflection of background factors such as matters of the precision of the data, and nature of the analytic methods used, so that in the future on the occasion of implementation of a similar study, suitable attention should be given to these matters. Below are some points deserving attention.

- It turned out that it was difficult to accurately grasp the absolute quantities of participatory approaches and beneficiaries activities (numbers of persons, amounts of time) through interviews with association leaders and members. There was the expectation that if questions were made more detailed that this would increase the error of replies, so when values obtained through interviews were converted to logarithm values, a scale was used (indicating different orders of magnitude in general terms). In the future, when inquiring about numerical values from past experience, it is thought appropriate to use a scalar method from the time that the questionnaire sheet is composed. Further, when the participatory approach is newly introduced to a project, there should be painstaking recording of data on activities obtained from the initial stage of establishment of an association onward, and from both the implementing agency and the irrigators association, so that at a suitable point after completion analysis such as undertaken in the present study can be performed.
- For the present study, numerical data at the association level for irrigation water quantities was not available, and it was not possible to fully perceive the quantities of water that could be supplied up-, mid- or downstream in the irrigation systems. In connection with this, it is necessary to devise new units of measure for water supply potential, the length of canals from the source to the point of end use, and so forth.[20] Also, it would seem that the attitude of each system's NIA office towards the participatory approach is a subject requiring examination as an additional issue in view of its influence on collective actions, although this was not a direct objective of the present study.

[20] In the study, on an experimental basis, the [(distance in kilometers from the source) divided by (square kilometers of irrigated area)] was calculated, but because it did not take into account geomorphological aspects of the irrigation region (small areas, or narrow areas, large circular areas, etc.) it was not of use for determining the influence of locational factors of the irrigators associations.

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