Part 1: Master Plan Study

CHAPTER 4 MASTER PLAN

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4.1 Development Direction

4.1.1 Basic Concept of Agricultural Development Plan

(1) Basic Development Concept

Under the "Vision on Agricultural-Forestry Development until year 2020" prepared by the Government, three agricultural development programs were given emphasis and these include (i) food security and self-sufficiency in food (rice), (ii) promotion of export oriented crops and livestock, and (iii) farming stabilization and reduction of slash-and-burn cultivation. In the Study area, the basic concept of the agricultural development plan has been formulated based on the assessment of its development potential from the view point of (i) improving and promoting the existing agricultural activities, and (ii) developing and expanding integrated farming systems including cash crop production. It is therefore essential to promote the increase in agricultural products, particularly paddy in order to stabilize and sustain each farmer's living conditions.

The ultimate objective of the integrated agricultural and rural development is to achieve a substantial and sustainable improvement of the living conditions of people in the Study area. The strategy adopted aims to increase farm output through the development and improvement of irrigation, drainage and rural infrastructure together with the provision of appropriate support services.

The following are the essential elements of the basic agricultural development plan.

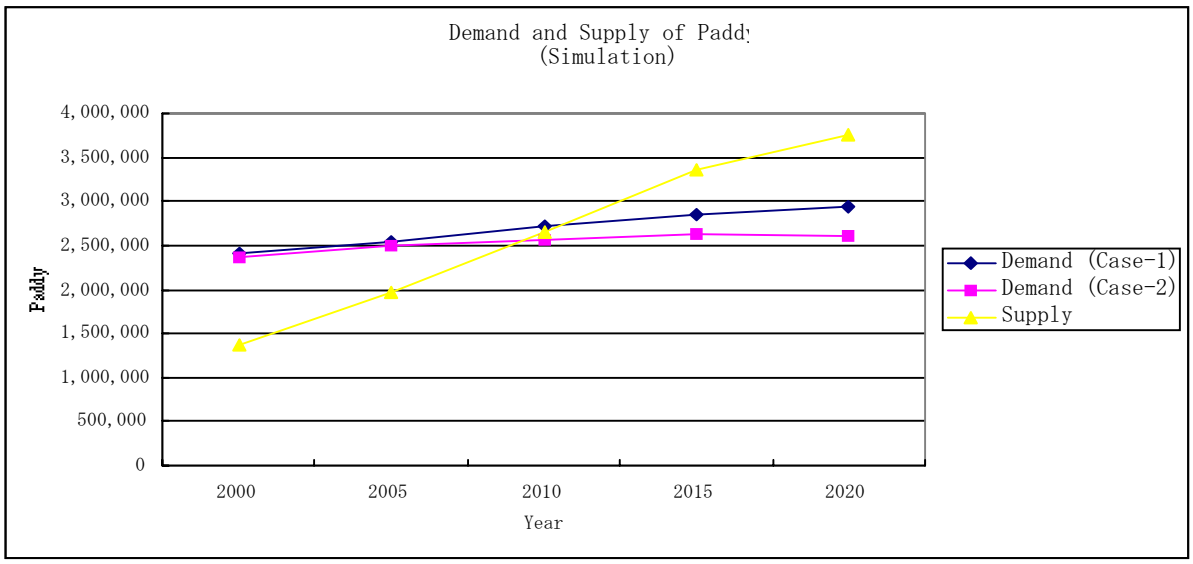
(2) Development Strategy

(a) To stabilize and increase paddy production (Initial and short term priority target)

A projection of the demand and supply of the rice was done based on the target outlined in the Vision 2020. The following assumptions are applied in the estimation of the supply and demand of paddy.

Paddy cultivated area: Year 2000, wet season: 450,000ha, dry season: 55,000ha
Year 2020, wet season: 450,000ha, dry season: 55,000ha
Unit yields: Wet season: 2.9ton/ha, Dry season: 3.9ton/ha
Population (year 2020): Case 1: 8,700,000, Case 2: 7,700,000
Consumption (per head per year): Year 2000: 350kg, Year 2005: 325kg, Year 2010: 300kg, Year 2015: 275kg, Year 2020: 250kg
Store provisions: 30% of total products
Seed requirement: 60kg/ha/season
Emergency stock: 30% of seed requirements

After the supply-demand estimation on the basis of above conditions, it could be inferred that self-sufficiency can be achieved by 2010, as shown in the chart below. Based on the same results, it can be assumed that 2010 is the critical turning point, therefore the stabilization and increase of paddy production is the most important target for the first ten years of the agricultural development plan.



The strategy for agricultural development in the next decade will mainly focus on promoting the adoption of appropriate techniques for paddy cultivation, especially on stabilizing and increasing the paddy production during the dry season. And almost simultaneously, the introduction of HYV (High Yielding Varieties) and appropriate techniques to improve the wet season paddy production will be promoted. Furthermore, the effective use of the irrigation facilities, the augmentation of base flow during the drought period and the establishment of the double cropping of paddy after flood the planting will also be given emphasis. Thus, an increase in paddy production could be ensured to promote the economic independence of farmers.

The initial targets for the agricultural development project are as follows,

-to stabilize the dry season paddy production in the early stage (short-term important component)

-to establish double paddy cropping system and stabilize the paddy production by 2010 (short-term important component)

-to increase unit yield after 2010 (medium- and long- term target)

Crop diversification and integrated farming are considered as the next essential steps towards stabilization and improvement of the farmers' living condition and accumulation of capital. The introduction of cash crops and integrated farming (fish culture) seeks to increase the farmers' income and the improvement of their economic status, in general. However, the introduction of cash crops and integrated farming (fish culture) will be implemented only on small-scale or to a number of limited farmers who are eager to produce fish even in the early stage. The crop diversification and integrated farming system will be expanded to other areas using the experience and knowledge from the advanced

farmers in the Study area. In addition, the introduction of cash crops and integrated farming could also help in the dispersion of risks commonly assisted with mono-crop system.

(b) The crop diversification and integrated farming（medium- and long- term target）

The next stage of agricultural development will be the expansion of area devoted to crop diversification and integrated farming. As such, the first ten years will emphasize the development of human resources and the accumulation of the experience and techniques. Starting from 2010, it is expected that there will be more farmers adopting the system and corresponding increases in the volume of agricultural product will be realized.

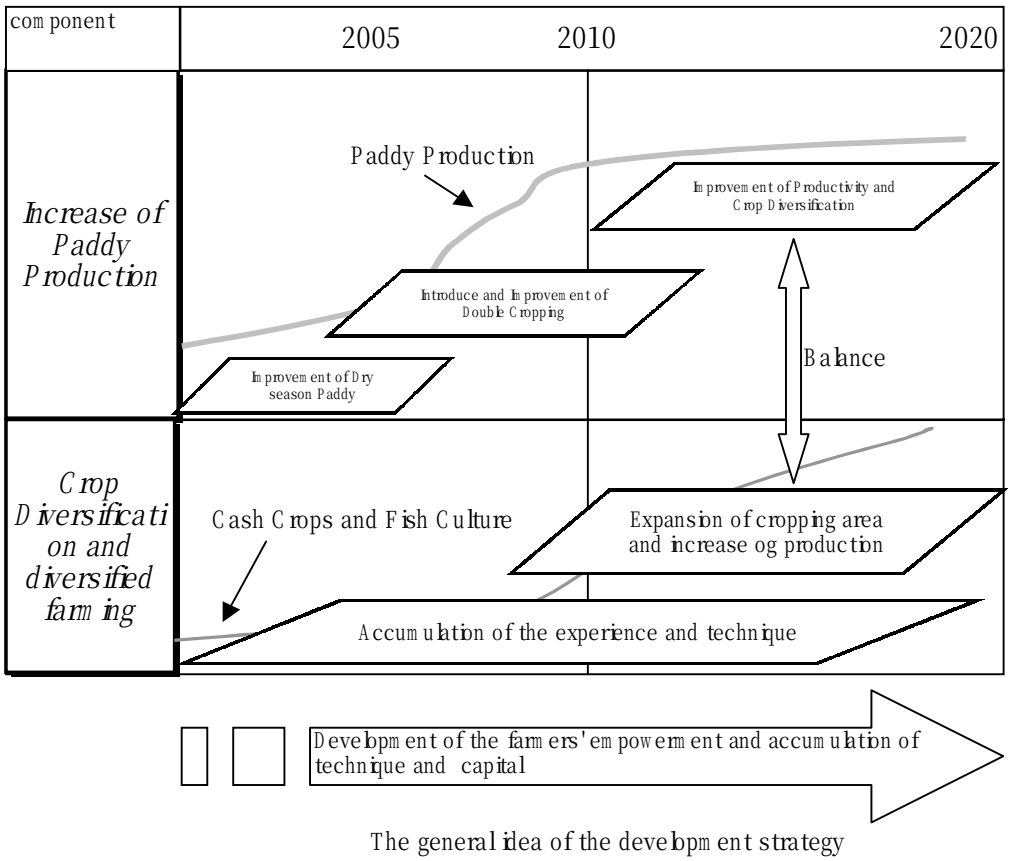
These efforts at increasing and stabilizing rice production will be the foundation for stabilizing and improving the farmers' living condition and promoting accumulation of their own capital (savings promotion) After attaining some progress, the establishment of larger areas for crop diversification and integrated farming will be promoted.

The medium- and long- term targets of the agricultural development plan are as follows,

The introduction of cash crops;

Up to 2010 the targets are as follows:
Accumulation of techniques and experience of farmers and extension workers
Preparation of both the soft and hard ware components for marketing
Selection of potential crops
After 2010, the expansion of area coverage, and the increase in the number farmers producing economically important crops will be undertaken to attain corresponding increases in the production levels.
For fish culture;
The targets up to 2010 are as follows:
Accumulation of techniques and experience of farmers and extension workers
Preparation of both soft and hard-ware components for marketing
After2010, the expansion of culture area and increasing the number of farmers will be pursued to attain the corresponding increase in the production level.

The approach to agricultural development in the Study area involves the development of farm model where the target groups shall be provided with productivity related support services, the development of human resources shall be pursued in line with participatory development, where serious effort will be exerted to improve the farmer's ability to analyze problems and to solve their problems in order for these farmers to participate actively in the project from the planning stage to implementation of the plan. The general structure of project development according to stages of the development and strategy employed may be illustrated in the following diagram.



The general idea of the development strategy

4.1.2 Agricultural Development Plan

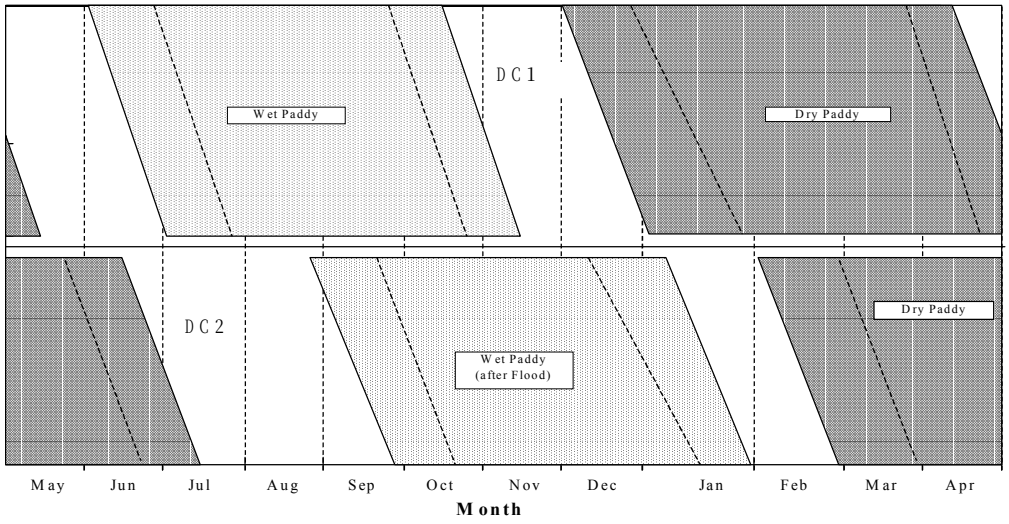
(1) Paddy cropping pattern (component 1)

The plan period will be divided into two (2) stages, namely the short-term. For the short-term target, the goal is to achieve self-sufficiency in the Study area, while for the medium-term, the goal is to achieve a stable self-sufficiency in rice at the national level. Hence, to achieve the stabilization of farmers' income by promoting the adoption of appropriate increasing paddy production during the dry season, should be an urgent task. The introduction of double paddy cropping system in the irrigated areas to realize a stable rice production, shall also be considered and as a second step, improving the unit level of productivity will be targeted.

The proposed double paddy cropping system involves the cultivation of rice twice a year in all areas, whether or not these areas suffer from flooding. In other words, the wet season cropping and the dry season cropping system will be practiced in areas not affected by floods. On the other hand, after flood cropping and the dry season cropping system (double cropping in the dry season) will be promoted in to areas affected by floods. In the after flood cropping system, seedling preparation can be started in the adjacent farmland not affected by the flood so that transplanting can be done right after the flood water subsided. This practice could also disperse the peak periods of demand for labor for the harvesting operation in the first cropping and for the transplanting operation in the second cropping. To deal with the seasonal labor peak periods of paddy farming, it is important to strengthen the existing mutual support among farmers or communities through the improvement of groupings.

The proposed typical cropping patterns depending on flood condition are as follows,

Flood	Cropping Pattern	Wet season	Dry season
Non-flood area	DC1	135 days paddy varieties June – November	135 days paddy varieties December - May
Flood area	DC2	120 – 125 days paddy varieties (after flood) September – January	125 – 135 days paddy varieties February - July



(a) Proposed farming practices

The adoption of appropriate farming practices is essential to successfully implement the agricultural development plan in the study area. With such components as irrigation development and support services, the introduction of HYV paddy, fertilizer and adoption of agro-chemicals application technique (IPM) must take into consideration the influence of such intervention on the environment. The appropriate farming practices to be promoted will basically complement the existing farming practices in the Study area, including farming system, land preparation by agricultural machines and

draft animals, manual transplanting and harvesting. In the Study area, farmers are already practicing the mechanization of farming operations. However, if mechanization is to be prioritized as one of the components and promoted in the short-term period, the farmers will have to bear heavy financial burden. Therefore, mechanization was not included in the plan, but was elaborated based on the current farming practices. The main components of the proposed farming practices therefore are as follows,

- The introduction of paddy HYV and other recommended varieties.

Vision 2020 aims to achieve a 100% spread on the of improved paddy variety（HYV）which now covers only 29% of the whole plains of the Lao PDR. The replacement of paddy seeds will be done every three cropping. The contract farming method with MAF, in which the contact farmers in each village will produce the necessary seeds will be adopted. The recommended varieties of paddy for wet season and dry season, seeding rate, and the planting density in this project are as follows,

Wet season cropping : RD-6, 8, 10, 23, TDK-1, 2, 3, 4, PNG-1, 2, TSN-1, CR203 IR253, IR66（The seed rate: 50～60kg/ha、the plant density: 20cm x 20cm、20cm x 25cm）

Dry season cropping : RD10, 23, TDK-1, 2, 3, PNG-1, TNT-1, TSN-1, CR203 IR253, IR66, SK-12（The seed rate: 70～80kg/ha、the plant density: 15cm x 15cm）

- Fertilizer application

The use of fertilizers is one of the significant factors which greatly influence paddy production. To get stable and high production levels, the proper technique of fertilizer application is essential. However, this is being practiced only by a limited number of farmers in the Study area.

The quantity of fertilizer application for paddy as recommended by MAF is generally 100 : 30 : 20kg/ha respectively, for nitrogen（N）,phosphoric acid（P2O5）and potassium fertilizer（K20）.

In coming up such recommendation, the MAF considered some conditions as the soil fertility and soil texture. In terms of the timing of fertilizer application, MAF encourages several top-dressing, in addition to basal application. Following the rice growing stages, such as tillering stage、panicle initiation stage, spikelet differentiation stage, etc, and the improvement of the utility into consideration, the split application has been promoted. For sandy soils with poor ability for nutrient retention, three or four times application is encouraged. This technique will likewise be recommended as described below.

If the recommended quantity for basal application can not be adopted due to financial constraints or lack of supply, the additional utilization should be done intensively. However, if the soil lacks phosphoric acid, utilization of phosphoric acid with nitrogen should be done.

Three time application: (i) For the initial application, nitrogen(N) : phosphoric acid (P_2O_5) : potassium fertilizer （ K20 ） =20:30:20kg/ha; (ii) 20 ～ 25days after transplanting,

nitrogen(N)=35kg/ha; (iii) 40～50days after transplanting, nitrogen（N）=35kg/ha

Four-times application for sandy soil: (i) For the initial application, nitrogen(N) : phosphoric acid(P_2O_5) : potassium fertilizer(K_20)= 15:30:30kg/ha; (ii)15days after transplanting, nitrogen(N)=25kg/ha; (iii)30days after transplanting, nitrogen(N) =25kg/ha; (iv)45days after transplanting, nitrogen（N）=25kg/ha

- Expected Yield: By adopting the recommended methods, rates and timing of application, expected yield to be achieved was estimated at 4.5-5.0 ton/ha. as shown in the table below.

Summary of each development model is as follows:

Model	Purpose	Applicable area	Main Item	Organization	Necessary Support
1. Stabilization of dry season paddy cultivation	Improvement of dry season paddy production	Irrigation scheme in the study area	Introduction of HYV seeds and applicable farming practice	WUG APG	Sustainable supply of HYV seeds (contract farming by farmers) Timely and appropriate supply of farm inputs Effective extension to target group through participatory approach Access to financing to farmers by APB
2. Introduction of double cropping（wet and dry season paddy）	Improvement of the paddy productivity (Improvement of unit yield)	Irrigated Paddy Fields in the non-flood prone area	**Wet season paddy** Introduction of HYV seeds and applicable farming practice Supplementary irrigation during drought period **Dry season Paddy** Introduction of HYV seeds and applicable farming practice Development of effective water management techniques	WUG APG	Sustainable supply of HYV seeds (contract farming by farmers) Timely and appropriate supply (timing and amount) of farm inputs Effective extension to target group through participatory approach Access to financing to farmers by APB
3. Implementation of double cropping (after flood paddy and dry season paddy)	Improvement of the paddy productivity (Improvement of unit yield and The avoidance of the flood damage)	Irrigated Paddy Fields in the flood prone area	After flood paddy Introduction of HYV seeds and applicable farming practice Establishment of the after flood planting system Introduction of the short term HYV Development of the effective water management technique Enhancement of group farming Dry season Paddy Introduction of HYV seeds and applicable farming practice Development of the effective water management technique	WUG APG	Sustainable supply of HYV seeds (contract farming by farmers) Timely and appropriate supply of farm inputs Effective extension to target group through participatory approach Access to financing to farmers by APB

(2) Cash Crop Production（component2）

In addition to the development of paddy production, the policy of LAO PDR on crop diversification will be taken into consideration by introducing cash crop as one of the important components. This

component is designed to increase the farmers' cash income and this will make the foundation on which the farmers can aggressively participate in the market economy. With the development of agro-processing industry and other investment opportunities observed in and around the Study area, the production of a stable supply of raw materials on contract basis (contract farming) will also be considered.

The potential cash crops were selected based on two major conditions that first, the crop is traditionally cultivated in the Study area and the farmers have enough experience on growing the crop. Furthermore, crops with relatively stable demand and high potential for import substitution and the crop with the potential market were considered and the crops listed below were identified as primary candidate crops. Among the candidate crops, those which need particular techniques handling and transport and those which are easily damaged (perishable) such as vegetables, are to be studied further during the F/S preparation stage.

Groups of primary candidate crops
Pulses : groundnuts, soy beans
Vegetables : tomato, cabbage, shallot, celery, lettuce, kale, cucumber, long beans, chili, eggplant, baby corn
Herbs : mint, coriander
Others : garlic (fresh and dry), potato

The prices and demand for cash crops are generally unstable. Therefore, the conditions of roads and collection and delivery facilities as well as the condition of the market facilities shall be taken into consideration. In the short-term period, the area which is already accessible to the market (consumer places) and has already been established as the production area will be given priority. In the crop diversification plan, the initial ten years will be devoted mainly on the accumulation of experience and knowledge through the introduction of the appropriate techniques for the existing crop and group activity (APG). During this period, the organization of APG, the development of the marketing strategies and the selection of the crops will be done to prepare for the expansion of the cultivation area and the increase in production level for the next ten years. The main targets for the initial ten years of this development project are as follows,

- To develop the knowledge and skills of production farmers through study and training
- To elaborate and promote diversified cropping in consideration of hazards due continuous cropping
- Multi-crops and other mixed cropping system to avoid oversupply.
- The introduction of wet season vegetables cropping when shortage of vegetables occur.
- The development of APG
- The implementation of the effective use of fertilizer by introducing IPM and the prevention of pests and diseases, in consideration of the environment.（The effective use of appropriate chemicals.)
- The evaluation of transformed fields from paddy fields.

Based on the above background, the combined management promotion model as shown below will be proposed.

Model	Purpose	Applicable area	Main Item	Organization	Necessary support
1. Development of cash crop production and introduction of promising crops Initial ten years: Accumulation of techniqye and experience Midium and long term: Increase of production	Improvement of productivity Increase of farmers cash income	Dry season paddy field where the water shortage occur during dry season and The expansion of the paddy field is difficult.	Improvement of productivity of cash crop production Introduction of promising crops and development of marketing Introduction of group farming system	WUG APG	extension of technique stable supply of farm inputs -marketing study and selection of promising crops introduction of new crops
2. Wet season cash crop production Initial ten years: Accumulation of techniqye and experience Midium and long term: Increase of production	Improvement of productivity Increase of farmers cash income Production during the preharvest months Paddy –upland diversion	Rainfed paddy field, un irrigable area, water-leaking paddy field	Development of the Rain shade cultivation, high ridge cultivation for preharvest production	APG	extension of technique stable supply of farm inputs -marketing study and selection of promising crops introduction of new crops

(3) Integrated Farming (component 3)

(a) The promotion of fish culture

In the Study area, there are many reservoirs and community ponds which suggest a great potential for fish culture. On the other hand, the depletion of marine resources due to indiscriminate fishing has become a problem. Given this reality, the effective use of available resources through the development of fish culture should be included in the project as the significant component of the combined management method. This will help in keeping the protein sources and generating cash income for farmers.

With the increasing number of artificial ponds built for fish culture in recent years, more and more people in Savanakhet province and Khammouane province have engaged in fish culture. As a consequence, the shortage of fingerlings is getting more significant as a new problem. To deal with this problem, this project will aim at building a management system in which the fish culture groups (APG) can produce fingerlings on their own without relying heavily on fingerlings produced at the center.

Just like the case for the promotion of cash crop, the initial ten years will be focused on the accumulation of experience and techniques of farmers and extension workers by using the existing facilities (reservoirs and community ponds). And during the next ten years, the expansion of the areas and

increasing the production levels will be pursued. The main targets for the initial ten years of this project are as follows,

- To improve the techniques of the fish culture by training farmers and develop the skills of the inexperienced farmers.
- To improve the techniques of the fish culture and to promote fingerling production.
- To organize and develop fish culture groups (APG) under the leadership of fingerling production farmers.

As to the introduction and promotion of fish culture, the method with lower density of about 1 fish per square meter (extensive fish culture), instead of adopting the culture method with high density, which FAO has also promoted, will be introduced. In addition, the use of net cage is also proposed to increase the survival rate of fingerlings up to 70% at the harvest time from around 30% to 50%. As for feeding, the low- cost culture will be promoted by using the homemade feed made of rice bran or broken rice, the by-products of stock-raising, and the residual of crops. In the early stage of the introduction, omnivorous species of fish as mentioned below, which are relatively easy to raise, will be introduced.

Introduced species：Common Carp、Silver barb (Tawes), Silver Carp

(b) The promotion of livestock hygiene

The major kinds of livestock found in the Study area are water buffalo, cattle, pig, and chicken, most of which are raised in small-integrated farming. The main feed is rice and leftover vegetables for small and medium sized livestock. And for the large livestock, the traditional feeds used include paddy residue, weeds, and the natural grasses.

MAF has emphasized on the promotion of the large-sized livestock in the rural and mountainous areas (up-country) while pig and chicken are promoted in the plains. However, a lot of problems including the prevention of infectious diseases, the lack of facilities for feed production, the need to upgrade existing facilities, and the slow adoption of the improved techniques have remained to be solved. The outlook for the fund is still unclear and therefore, the chances for its implementation are still vague.

The Village Veterinary Workers (VVWs) network, in charge to improve the animal hygiene condition of the livestock in the villages, has already been established and is still developing. As such, expansion of the vaccination services can be considered as the most effective and realistic measure to reduce livestock mortality due to some diseases and will be included in the project. It can be expected that the promotion of such activity can lead to increased protection of livestock as farmers' assets and draft animal.

Vision 2020 has also given the top priority on increasing the rate of vaccinations to ensure the growth of livestock population and on the promotion of the prevention of the diseases to reduce the obstacles for

the export. The main targets of this project are as follows,

- To improve and develop the techniques of Village Veterinary Workers (VVWs).
- To promote VVWs network.
- To increase supply of inputs and materials for the vaccination services of DAFSO

Based on the above conditions, the model shown below is proposed to promote the combined management.

Model	Purpose	Applicable area	Main Item	Organization	Necessary Support
1. Improvement of the fish culture Initial ten years: Accumulation of techniques and experience Medium and long term: Increase of production	Increase of cash income Effective use of resources	Initial ten years Existing reservoirs and artificial ponds Medium and long term Area where water resources are available	Development of fingerlings production farmers Development of fish culture farmers group Development of fish culture using available reservoirs Development of fish ponds Improvement of survival rate of Establishment of ecological fish culture-	APG WUG	Extension of fish culture technique Supply of inputs Expansion of omnibus species of fish Establishment of Loan -Development of fingerlings production farmers Establishment of home-made feed technique
2. Promotion of Livestock hygiene	Avoidance of the risk of the diseases	Farmers who keep livestock	Improvement of vaccination services		Development farmers' interest in vaccination Improvement of extension in the remote area -promotion of and the activities for vaccinations

4.2 Farmers' Organization Strengthening Plan

The general approach is based on the basic principle of farmers participation in rural development specifically in: (i.) irrigation development (survey and design, planning, construction and rehabilitation); (ii.) in operation and maintenance of irrigation system (water management, cost recovery); and (iii) in agriculture production (setting objective of production, production planning, procuring support and credit, implementing, monitoring and evaluating production).

In order to support the participatory approach as described above, a community-focused approach will be also applied. The main points of the community approach are:

- The community manages the irrigation scheme. The focus will be to develop their sense of ownership of irrigation system.

- Irrigation and agriculture development is integrated into the community development scheme and is based on the absorptive capacity of the community.

- The economics of irrigation are not only based on the direct benefit to the users but also on the direct and indirect benefit to the community.

- The holistic approach in irrigated agriculture development is applied in relation to the diversity of the communal resources.

The development strategy for farmers' organization identified in the Master Plan is to organize Water User Organizations, develop water management and cost recovery scheme in the framework of the operation and maintenance of irrigation, and strengthen the capability of these farmers groups. The specific approaches developed for each component and for each term/period are given as follows.

(1) Approach for WUO

The general approach is to develop and strengthen water user organizations for them to assume full operational, financial and legal responsibilities of their irrigation scheme.

Short term (2005): A strengthening process will be elaborated and should start with the establishment and/or strengthening of village driven WUG. The important elements for WUG development are:

- Increasing farmers'awareness in the irrigation scheme;

- Developing a common interest and organizational capacity to work together and share resources. This is very important for multiple driven villages WUG;

- Sustaining the interest and organizational capacity to assume the responsibility of operation and maintenance and then after, the full management of the irrigation system;

- Developing systems and skills for financial control, management of funds and accounting;

- Developing system, skills and commitment to recover actual cost from farmers. In this stage full O&M costs and part of the replacement costs will be required.

- Developing systems, skills and commitment to provide for future costs e.g. repairs and replacement;

- Developing the skills and interest to establish a legal framework, which imposes obligation on its

members, i.e. prepare for the establishment of Water User Association.

- In cases where new construction or infrastructure improvement is needed, mobilizing substantial local resources (money, labor and land) to the construction as the farmers' equity.

- Ensuring appropriate design and civil works during the construction of the scheme with participation of the farmers in all stages of the design and construction;

- Developing or improving agricultural skills and water management capability to make the most efficient use of the irrigation system.

Medium term (2010): In the medium term the focus will be to strengthen the capacity of the WUA and to establish the necessary legal framework to sustain the organization:

- Establishing and/or strengthening of WUA organization according to the directive and process of DOI;

- Developing systems and skills for financial control, management of funds and accounting of WUA;

- Developing system, skills and commitment to recover actual cost from farmers. In this stage full O&M costs and 50% of the depreciation costs will be required.

- Developing systems, skills and commitment to provide for future costs e.g. repairs and replacement. This should be through the development of ISF and VDF systems;

- Developing the skills and interest to establish a legal framework which imposes obligation on water users, i.e. prepare for the establishment of Federation of Water User Association; and

- Developing or improving agricultural skills and water management capability to make the most efficient use of the irrigation system.

Long term (2020): The approach is to develop a communal organization that is coordinating and managing the water and water resource utilization in the water basin and watershed area. The communal organization should group all the WUAs and other stakes holders located in the water resource basin and watershed area.

The WUA organization would retain its legal entity as an association within sub-basin area. Therefore, the strengthening of WUA organization and management will be pursued and further developed. The

components of the approach are:

- Developing systems and skills for financial control, management of funds and accounting of WUA;

- Developing system, skills and commitment to recover actual cost from farmers. In this stage full O&M costs and 100% of the depreciation costs will be required;

- Developing systems, skills and commitment to provide for future costs e.g. repairs and replacement. This should be through the development ISF and VDF systems;

- Studying water resources;

- Developing water resource management concept at basin level;

- Getting consensus among farmers on the utilization of the same water resource, to understand the importance of water and water resource conservation and to establish a water board at river basin and watershed level;

- Establishing and strengthening the Federation of WUA as a communal water board;

- Formulation of water and water resource conservation and management policies within the water basin and watershed area;

- Design of water utilization and conservation plan;

- Supporting the water board to analyze and approve new project for utilizing water and water resource;

- Establishing water right regulations and issue water rights to WUGs and other stakeholders.

(2) Approach for Water Management

The approach is to develop the practice of appropriate water management concept with the farmers and water user organizations in line with the irrigation system improvement and irrigated agriculture development activities.

Short term (2005): During the period the aim is to initiate the farmers in the elaboration of water management concept (WMC) and irrigation system fee (ISF) of their irrigation scheme. The components

of this approach are:

- Developing water management concept for each irrigation system;
- Establishing water blocks;
- Implementing the water management system starting the first cropping season;
- Introducing ISF system;
- Supporting WUG to collect ISF after each cropping season;
- Improve WMC after each cropping season;
- Adjust ISF before each cropping season;
- Introducing APGs' crop plans into WMC;
- Adjusting ISF to each specific crop and agriculture activity (integrated farming, fish culture etc.).

Medium term (2010): During the medium term period the approach will be to introduce on-farm water management practice at block level of the WUGs. The approach is to develop On-farm Water Management Groups (OWGs) with the same group process developed for the Agriculture Production Groups (APGs). The components of this approach are:

- Introducing concept and methods of on-farm water management to the farmers.
- Motivating farmers to group themselves through group dynamics and study of land holdings. This should be through the application of the group development process developed for the APGs;
- Developing on-farm water management concept at block level;
- Developing OWG cost sharing and labor to undertake on-farm structures;
- Developing on-farm ditches and turn out systems;
- Implementing on-farm water management during wet season and dry season production;
- Improving WMC and ISF to benefit on-farm water management practice;
- Collecting ISF on block basis in order to benefit on-farm water management practice.

Long term (2020): During the long-term period the approach will be to strengthen and improve the on-farm water management practice into all the service area of the WUG and then after into the total service area of the WUAs. The components of the approach are:

- Pursuing the development components initiated during the medium term;
- Developing on-farm management system with new WUGs;
- Developing the system in all service areas of the WUGs and of the WUAs;
- Adjusting WMC and ISF collection to improve the irrigation operation system.

(3) Approach for cost recovery

The approach for cost recovery is to change the attitude of the farmers from the practice of subsistence agriculture to agriculture commodity production. Aside from developing a sense of ownership for the irrigation system through the participatory approach, the farmers will have to consider the system as an enterprise. Therefore, they will have to operate the irrigation system more efficiently in order to reduce the operational costs and to partly recover and then, later recover the full capital investment costs.

At a later stage, irrigation economics will have to be introduced to the farmers to enable planning at scheme level and to structure the real financial and economic recovery of the system. The development of irrigated agriculture through the development of APGs will play an important role in improving the revenues generated from the irrigation scheme through the introduction of new farming practices in all service areas of the WUGs and WUAs.

Short term (2005): The approach is to develop the sense of ownership of the farmers through participatory approach and through the irrigation management transfer (IMT) process. In the IMT process the development of ISF is one of the major component. The components of this approach are:

- Getting consensus on the role of the irrigation system in the development of the community. Introducing the concept of village and communal enterprises;
- Implementing the WUGs/WUAs development and water management;
- Implementing irrigation management transfer;
- Developing a repair and replacement plan after each cropping season for implementation before the start of each cropping season;
- Getting consensus on ISF calculation and collection rules;
- Developing ISF to cover cost for power (fuel/electricity, minor repair, pump operator);
- From Second or third cropping season, developing ISF to cover cost for power, minor repair, pump operator, head of blocks, administration costs for WUG;
- Collecting ISF according to above steps and elaborated to WMC for each season;
- Introducing new farming systems;
- Adjusting ISF to each specific crop and agriculture activities (integrated farming, fish culture etc.);
- Adjusting ISF according to on-farm water management plan as specified above.

Medium term (2010): The approach during the medium term is to further develop the concept of irrigation enterprise by improving the ISF to cover part of the capital cost (50% of the depreciation costs) in combination with the collection of Village Development Funds (VDF) initiated by the government. The components of the approach are:

- Getting consensus about the concept of full cost recovery and VDF;
- Calculating VDF-AF for each irrigation scheme and compare it to the real depreciation costs of the irrigation system;

- Adjusting ISF to cover full depreciation costs after deduction of VDF-AF;
- Getting consensus among farmers during WUGs/WUAs general meeting on ISF and VDF-AF to be collected for each cropping season;
- Developing ISF to cover costs for power, minor repair and maintenance, pump operator, head of blocks, administration costs for WUG, WUG committee premium, part of large repairs (30% of depreciation costs) for first cropping;
- Developing ISF to cover full costs of operation and maintenance as specified in third ISF and full major (50% of depreciation costs) after 3rd cropping depending on scheme situation;
- Collecting ISF and VDF-AF after each cropping season;
- Paying operational expenses and depositing ISF balance in APB;
- Paying VDF-AF to district authority;
- Utilizing ISF funds for major replacement /repairs and/or canal rehabilitation;
- Requesting the use of VDF for replacement of parts and/or canal rehabilitation if ISF funds are not enough;
- Requesting long-term loan from APB if ISF and VDF are not enough for major replacement of parts and/or canal rehabilitation.

Long term (2020): The long-term approach is to initiate the concept of economical return on irrigation system. Economical and financial return of irrigation system will be addressed in order to guaranty the full cost recovery of the system. It is anticipated that appropriate farming systems that have been introduced during the medium term phase have increased farm income and irrigation revenue in order to balance with the operational expenditures of the irrigation system. During this term, the full cost recovery of irrigation system will be obtained. The components of this approach are:

- Pursuing the development interventions`` initiated during the medium term phase;
- Developing ISF to cover costs for power, minor repair and maintenance, pump operator, head of blocks, administration costs for WUG, WUG committee premium, part of large repairs (50% of depreciation costs) for first cropping;
- Developing ISF to cover full costs of operation and maintenance as specified in third ISF and full large repairs (100% of depreciation costs) after 3rd cropping depending on scheme situation;
- Calculating irrigation scheme economics analysis based on full cost recovery;
- Conducting financial analysis on irrigation investments with consideration of ISF and VDF;

- Adjusting ISF according to financial analysis (if needed);
- Improving economic performance and financial returns according to evolving economic and financial conditions generated by APGs/ACGs.

(4) Approach for Agriculture Production Groups (APGs) and Agriculture Credit Groups (ACGs)

The approach is to develop agriculture production groups that are able to manage their agriculture production and adapt their production system according to the changing conditions of the market. Considering the uncertainty and the sensitivity of the market for agricultural products, the composition and size of the APGs will vary according to the demands of the commodity market. However, to develop formal APGs will be a difficult task when the market for certain agriculture commodities could not be guaranteed.

The development of the APGs will be done by the elaboration and application of a group development process that is based on the participatory approach and in line with the development of crop plans and irrigation scheme plans supporting the concept of full cost recovery of irrigation system.

At the core of the development of the WUGs, farmers producing the same variety of crops and livestock or practicing similar farming system will be encouraged to group themselves together. In the process of the APGs' development, the farmer members of the APGs will also group themselves into ACGs to be able to make a request for seasonal credit for input supplies with APB. By doing this, the production function of the ACGs will be improved.

Short term (2005): The short-term approach is to develop a group process for the ACGs that conforms with the current situation in Lao PDR and in the Study area. The APG group process will be field tested and improved during that period. The components of the approach area:

- Motivating farmers to group themselves through group dynamics;
- Organizing APGs for specific agriculture development activities (double cropping, integrated farming, rice seed production, fish culture, direct sowing etc);
- Elaborating the APGs development process for one production season (dry and wet);
- Elaborating crop and activity plan for the APGs;
- Integrating APGs crop plan and activity plan to WUG/WUA's WMC and ISP;
- Implementing crop plan and activity plan during dry and wet season;
- Supporting APGs to secure shares and credit for production by grouping themselves into ACGs;
- Developing the capabilities of APGs to store farm products at the village level and sell the

products at reasonable prices;

- Developing the capabilities of APGs to evaluate the performance of production and sale and seek for market information for the succeeding seasons;
- Encouraging more farmers to join the groups for the next season;
- Developing crop and activity plans for next season;
- Developing capabilities of APGs to implement the production plans and group process for the succeeding seasons and adapt their production to changing market conditions;
- Developing technical/production knowledge and skills;
- Developing input/credit knowledge;
- Developing water management knowledge and skills;
- Developing environmental awareness and IPM techniques and knowledge.

Medium term (2010): The medium-term approach is to strengthen the APGs group development activities. In relation with the development of WUAs, the APGs that are producing the same commodity in the different WUG under the jurisdiction of WUA will exchange technical skill and knowledge, and will further group themselves into a larger selling group. The selling group will be able to negotiate with potential buyers (middleman, State Foodstuff Companies, agriculture industries etc.). The components of the approach are:

- Pursuing the development components initiated during the short term phase;
- Establishing APGs exchange groups within the WUA;
- Coordinating with marketing outlet;
- Developing skills and knowledge in marketing.

Long term (2020): The long-term approach is to further develop the legal framework of the APGs. It is foreseen that when the APGs have evolved to a certain level where they have enough skills and knowledge to develop their agriculture production according to the demand of the market, the development of the legal framework of APGs will be one important component. Depending on the social and economic conditions, the APGs will evolve to as formal institutions such as agriculture cooperatives or enterprises.

It is not possible to predict the structure of the future organization but there are 3 alternatives worth initiating:

(i) The APG is developed as an enterprise arm (or cooperative) of the FWUA: This organizational structure is found in many countries. The FWA is the main organization body that has a holding

function. While the WUA and agriculture cooperatives have the enterprise function.

(ii) The APG is transformed into a cooperative that has the FWUA under its organization: This is the case when cooperatives are established based on administrative boundaries such as district cooperatives or zone cooperatives. This could also happen when the irrigation area is very limited as compared with rainfed crop area which is dominated by industrial crops. The cooperative in the latter area is organized to support contract farming with large business firms.

(iii) The APG is developed in to an independent cooperative, outside the organization of FWUA: This is the model adopted in many countries. And it is seen as the most appropriate model in the Study area, if we consider the capability of the farmer community. A small size organization is definitely more efficient.

The components of the approach are:

- Pursuing the development components initiated during the medium term phase;
- Getting consensus with APGs exchange groups to form a cooperative;
- Registering APGs exchange groups into cooperative under the existing laws and regulations of Lao PDR;
- Supporting cooperative development activities;
- Developing skills and knowledge in leadership and management;
- Developing systems and skills for financial control, management of funds and accounting of cooperative or agriculture enterprises;
- Strengthening the cooperatives to gain control in the pricing of agriculture commodities and establish their market channels;
- Developing the capability of cooperatives to evolve new products or change their products in relation to changing economic and social conditions.

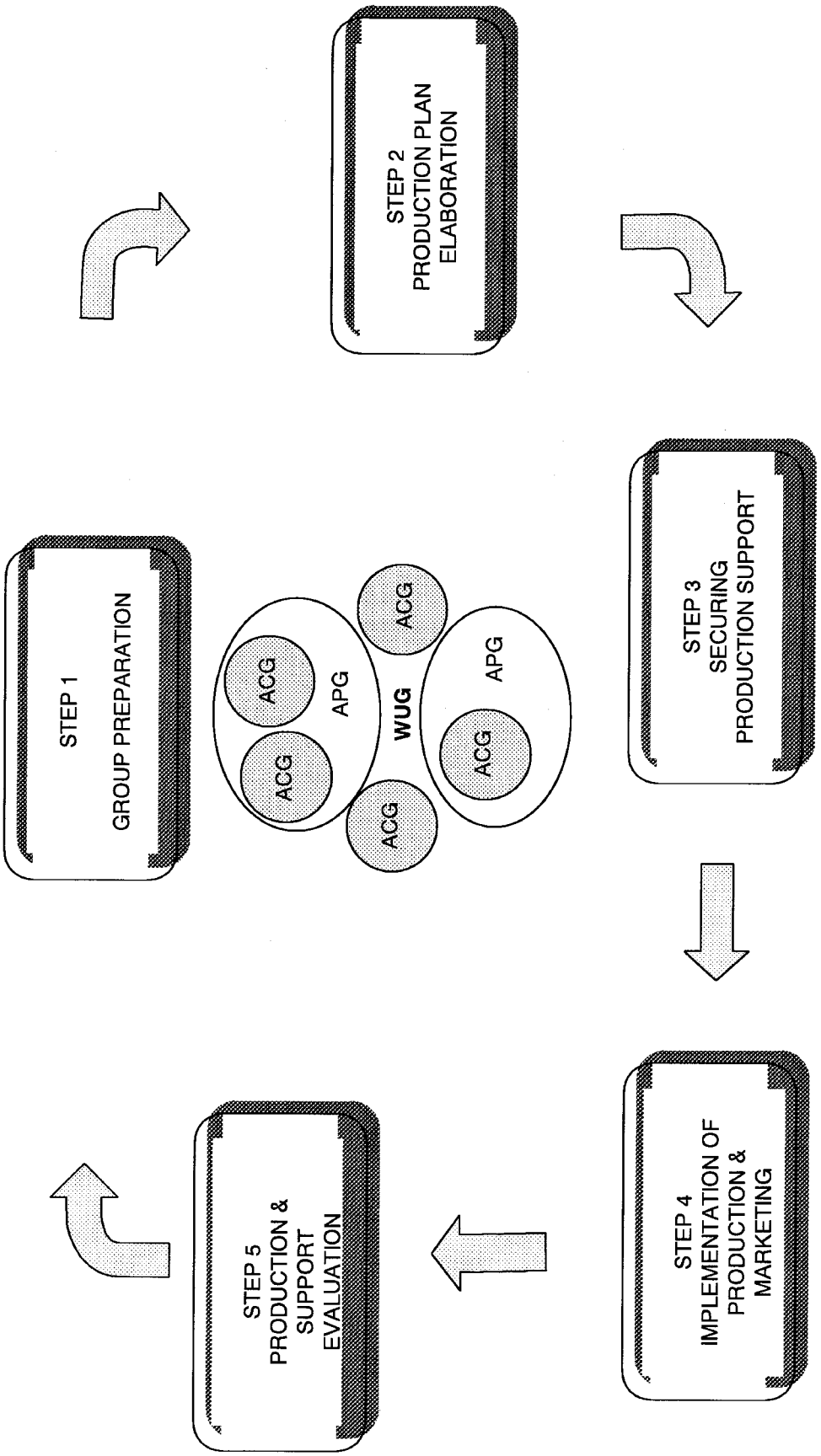
(5) Inter-relationship between the different farmers' organizations

The relationship between the water user groups, production groups and credit groups and their evolution towards the master plan development is shown in Figure 4-1.

(6) The farmer group development process

The farmer group development process is basically a management tool for government agencies and farmers' organizations to better coordinate their resources and to jointly plan for agriculture production. By implementing the process, the government agencies will be able to elaborate appropriate support

Figure 4-1 Farmer Group Development Process



plans that would meet the demands of the farmer community. On the other hand, the farmers will be organized to plan and implement production systems with the required support from the agencies. The main farmers organizations involved in this process are; the WUO (WUG or WUA), the APGs and ACGs. The APGs and ACGs will be organized in the frame of the group process. In order to get better coordination between the sectors in extension activity, a task force representing the agencies concerned should be established at provincial and district level to support the implementation of master plan. At provincial level the task force should comprise staff of PAFSO (PIS, PEA, PLF) and APB-SU, and at district level of DAFSO and APB-SSU.

The underlying principle in the process is based on the participatory approach where the farmers are involved in all steps and all extension activities of government agencies. The bottom-up approach farm planning is developed through a series of meetings and PCM workshops with the farmers' organizations. The group process consists of 5 steps as follows.

Step 1: Group preparation: consists of activities for community assessment, selection and analysis of target groups, and of the different activities that will lead to the formation of APGs in the structure of the WUG/WUA.

Step 2: Establishment of production plans and irrigation development plan: consists of activities) that cover the production, irrigation, inputs/credit and marketing components, e.g. elaboration of individual crop plans, APGs production plans, Irrigation Scheme Plan (ISP)

Step 3: Securing production support: consists of activities to prepare for agricultural production and to secure inputs and credit required. In this step, the agriculture credit groups are formed in order to avail of seasonal loans from APB.

Step 4: Implementation of production and marketing: consists of activities to implement production and marketing, and other activities to support production and marketing.

Step 5: Evaluation: consists of activities to evaluate the production level and the performance of the farmers' organization as well as the government agencies under the task force in support of the production. The last step of the evaluation process is to redefine the objective of production and to plan improvements for the next season.

In the overall farmers' organizational development, the development of the group process to cover both wet and dry season should be included in the medium term in order to support the calculation of irrigation economics. The details of the above group process are described in Figure 4-2.

Figure 4-2 Farmer Group Devevolpment Process Step 1: Group Preparation

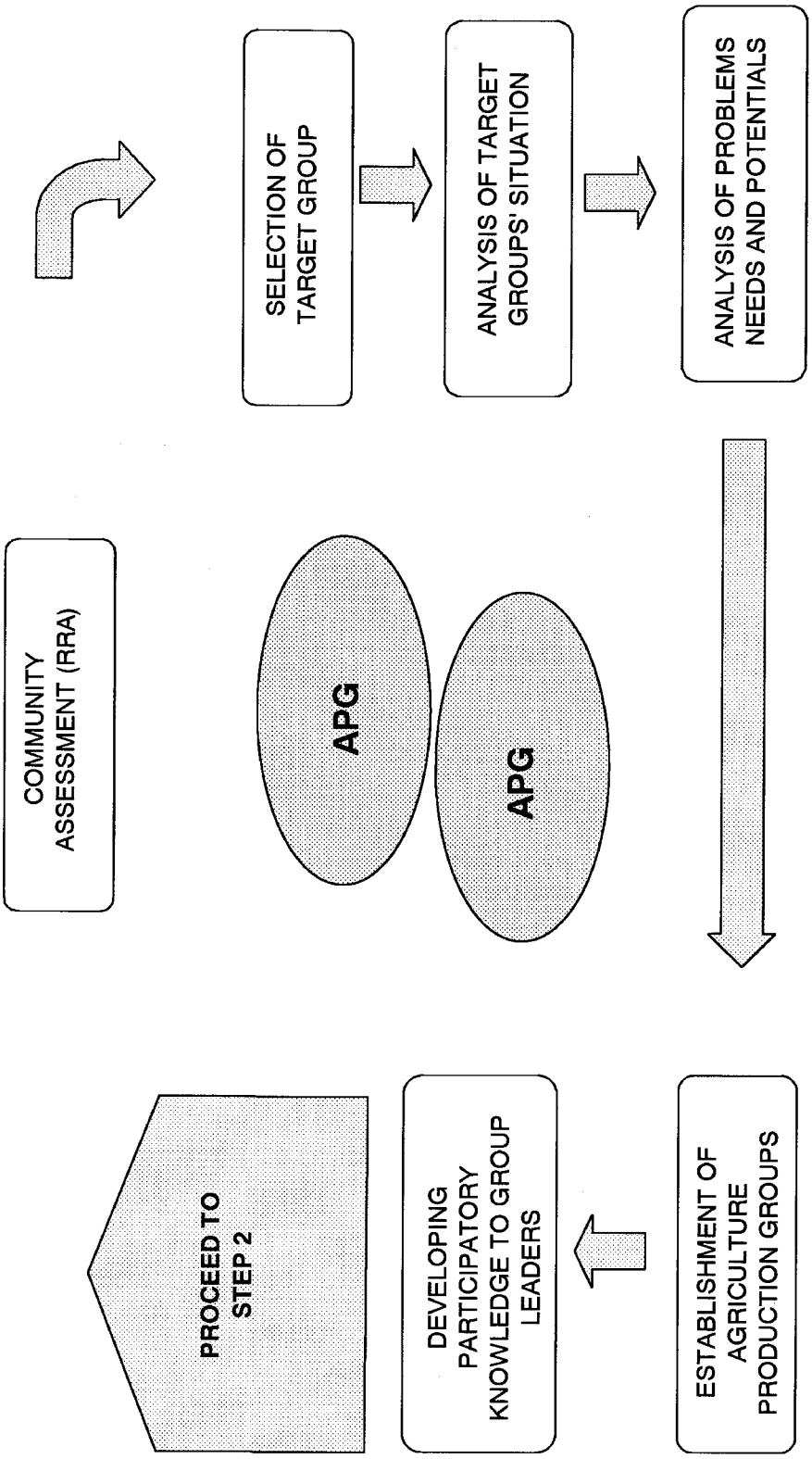


Figure 4-2 Farmer Group Development Process Step 2: Production Plan Elaboration

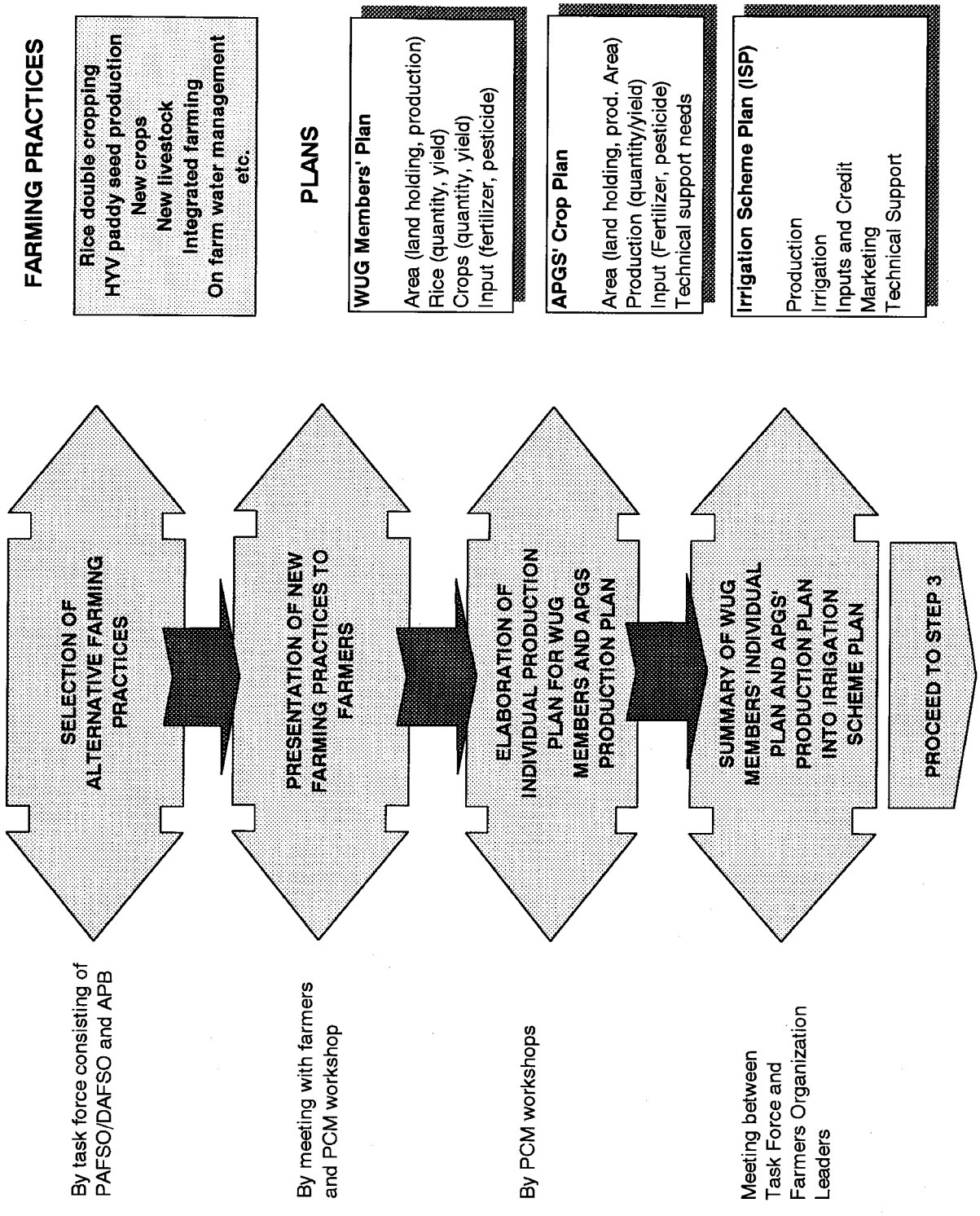
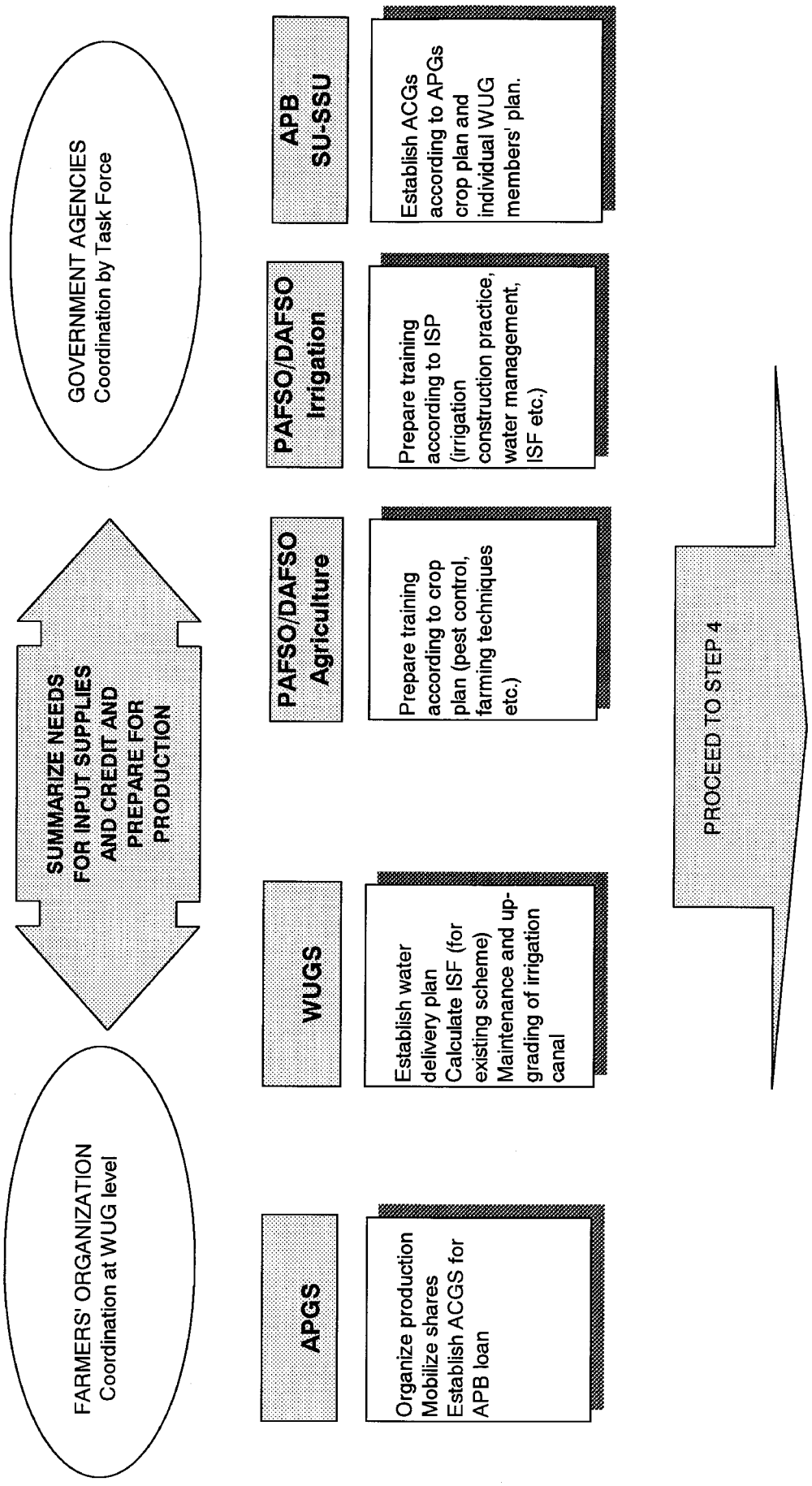


Figure 4-2 Farmer Group Development Process Step 3: Securing Production Support



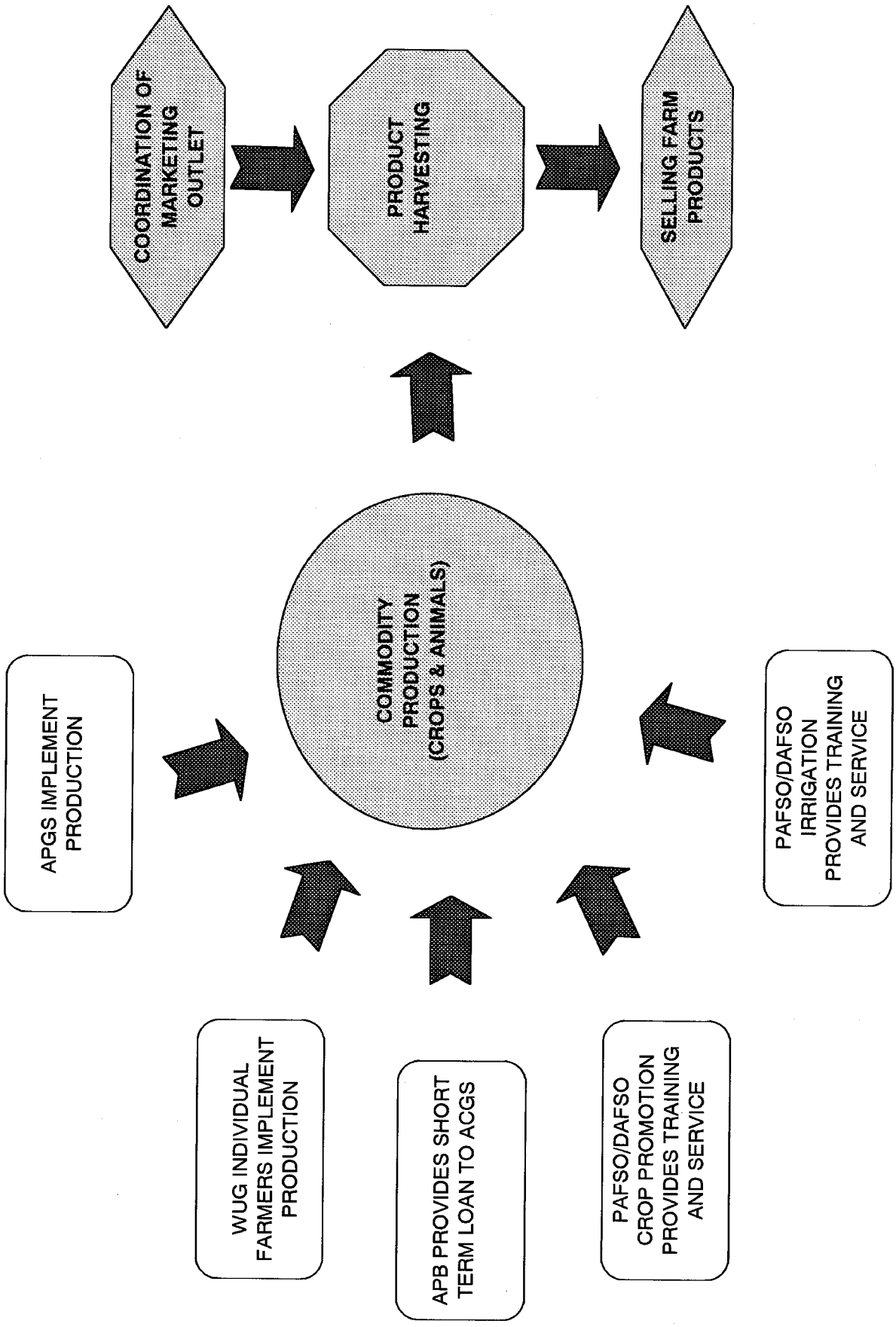
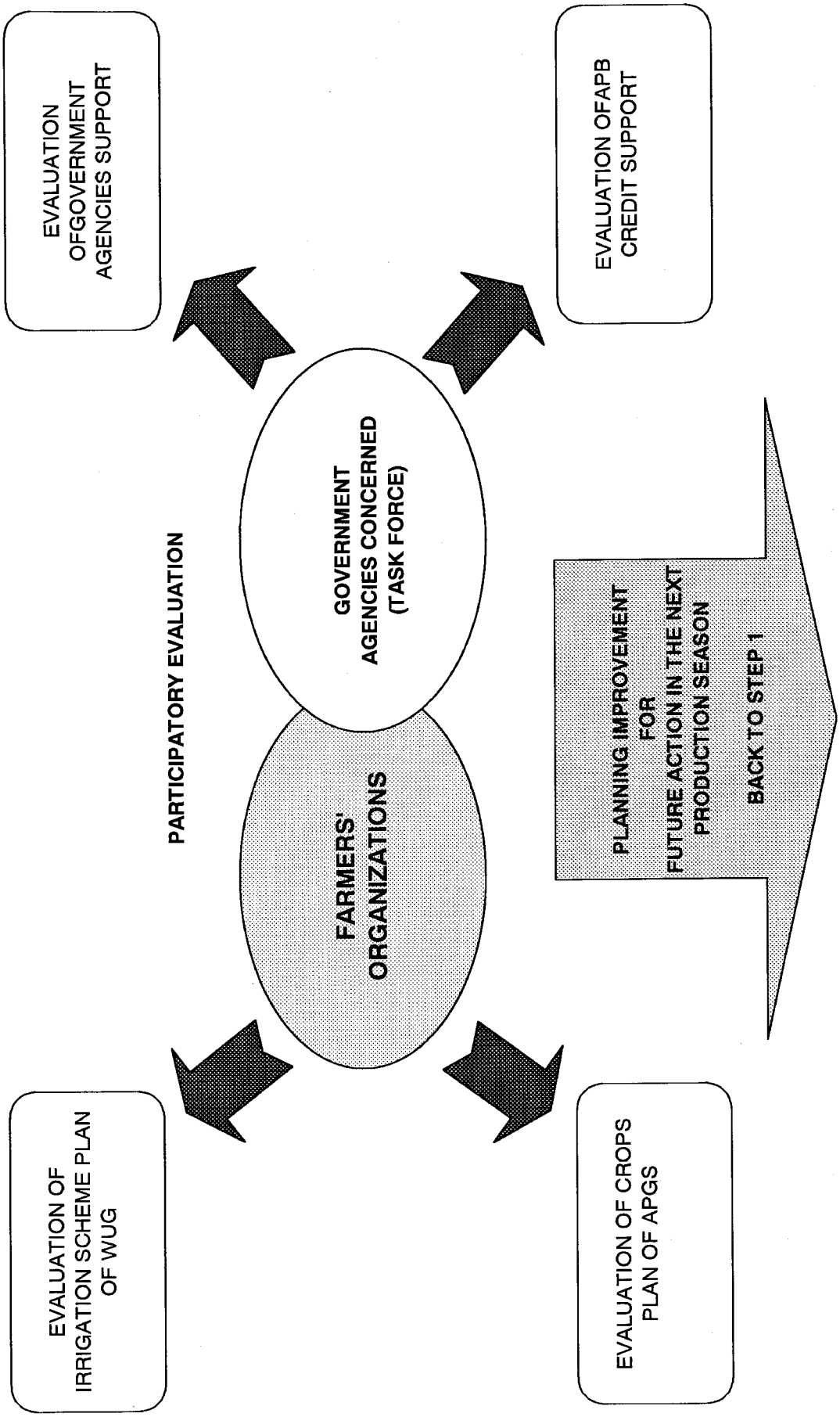


Figure 4-2 Farmer Group Development Process Step 4: Implementation of Production Marketing

Figure 4-2 Farmer Group Development Process Step 5: Evaluation of Production and Support



4.3 Agricultural Financing Improvement Plan

4.3.1 Improvement of Finance System

(1) Improvement of Bank Accounting System

(a) Need for improvement

The standards of accounting and the related manuals of accounting, which are now used by the central bank and fourteen (14) commercial banks in Lao PDR, have been enforced since January 1, 1997. Three (3) years has passed and it is felt necessary to improve these standards and manuals thoroughly because:

(i) they lack stipulations regarding Cash Flow Statement,

(ii) many unnecessary accounting items have been outlined while necessary items are not stipulated and

(iii) they are not usable as manuals of accounting.

Accounting standards are basic and very fundamental in the banking business. These financial documents, which are made and publicized according to such standards, are indispensable and primary materials for those who are concerned to assess the performance of the banks. At present, the financial documents of all banks are reported to and compiled by the central bank until 20th of the following month. Compared with the efficiency of reporting, the formula and contents are quite immature and below international standards so that those outputs are difficult to be understood even by accounting specialists.

On the other hand, the accountants in the banks, such as Directors of Accounting Departments of Bank of Lao PDR and Agricultural Promotion Bank, claimed that the present standards are very difficult to follow and strongly hope that these be rectified to more appropriate and would fit actual conditions of this nation.

(b) Contents and estimated costs of improvement

(i) Rectification of accounting standards

Works in Lao PDR	6MM (150,000 dollars) (Foreign experts)
-- do --	6MM (3,000 dollars) (Domestic experts)
Total	12MM (153,000 dollars)

(ii) Application of new accounting standards to computer system

Works in Lao PDR	6MM (150,000 dollars) (Foreign experts)
-- do --	6MM (3,000 dollars) (Domestic experts)

Total 12MM (153,000 dollars)
Grand total 24MM (306,000 dollars)

(c) Draft of accounting standards improvement

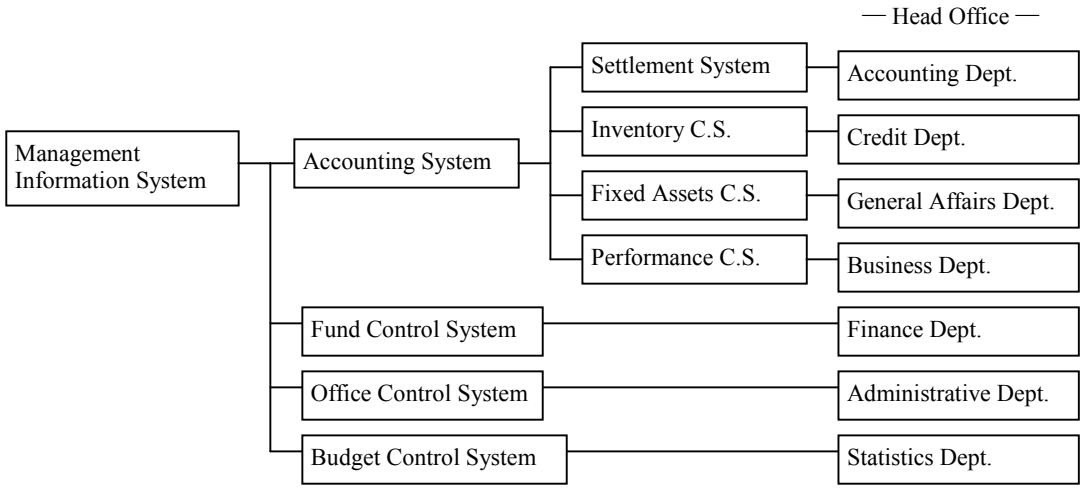
(i) Concept

The Bank's accounting system (hereafter called "Accounting System") must be an information system which becomes a core of MIS (Management Information System).

As shown in the following Figure, the Accounting System comprises sub-systems including "Settlement System" which makes, reports and stores financial documents such as Balance Sheets (B/S), Profit & Loss Statement (P/L) or Statement of Income (S/I), Cash Flow Statement and Statement of Appropriation of Earnings, and accounting books such as ledgers, trial balance and daily trial balance, "Inventory Control System" which controls actual goods, "Fixed Assets Control System" which controls buildings, motorbikes, computers etc., and "Performance Control System" which evaluates results of performance such as amounts of deposits and loans, earned interests, expenditures and non-performing loans.

In addition to accounting system, there are "Fund Control System" which includes Asset-Liability Management (ALM), "Branch Office Control System" which comprehensively controls opening and expansion of branches and sub-branches, personnel, equipment etc. and "Budget Control System" which prepares budgets, evaluates and reports the results.

MIS & Bank Accounting Systems



(ii) Accounting Postulates and Accounting Principles

As to the basic concepts of business accounting, there are three postulates, these are postulate

of business entity, postulate of accounting period or going-concern and postulate of monetary measure.

However, it seems not necessary or proper to show these postulates as principles of Accounting System, which has no academic background nor but very practical purposes.

It is more appropriate for accounting principles of Accounting System to include the following items which are stipulated in the Business Accounting Principles of Japan;

1) Application of principle of importance
2) Presentation of important accounting policy
3) Presentation of important matters which occurred after settlement
4) Writing of footnotes
5) Distinction of reserves caused by capital transactions and profit
6) Principle of consistency
7) Principle of conservation
8) Principle of accrual basis
9) Cases to apply principle of realization
10) Items to show evaluation loss of inventory
11) Items of extraordinary special income and loss
12) Items to show extra payment of corporate tax etc.
13) Items of deferred assets
14) Standards to distinguish current assets or current liabilities and fixed assets or fixed liabilities
15) Formula for reserve deduction for loan loss or accumulated depreciation
16) Items of required reserves
17) Items of surplus money
18) Method of depreciation
19) Method to calculate B/S value of inventory
20) Method to calculate B/S value of debentures in B/S
21) Method to calculate B/S value of credit
22) Principle to show assets obtained by governmental subsidies
23) Principle to show goodwill

(iii) Conformity to IAS

The Accounting System of Lao P.D.R., must take into consideration the International Accounting Standard (IAS), but it not may be necessary to stipulate all required items in current Accounting System because it is not practical for this country to stipulate accounting procedures of lease, exhibition of off-balance items, accounting procedure of corporate consolidation and etc. According to stages of economic growth the Accounting System may be revised to conform more to IAS. For the time being, it is enough to recognize well how the

present system fits to IAS. The checkpoints of conformity to IAS are as follows;

1) Presentation and evaluation of inventory under principle of acquisition cost
2) Information to be shown on financial documents
3) Extraordinary profit/loss items, modified profit/loss of previous period and change of accounting policy
4) Accounting of research and development activity (compulsion to appropriate in asset)
5) Accounting of construction contract (principle of progress standard)
6) Accounting of tangible fixed assets (procedure of revaluation)
7) Accounting procedure of lease
8) Recognition of income (as counter-value of service)
9) Accounting of retirement allowance on financial documents (evaluation at current price of pension fund asset)
10) Accounting procedure for corporate consolidation
11) To dispose of borrowing expenses as asset
12) Accounting procedure for investment (for consolidated B/S, actual control standard may be applied)
13) Financial report under hyper inflation economy (revision of financial documents by general price index)

From the point of view of bank accounting, the following items must be checked;

1) Presentation of data by type of main income
2) Presentation of current price of securities in portfolio
3) Presentation of character, position and etc. of off-balance items
4) Accounting procedure for bad loan
5) Accounting procedure for reserve for unforeseeable risk
6) Maturity control of securities
7) Net- Principle of profit/loss in short-term securities transaction
8) Structure of Gross- Principle accounting system in income/expense of business activity (prohibition of offset)

(iv) Structure of Accounting System

The Accounting System consists of four sub-systems, these are; Settlement System, Inventory Control System, Fixed Asset Control System and Performance Control System.

The Settlement System relates close to daily banking operations. Data from such business as transfer of money as deposits and loans are basic data for the settlement system. Settlement System includes “stipulation of slips and other evidence”, ”stipulation of trial balances, ledgers and other books ” and ”stipulation of financial documents”. These stipulations show the procedures of making, checking, approval, preservation, secret keeping and etc.

Accounting Department as a whole takes charge of the settlement system.

The Inventory Control System relates to control of actual goods or loan in kind, characteristic to APB operations. The Credit Department being in charge, keeps such actual goods as fertilizer deposited by the government, keeps records of changes in inventory and makes inspection and report on inventory periodically.

The Fixed Asset Control System is a system based on fixed assets ledger for Department of General Affairs to record change of fixed assets of all offices, to calculate depreciation value and accumulated depreciation value, to revalue them when necessary and to prepare reports to top management.

The Performance Control System has the main purpose of preparing information for profit control. As such very flexible output corresponding to needs of users of the information is required. The method of collecting data, items to evaluate, kinds of reports to make, inspection, approval, reporting, preservation and etc. are to be stipulated.

(v) Detailed Guidelines

a) Financial documents and their foot-notes

The present financial documents are inclined to lease and securities, which are not generally used by present business of SOCBs, The items for loans in kind and unsettled transfer are not stipulated and some necessary foot-notes for information of deposits and loans are also not clearly mentioned. As such, the present accounting system is quite unrealistic and full of unnecessary explanation and items but lacks the other necessary items. Accordingly, important items are forced to be combined with other items, so that the present financial documents are very difficult for bank accountants to make and for those who are concerned to understand the bank's actual situation.

In order to improve the present accounting system, desirable outputs should first identified and later the system should be revised so as to yield such desirable outputs.

The examples of B/S, S/I, Cash Flow Statement and their foot-notes are shown in the attached sheets (Sample 1, 2 and 3).

It is strongly recommended to stipulate necessary such items in the financial documents and to prepare new forms of basic data ---slips and evidence---so as to make necessary ledgers of new items and foot- notes, as shown in the attached examples.

b) Inventory Control System

The Credit Department of the Head Office is in charge of controlling the actual goods such as fertilizers to be lent to farmers. It is desirable to stipulate the control procedures

according to the following:

1) In charge：Credit Department of Head Office, cooperating with Credit Departments of each branches
2) Controlling method： EDP system（Electronic Data Processing System）
3) Stocktaking method： Individual method
4) Physical inventory： To be executed annually at the end of the period
5) Data to be entered in slips of output and input
   a. Name of maker (initials)
   b. Name of person in charge (signature)
   c. Transaction items (input, lending, input-cancelled, lending-cancelled, transfer, abandoned, others)
   d. Date of transaction
   e. Input from
   f. Lending to
   g. Loan approval number
   h. Name of warehouse
   i. Name of goods
   j. Goods quality
   k. Packing condition
   l. Number of goods
   m. Unit weight
   n. Unit price
   o. Amount
   p. Delivery method (borrowers, Credit Group, agent, others)
   q. Delivery place (warehouse, borrowers' residence, others)
6) Preparation of goods slip and lending slip
   To make accounting slips based on slips of output/input and loan approval
7) Inventory ledgers
   To make inventory ledgers by kind of goods based on output/input slips and accounting slips
8) Monthly inventory report
   Monthly inventory report to be made every month end
   Main details are;
   a. Inventory balance at previous month end (volume, amount)
   b. Input of current month (volume, amount)
   c. Output of current month (volume, amount)
   d. Inventory balance at current month end (volume, amount)
   e. Extraordinary deals such as abandonment must be written in a footnote in details.

Annual physical inventory report

At the end of the year, to perform physical inventory and to report the results.

c) Fixed Assets Control System

1) In charge : General Affairs Department of Head Office, cooperating with General Affairs Departments of each branches

2) Controlling method : EDP system

3) To define the range of fixed assets

4) At acquisition : To make accounting slip at purchase, confirming the following items
   - Contract/Estimate
   - Approval to purchase assets and related budget
   - Inspection sheet
   - Range of related expenses to add to acquisition costs

5) Construction in process account : In case of big-scale construction, expenses are appropriated to assets, before completion. Items to confirm are same as during acquisition.

6) Depreciation :
   - To execute depreciation according to law
   - To select method of depreciation within range allowed by law (service life, depreciation method, residual cost)
   - To make Specification of Depreciation Costs
   - To show asset balance after depreciated, accumulated amount of depreciation as Note 3.

7) Fixed assets ledgers :
   - At acquisition, to take serial numbers and control by branch
   - To open ledgers by items such as "vehicle" and "computer", with details of acquisition date, number, individual item, acquisition cost, depreciated cost, balance after depreciation, abandonment date, location, preserving condition and others.
   - The General Affairs Department of Head Office makes ledgers regarding fixed assets which belong to Head Office and consolidates ledgers of the whole bank at the same time

8) Physical inventory : At settlement date, to execute physical inventory, to confirm preserving condition and to report the results

d) Performance Control System

1) In charge : Business Department of Head Office, in cooperation with the Business Department of each branch
2) Purpose : information control in order to execute profit control

3) Budget control： on the assumption of budget system establishment
4) Monthly control： To execute monthly settlement
5) By branch ： Each branch executes its own performance control
6) Control items ：

- Deposit（kind・period）
- Loan（customers・period・collateral）
- Occurrence, collection and outstanding balance of non-performing loans and interests
- Occurrence, disposition and outstanding balance of bad loans
- Contingent liabilities
- Profit（business profit, fund operation profit, investment profit, profit before tax, profit after tax）
- Income in details
- Expense in details
- Inventory control results
- Fixed assets control results

7) Report ： General Affairs of Head Office should evaluate performance of controlling items by branch every month, comparing it budget and submit the report of performance evaluation to the top management.

4.3.3 Construction of Training Center of Bank of the Lao PDR

(1) Purpose

Since November 1986, Lao PDR has promoted a market-oriented economy and Bank of the Lao PDR (BOL) has tried to train and foster bank clerks and officers at its training center.

However, talented bank staffs are still very limited and it is strongly requested to reinforce the training system so as to meet the market demand for extension, diversification and modernization of banking business.

At present the training center of BOL is located about 5 km northeast from the center of Vientiane, capital city and has an area of about 40,000 square meters. It has schoolrooms and lecture hall but without air conditioning, while its dormitory with capacity of 40 trainees is very humble like a warehouse.

It is urgent to rebuild and modernize the facilities and to attract domestic and foreign talented lecturers and trainers, so that the training center will be able to contribute more efficiently to the training of new graduates and raising the vocational level of its present staff.

(2) Present situation

(i) Present facilities：as per the figure "Sketch Map of Present Facilities" shown below
(ii) Management ： Bank Training Center, Personnel Dept., BOL
(iii) Capacity and frequency of usage：
Dormitory capacity: 40 beds, Trainees: 160 ~ 200 persons a year
Terms: 4 ~ 5 terms a year, One term: 1.5 ~ 6 months
(iv) Curriculum： English conversation, Management, Loan business, Bank accounting, etc.
(v) Equipment： 20 desk top computers (donated by ADB)
(vi) Trainee： Employees of BOL、APB and SOCBs
(vii) Trainer： Staff or temporary staff of BOL、APB and SOCBs
(viii) Cost borne by： BOL 50%、APB and SOCBs 50%

(3) Problems after Building the Center：

At present the facilities are not fully used, because of bad conditions, poor equipment and limited budget and training staff.

However, when the buildings and facilities are improved, equipment, budget and training staff should be also increased and their capabilities need to be improved.

(4) Cost estimate：

(i) Dormitory: Capacity 50 beds
Building two- storey
Equipped with central wash room, central shower room, 10 ~ 15 private rooms with two beds, two desks, two cabinets each
Cost estimate: 100 thousand USD

(ii) Dining and conversation room
Capacity: 70（Dining 50、Conversation 20）
Building: Flat with self-service style dining room
Equipment: Kitchen, warehouse, employees' room with TV, Refrigerators, Wash rooms, Shower rooms,
Cost estimate: 20 thousand USD

(iii) Main building
two-storey
First floor: Office, Teachers' room, Wash room, School room (50 desks)
Second floor: Lecture hall (100 chairs), 2 class rooms (50 desks each)
Cost estimate: 80 thousand USD

(iv) Total Cost estimate 200 thousand USD

4.3.4 Review of Interest Rate and other Bank Policies

(1) Background

The provision of concessional loans to rural sector channeled through APB is one of the Key agricultural policies of GOL although it has been the object of criticism from various sources including the overseas aid agencies. Since the GOL is placing more and more emphasis on the market economy, there had been changes in the rural economy that makes it difficult to continue the present policy in the banking sector. The following are the policy proposals for the MOF and BOL to accelerate the agricultural diversification and development of market economy.

(2) Interest Rates

The rates of interest for loans and deposits are placed under the control of BOL and this makes the resource allocation role of interest rate not to work as it should. Hence, a step-wise liberalization should be made.

(3) Restructuring Interest Rates

The interest rate structure for the concessional loans for rural sector is proposed to be restructured based on the following.

i) Concessional Loans
For the agricultural projects that require a long term for cost recovery and of low profitability including irrigation projects, the existing concessional loan system carrying low interest rates should be continued. However, the rates must be raised stepwise to make up for the lending costs on the part of APB. PAFSO and other government agencies shall be responsible for monitoring the projects.

ii) Seasonal Loans, Normal Investment Loans
The lending interest rates for seasonal loans and medium / long – term agricultural investment should be raised stepwise but a level somewhat lower than the market rates. It should be made stepwise and eventually raised to the level of savings deposit rate plus spread which is positive under inflationary conditions.

(4) Liberalization of Banking Business in the Rural Area

In order to meet the various financial needs and numerous types of clients that are diversifying with the development of market economy and development of agriculture, it is desired to allow various banking institutions to operate in the rural areas in addition to APB. In order to make it, the interest rate structure of APB must be revised, but it will take a medium to long time until the financial system is restructured to allow the other banking institutions to establish their office in rural area.

4.3.5 Strengthening the APB Head Office

Laotian agriculture has problems in its production diversification and market and more importantly, the lack of operational fund. With the restructuring of the interest rate upward, the GOL and BOL will encourage Kip money market grow further. It might be difficult for GOL and BOL to supply concessional fund to APB at the rates much below the market level. However, concessional funds may be sourced from the foreign donor agencies. But, in order to receive foreign fund to be used for on-lending to rural sectors, APB should improve its head/branch office system so that the APB can be responsive to foreign donors' requirements and to the change in the external sector. Table 4-1 indicates the results of evaluating APB with OECF's (Presently JBIC) manual for operation and management capacity of implementing agency under the yen loan project. In this evaluation, the identified issues to be solved are (a) improvement of accounting system, (b) restructuring, (c) education and training of staff and (d) establishment of MIS.

(1) Improvement of Accounting System

As mentioned above, this item is an issue for the entire Laotian financial system. APB should follow the improvement process and pace over the entire system and be able to incorporate the improvements into its accounting system. In addition, APB should re-structure management system for both the fixed assets and the stock.

(2) Restructuring

It is desirable for APB to increase its capital from 800 million Kip to 6 billion Kip (about 4% of total asset in end of 1999). Secondly, in order to monitor loan receiver in more details, the Auditing Division shall be further strengthened with present staff of five, and APB should be audited by an external institution.

(3) Staff Training

(a) High level officers

About 20 officers of branch / service unit chief level will be trained at BAAC Head Office training facility.

(b) Middle level and fresher

Middle level and refresher trainings will be conducted at the Training Facility of BAAC at Khon Kaen.

Table 4-1 Evaluation of APB and Countermeasures

Evaluation scope Evaluation factor	The most emph-asized factor	Evaluation (ABCD)	Countermeasures for C or D
200 Evaluation of past performance			
210 Financial performance			
1.Preparation of financial documents	◎	B	
2.Income results		A	
3.Profitability		A	
4.Liquidity		A	
5.Own capital & dependency on long-term borrowing		D	Capital increase
6.Ability of loan repayment	◎	B	
220 Results on execution, operation & management of project			
1.Achievement of project targets		C	Staff training
2.Strategic factors to achieve targets		C	－do－
3.Results of operation monitoring	◎	B	
4.Ability to find/improve problems		B	
5.Negotiation factors		B	
300 Relation with gov't/administrative system			
1.Relation with gov't organizations	◎	A	
2.Assistance of Governmental system	◎	A	
3.Decision-making process	◎	A	
4.Clarification of role	◎	A	
400 Law system and policy			
1.Relative laws		C	Improvement of accounting system
2.Policy & its problems	◎	C	－do－
3.Necessity of additional law system		C	－do－
500 Managerial authority & assigned power			
1.Power of operation & management	◎	A	
2.Financial independency	◎	C	Enlarge office network/deposit mobiliz'n
3.Problem of limit of assigned power	◎	B	
4.Decision power for project		B	
600 System & managerial structure			
1.Preparation of charts of structure	◎	B	
2.Relation between role & structure	◎	B	
3.Dispersion and management area		B	
4.Flexibility of system	◎	B	
5.Ability of managing staff	◎	A	
6.Managerial structure & decision-making		A	
7.Project management system	◎	C	Establish project management system
700 Business manag't/control system			
710 Business plan & budget control			
1.Long-term plan & rolling plan		C	Prepare long-term plan & staff training
2.Eligibility of budget		B	
3.Responsibility of plan/ budget	◎	B	
4.Evaluation report on investment business	◎	B	
5.Budget report		B	
720 Financial accounting system			
1.Accounting processing procedures		B	
2.Accounting control method		C	Improve accounting system & staff training

3.Accounting records & documents		B	
4.Auditing system	◎	C	Improve accounting system & staff training
5.Conformity to international and national accounting standards	◎	C	－do－
730 Internal audit & inner control			
1.Contents of manag't control objectives	◎	B	
2.Inner control of assets maintenance		B	
3.Internal audit system		C	Staff training
740 Cost calculation			
1.Necessity of cost calculation system		B	
2.Cost calculation information	◎	B	
3.Cost calculation method		B	
4.Inventory evaluation method		C	Staff training
5.Feedback to plan/budget control	◎	C	Establishment of MIS
750 Information disposition			
1.Information plan	◎	C	Establishment of MIS
2.User's contentment/participation	◎	C	－do－
3.Cost/benefit & risk	◎	B	
4.System development		D	Establishment of MIS
5.EDP system & management		C	－do－
760 Procurement control & inventory control			
1.Procurement system/control		B	
2.Inventory control method/procedures	◎	C	Establishment of inventory control system
3.Warehouse control	◎	C	－do－
4.Execution of physical inventory	◎	C	－do－
5.Report & supervision of inventory		C	－do－
770 Supervision of project (construction)			
1.Constru'n/contract/tender manag't	◎	B	
2.Progress report(budget/const'n)	◎	B	
3.Management & control on progress		B	
4.Construction cost accounting	◎	C	Improvement of accounting system
5.Construction completion procedure		B	
780 Fixed assets control			
1.Record of fixed assets ledger	◎	C	Improvement of accounting system
2.System/staff maintenance & management		C	Staff training
3.Maintenance control program		D	－do－
4.Budget/materials maintenance/ manage't	◎	D	－do－
5.Maintenance/management by outsourcing		B	
790 Financial & monetary management			
1.Cash management		B	
2.Loan management	◎	B	
3.Fund raising	◎	A	
4.Investment business & funding plan		B	
800 Staff & training			
1.Staff training policy	◎	C	Off-job training program
2.Personnel policy		C	－do－
3.Staff ability	◎	C	－do－
4.Recruiting policy & procedures		B	
5.Training program		C	Off-job training program
6.Wage & salary system		B	

Evaluation: A＝excellent, B＝Ordinary, C＝Fair, D＝Poor/Problematic

(c) Foreign Section officer

Training in English communication will be conducted in Thailand for two junior officers of APB for one year.

(4) Establishment of MIS

As of the end of December 1999, the total fund at APB amounts to Kip 145,683 million (US$ 19 million) including the loan of Kip 91,438 million (US$ 12 million). APB must be able to monitor the status of these funds and operate the financial business in order to realize the maximum profit of APB even under the changing financial environment. In order to make it, various information will be necessary, not only of interest rate but also on loan terms and status information. The following equipment is needed by all offices of APB. The whole cost may be self financed by APB.

---Telephone (including wireless phone).
---Personal computer.
---Copier machine.

(5) Others

(a) Strengthening of Field Office and Staff

In the last two years, the number of APB staff increased by 100, but the number of offices was unchanged. To attain the target for APB to cover 60% (present BAAC's figure) of rural farmers in Lao by year 2020, APB should increase its offices by 84 and staff by 300 in next 10 years as shown below:

	Number of Office	Number of Staff	Target Farmers	Cover Rate (%)
End 1998 (Actual)	66	380	130,000	20.6
2010 target	150	800	368,000	42.5
2020 target	200	1,150	378,000	60.0

(b) Corporate Plan of APB

An analysis of the financial reports of APB, including balance sheets and profit and loss statements, it was found out that there are many factors that make the sustainability APB at volatile conditions. The APB has been earning some profit every year in the past. However, it depended on various factors including plenty of low interest fund from BOL and KR2 loan from MOF as well as foreign exchange income. APB must conduct simulation of the changes in these factors that may have important impact on the sustainability of APB. Based on its findings, APB should prepare a medium / long-term corporate plan to confirm its sustainability in future.

4.3.6 Strengthening APB Branches / Service Units / Sub-service Units

(1) Facilities and Equipment at APB offices

The APB offices (branch, service units and sub-service units) are in need of various facilities and equipment including vehicles which are indispensable for the banking institutions. There are still many offices of APB which do not have telephone, fax, copier machine, typewriter, personal computer, fire extinguisher, steel locker, furniture for the clients. All of them have motorcycles, however, the number is not enough for all field officers. In the rural areas of Lao PDR, APB is the sole banking institution where the farmers can get in touch with the bank. The conditions of APB may be very damaging to the image, not only of APB but also of banking institution in general in Lao PDR. Hence, it is proposed that 12 offices of APB in the study area be provided with necessary facility.

(2) Staff Increase and Training of Personnel

At the end of 1999, the total number of APB officers, inclusive of staff at head office, reached 500. Total number of clients is estimated at 200,000 households which is about 25% of all households in Lao PDR. At the field offices of APB, 2-3 officers are assigned to serve the farmer clients, reaching 2,000 households or more. It is evident the loan service cannot be handled by field officers alone. APB must ask for help from the village chief and other administrative organizations. This makes it difficult for APB to assess the quality and conduct loan classification. Hence, increasing the number of field officer at the field offices is urgently needed. APB recruits 50 new officers every year but they must first be trained in Lao PDR and Thailand to function effectively. The cost may be within the paying capability of APB.

(3) Rural Fund Mobilization

Very little efforts have been exerted by APB in terms of rural fund mobilization. Of its deposits amounting to Kip 46.4 billion at the end of December 1999, about Kip 28.1 billion (60.6%) represents current accounts which is used for its business transactions. Savings and fixed deposits amount to Kip 11.8 billion (25.4%) which are almost negligible in comparison to other SOCB's total deposits estimated at Kip 408 billion at the end of December 1998. APB must also strengthen its efforts by preparing deposit brochures and other public relation activities.

In areas which are difficult to reach, mobile banking is undertaken by using a car carrying the teller machine and other equipment necessary for loan and deposit processing to serve the clients in the area visited by field officers. The date and time of the visit must be announced to the villagers in advance. Likewise, APB is increasing its field office network. In areas where the population density is low and communication and traffic infrastructure are poor, the mobile banking system will be much more economical than establishing new field offices. Hence, one set of mobile banking system is proposed by opening in the three provinces under this project.

4.4 Stabilization of Farming System and Production Increase

4.4.1 Software Approach

(1) Basic Concept for Agricultural Supporting Plan

As seems difficult to secure the additional staff necessary to support farmers and/or farmers' group by the Government organization due to the tight budgetary situation, the existing human resources should effectively be utilized for the agricultural supporting system. The promotion of participatory approach will be given emphasis. The basic facilities necessary for DAFSO and ABP Sub-Service Unit should also be arranged in order to improve the mobility for the staff of such organizations.

The basic concept for the agricultural supporting plan is therefore the introduction of localized development system through the effective utilization of readily available human and facility resources. The agricultural supporting plan as described below harmonizes the development of farmers' organization through localized service system by organizing task force teams and by improving the contact farmer system in cooperation with the progressive farmers in the community.

(2) Scope of the Agricultural Supporting Plan

The plan shall elaborate the recommendations for the strengthening of nation wide extension system including the clarification of role and function for different organizations and the general information management. The improvement of staff mobility of DAFSO is urgently needed. For practical reasons, the facility-strengthening plan is therefore proposed based on the DAFSO inventory prepared through the field survey in the target area. At the same time, the formation of the task force team is proposed for the implementation of localized supporting services and the utilization of trained staff already is emphasized. The contact farmer system is also proposed as an effective extension activity by involving the progressive farmers in the community. The farmers' organizations should be developed from the level of just being receivers of support services to a level of where these organizations can have active participation to the management of such services. As such, the process of developing functional farmers' organizations will also be considered.

As for agricultural research, the effective utilization of existing system and facilities is proposed through appropriate coordination with other agencies concerned. For example, the training facilities under Lao-IRRI project and the farmer field school under IPM project should be utilized for many other purposes. The system to utilize the pool of contact farmers as model and extension field is also proposed.

An appropriate distribution and supply system for fertilizer and agro-chemicals to be performed under the cooperation between DAFSO and APB staff is proposed. The transfer of necessary information for the proper application of the materials supplied is also proposed. As for seed multiplication and supply, improvement of the system for the production and distribution in the district level is proposed in addition to the strengthening of existing seed processing center.

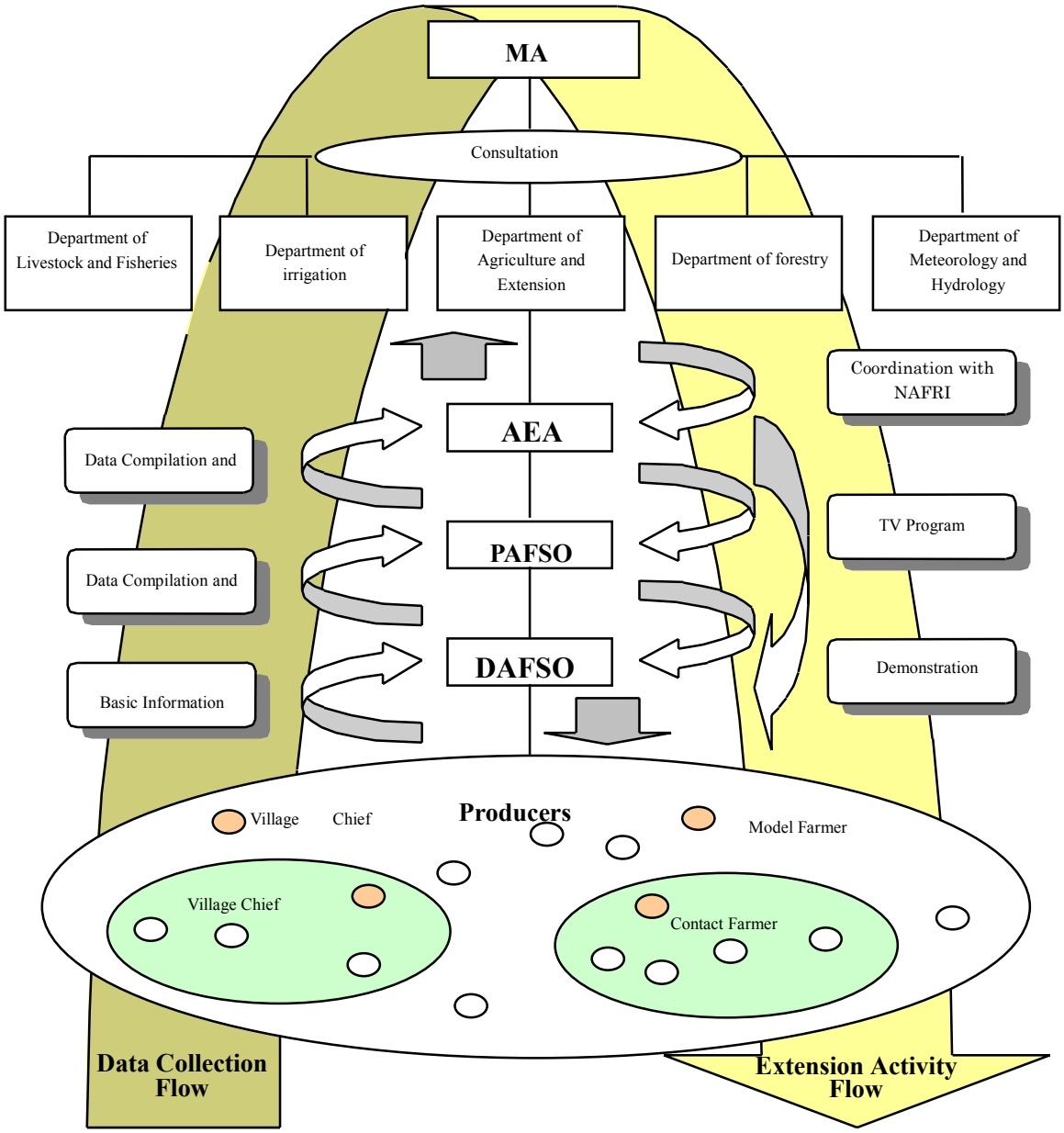
The strengthening of village middleman and the promotion of group selling by the farmers' organization is proposed for the improvement of agricultural products marketing. The system of credit to traders and the basic marketing facilities should therefore be improved. General recommendation will then be given for the strengthening of Food Supply Company through improvement of transportation, milling and storage capacities and the active transition to the market economy through introduction of private business initiatives.

(a) Agricultural Extension System

Clarification on the role and function of each extension level

There should be a two-way flow of information from the village level to the central administration and the technical support back to the villages. The basic information collected from village level by DAFSO should be compiled and conveyed to PAFSO by using an appropriate format for the detailed analysis. PAFSO can manage this information as district inventory and similarly AEA can deal with province inventory. These inventories can be utilized as useful materials during consultations with relevant departments especially with NAFRI for designing more effective extension activities. The useful information to solve the problems of producers should then be conveyed to the village level through various extension means such as mass media, demonstration and training courses. In order to establish such, a system information management system, the roles and the functions of AEA, PAFSO and DAFSO should clearly be defined as shown below.

Organization	Role and Function
AEA	- Planning for basic strategy and guidance on extension activities - Monitoring and evaluation for extension and training activities - Collection, compilation and publication of useful information - Training of extension staff and education of rural population - Management of province inventory
PAFSO	- Planning on extension activities in province level - Training of extension staff and education of rural population - Management of district inventory and transfer to AEA
DAFSO	- Extension of technology and knowledge useful for the improvement of agriculture and rural life - Various services on analysis, diagnosis and operation of model plot etc. - Management of village inventory and transfer to PAFSO


MA
Consultation
Department of Livestock and Fisheries
Department of irrigation
Department of Agriculture and Extension
Department of forestry
Department of Meteorology and Hydrology
Coordination with NAFRI
AEA
Data Compilation and
TV Program
PAFSO
Data Compilation and
DAFSO
Demonstration
Basic Information
Village Chief
Producers
Model Farmer
Village Chief
Contact Farmer
Data Collection Flow
Extension Activity Flow

In relation to training activities, all the necessary facilities of AEA for the training and accommodation together with computer network should be upgraded. In-service training activities should also be strengthened by incorporating the following fields which are deemed necessary for improving current extension activities.

- Agricultural machineries including operation and maintenance of hand tractors, threshing machines and irrigation pumps,
- Extension skills including group organizing and communication skills,
- Agricultural economics for the assessment of various development plans, and
- Education of rural women on environmental health and various income generating activities.

Strengthening the DAFSO

The most critical point for the establishment of an effective agricultural extension system is the communication among DAFSO staff as extension-workers and villagers. The existing staff and facilities of DAFSO are, however, extremely poor in order to execute an ideal set of extension activities. The basic provisions facilities such as electricity, telephone, copy machine and motorcycle should work DAFSO for better communication and information management. In addition to such facilities, DAFSO should be equipped with seed processing unit to implement seed production in district level for the steady supply of HYV seeds to farmers. Practical facility supply plan based on the inventory of DAFSO distributed in the Study area is shown in the table below.

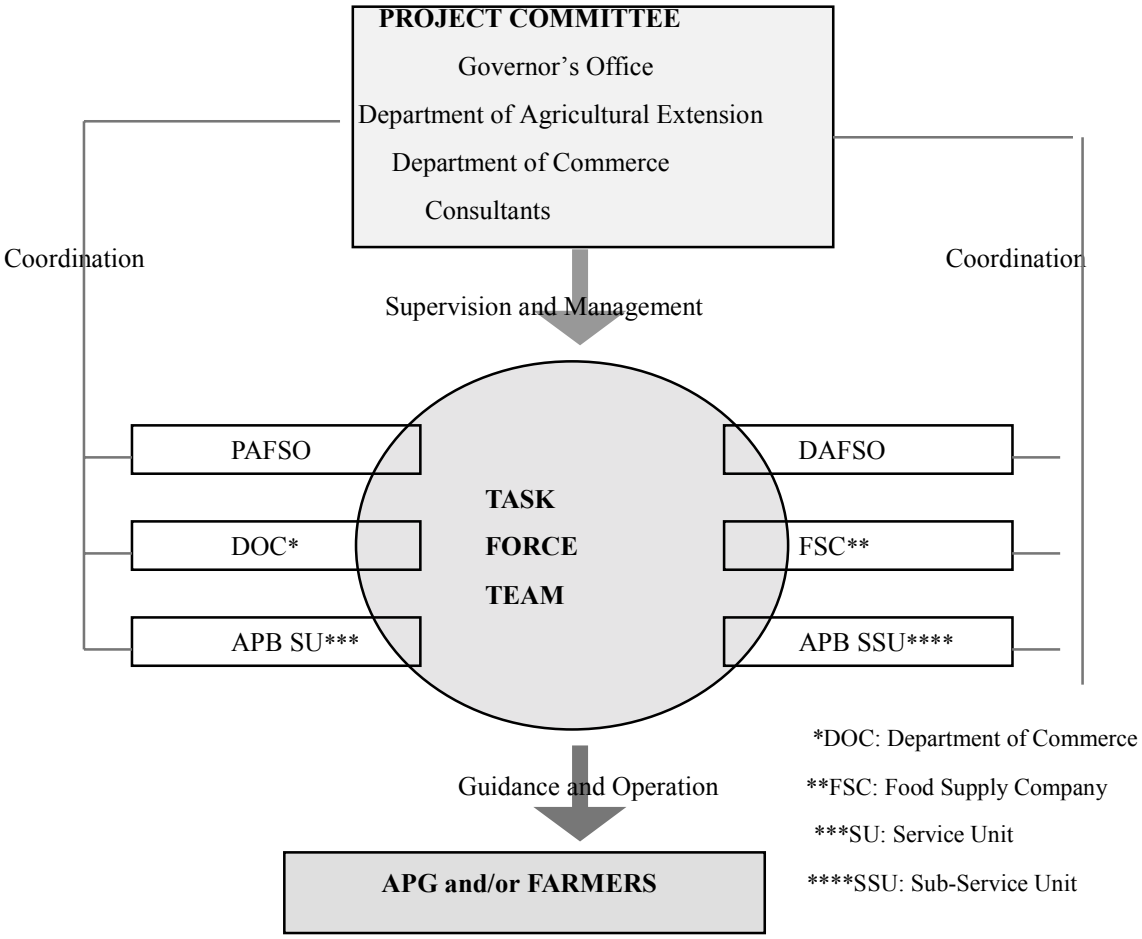
Facility Supply Plan

Province	DAFSO	No. of Village	No. of HH	No. of Staff	Electric Supply			Telephone Line			Copy Machine			Motorcycle			Seed Processing Unit		
					(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Bolikhamsai	Thaphabath	32	3,640	19	1	1	0	0	1	1	0	1	1	1	4	3	0	1	1
	Bolikhan	50	2,582	27	0	1	1	0	1	1	0	1	1	0	5	5	0	1	1
	Paksan	75	5,913	22	1	1	0	1	1	0	0	1	1	0	4	4	0	1	1
	Pakkading	57	5,215	17	0	1	1	0	1	1	0	1	1	1	3	2	0	1	1
Khammouane	Hinboun	166	9,480	36	1	1	0	0	1	1	0	1	1	2	7	5	0	1	1
	Thakhek	139	13,293	47	1	1	0	1	1	0	0	1	1	0	9	9	0	1	1
	Nongbok	72	7,048	36	1	1	0	0	1	1	0	1	1	3	7	4	0	1	1
	Sebangfai	49	4,229	31	1	1	0	0	1	1	0	1	1	2	6	4	0	1	1
Savannakhet	Xaibouri	89	7,259	41	1	1	0	0	1	1	0	1	1	4	8	4	0	1	1
	Khantabouri	94	16,754	52	1	1	0	1	1	0	0	1	1	3	10	7	0	1	1
	Songkhaon	142	12,465	64	0	1	1	0	1	1	0	1	1	2	13	11	0	1	1
	Xaiphouthong	63	-	28	1	1	0	0	1	1	0	1	1	2	6	4	0	1	1
Total Requirement							3			9			12			64			12

(1): Presently available number
(2): Necessary number (1 motorcycle/5 staff in case of motorcycle)
(3): Requirement

Organization of Task Force Team

Since the number of existing DAFSO staff is limited, the specialized orientation of DAFSO staff should be gradually eliminated and all the staff should work as generalist extension-worker for more practical extension activities. The Task Force Team should then be organized among the staff of PAFSO, DAFSO, APB and other relevant organization for more localized and collective support services delivery. This Task Force Team will be supported by project committee which consists of staff from the Governor's office, Department of Extension, Department of Commerce, APB, Farmers' Organization and NGO. If possible, experts of agriculture and irrigation will be employed as consultants. The role of this committee is to supervise the Task Force Team under the full coordination with relevant authorities. The following diagram shows the relationship between project committee and task force team.



The PAFSO staff will be involved in the Task Force Team until such time when DAFSO staff can

independently perform their activity. The task force team is expected to perform within the district level in line with its medium and long-term objectives. The members and the composition of the team should be selected carefully according to the issues to be tackled and the experience on past training and the communication capability of each staff. Since various training programs have already been executed as shown in the table below, these trainees should be utilized effectively. There are many other training programs offered by various donors and the total number of such trainee may have been considerable. AEA should prepare the staff inventory as part of monitoring the training activities. This kind of staff inventory can be utilized in the formation of task force team and other human resource management concern.

Annual Training Programs being carried out by AEA and NARC

Agency	Training Subject	Trainee	Duration	Note
AEA	Extension Principles and Methods	PAFSO/DAFSO staff	14 days	
AEA	Extension System Development	DAFSO staff	whole year	Pilot Extension Project
AEA	IPM (Rice, Vegetables)	PAFSO/DAFSO staff	5/3 months	IPM Project
AEA	Mushroom Culture, Seed, Production	DAFSO staff, Model farmer	7 days	
AEA	Rice cultivation and seed production	PAFSO/DAFSO staff	7 days	
NARC	Seed Multiplication	PAFSO/DAFSO staff	3 weeks	
NARC	Participatory Rural Appraisal	15-25 participants/year	3 weeks	Lao-IRRI Project
NARC	Extension oriented basic rice production	15-25 participants/year	3 weeks	
NARC	Basic statistics for rice experiment	15-25 participants/year	1 week	

The activity of the task force team will be, in the beginning, confined within the model area to be selected during the master plan. The actual activity will be carried out as a localized support to a certain APG through contact farmers. The subjects to be tackled will be decided according to the requirement of APG. The improvement of irrigation system and the introduction of double cropping are the immediate subjects and the production of cash crops and the promotion of fish culture will be the next important subjects to meet the medium and long-term objectives. The task force team will thus support one APG at a time. The selection of suitable APG as a model is therefore the important role of the task force team. The following illustrates an example of Task Force Team.

Example of Task Force Team

Subject	Member	Function
Introduction of double cropping	PAFSO (Crop production) staff DAFSO staff of target district APB staff of target service unit	Appropriate supply of fertilizer through APB loan and seed supply through contract farming, Effective technical transfer to the farmers group
Improvement of Irrigation System	PAFSO (Irrigation expert) staff DAFSO staff of target district APB staff of target service unit	Designing, Construction arrangement including supply of materials and man-power, Training for Opration and Maintenance

Establishment of Contact Farmer System

The contact farmer system is already implemented in some of DAFSOs, specifically in relation to crop production and livestock rearing. This existing system is, however, not functioning

effectively due to the limited capability of DAFSO and the unclear function of contact farmer. An effective system of contact farmer should be established by identifying the contact farmer as the leader of Agriculture Production Group (APG). Progressive farmers who have been producing HYV paddy seeds on contract bases are already cooperating in the extension activities and such farmer can work as a leader of the group and also as a model farmer or extension volunteer. Contact farmers can produce paddy seeds and fish fingerlings in the community level with the full support of Task Force Team and the field of the contact farmer can be used as venue for training and demonstration. The number of existing contact farmers in each district is shown in the table below and this should be redesigned according to the number of staff and potential beneficiary household. In addition to the contact farmer, the involvement of schoolteachers and other village leaders including the priests into extension activities should be seriously considered.

Contact Farmers Allocation

Province	DAFSO	No. of Village	No. of HH	No. of Staff	Village /staff	HH /staff	Crop Production			Livestock			Proposed		
							(1)	(2)	(3)	(1)	(2)	(3)	(4)	(5)	(6)
Bolikhamsai	Thaphabath	32	3,640	19	1.7	191.6	4	7	1.8	4	4	1.0	19	32	1.7
	Bolikhan	50	2,582	27	1.9	95.6	6	3	0.5	4	61	15.3	27	50	1.9
	Paksan	75	5,913	22	3.4	268.8	3	3	1.0	5	0	0.0	22	75	3.4
	Pakkading	57	5,215	17	3.4	306.8	3	14	4.7	4	0	0.0	17	57	3.4
Khammouane	Hinboun	166	9,480	36	4.6	263.3	7	0	0.0	8	0	0.0	36	166	4.6
	Thakhek	139	13,293	47	3.0	282.8	12	43	3.6	14	63	4.5	47	139	3.0
	Nongbok	72	7,048	36	2.0	195.8	10	27	2.7	12	1	0.1	36	72	2.0
	Sebangfai	49	4,229	31	1.6	136.4	7	30	4.3	6	0	0.0	31	49	1.6
Savannakhet	Xaibouri	89	7,259	41	2.2	177.0	6	71	11.8	9	4	0.4	41	89	2.2
	Khantabouri	94	16,754	52	1.8	322.2	8	161	20.1	12	53	4.4	52	94	1.8
	Songkhaon	142	12,465	64	2.2	194.8	14	150	10.7	11	15	1.4	64	142	2.2
	Xaiphouthong	63	-	28	2.3	-	5	55	11.0	3	34	11.3	28	63	2.3
Average							7.1	47.0	6.0	7.7	19.6	3.2	35.0	85.7	2.5

(1): Number of DAFSO staff specialized for each subject
(2): Number of presently available Contact Farmer
(3): Contact Farmers/Staff
(4): Total Number of DAFSO staff
(5): Number of Contact Farmer in case one/village
(6): Contact Farmer/Staff

The effective extension activity should thus be carried out mainly by the Task Force Team towards the empowerment of APG through contact farmers during the short and medium term step. Various APGs for such activities as paddy, cash crops, fish culture and livestock can be created and developed according to available natural resources and interests of each villager. At the final stage of long term period, each APG will be able to develop an approach to extension services according to their own needs.

(b) Research and Extension

Coordination among existing projects

The National Agricultural Research and Extension Program should be implemented under the MAF and the relevant projects supported by foreign donors should be incorporated as components of this national program. The coordination among projects is then needed for more

effective research and training activities. For example, the training facilities established under Lao-IRRI project can be utilized for many other training purposes. On-farm research plots are distributed in the Study area and these plots can be utilized for the task force teams to execute their training and demonstration activities in coordination with research staff. It is worth mentioning that the Tasano seed multiplication center was established not only for seed multiplication but also for research and training activities. This center is so far utilized only 2 times/year for training in seed multiplication. This training facility should effectively be utilized by the staff of PAFSO and DAFSO for various activities according to the program to be designed by the committee. The National Integrated Pest Management (IPM) Program on Rice and Vegetables is being carried out in collaboration with Food and Agriculture Organization (FAO) for the promotion of environmentally sound agriculture. The extension of this program is, therefore, very important considering that the system of Farmer Field Schools (FFS) established under this program can be utilized for the extension services. The distribution of existing facilities in the Study area is presented in the following table:

Existing facilities in the Study area

Province	District	National Rice Research Program		IPM Program
		Research Station	On-farm Research	Farmers Field School
Bolikhamsai	Thaphabath			
	Bolikhan			
	Paksan		1	3
	Pakkading			
Khammouane	Hinboun			1
	Thakhek			2
	Nongbok			2
	Sebangfai			
Savannakhet	Xaibouri			1
	Khantabouri	1	1	2
	Songkhaon			2
	Xaiphouthong			

Establishment of Adaptive Research

Although the research centers of the different sectors were organized under the same umbrella, the role and function of each center is not clearly stipulated. The technical level required in the village level is much lower than the level required of research stations. Hence, farmers are requesting the transfer of the practical know-how relating to the plowing, transplanting, fertilization, chemical spray and so on from the research station staff. The linkage between research and extension could be improved towards the effective technical transfer from the extensionists to the farmers by preparing a suitable program and also by utilizing the existing facilities such as the demo fields of contact farmers more effectively.

(c) Supply of Agricultural Input

Fertilizer and Agro-chemicals

The supply of Fertilizer and Agro-chemicals to the farmers should be improved through group buying by APG for the appropriate supply in time and amount. This improvement is closely connected with loan services, technical guidance and farmers' organization. The DAFSO staff should be more involved in the supply of such materials by playing the following roles:

- Assessment of the necessary amount and kind of fertilizer and agro-chemicals for each APG according to the cropping area and cropping pattern,
- Supply arrangement under the full coordination with the staff of APB and other relevant organizations such as State Food Supply Companies,
- All the information necessary for the proper application practice of each material should be conveyed to the farmers during the supply procedure. In case of agro-chemicals, the preparation of guidelines for the proper application is needed from the viewpoint of environmental conservation.

Seed Multiplication

The supply of HYV paddy seeds is indispensable for the development irrigated paddy production. The seed multiplication system should therefore be improved especially for the production and processing of extension seeds. Foundation seeds (F1) of HYV such as TDK and RD series are annually produced in NARC for the processing centers such as Tasano. Although the amount of F1 is satisfactory, the quality of F1 is not satisfactory. F2 is mainly produced by the seed processing centers and F3 is usually produced by the progressive farmers under a contract. The quantity and quality of both F2 and F3 are unsatisfactory and farmers are often facing the problem of the shortage of seed supply. The following table shows the seed requirement in the Study area. The amount of processed seeds supplied by Tasano Center was about 30 ton and this is extremely lower than the requirement. The scale of seed processing unit for each DAFSO can be estimated from the requirement of each district.

Seed requirement in the Study area

Province	DAFSO	Rainfed Paddy on 1998 (ha)	Irrigated Paddy on 1998 (ha)	Area* for HYV on 1998 (ha)	Total Seed** Requirement on 1998 (ton)	Necessary*** Amount Of F3 (ton)	Necessary**** Area for F3 Production (ha)	Number of Village (villages)	Necessary Area for F3 Production /Village (ha)
Bolikhamsai	Thaphabath	3,464	1,102	3,180	191	64	16	32	0.50
	Bolikhan	2,023	124	1,338	80	27	7	50	0.13
	Paksan	7,528	3,088	7,605	456	152	38	75	0.51
	Pakkading	5,062	425	3,462	208	69	17	57	0.30
Khammouane	Hinboun	4,100	1,050	3,510	211	70	18	166	0.11
	Thakhek	6,742	1,350	5,395	324	108	27	139	0.19
	Nongbok	9,556	2,111	7,845	471	157	39	72	0.54
	Sebangfai	3,513	1,000	3,108	186	62	16	49	0.32
Savannakhet	Xaibouri	7,214	6,330	10,658	640	213	53	89	0.60
	Khantabouri	5,515	674	3,983	239	80	20	94	0.21
	Songkhaon	19,052	3,083	14,514	871	290	73	142	0.51
	Xaiphouthong	5,757	581	4,035	242	81	20	63	0.32
Total		79,526	20,918	68,634	4,118	1,373	343	1,028	4.25

* Area for HYV : Provided the total Irrigated Paddy plus 60% of Rainfed Paddy

** Seed requirement : 60 Kg / ha

*** Necessary amount of F3 : 1/3 of Total seed requirement due to 1 replacement/3 croppings

**** Necessary Area for F3 Production : Provided the yield is 4 ton/ha

The seed processing facility in NARC should immediately be improved. The production of F2 should be improved by establishing the proposed seed multiplication center in Bolikhamsai and upgrading the Tasano center. The production of F3 should be improved by placing the contract farmers in each district under the supervision of DAFSO.

Finally, the supply of agricultural input such as fertilizer, agro-chemicals and seeds should be carried out by the farmers independently, with a transition period supported by APB and Food Supply Company.

(d) Marketing System

Strengthening of village middleman and Food Supply Company

The purchasing system of rice is generally composed of two flows. One is the private system operated mainly by the middleman and the other is the purchasing done by the food supply company operating in each Province under the Department of Commerce. The so-called village middleman can maintain mutual trust with producers in the village and is expected to play an important role for the farmers' organization in future. It is therefore important to promote a system of credit to traders in order to support those village middlemen. The purchasing power of middleman will thus be strengthened and the efficient marketing of paddy will generally be promoted in the village level.

Food supply companies were recently established in each Province aimed at (i) promotion of

agricultural production, (ii) stabilization of rice price and (iii) distribution of surplus rice to areas experiencing deficiency. In order to adjust the supply/demand balance within and between provinces and also to stabilize the price of paddy, the Ministry of Commerce prepares an annual schedule for paddy purchasing through Food Supply Company. According to the staff of the Ministry of Commerce, the major constraints for purchasing paddy are (i) shortage of budget, (ii) inconvenient transportation and (iii) insufficient rice milling and storage capacity. The role of Food Supply Company should therefore be strengthened by increasing its budget in order to purchase more products and also to improve transportation, rice mill and storage capacities. Once the marketing system is improved, the transition into a market economy through the introduction of private business initiatives can be smoothly achieved.

Group Selling by APG

The capacity to undertake group selling of agricultural products by APG will be among the important and immediate objectives in order to improve the existing marketing system in the village level. This process should be developed in accordance with the progress of APG. As a medium term objective, the construction of storage house and strengthening of transportation services by APG will be needed. As a long-term objective, milling facilities will be established in order to add the value to the products. Furthermore, the construction of vegetable storage facilities and group reorganization will be needed for the improvement of marketing system for cash crops. The financing support to APG will be indispensable in this process. The periodic supply and exchange of market information between producers and middlemen is another important subject for market development. The above mentioned task force team will play an important role within the model area for the improvement of facilities and the supply of such information needed during the development process of farmers' organization. The best practices obtained in the model area will then be expanded to the surrounding areas.

4.4.2 Hardware Approach

(1) Infrastructure Improvement Plan and Water Management

(a) Basic Development Concept

Although past irrigation development projects have been constructed by the government, these projects have faced many difficulties. These problems can be summarized as poor operation and management system, lack of supplemental project and inadequate support mechanisms. On the other hand, under the nation's new policy of a shift towards a market-oriented economy, new social and economic reforms have been initiated. Government's economic strategy has changed and state enterprises are given more freedom to determine production plans. Under this background, the agriculture sector has to grapple with the problems of shifting from historical and centralized approach to a more realistic approach based towards market-oriented mechanism.

The basic policy to shift from government-led development to a local resource-based one emphasized

that development approach generates self-support of farmers and mobilizes their resources should be incorporated into the development concept. Under this situation, farmer participation is considered as a practical approach for irrigation development. Irrigation development planning, therefore, should consider farmers' technical and financial capacity and development potential of local resources.

Frequent heavy flooding in the plains along the Mekong is one of the major constraints to secure food production. Although large-scale structural approach is the most effective way to mitigate flood damage, it needs longer time and costly investments. It is not therefore, an appropriate measure for urgent and short-term development approach. The provision of small-scale agricultural infrastructure, aiming to secure stable wet season rice cropping and to encourage dry season rice production, is a rather more realistic approach to deal with the annual cycle of flooding.

Structural constraints to secure stable rice production, such as incomplete irrigation facilities, poor operation and maintenance system, deteriorating irrigation system, lack of water management sense, shortage of irrigation water, lack of development strategy including pump irrigation plan and non-functional water management organization, among others. Given these constraints, well-elaborated development plan involving farmer participation and cost-sharing system should be formulated to achieve the development target.

(b) Development strategy

(i) Development approach

To provide agricultural infrastructures for stable rice production, the following development approach is proposed based on the present development resources such as infrastructures, natural resources, water users groups and institutional framework.

- Rehabilitation of Existing Irrigation System
- Construction of New Irrigation System
- Strengthening Water Management

Outline of these approaches presented as follows.

Approach/ Items	① Rehabilitation of Existing Irrigation System	② Construction of New Irrigation System	③Strengthening of Water Management
Application area	Deteriorated irrigation system area	Non-irrigation infrastructure area	Unproductive water Allocation area Critical water resources Basin
Component	- Irrigation canal construction plan - Pump facilities maintenance plan -Small scale irrigation system rehabilitation plan	-Small scale pump irrigation construction plan -Small scale gravity irrigation system construction -Medium and large scale irrigation development plan	-On-farm and irrigation block water management plan -Sub-basin water management plan
Input	Small	Moderate to large	Small to moderate
Implement Possibility	High	Medium to low	High to low
Priority	High	High to low	High to low
Relation with other Projects	Pump irrigation program、IMT	IMT	IMT

Approach ① and ② aim at expanding the acreage of irrigable land while approach ③, the cross-cutting qualitative improvement approach of ① and ②, aims at improving rice production activities in the irrigated fields.

(ii) Development Plan

The establishment of a stable double cropping system is set as the short-term target for year 2010. As a medium and long-term target, the introduction of crop diversification and integrated farming is proposed considering the future agricultural prospects in the Study area. For both terms, irrigation infrastructures should be provided but should be applied step by step.

- Rehabilitation of Existing Irrigation System (short-term target)

This approach will be applied in poor rice production areas due to deteriorating irrigation facilities. In this approach, higher priority is given to area where quick development impact can be generated with relatively lower input and higher benefit. The planning, improvement level of the existing facilities will be designed based on the present technical capability of farmers. This consists of three components, a) irrigation canal system construction plan, b) pump facilities maintenance plan, c) small-scale irrigation system rehabilitation plan.

The formulation of a pump facilities maintenance plan is quite urgent. Considering the social backdrop of National Irrigation Pump Installation Program (NIPIP), this plan should be elevated as a nation-wide plan with full cooperation and support from the pump manufacturers and in line with the

ongoing NIPIP.

- Construction of New Irrigation System (short, medium and long term target)

This approach should be applied in the rain-fed area where irrigation system is absent. It consists of three components, a) small-scale pump irrigation system construction plan, b) small-scale gravity irrigation system construction plan, c) medium to large-scale irrigation system construction plan.

The small-scale pump irrigation system construction plan should be promoted as a short-term target since pump irrigation schemes under NIPIP is already ongoing. Priority areas for development can be selected from the candidate areas listed by PAFSO, based on the preliminary study on project viability.

Medium to large-scale irrigation system construction plan will be applied in the existing rain-fed and non-irrigated area where small-scale pump irrigation schemes can not be introduced due to low project viability resulting from low cost-benefit and inappropriate cost sharing scheme. Considering these conditions, this plan should be developed as the medium and long-term target. Long period and huge investments are needed to realize such development activities. In the development process, repairs of deteriorated pump facilities, progress of IMT and mobilization of financial resources should be considered. Faced with these development constraints, the possibility of implementing the plan should be considered in the short and medium term period.

- Strengthening Water Management（short, medium and long term target）

As irrigation area is being expanded and integrated farming is being pursued, more appropriate water management skills are needed. This approach will be applied in the area or basin where shortage of water resources has been experienced and in areas where water allocation is needed due to limited water resources the dry season. This approach consists of two components, a) on-farm and irrigation block water management strengthening plan and b) sub-basin water management strengthening plan. The required management level will be determined in accordance with the existing physical conditions and farmers' management skill.

The promotion of sub-basin water management strengthening plan is regarded as short-term target since water use condition in the dry season is becoming more critical in some sub-basins. Some remedial actions aiming at effective water use and conservation of water resources should be prioritized

As irrigation system expands, water allocation needs to be more systematic, within and among farm fields or irrigation blocks. To increase rice production under restrained water resources, irrigation system should be re-structured to accommodate a system of water management at the farm or irrigation block level. In some irrigation blocks, water management facilities may be required. This is basically set as medium and long-term target. Under this approach, management skills of WUOs will be upgraded through a well-designed training program.

- Engineering service by task force team

The irrigation structures initially provided will be managed under the farmer participatory approach. However, some support activities will be needed considering the technical and financial limitation of farmers. The creation of a task force team can play an important supporting role. Engineering staff of PAFSO and DAFSO can be organized into one task force team to provide engineering services such as planning, design, cost estimate, bidding and supervision to farmers.

(c) Project Components

(i) Rehabilitation Existing Irrigation System

Irrigation canal construction plan

［Present condition］

While the existing pump facilities were constructed by government's fund, construction of feeder canals was delegated to farmers' group. However, the canal construction work has not proceeded as government had planned primarily due to financial and technical limitation of farmers' group. As a result, most of pump irrigation service areas have incomplete canal system and consequently, an inefficient pumping system. On the other hand, the collection of irrigation water fee from beneficiary farmers as compensation to the government, to cover costs for operation and management of irrigation system and re-investment was quite low

If the present incomplete canal system is transferred into farmer group without any improvement measures, the beneficiary area and farmers capable of paying the fees will be limited to those along existing canals, thus creating a farming disparity in target area. Smooth implementation of IMT will also be threatened.

［Improvement approach］

With the NIPIP, irrigation water could be lifted in areas where the pumps have been installed. As a next step, the canal system should be constructed so that water being lifted could be delivered effectively to the targeted agricultural lands. On the other hand, the expansion of irrigable areas will enable the smooth implementation of IMT.

The following plan should be implemented in the village or irrigation request basis.

Development Plan	Irrigation canal construction plan
Purpose	To stabilize irrigation water supply Expansion of irrigated area
Application area	Areas with Incomplete canal system
Content of plan (expected output)	-Canal construction -Small portable pumps -O/M organization
Required supporting activities	-E/S for canal construction -Mobilization plan of construction fund -Calculation of cost sharing by farmers -Repayment plan of WUO -Training for O/M

「Development effect, etc」

Target area: 150 areas with incomplete canal system (as short-term target)

Development effect: additional 8,400 ha irrigated

Pump facilities maintenance plan

［Present condition］

Most of the pumps were installed after the 1995/96 flood to compensate for rice shortage. With these pumps, dry season rice production has increased. However, the management and maintenance system of the pump facilities was not established under the Program. Since they are still new, the pump facilities operate smoothly. Although minimum management work is needed at the moment, some maintenance activities such as regular check and repair of facilities, and replacement of parts will be required in the future.

［Improvement approach］

An O/M system to operate the installed pump should be established immediately to sustain the productivity of dry season rice cropping. According to the government's policy, the responsibility for pump operation and management rest upon the WUO. However, the present level of operation and maintenance skill of WUO is still inadequate to deal with mechanical problems of pump, hence, O/M work should be supported from both engineering and non-engineering viewpoints.

The following plan should be developed under the leadership of DOI.

Plan	Pump facilities maintenance plan
Purpose	To secure irrigation water
Application area	Deteriorated pump station
Content of plan (expected output)	Conduct of workshop Establishment of maintenance organization （WUO、PAFSO、DAFSO、DOI、Pump manufacturer） Technical training Preparation of pump O/M manual Preparation of pump operation and monitoring manual
Required supporting activities	Procurement of fund Cooperation with pump manufacturer

「Development concept」

DOI has a nation-wide development plan on the conduct of workshops, taking the importance and sustainability of irrigation pumps into consideration. At present, training and education seminars for maintenance staff of PAFSO and DAFSO is irregular and not systematic. In the development planning of pump maintenance system, after-sales-service of pump manufacturers should be incorporated.

This development plan should be promoted in line with the rationale fro NIPIP as a nation-wide program.

Small-scale irrigation system rehabilitation plan

［Present condition］

Most of the small-scale reservoirs and weirs were constructed before the commencement of the NIPIP. Operation and maintenance of these facilities is not clearly organized. Thus, there had been no maintenance work undertaken that the reservoir dikes and gate structures are deteriorating. As a consequence, there had been poor water storage and water distribution system is deteriorating. All these conditions contributed significantly in the decrease in irrigated areas.

［Improvement approach］

The deteriorated facilities should be rehabilitated as they become the key constraints to an efficient irrigation system. Since the scale of rehabilitation work is dependent on the extent of damage of facilities, cost sharing by farmers will vary. Cost-sharing scheme is the main concern of farmers in the planning of renovation and improvement works. By adopting the farmer participatory approach, frictions and conflicts of interest among the beneficiary farmers could be eliminated from the initial development stage. It may also be noteworthy to mention that for any plan seeking for technical improvement of facilities, the financial limitation of farmers and possibility of fund procurement

should be considered.

The following development plan should be implemented on request basis from pertinent village.

Development plan	Small scale irrigation rehabilitation
Purpose	To secure irrigation water Micro basin water conservation
Application area	Areas with Deteriorated Irrigation facility
Content of plan (expected output)	Reinforcement of dike Rehabilitation of weir and intake facilities Operation and management of facilities constructed by WUO
Required supporting activities	E/S for rehabilitation works Fund mobilization plan Definition of cost sharing in facilities construction and improvement level of facilities Repayment plan of farmers Establishment of O/M organization (WUO) Training WUO for O/M of rehabilitated facilities Preparation of appropriate water use plan

「Development effect」

Target area: 27 areas (short-term target)

Development effect: 1,600 ha of irrigated area

(ii) construction of irrigation system

Small-scale pump irrigation system construction plan

［Present condition］

DOI intends to continue the program on the installation of pump facilities for further expansion of dry season rice cropping. PAFSO has already prepared the candidate areas for pump irrigation based on the farmers' request. Considering the progress of ongoing NIPIP, the development area has shifted from the existing paddy fields to newly reclaimed area but with slow and low development effect.

［Improvement concept］

Although pump facilities could be introduced to expand dry season rice cropping, an integrated approach to realize quick and positive development effect should be taken. This involves the development and planning of farming practices compatible with local resources. As such, the integrated farming plan should be introduced to complement the program on the installation of pump facilities.

The following development plan should be implemented on village request basis.

Plan	Small scale pump irrigation construction
Purpose	To secure irrigation water Stable supply of irrigation water Extension of irrigation area
Application area	Non-irrigated areas
Content of plan (expected output)	Provision of canal system On-farm development O/M of constructed irrigation system Introduction of portable pump
Required supporting activities	Installation of pump station E/S for canal/on-farm development Procurement plan of construction fund Definition of cost sharing for farmers Repayment plan of construction cost Establishment of WUO Training for O/M to WUO

「Development effect」

Target area: 58 areas (short-term target)

Development effect: 8,500 ha of irrigated area

Small-scale gravity irrigation system construction plan

「Present condition」

Dry season irrigation area has been expanded horizontally and gradually, from areas having easy access to water resources such as those along river/swamp toward the inland area. The remaining remote areas are still practicing traditional rainfed agriculture. For such areas, the introduction of small-scale pump irrigation system is not feasible due to high construction cost. The development of other water resources will be explored wherever there is a possibility.

「Improvement concept」

For remote inland areas, water resources development plan should first aim to secure drinking water and then irrigation water for wet/dry rice cropping and finally, the introduction of integrated farming system. Development plan should be examined on a micro-basin level and conducted on a village development level. The plan will have to be shaped by the natural resources in the micro-basin. In development planning, financial support from agencies or government would be needed considering the need for higher investment. For such cases, cost-sharing method should be clarified in the planning stage and repayment method should be accepted by farmers.

The following plan should be developed in the village request basis.

Plan	Small scale irrigation system construction plan
Purpose	To secure drinking and irrigation water Stable supply irrigation water Extension of irrigation area
Application area	Non-irrigated areas in micro-basin Inland area far from ample water resources
Content of plan (expected output)	Construction of reservoir, weir Provision of canal and on-farm facilities O/M of constructed facilities by WUO Establishment of WUO
Required supporting activities	E/S for development design Mobilization of construction fund Definition of cost sharing system Repayment plan of construction cost Establishment of WUO Training O/M to WUO Preparation of cropping schedule

Medium and large-scale irrigation development plan

「Present condition」

A small-scale irrigation development plan alone cannot provide adequate water to irrigate the whole of rainfed lands. Expansion of irrigable areas would be limited even if the installation of new small-scale pumping schemes were to be continued. On the other hand remote rainfed areas will remain as non-irrigated if no development measures are taken. Although a non-irrigated agricultural approach might be taken as one of the poverty alleviation measures, development of rice based subsistence agriculture is the most realistic measure for the rural people since no other income source is found, except for agricultural activities.

「Improvement concept」

A medium and large-scale irrigation development plan should be implemented for such remote rainfed areas not presently covered by small pumping schemes. Since the development plan will cover a wide area of agricultural land, the possibility of re-allocation or unification of present pump irrigation system might be considered in the development planning process. However, the main constraint to the realization of the plan is the mobilization of project fund considering that large systems entail huge investment costs.

The following development plan should be developed under the leadership of DOI.

Plan	Medium/large scale irrigation development plan
Purpose	To secure irrigation water Stable supply of irrigation water Extension of irrigation area
Application area	Rain-fed area
Content of plan (expected output)	Construction of pump station, reservoir, weir Provision of canal/on-farm facilities O/M of constructed system by WUO/WUA
Required supporting activities	Feasibility study E/S for construction Procurement plan of project cost Mobilization of local resources for construction work Definition of cost sharing Repayment plan of farmers Establishment of WUO Training O/M to WUO Preparation of land use and cropping plans

(iii) Strengthening of Water Management

Water management plan for on-farm and irrigation area

「Present condition」

In the existing irrigated areas, ineffective and uneconomical pump irrigation systems can be seen. The main causes identified were poor water management system resulting to water delivery losses and insufficient water allocation. Taking into consideration the IMT program in which beneficiary farmers are supposed to collect irrigation service fees and to operate and manage pump irrigation system fair and transparent water allocation system will be needed in the future.

「Improvement concept」

In irrigated areas with poor efficiency, the concept of water management should be introduced. The present canal system should be improved to enable WUO to conduct efficient water allocation. Considering the practical side of IMT, irrigation service fee per farm household should be reduced as much as possible through expansion of irrigated areas and increasing the number of farmer-beneficiaries. To expand irrigation area currently served by the existing pump facilities, effective pump operation and water allocation is required.

The following plan should be implemented in the WUO's request basis.

Plan	On-farm/irrigation area water management
Purpose	Proper irrigation water distribution Reduction of irrigation service fees per farm household
Application area	Ineffective and uneconomical irrigation service area
Content of plan (expected output)	Construction of on-farm facilities, water distribution structures Installation of water measurement tools Water allocation by WUO Transparent management of WUO Estimation of acceptable irrigation service fees
Required supporting activities	E/S for introduction of water management Mobilization of construction fund Definition of cost sharing for construction Repayment plan of farmers Training water management method to WUO Training of democratic management of irrigation service

Sub-basin based water management development plan

［Present condition］

The present irrigation projects have been developed individually and independently, on the assumption that water resource is in ample supply. The study for these projects was conducted without any proper consideration for hydrological properties, water resources potential and water use adjustment. As a result of the rough study of water balance, it may be concluded that the availability of water resources in the dry season is not always high but depends on the size of basin. In general, as more pump irrigation schemes are being installed in the basin, water demand pressure becomes higher. In the future, there could be a water crisis in basins during the dry season where water resources are becoming critical. On this perspective, the establishment of water management system to deal with water use adjustment among irrigated areas becomes urgent.

［Improvement concept］

If irrigation water is tapped unsystematically and independently from each pump station in the basin, dry season rice production will become unstable. Its negative impact on the valuable ecosystem in the wetland may be increased by further irrigation development. To secure sustainable irrigation agriculture in the basin, water management plan should be introduced into the critical water resources basin where effective water use and conservation of natural resources should be emphasized.

The following development plan should be developed in critical water resources basin.

Plan	Sub-basin water management plan
Purpose	Effective use of water resources Basin conservation Appropriate water use adjustment
Application area	Critical water resources basin
Content of plan (expected output)	Construction of small intake weir Provision of irrigation canal Movement from each WUO to federation of WUO Intake management by WUO Cropping plan by WUO under limited water resources O/M of constructed system
Required supporting activities	E/S Mobilization plan construction fund Definition of cost sharing system for construction work Mobilizing plan of local resources Training water management method to WUO Training and education for federation of WUO Training and education for basin management and water conservation Preparation of land use plan under limited water resources

「Development effect」

Target area: 9 sub-basins

Development effect: secure a stable dry season rice cropping

4.5 Environmental Consideration

4.5.1 Environmental Conservation Plan

(1) Required Concepts

Based on the analysis of possible environmental issues under the present condition, the required concepts for the proposed master plan are considered from the environmental viewpoint. The concepts presented aimed at ensuring the project sustainability while avoiding any conflicts during the project implementation and considering the recent changes in the Study area.

(a) Systematic and Environmentally Sound Water Management

A systematic and basin-wide water management system should be considered in irrigation development, not only focusing on the expansion of the irrigated fields. Therefore, it must be the premise that sufficient amount of water will be ensured for all stakeholders in the basin especially on newly established irrigation schemes. For the existing irrigation scheme, it is essential to make a discussion among the stakeholders and related agencies (especially in case of wetlands) in the basin to set up the necessary water rights including the guidelines for water distribution among stakeholders. An efficient water utilization scheme is also important for the achievement of a systematic basin-wide water

management scheme. Therefore, the activities to improve the irrigation efficiency in the scheme, such as the improvement and updating of existing facilities, establishment of water management methods and rules, and reinforcement of WUG are also important.

(b) Sufficient Extension for Environment-friendly Agriculture

The sufficient agricultural extension work for intensive irrigated farming is essential for preventing the future pollution of the drainage water and the health hazard to farmers. Farmers require the information of farming practice, especially in terms of agrochemical and fertilizer usage, such as usage and dosage of farm input, selection of safe and suitable agrochemical, application period, etc. In addition, the water management in the field is also to be technically supported by the extension works to avoid the contamination of the drainage due to the improper water management. Through wide dissemination of the knowledge and establishment of the proper farming practices (for the environment-friendly agriculture) among the farmers, it is expected that not only they will be able to operate environmentally sound agriculture, but also contribute in the upliftment of the villagers' living condition through increases in agricultural benefits.

(c) Coordination with Health Education Programs

As earlier mentioned, special health programs to complement the irrigation development schemes have not been carried out by DOI. In order to reduce the health risks, especially the outbreak of malaria, caused by irrigation development, it is recommended that the following health education and monitoring programs be conducted by PAFSO / DAFSO in collaboration with Provincial Public Health Office (PHO), or by entrusting the activities to PHO.

i) Introduction of Impregnated Bed Net (IBN) system to households within and around the irrigated areas

ii) Establishment of Revolving Drug Fund (RDF) and training of the villagers as the Village Health Workers (VHWs) at the target villages

iii) Establishment of periodical monitoring system of the farmers' health conditions in cooperation with VHWs

The agricultural benefit from irrigation development will also contribute to improving the farmer's living condition and uplifting their intention to proper health management. Therefore, the future health impact especially in terms of malaria could be mitigated by the application of the above health education and monitoring activities together with the irrigation development.

(d) Strengthening WUGs for Proper Water Management

The capability of WUG is an important factor for the efficient water management. WUG should be reinforced focusing on the following matters:

- to get full consent of the members to the objectives and activities of WUG

- to fully understand the importance of water management
- to acquire proper water management techniques
- to acquire proper O&M techniques

These strengthening activities should be carried out continuously starting from the establishment stage of the organization through regular discussions along the members. Therefore, full-participation and full understanding is keywords for the elimination of conflict on any issues.

(2) Environmental Conservation Plan

Since the above-mentioned concepts will be incorporated into the Master Plan, the detailed plan is mainly described in the specific sectors. This section basically notes the outline of environmental conservation plan except for the matters relating to farmers' health. The environmental conservation plans are basically urgent and must be implemented by 2005. Since the environmental condition might be changed, the required conservation plans have to be updated according to these changes.

(a) Improvement of Water Management (details described in the section on "Irrigation")

To improve the water management at both scheme and basin levels, the following activities should be taken into consideration.

(i) Scheme-wide

- Upgrading and rehabilitation of irrigation facilities
- Utilization of small mobile pumps under inefficient canal system
- Establishment of water management manuals including O&M manual and orientation on the concepts of water management among the members of WUG

(ii) Basin-wide

- Establishment of water user's guidelines among stakeholders in the basin
- Establishment of water user's committee composed of the stakeholders and related agencies
- Consensus-building for the rules established through regular discussion among the stakeholders

(b) Strengthening WUG and its Function (details described in the section on "Irrigation" and "Farmers' Organization")

To strengthen WUG structure and its function, the following activities are recommended.

- Discussion meeting with the members of WUG to make them understand WUG functions and importance of water management by applying participatory approaches

- Establishment of articles of WUG
- Setting up technical units in WUG and the specific TORs of units
- Legalization of WUG (Upgrading to WUA)
- Technical guidance for water management including O&M activities and field water management

(c) Establishment of Environment-friendly Agriculture (details described in the section on "Agricultural Support Service")

This plan aims to prevent any health damages caused by mishandling and poor selection of agrochemical and to mitigate potential adverse impacts to the surrounding environment, such as water pollution of the downstream poor water quality and wetland degradation. The following direct measures are proposed for incorporation into the agricultural development plan and improvement plan of agricultural support services.

(i) Dissemination of Integrated Pest Management (IPM) System

Under the FAO inter-country program, the IPM system has been introduced since 1996 eight (8) provinces, which includes the Study area. For three seasons during 1998 to 1999, 22 villages involving about 650 farmers have been trained, and furthermore, some of the extension workers have also been trained to become trainers under the program. The main objectives of the IPM program are to improve the farmer's ability for problem identification and analysis in the field by learning the basic agricultural knowledge and farming practice, and eventually to adopt a low input sustainable agriculture and to obtain significant benefit through the operation of IPM.

It is recommended to disseminate the IPM system in the Study area in collaboration with the FAO program in order to utilize human power efficiently and to make extension works effectively. Based on the present activities under the FAO program, the IPM extension will cover two or three villages in each province per one crop season. The number of farmers to be trained for one village will be about 30 farmers.

(ii)Establishment of guidelines for proper use of agrochemical

At present, no information is available regarding the hazardous effects of the common agrochemicals used in the country. Likewise, there is no statistical data regarding the types and volume of imported agrochemicals in the market. To ensure safe utilization and reduce the utilization of the extremely or highly hazardous agrochemical, such as Folidol (Parathion-Methyl) and Furadan (Carbofuran), a practical guideline for proper and safe utilization of agrochemical in the country should be established. This guideline should also include the precautions and recommended methods for safe storage, handling, application, and disposal.

(iii) Technical Training on Field Water Management

The establishment of proper water management in the field is also essential to prevent water contamination by farm inputs (fertilizer and agrochemical) into the drain water. In the course of strengthening of WUG, the technical training for field water management is also required considering that field water management is one of the farming practices, closely related to efficient utilization of fertilizer and agrochemical.

As for the indirect measures or long-term approaches, the registration and control of agrochemical in the market should be enforced, since the present regulation does not fully cover all the agrochemicals having high potential for increasing agricultural production. Further, it is also required to conduct training courses for capacity building of extension workers to effectively reduce or control the use of these agrochemicals.

(d) Implementation of Farmers' Health Education Program

As noted, two topics, such as health damages arising from poor agrochemical utilization and outbreak of malaria infection, are considered as the probable health issues related to the introduction of dry season irrigation. The dissemination of IPM system and reinforcement of agricultural extension system is therefore essential to mitigate such adverse effects. On the other hand, the conduct of health education program is another alternative. The following health education program is proposed as a component of the environmental conservation plan.

(i) Outline of Health Education Programs

At present, two education programs are being implemented by the Provincial Public Health Department with support from several donor agencies as mentioned in section 3.3.7. In the implementation of the Master Plan, it is recommended that these existing programs be incorporated into the Project. In areas where there is high potential for outbreak of malaria, both IBN and RDF programs will be applied. On the other hand, only RDF will be applied in low potential risks such as those along Road No.13 or surrounding towns.

The executing agency for the programs will be the Provincial Public Health Department in each province. However, DAFSOs and PAFSOs must collaborate and make close coordination with Provincial Public Health Department to feed back results of the monitoring as input to the planning works for irrigation development. The initial cost required of the program shall basically be borne by DAFSO and PAFSO.

The outline of the programs is explained in the following boxes.

Impregnated Bed Net Program

The objective of this program is to prevent villager's malaria infection through distribution of impregnated bed net to villagers. The impregnated bed net is the mosquito net impregnated with pesticide. The net have to be re-impregnated once a year to maintain the effect. The program is combined with a revolving fund system to ensure the sustainability of the program. In the program, villagers have to share some of the cost for mosquito net and pesticide, and to deposit the accumulated fund to obtain pesticide for the succeeding year.

Revolving Drug Fund Program

The objective of this program is to develop the self-health management ability in the village. One or two villagers will be trained as Village Health Worker (VHW) at the start of the program. The VHW will have basic knowledge on primary health care and finally have a role to conduct consultation with villagers and prepare for a post at the Provincial Public Health Department. A drug store will also be established together with the training of VHW in order for villagers to secure an access to medicines for primary health care. This program also combines with the revolving funding system to ensure that villagers can operate it by themselves. Medicines in the drug store will be supplied periodically by using the proceed from sale of medicines.

Staff of health post or DAFSO (extension workers) shall maintain periodic contact with the VHWs to assess health condition of villagers in the area. Through periodical monitoring, the possibility of outbreak of malaria will be determined in advance.

(ii)Unit Cost of the Programs

Based on the existing program, the unit cost of IBN program is estimated as shown below.

Items	Unit	Price (US$)	Remark
Mosquito net	net	2.4	
Insecticide	lit	15.1	1 liter of insecticide covers about 30 bed net
Dipping set	set	59.1	1 dipping set for each village is required

On the other hand, the cost for RDF program is roughly estimated at about US$130 per village, according to the interview survey among staff of the Provincial Public Health Department.

(e) Conservation of Wetland

To conserve and wisely manage the wetlands in the Study area, it is required to carry out the following activities in addition to the establishment of systematic water management and the operation of environmentally sound agriculture as mentioned above. Since these activities are not directly connected with the agricultural and rural development, they are considered as activities for the long-term:

Site level

- to conduct a survey to assess the present situation of wetlands
- to identify the stakeholders in each wetland area
- to evaluate the importance of each wetland from natural resource and social economic viewpoints
- to formulate a wetland management concept and plan at the village level
- to set up rules for the conservation of wetlands (if required)

Central level

- to establish and enact regulations for wetland conservation and management
- to establish a coordination committee or agency composed of staff from related departments

The above activities will be conducted by the forestry section in DAFSO and/or PAFSO.

4.5.2 Initial Environmental Examination of the Master Plan

(1) Screening and Scoping

The environmental screening and scoping were carried out to identify and assess the potential adverse impacts of the project on the environment by using an environmental checklist. As a result of the screening and scoping, the following are considered as potential environmental issues and/or effects.

1) Health hazard from agrochemical use
2) Deterioration of water quality in the downstream at construction and operation stages
3) Soil salinization
4) Degradation of wetlands
5) Improvement of living condition of rural households and communities
6) Improvement of regional economic situation

(2) Adverse Impacts

Some of the environmental issues are those already pointed out in Chapter 3 and the countermeasures for them are also presented in Chapter 4 as the environmental conservation plan. Although the countermeasures are incorporated into the project design, it can be considered that these issues still have potential to occur in field level in case of mis-operation by farmers. In fact, it may take a long time to accomplish the environmental conservation plan and to achieve the target of the plan. However, the degree of the impact will be surely minimized through the implementation of the project. The prospective impacts on the Master Plan are shown in Table 4-2.

Table 4-2 Future Environmental Examination and Mitigation Measures

Probable / Potential Impacts	Stage				Comments / recommended mitigation measures
	Construction		Operation		
	Without	With	Without	With	
1. Health hazard from agrochemical use	-	-	**2~3N-d-s(l)-r(ir)**	**3N**	・ The hazard will be minimized by proper handling of chemical under proposed extension works. ・ IPM or proper use of agrochemicals will be included in the improved farming practices (plan) and extension program.
2. Deterioration of water quality in downstream (1) Effect caused by agrochemical and/or Eutrification caused by fertilizer contamination	-	-	**2~3N-d-l-r**	**3N**	・ Proper water management taking agro-input use into consideration will be undertaking□IPM or proper use of agro-input including use of organic matter will be included in the improved farming practices (plan) and extension program.
(2) Inflow of construction materials into rivers	**2~3N-d-s-r**	**3N**	-	-	・ Proper construction methods shall be employed on the construction. ・ Proper disposal of construction waste shall be enforced thoroughly.
3. Soil salinization	-	-	**2N-d-l-ir**	**3N**	・ Detailed soil survey shall be carried out in the potential area for salinization. ・ Proper drainage system shall be designed and estalished.
4. Degradation on wetlands (in case wetland exsit in the downstream of the scheme)	**2~3N-id-l-ir**	**3N**	**2~3N-id-l-ir**	**3N**	・ The value of wetland shall be identified to set up the conservation concepts. ・ EIA study shall be conducted before designing works for irrigation scheme.
5. Improvement of living condition of rural life	-	-	**1P-d-l**	**1P-d-l**	・ The living standards for rural life will be improved through increase of agricultural production and improvement of rural road. ・ The construction works will provide temporary job opportunity to the villagers nearby.
6. Improvement of regional economic situation	**2P-d-s**	**2P-d-s**	**1~2P-id-l**	**1~2P-id-l**	・ Employment opportunity in marketing of inputs and outputs, processing, etc. will be increased substantially.

Remarks : <1 "with" indicates future condition with mitigation measures

Significance of impact
1 : Significant
2 : Moderate
3 : Minor

Feature of impact
P : Positive
N : Negative

Characteristics of impact
D : Direct
ID : Indirect
S : Short term
L : Long term
R : Reversible
IR : Irreversible

The feature of impacts is indicated as follow:

1P-d-s-r meaning that the positive impact would be significant, direct, short term, and reversible.

2N-d-l-ir meaning that the negative impact would be moderate, direct, long term, and irreversible.

(3) Positive Impacts

(a) Improvement of living condition of rural households and communities

Farm income will directly increase through increments in farm production. In addition, the accessibility to outside area will be improved through the rural road improvement. Other factors related to the improvement of living standard such as access to water supply and health facilities, literacy rate, etc., would also be realized by the implementation of the Master Plan, as indirect effects.

(b) Improvement of regional economic situation

The project will generate incremental employment of casual labor at the construction stage, though not permanently. In addition, the increase in agricultural production will induce economic activities in other sectors through linkage and multiplier effect. The secondary and tertiary benefits will accrue in sectors related to agriculture, such as among traders and millers.

(4) Mitigation Measures

Minimizing Soil Erosion and Deterioration of Water Quality at Construction Stage

The construction activities for rehabilitation of irrigation system and road improvement in the rainy season may cause soil erosion and deterioration of water quality due to the inflow of eroded soil. Improper construction methods which leaves the soil unnecessarily exposed might also cause soil erosion. The mitigation measures to be taken for avoiding any soil erosion are:

i) construction would be undertaken by employing proper construction methods; and

ii) disposal of cut and fill materials would be done in the right way.

As for the rural road improvement activities, slope protection works would be taken to avoid soil erosion and to ensure sustainability of the roads. Considering cost effectiveness, re-vegetation by seeding on slope and/or utilization of surface soil for fill material is recommended as the protection measures to be applied.

Conduct of Environmental Study

In case of existing wetland in the downstream of the scheme, an environmental study (EIA) should be carried out pursuant to the EIA guidelines that will be established in the near future in order to avoid any adverse impacts. Procedures and items to be studied in the environmental study are considered as follows:

Step 1: To identify the importance of the wetland

- Types and numbers of existing animals (Values for natural resources)
- Fishing condition (Values for rural life)

Step 2: To assess the environmental impact (in case the wetland is to be conserved.)

- Present hydrological condition
- Water quality

In addition, soil survey will also be required in areas with high potential risks for salinization. If the presence of salt affected layer will be confirmed, proper soil management and drainage plans should be formulated.

Part 1: Master Plan Study

CHAPTER 5

CAPACITY BUILDING OF IMPLEMENTING BODY

CHAPTER 5 CAPACITY BUILDING OF IMPLEMENTING BODIES

5.1 Necessity for Human Resource Development

The human resource development of farmer-beneficiaries shall be pursued through the establishment and strengthening of their organizations like ACG, APG, BSG and WUO, to build their capacity for project implementation. On the other hand, it is a prerequisite to upgrade the capacity of governmental agencies concerned in both hardware and software components to stabilize farming practices. It is also ideal to extend the APB's institutional finance to infrastructure development.

It was also observed that the level of technical know-how of both DAFSO and PAFSO staff has not reached a level in which they can successfully implement the various project intervention.

5.2 Capacity Building for Beneficiaries

It is no doubt that the farmer-beneficiaries are main actors to plan and implement a bottom-up type of project under the participatory approach. While, it is true that much valuable information have been developed through substantial research activities, such information do not reach the farmers' level under the existing agricultural support system.

It is definitely difficult to convey appropriate support to individual farmers in view of the limited staff in the concerned public agencies, hence, organizing the farmers is indispensable. In case of APB's institutional finance, an agricultural credit group should be formed, and a village chief consolidates several groups in place of APB field staff, through which financial burden of each APB's staff is mitigated. Although the APB staff cannot obtain and administer financial transactions on an individual borrower basis, it is presently the best alternative for APB to cope with the rapid increase of farmers' demand for seasonal loans in view of the progress of irrigation development.

As to types of farmer organizations, an agricultural production group (APG) will be organized by the farmers who grow the same crop and a water user group (WUG) to be organized for the irrigation scheme. In the future, it is necessary to systematically federate the groups or cooperate with other types of organizations.

It is also quite important to establish and train contact farmers, who should play a vital role to directly receive various inputs including technical know-how from the public agencies concerned. The contact farmer shall act as the core of farmer organization and shall extend the technical know-how to other farmers.

Issues	Solution
- Low or insufficient technical level of farmers	- Training of farmers
- Poor system information transfer	- Organizing farmers & cooperation among groups
- Insufficient staff number in public agencies	- Establishment of contact farmer system

5.3 Capacity Building for Support Bodies

In Laos, various external cooperation agencies of bilateral and multi-lateral nature have extended support in the form of technical and financial assistance. However, these various efforts accumulated during the period of cooperation, have not been sustained to attain their original targets after project completion. While many Laotian counterparts were trained in agricultural and rural development through SIRAP, FIAT and the technical and financial cooperation extended by the Japanese government, the trained staffs are not properly mobilized. On the other hand, those capable staff does not have the opportunity to extend their technical know-how.

In addition, the combination of a bureaucratic system and decentralization had it adverse effect as; there exist some conflicts in mobilizing human resources including extension staff at field level due to the absence of a clear and systematic synchronization between central and local governments' policy and directives.

In order to address the said problems, it is urgent to establish a cross-sectoral agricultural support system. In this connection, it is proposed to establish and to promote the formation of Task Force Team (TFT) to operationalize the cross-sectoral approach. Since the condition of infrastructures in DAFSO is generally at an unsatisfactory level, it is necessary to develop and reinforce such infrastructure, through which mobility of DAFSO staff will be improved.

On the other hand, as every proposed project requires the procurement of fund and considering the weak financial base of the related agencies and major role players including the farmers, there is heavy reliance on external fund sources. Farmers have to rely on APB's finance for seasonal production expenses as well as capital cost for the construction and rehabilitation of irrigation facilities. For APB, it is exerting serious efforts to cope with rapid increase of loan demands due to the promotion of irrigation schemes, but APB's financial capability is limited to meet such volume of demand. It is also an urgent matter for APB head office, branch offices, service units and sub-service units to strengthen its staff capability to comply with additional loan demand for the implementation of identified projects under the Study.

Issue:	Solution:
- Insufficient or poor technical level of extension staff	- Training of extension staff
- No continuation of foreign assisted cooperation	- Preparation of cross-sectoral supporting system
- Lack of consistency in public administration system	- Provision/reinforcement of office facilities in DAFSO and APB
- Improper mobilization of staff	

5.4 Role of TFT

The concept of TFT as proposed under the Study, recognizes the role of the team as a key player for the basic and intensive development approach and the participatory development approach. In the field survey of Phase II Study, the TFTs have been organized and implemented their activities on a trial basis.

Due to different views and opinions in the upper administrative structure, particularly in the district offices and province who are responsible for guiding and supervising the TFT, it was not possible to introduce the TFT concept under the existing organizational structures in the three Model Areas. However, a similar structure and system could be applied and operationalized as the TFT itself is concerned. It can be said that the members of these virtual TFTs seem to have recognition of the necessity and importance of their role as an interface with farmers. This was experienced through collaborative work with Study Team members and hands-on experiences in the preparation and operation of PCM workshop as well as formulation and feedback of PDM. It is remarkable that the TFT members for the Phonthan Model Area expressed their interest to continue their activities including attendance to regular meetings to be held once a month even after the completion of the Study.

It is evident that the TFT activities will serve as the core to continuously implement the various projects and schemes identified under the Study. The main roles of TFT are basically (a) as an interface between farmers or farmers' organizations and support system provided by public agencies, (b) establishment of bottom-up system as public agencies' antenna and (c) facilitator of various activities undertaken by farmers or farmers' organizations.

5.5 Capacity Building through OJT

On the basis of the concept of project cycle management, it is proposed to implement a capacity building program for staff of public agencies as well as beneficiaries through on-the-job training approach by using the identified infrastructure development as context (See Figure 5-1).

In view of the effective utilization of human resources which have so far been educated and trained in classroom as well as in field, it is considered necessary to establish a staff database in the concerned offices, like PAFSO, DAFSO, APB and FSC. Items of the database shall cover at least name, position, birthplace, educational attainment, specialization, qualification, trainings received (subject, period, etc.). The selection of SMS and TFT members who are participating in the implementation of projects and schemes identified in this Study, shall be made by using the database. The lessons and experiences obtained from project implementation shall be inputted into the database and applied to other areas, if possible.

In the early stage, external assistance in both technical and financial terms may be required to support the series of project cycle workshops and verification of the respective PDM which will be adopted in the identified projects in Model Areas. In this case, the project will start from the second step as survey/investigation to the monitoring/evaluation step. It is a final target that promotion of succeeding projects and schemes will be implemented using domestic resources through accumulation of experience and know-how by SMS and TFT.

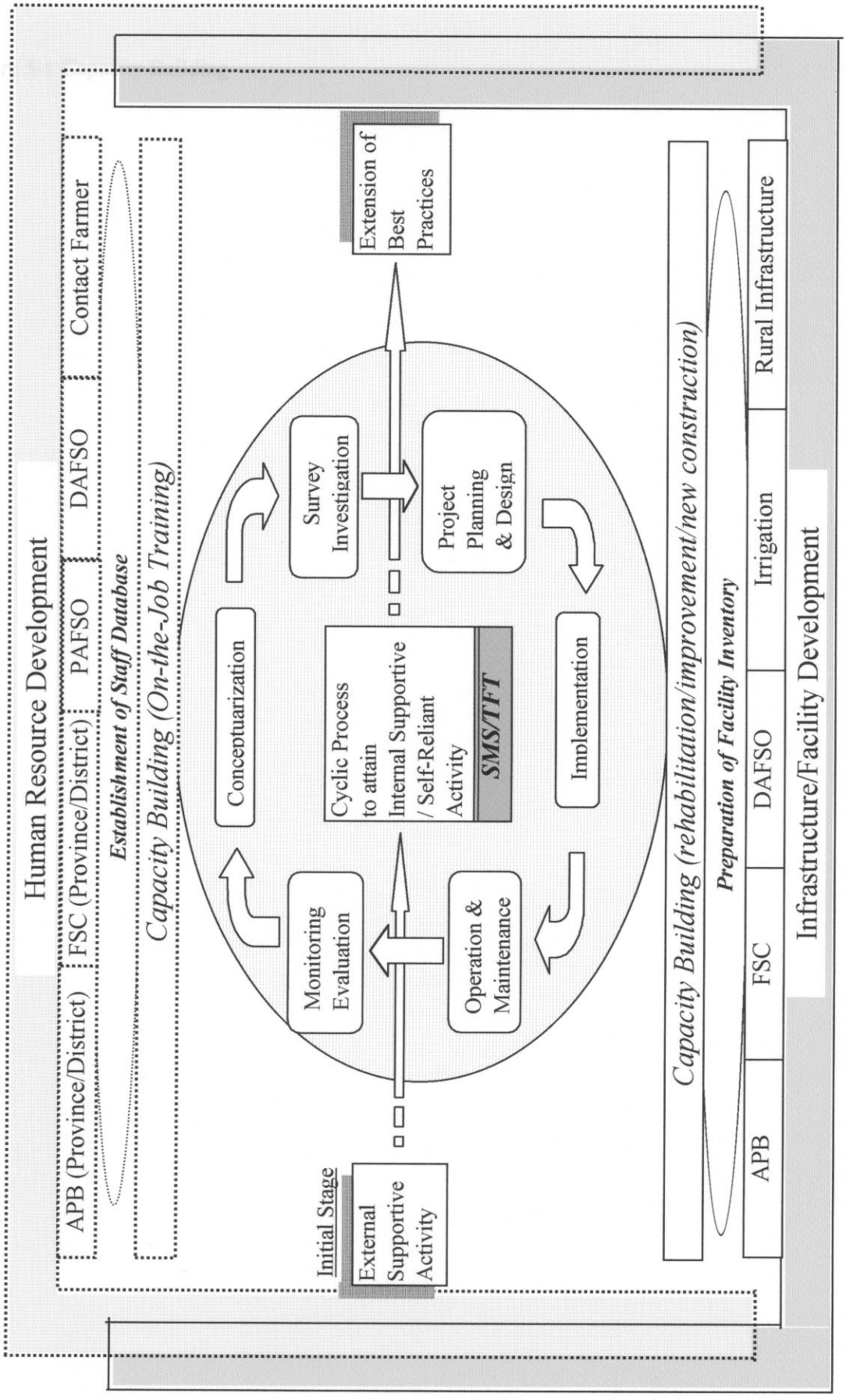


Figure 5-1 Capacity Building through On-the-Job Training