APPENDIX D : AGRICULTURAL SUPPORTING SYSTEM

THE STUDY
ON
MODEL RURAL DEVELOPMENT
IN
NAM DAN DISTRICT, NGHE AN PROVINCE

FINAL REPORT

APPENDIX- D : AGRICULTURAL SUPPORTING SYSTEM

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D.1 INTRODUCTION

D.1.1 Objective of the Study

The main objective of the study is to clarify the present conditions of agricultural supporting system, such as agricultural extension, seed supply and agricultural mechanization, and to suggest the reasonable agricultural supporting system plan which is more contributive for production increase in the Study Area.

In Nam Dan District, farm size per household is very small (about 0.35 ha) and cropping rate of farm is very high (about 190 %) because present whole agricultural land is very small and there is no space for land reclamation. Therefore, "increase of yield and profit per land" was regarded as a principal viewpoint of the study. Enhancement of agricultural supporting systems will play an important role in agricultural development considering these circumstances.

D.1.2 Summary of Field Work

Following data and information were collected.

- present situation and problem of agricultural extension system
- present situation and problem of seed supply system
- present situation and problem of agricultural mechanization

Collection of the information in the District office, the Provincial office and the Provincial Crop Seed Company including its Nam Dan Seed Station, questionnaire survey on typical farmers, discussion with staff of the District and the Province including staff actively engaged these works, observation on crops growing field were carried out.

D.1.3 Summary of Agricultural Supporting System Plan

Based on the results of field survey and analysis of present conditions, the Agricultural Supporting System Plans consisting of the Agricultural Extension Center, the Seed Supply Center, the Nursery Center and the Agricultural Mechanization Service Center was formulated as the Master Plan.

As year 2010 was set as the target year in the Master Plan of Socio-economic Development of Nghe An Province, the target year 2010 is also set for the Master Plan Study for Model Rural Development in Nam Dan District.

(1) Basic Concepts for Agricultural Supporting System

Based on the considerations of present situation, following basic development concepts are proposed.

1) Agricultural Extension Services

The Agricultural Extension Center is established to increase agricultural production and to increase farmer's income by activation through expansion of extension organization and enrichment of facilities & equipment as well as budget for extension services.

2) Seed Supply Service

The Seed Supply Center is newly established as an organization of the District. The Center produces high quality seed, preserves the seed keeping high quality, and distributes timely the high quality seed to all rice cultivating farmers.

3) Nursery Stock Supply Service

The Nam Dan Nursery Center is established as an organization of the District. The Center produces and distributes to farmers nursery stocks with high productivity and high quality of orange, lemon, grapefruit, persimmon.

4) Agricultural Mechanization Service

The Agricultural Mechanization Service Center is established as an organization of the District. The Center get a complete set of farm machinery and carry out timely rent of machine or contracted farming service. The Center aim to promote agricultural mechanization in the region through service and demonstration of agricultural mechanization.

(2) Prioritization of Project

Prioritization of those projects have been studied based on inhabitant needs, impact and synergistic effect in the agricultural sector. As a result of the study, the Agricultural Extension Center, the Seed Supply Center and the Agricultural Mechanization Service Center were given ranking A, and the Nursery Center was given ranking B.

(3) Outline of Priority Projects

Outline of the priority projects are as shown below.

Outline of Priority Projects

Title	Type of Organization	Activities/Functions
Agricultural Extension Center	Official Organization under The People's Committee of Nam Dan District(New establishment)	1) Analysis of limiting factors of productivity 2) Introduction & propaganda of good varieties 3) Exhibition of single technologies (through Model Plot) 4) Exhibition of model farming practice(High profitable farming system by original idea of farmers themselves, in addition to the instruction by the Center)

Title	Type of Organization	Activities/Functions
		5) Visiting instruction by commune specialist 6) Technical training course tours
Seed Supply Center	Official Organization under The People's Committee of Nam Dan District (New establishment)	1) Production of high quality seed on the contract basis 2) Preservation of the produced seed keeping high quality 3) Timely distribution of the high quality seed to farmers
Agricultural Mechanization Service Center	Official Organization under The People's Committee of Nam Dan District (New establishment)	1) Training of operation technique of farming machine and conferment of the license 2) Lending of farming machine to licensed farmers 3) Implementation of contracted farming 4) Maintenance and repair of machinery 5) Advice and guidance on farm mechanization 6) Guidance on farm mechanization for the Farming Model Farms

(4) Implementation Plan

Preparation period : 1998(1 year)
Construction period : 1999(1 year)

Implementation of the Projects is executed by organizations of Nam Dan District and Nghe An Province as shown below.

Organization Concerning Implementation of the Projects

Name of Organization	Agr. Extension Center	Seed Supply Center	Agr. Mechani. Service Center
Agr. & Rural Devel.Dept.of Nam Dan	●	●	●
Agr. Extension Station of Nam Dan	○		○
Agr. Exten. Center of Nghe An Prov.	■		
Agr.& Rural Devel. Dept. of Nghe An Prov.		■	■
Crop Seed Company of Nghe An Prov.		○	

(note) ●: Core organization for implementation of the Project
○: Collaborated organization with closer connection for implementation of the Project
■: Supporting and supervising organization for implementation of the Project

(5) Operation and Maintenance Plan

Operation of the Projects will be initiated at 2000.
Operation and management system is as shown below.

O/M System

Name of Project	Number of Staff				Number of Section
	Technical	Skilled	Others	Total	
Agricultural Extension Center	27	5	3	35	2
Seed Supply Center	5	4	7	16	3
Agricultural Mechanization Service Center	4	29	43	76	2 stations

Note: "Technical" means Technical Officer.
"Skilled" includes Operator, Mechanics, Driver and Skilled worker.

(6) Project and O/M Cost

Project Cost

Name of Project	Project Cost (mill.VND)		
	L/C	F/C	Total
Agricultural Extension Center	134	1,951	2,085
Seed Supply Center	3,270	18,449	21,719
Agricultural Mechanization Service Center	6,667	35,138	41,804
Total	10,071	55,538	65,609

Note: Project cost includes engineering cost and material reserves, but rise in prices.

Annual Operation & Maintenance Cost

(mill. VND)

Name of Project	Operation & Maintenance	Annual Average of Replacement	Annual Total O/M Cost
Agricultural Extension Center	531	187	718
Seed Supply Center	2,781	723	3,504
Agricultural Mechanization Service Center	1,432	3,477	4,909
Total	4,744	4,387	9,131

Note: Replacement cost is the annual mean value according to the life of equipment.

D.2 PRESENT CONDITIONS OF AGRICULTURAL SUPPORTING SYSTEM

D.2.1 Agricultural Extension Station

(1) General

The Nam Dan Agricultural Extension Station started giving services in October, 1996. Previously, the agricultural extension services were provided by the Agriculture and Rural Development Department. The station is presently under the direct management of the District and is under the guidance and supervision of the Provincial Agricultural Extension Center. The center, in its turn, depends on the Department of Agricultural Extension Department of the Ministry of Agriculture and Rural Development.

(2) Extension Purposes

The main purpose of the extension services are related to the introduction of new agricultural technologies, new crop and animal breed varieties. For these purpose, "Extension Model Plots" have been established where new agricultural technologies are demonstrated and are taught to the farmers. The system used is the "Training and Visiting System". This system means to provide training on site to farmers and visit them on the spot.

At the provincial level, the Extension Center provides training courses mainly for extension workers. Also, the Ministry of Agriculture and Rural Development provides series of training courses for extension workers. At present, there is no

official licensing of extension workers established in the country. Only the ministry issues certificate to extension workers of completing a training course they offer. Experienced and qualified extension workers are invited to attend the training courses.

(3) Budget

The available budget for the Station in 1996 was VND77,000,000. The provincial budget provides VDN60,000,000 and the district budget provides VND17,000,000. These budget are mainly used for establishing "Extension Model Plots" and for extension services. Besides these budget, another budget covering salaries for extension workers will be provided by the District. However, the total budget for the station is too small to cover the financial requirements for an adequate provision of extension services.

(4) Staff and Services' Coverage

At present, there are only 4 people working at the Station. This number is evidently insufficient to cover the 31,800 households in the district. The station's services plan considers covering one commune at the time due to the small number of extension workers. It has been estimated that under the present conditions, one staff can cover only two communes per year.

The staff has only three motorcycles and 1 bicycle which makes it very difficult to go to the farms during the rainy season when most of the rural roads becomes muddy and hard to ride on.

(5) Materials

The materials used for extension services are:

- Magazines
- Leaflets specially prepared by the Station
- Educational material provided by the Provincial Extension Center

As most of the material mentioned above are available in small quantities, the extension workers give some material to the head of the commune and he is in charge of circulating the material among the members of the commune.

(6) Extension Model Plots

As a major activities of the station, Extension Model Plots have been established in the District. These plots are established to demonstrate mainly new varieties of rice, other crops, livestock and fishes. Programs of extending new varieties are planned in the different offices such as in the extension department at the Ministry level, in the extension center at the provincial level and in the extension station at the district level. Budget and implementing schedule for each program are planned in the office of initiating the program. Then, some of these programs that are located in the district are implemented by the extension station.

For an example of extension program of new rice variety, few farmers are selected by extension workers with a coordination of agricultural cooperatives in the area to implement a program. Since the budget of a program is limited, only some of the farmers can be participated in a program. Level of skill and willingness to participate are considered in the selection of farmers.

The selected farmers provide a part of their cultivating land for the program. And the farmers are provided with all necessary materials such as seeds, fertilizer and cost of extra labor if it is necessary. The farmers are responsible to cultivate the crop in the specified area according to the instruction of extension workers. Extension station and cooperative often organize other farmers to visit Extension Model Plots and to observe demonstration. The farmers participated in the programs are also responsible for reporting the process and the outcomes of the cultivation.

Once the crops are harvested, the farmers can directly see the advantages of adopting a new and improved variety, and of using new technology. These activities are usually contracted between extension workers and farmers by verbal agreement and are lasted for one year or one crop season.

(7) Present and Future Activities

At present, the Station has been concentrating on the introduction of new rice varieties, X21 in Hung Tien commune and OMCS96 in 12 communes. Present activities of the extension station including the introduction of new varieties are listed below:

Item	Location	Total Area	Initiated Agent
Rice (X21)	12 communes	115 ha	District
Rice (OMCS96)	Hung Tien commune	5 ha	Province
Sesame Seeds	5 cooperatives	20 ha	District
Sugarcane	N. Loc/N. Tan commune	4 ha	Province
Fish	5 cooperatives	5 ha	Province
Potato	3 cooperatives	8.8 ha	District

Besides the introduction of new rice varieties, Also, it will put emphasis on the new project of introducing a new breed of pigs which will provides more kilograms of meat per animal. This project is being planned with the cooperation of the Agricultural University No.2 of Hue. To introduce this new breed, 10 households will be selected at each commune and they will be guided in the breeding process of the pigs. They will help to disseminate the required technology to raise the pigs within their own communes.

(8) Main Problems

At present, the following problems can be detected related to extension services.

- The budget is too small to operate an efficient extension service.
- The present number of extension workers is not enough at all. Technical level of the

extension workers is too uneven.
- Transportation means are not enough to carry out the extension activities.
- Number of training facilities and materials is not enough.
- Extension Model Plots are not enough in number. Farmers who live far away find it very difficult to visit the demonstration plots.

D.2.2 Seed Supply System

(1) Breeding

Breeding of crops is carried out by some Agricultural Research Institutes, which are under management of Ministry of Agriculture and Rural Development, Ministry of Training and Education as follows:

- Food Crop Research Institute
- Viet Nam Agricultural Science and Technology Institute
- Agricultural Genetic Research Institute
- Plant Protection Institute
- Ha Noi Agricultural University No I
- Bac Thai Agricultural University
- Other Institutes

One of the main activities of these Institutes are breeding of paddy. Due to the different breeding methods, they can select and create new varieties with good prospect. After performance test in some local areas (which have been observed by National Center of variety examination), if these varieties can be applied for production by farmers in several areas, so there should be approved as the national variety by the Government.

(2) Seed Production and Supply System

In Ha Noi, there is National Crop Seed Company, which is under management of ministry of Agriculture and Rural Development. In the provinces, there are Provincial Crop Seed Companies, according to profession these companies are under management of the National Crop Varieties Company.

When the variety has been approved as a national variety, so according to relationship of the breeder with the relating agencies, that is the seed production can be implemented at any levels, it is not necessary to be relied on the levels from national to provincial level. The breeder, who has Super Original Seed, can organize to produce Original Seed at Seed Stations of National Crop Seed Company or Provincial Crop Seed Companies.

In Nam Dan District, there is existing a Seed Station of Nghe An Crop Seed Company. The functions and activities of the Station are as follows:

- Organize to produce the prospect variety's seed (Original Seed), which have been approved by the Government
- Supplying paddy seed for farmers in Nam Dan District and other areas

This Seed Station has not farm to produce seed, hence annually the Station has contract on production of Original Seed with cooperatives (Hung Tien, Xuan Hoa). The main agreements on the contract are:

- Exchange rate: 1 kg paddy seeds = 1.7 - 1.8 kg of paddy according to market price
- The cooperatives, which sign contract with the Seed Station have to follow the technical process according guideline of the Seed Station

Annually in Winter-Spring paddy crop, the Seed Station produces about 30 tons of Original Seed of variety IR 1820 and 18 tons of IR 17494. In Summer-Autumn paddy crop it can produce 40 tons of Original Seed of CR 203 and 12 tons of IR 352. This paddy seed volume can cover less than 10 % of seed demand of the farmers within the District.

(3) Seed Using of Farmers

Quantity of seeding of crops and its value are shown as follows:

Quantity of Seeding and its Value

Crop	Variety	Quantity kg/ha	Price VND/kg	Value VND/ha
Rice	IR 1820 (1st class)	120	4,500	540,000
	IR 1820 (2nd class)	120	2,500	300,000
	CR 203 (1st class)	120	4,000	480,000
	CR 203 (2nd class)	120	3,700	444,000
	IR 352	120	5,000	600,000
	Bao Thai	100	4,000	400,000
	(Average)	120	4,000	480,000
Maize	Bioseed 9681	14	20,000	280,000
Sweet potato		50	1,200	60,000
Peanut	Nghe An Sen	150	6,000	900,000
Soybean	AKO3, AKO2	40	7,000	280,000
Sesame		5	18,000	90,000
Chili		2	10,000	20,000
Sugar cane		30,000piece	13	390,000

(Source) JICA Study Team

D.2.3 Farming Labor and Farming Mechanization

Farmer's actual labor input for crop production which is roughly estimated is shown as follows:

Labor Input For Crop Production

(days/ha)

Operation	Rice	Maize	Sweet potato	Peanut	Sesame	Sugarcane
1. Seed Bedding	10		10			
2. Land Preparation	20	20	20	20	20	20

Operation	Rice	Maize	Sweet potato	Peanut	Sesame	Sugarcane
3. Transplant	30					
4. Weeding	120	80	40	80	130	120
5. Fertilization & spraying	20	10	10	10	10	30
6. Harvesting & threshing	60	50	40	50	38	60
7. Others			10			
Total	260	160	130	160	198	230

(Note) Others of sweet potato : Cutting tubers and drying
One day : 8 hours
(Source) Nam Hung Cooperative

Land preparation, rice transplanting, weeding and harvesting are major heavy works in rice cultivation. Most management works are carried out by using manual labor. Land preparation of rice field is carried out with local plow and harrow driven by buffalo. This work needs about 20 days per ha (1 day=8 hours). A few farmers have exceptionally a power tiller and they carry out the contracted land preparation for neighboring farmer's fields after completed the work of theirs. Land preparation work for 1 ha of field is completed only 2 days with the power tiller. Service fee for land preparation of 1 ha of field is from 400,000 to 700,000 VND. On the other hand, direct seeding of rice is carried out a little in W-Sp cropping to avoid a heavy labor of rice transplanting. However, direct seeding in summer-autumn cropping is impossible because of shortage of fallow field as a result of intensive land use. According to the results of the socio-economic survey about 40 % of answers expressed the need of farm mechanization in order to be free from heavy labor. A sample of actual farm mechanization as a survey result of farmers who use power tiller is shown in Table D.2.1.

D.3 BASIC DEVELOPMENT CONCEPT FOR AGRICULTURAL SUPPORTING SYSTEM

D.3.1 Development Potential and Constrains

(1) Agricultural Extension Services

1) Potentials

The farmers are open to adopt new technologies as they are beginning to understand that it is the only way how their productivity could rise. As the transition towards a free-market economy is gaining speed, farmers have found that old traditional farming ways are not adequate to generate enough production to compete in the market.

They understand that gaining such knowledge of new technologies can be done through the extension services. Those services play the important role to be rise agricultural production.

2) Constraints

The Nam Dan Agricultural Extension Station started giving services in 1996. However, the activities of the Station are not sufficient because the following

problems can be detected related to extension services.

- The budget is too small to operate an efficient extension service.
- The present number of extension workers is not enough at all.
- Transportation means are not enough to carry out the extension activities.
- Extension Model Plots are not enough in number. Farmers who live far away find it very difficult to visit the demonstration plots.
- Present Extension Model Plots exhibit only single technologies but are lack of exhibition of farming technologies.

(2) Seed Supply Service

1) Potentials

In Nam Dan District, farm size per household is very small (about 0.35 ha) and cropping rate of farm is very high (about 190 %) because present whole agricultural land is very small and there is no space for land reclamation. Therefore, "increase of yield per land" is principal factor for crop production increase. Supply of a high quality rice seed is one of most efficient means for rice production increase. Supply of high quality seed to farmers contributes generally to increase rice production of 10 to 15 %. It is very effective for production increase that production of high quality seed, preservation of the produced seed keeping high quality, and timely distribution of high quality seed to farmers. In addition, it is also necessary to select high quality seed by inspection on the field and test after harvest. Consequently, establishment of appropriate seed supply system will make increase crop production without increase of present cropping area of Nam Dan District.

2) Constraints

Nghe An Provincial Crop Seed Company with branch (Seed Station) in Nam Dan supplies the recommended rice varieties seeds to farmers. However, function of the company is not sufficient. Main constraints are as follows:

- supplying quantity of seed is to small because the Company does not have sufficient capability nor facilities for seed production. The quantity covers only less than 10 % of whole rice fields in Nam Dan District.
- most of the supplied seed are not of high quality because the Seed Station does not have seed processing equipment and storing facilities with adequate control equipment
- selection of high quality seed is not enough because of lack of inspection & test system

(3) Nursery Stock Supply Service

1) Potentials

Fruit production such as orange, lemon, grapefruit, persimmon, is major resources of cash income for the farmers. Most fruit trees are planted on the gardens surrounding farmer's house. However, these fruit trees have not always high productivity and high

quality which are able to get high income. Most farmers provide nursery trees themselves by old trees which are low productivity and low quality. If good nursery stocks which are high productivity and high quality are supplied to farmers, farmers will become to get more income.

2) Constraints

Excellent nursery stock is bred by grafting with environment tolerant stock and high productive and high quality scion. However, here is no any experience for production of grafting nursery stock in the district organization nor private sectors. Therefore, training of this technique for staff of the organization concerning is essential. In addition, there are some problem to settle in order to produce excellent nursery stock as follows:

- selection of environment tolerant stock which has high tolerance for diseases & insects and adaptability for soil characteristics.
- selection of high productive and high quality scion which has affinity for stocks.
- training for skilled worker of grafting

(4) Agricultural Mechanization Service

1) Potentials

Many farmers want keenly farming mechanization in order to be free from heavy labor. The expected merits of farm mechanization are summarized as follows:

- To release farmers from heavy work including transplanting which is commonly considered as women's task
- To increase production by implementing timely operation for efficient working (especially the effect will be remarkable in Summer-Autumn rice cultivation through efficient land preparation and transplanting)
- To increase production by decreasing harvesting loss with the introduction of reaper (harvesting machine) and power thresher
- To enable beef production to extended by replacing buffalo which is used for farming labor presently
- To save labor force to obtain other income sources including hog raising and other industry

However, mechanization by individual farmer may not be profitable because of too small farming scale. Although joint farming is an idea for the solution, to build up a rental system and a contracted farming service system with machinery will make farming of small scale farmers more effective and profitable than joint farming. Therefore, establishment of the Agricultural Mechanization Service Center will promote agricultural mechanization in the region by means of demonstration that the agricultural mechanization contributes to increase agricultural production and to increase farmer's income and to keep farmer's health through mitigation of farmer's heavy labor, production increase by timely farming, increase of income sources by farm labor saving.

2) Constraints

There are some problem to settle in order to introduce agricultural mechanization as follows:

- a farm size is too small which obstructs efficiency of mechanization work
- lack of farm road is also obstructs efficiency of mechanization work
- training of technical officers concerning general knowledge on farm mechanization and technology for rearing of seedling
- training of operators of the Center is necessary
- training of mechanics of the Center is necessary
- training of farmers for operation technique of farming machine is necessary

D.3.2 Target and Strategy of Agricultural Supporting Service Plan

(1) Target Year

As year 2010 was set as the target year in the Master Plan of Socio-economic Development of Nghe An Province, the target year 2010 is also set for the Master Plan Study for Model Rural Development in Nam Dan District.

(2) Proposed Target and Strategy

1) Agricultural Extension Services

As mentioned before, present agricultural extension services are very insufficient because of extreme shortage of technical staff, budget and equipment for extension services. In consideration of this circumstance, present Agricultural Extension Station should be enhanced. Based on this consideration, the Agricultural Extension Station is reorganized to the Agricultural Extension Center which contributes sufficiently to increase agricultural production and to increase farmer's income.

2) Seed Supply Service

As mentioned before, supply of high quality seed is essential in order to increase rice production without increase of present cropping area. Therefore, it should provide annually 570 tons of rice seed which covers whole rice cropping area of the District. Based on this consideration, the Nam Dan Seed Supply Center which can supply necessary seed to farmers is established.

3) Nursery Stock Supply Service

As before mentioned, high productivity and high quality nursery stock of fruit tree is essential in order to produce much high quality fruits which are major resources of cash income for the farmers. Therefore, it should provide annually nursery stocks for 100 ha of orchard. Based on this consideration, the Nam Dan Nursery Center is established.

4) Agricultural Mechanization Service

As mentioned before, to build up a rental system and a contracted farming service system with machinery are most effective and profitable means in order to make farmers being free from heavy labor. It is estimated that the agricultural mechanization area will become to about 1400 ha, that is about 20 % of whole paddy cropping area in a season at 2010. Based on this consideration, the Agricultural Mechanization Service Center which has objective area of 1,400 ha is established in order to promote agricultural mechanization in the region.

D.3.3 Basic Development Concepts for Agricultural Supporting Systems

Based on the considerations above mentioned, following basic development concepts are proposed.

(1) Agricultural Extension Services

The Agricultural Extension Center is established to increase agricultural production and to increase farmer's income by activation through expansion of extension organization and enrichment of facilities & equipment as well as budget for extension services.

(2) Seed Supply Service

The Seed Supply Center is newly established as an organization of the District. The Center arranges enough staff and provides facilities & equipment for seed production , seed processing, seed storage and seed distribution. The Center produces high quality seed, preserves the seed keeping high quality, and distributes timely the high quality seed to all rice cultivating farmers.

(3) Nursery Stock Supply Service

The Nam Dan Nursery Center is established as an organization of the District. The Center arranges enough staff and provides facilities & equipment for production of nursery stocks and those distribution to farmers. The Center produces nursery stocks with high productivity and high quality of orange, lemon, grapefruit, persimmon. They are annually produced for 100 ha of orchard.

(4) Agricultural Mechanization Service

The Agricultural Mechanization Service Center is established as an organization of the District. The Center get a complete set of farm machinery and carry out timely rent of machine or contracted farming service. The Center aim to promote agricultural mechanization in the region by means of demonstration that the agricultural mechanization contributes to increase agricultural production and to increase farmer's income and to keep farmer's health through mitigation of farmer's heavy labor, production increase by timely farming , increase of income sources by farm labor saving.

D.4 FORMULATION OF MASTER PLAN FOR AGRICULTURAL SUPPORTING SYSTEM

D.4.1 Proposed Agricultural Supporting Service Project

In consideration of lack of space of farming land which is able to develop, it is necessary to increase yield through introduction of new technology and input of effective materials and to rise cropping rate through intensive cropping in order to increase agricultural production in the District. Based on the considerations above mentioned, following agricultural supporting service projects are proposed.

(1) Agricultural Extension Center
(2) Seed Supply Center
(3) Nursery Center
(4) Agricultural Mechanization Service Center

The project summary for the agricultural supporting services is given in Table D.4.1.

Objective area of these projects is appreciable area in the District in principle. However, that of the Agricultural Mechanization Service Center is made 1,400 ha of the prior irrigation improvement project area because it is reasonable that agricultural mechanization area will become to about 20 % of 6,800 ha which is whole paddy cropping area in a season at 2010, and because of consideration of high effectiveness of agricultural mechanization under complete irrigation facility and demonstrational effect of model farming.

D.4.2 Prioritization of Projects

Basis of priority evaluation of the selected projects as a part of the Master Plan and expected synergetic effects are shown in the following table:

Project	Project Relation and Basis of Prioritization	Synergetic Effects
Agricultural Extension Center	High priority is given because the project plays an important role by providing a new agricultural management method.	Synergetic effects with the production related projects are expected to be great, however, it is impossible to measure the effects quantitatively.
Seed Supply Center	High priority is given because improving high quality seed directly influences increase of production over the district.	Synergetic effects with the irrigation projects are expected to be great
Nursery Center	Because of the limited beneficiaries, impact of this project over the area is rather small compared with other project.	Synergetic effects with marketing and road network project shall be considered, however, the results are expected to be less.

Project	Project Relation and Basis of Prioritization	Synergetic Effects
Agricultural Mechanization Service Center	High priority is given due to the expected effect on the following aspects: - Improvement of farmers' working conditions related to field preparation and transplant works, - Increase of farmers' income by introducing cattle raising instead of draft animals, and - To accelerate forming farmers' groups through the experience gathered by operation of agricultural machinery by cooperatives.	Synergetic effects with the road network projects are expected to be great

Prioritization of those projects have been studied based on inhabitant needs, impact and synergistic effect in the agricultural sector.

Inhabitant needs : "a" rank is given to the projects required for most of the farmers and "b" rank is given to the other projects which are not.

Impact : "a" rank is given to the projects which largely influence agricultural management and "b" rank is given to the other projects which do not.

Synergistic effect : "a" rank is given to the project which largely influence agricultural production in the District and "b" rank is given to the other projects which do not.

Comprehensive Assessment:

If "a" rank is given for all items above mentioned, the project rank should be A. For other cases, the project rank should be B.

Project Name	Objective of Project	Effect of Project	Inhabitant Needs	Impact	Synergistic Effect	Comprehensive Assessment
Agricultural Extension Center	Whole District: about 11,500 ha	Increase of productivity by introduction of new technology	a	a	a	A
Seed Supply Center	Whole Paddy field of District: about 8,450 ha	Increase of yield by supply of high quality seed	a	a	a	A
Nursery Center	Perennial Crops in Middle land: annually 100 ha	Increase of yield of cash crops	b	b	b	B
Agricultural Mechanization Service Center	Priority Irrigation Project area: about 1,400 ha	Increase of yield by timely cropping	a	a	a	A

D.4.3 Proposed Implementation and Operation Schedule of Master Plan

For implementation of each project, it is necessary to consider the preparation period such as detailed design and tendering procedure for one year before construction. Considering the work volume of each project, with in one year of construction period for one project is expected respectively.

Based on the results of prioritization, implementation and operation schedule was proposed as shown below.

Summary of Proposed Implementation & Operation Schedule

Project	Period												
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Agr. Extension C.													
Seed Supply C.													
Agr. Mecha. C.													
Nursery Center													

Note: Preparation, Construction, Operation

D.4.4 Project Cost of Master Plan

The cost for the projects proposed in this Master Plan excluding price escalation is 65,608 million VND for the priority "A" projects, 5,085 million VND for the priority "B" projects and 70,693 million VND as the total for the whole projects.
The cost of each project is as follows:

Summary of Project Cost (million VND)

Project	Project Cost		Total
	Priority "A"	Priority "B"	
Agricultural Extension Center	2,085		2,085
Seed Supply Center	21,719		21,719
Nursery Center		5,085	5,085
Agricultural Mechanization Service Center	41,804		41,804
Total	65,608	5,085	70,693

Note: The cost includes administration cost, consultant fee and physical contingency, and excludes price escalation.

D.5 Priority Project

D.5.1 Agricultural Extension Center

(1) Background

The Nam Dan Agricultural Extension Station started giving services in 1996 in order to enhance the extension services which were previously provided by the Agriculture & Rural Development Department. However, the activities of the station are not sufficient because of extreme shortage of technical staff, budget and equipment for extension services including transportation mean. In view of effect of the extension service which contributes to increase the agricultural production, expansion of its organization and enrichment of facilities & equipment are necessary. By the way, the Extension Center of the Nghe An Province provides training courses for extension staff of the districts.

(2) Purpose

To contribute to increase agricultural production and to increase farmer's income by activation through expansion of extension organization and enrichment of facilities & equipment. In addition, exhibition of the model farming practice which is high profitable farming system will be initiated.

(3) Outline of Project

- Arrangement of the agricultural extension workers at least one person for each commune in order to enhance T & V system
- Enrichment of equipment and materials including for extension services. For example;
  One motorbike for one extension worker: mobile power
  Computer: preparation of information papers for extension service, accumulation of information on new technologies, composition of adaptable technologies, analysis of effect of the services etc.
  Copying machine: preparation of information papers for extension service
  Audio-visual instruments: to hold technical course tours
- Exhibition of technical model plot: single technologies such as new varieties of crops, new feeding method of poultry
- Exhibition of the model farming practice: 5-6 farmer's group farm; instruction and exhibition of farming technologies including farm mechanization and farm management technology etc.

(4) Facility and Equipment

It is to be desired that the facilities are constructed at Kim Lien considering the convenience of transportation and the effect of model. The provided facilities and equipment are as shown below:

Facility			
Office building	200 m^2	Equipment warehouse	100 m^2
Garage	50 m^2	Parking	100 m^2
Equipment			
Computer	1 set	Audio-visual instruments	1 set
Copying machine	1 set	4 WD Vehicle	2
Motorbike	25		

D.5.2 Seed Supply Center

(1) Background

Nghe An Provincial Crop Seed Company supplies the recommended rice varieties seeds to farmers. However, most of the seed are not of high quality because the Company does not have capability nor sufficient facilities to produce enough high quality seeds. A Seed Station of the Company is located in the Nam Dan District and

the recommended varieties seeds are produced in the Station on the contracted basis. However, the quantity of seed produced in the Station is small and the quantity covers less than 10 % of whole rice fields in Nam Dan District. In addition, selection of high quality seed is not enough because of lack of inspection & test system and seed processing equipment, and keeping high quality of seed is difficult because of lack of storing facilities in the Station. It is necessary to select high quality seed by inspection on the field and test after harvest, and to preserve seed in environment of lower temperature and lower humidity for supply of high quality seed. Fortunately, Nghe An Provincial Seed Test & Inspection Center was established and was initiated its work at June 1997.

(2) Purpose

To increase rice production without increase of present cropping area by supply high quality seed to whole rice cropping fields of Nam Dan District.

(3) Outline of Project

The Nam Dan Seed Supply Center is newly established as an organization of the District. The Center carries out under mentioned works making full use the seed supply the Nghe An Provincial Crop Seed Company.

- To produce high quality seed on the contract basis, under supervision of the Nghe An Provincial Government and under assistance of the Nghe An Provincial Crop Seed Company. Quantity of produced seed is necessary volume to cover cropping area of 6,884 ha, 6,771 ha and 614 ha for winter-spring cropping, summer-autumn cropping and summer cropping respectively. Contracted farmers are selected by cooperatives. Distribution of original seed and collection of produced seed are also get cooperation of the cooperatives.
- To preserve the produced seed keeping high quality
- To distribute timely high quality seed to farmers

Scale of contracted seed production is as shown below:

Item	Cropping Season		
	W. - Sp	SU. - Au	Summer
Necessary quantity of seed	273.8 ton	270.8 ton	24.6 ton
Necessary field for seed production	98 ha	108 ha	10 ha

Calculated base of these values is shown in Table D.5.1.

(4) Facility and Equipment

It is to be desired that the facilities are constructed at Kim Lien considering the convenience of transportation and the effect of model. The provided facilities and equipment are as shown below:

Facility

Office building 200 m^2 Processing room 500 m^2

Seed storage(with equipment for low temp. & low humid.) 600 m^2
Equipment warehouse 100 m^2 Parking 100 m^2

Low temperature and low humidity are necessary condition for keeping high quality of seed. The following conditions are necessary to keep about 100 % of germination percent of paddy seed during 1 year.

Water content of seed %	18	16	14	12	10	8	6	4
Temperature in storage ℃	-5	0	5	10	15	20	25	30

Therefore, 10 to 12 % of water content of seed and 10 to 15℃of temperature in storage is desirable.

Equipment

Seed processing equipment	1 set	Truck(2 ton)	3
4WD Vehicle	1	Heat insulator panel	1 set
Thermo-humid automatic control equipment of seed storehouse			1 set
Spare parts of above equipment			

Specification of the seed processing equipment is shown in Table D.5.2.

D.5.3 Agricultural Mechanization Service Center

(1) Background

Many farmers want keenly farming mechanization in order to be free from heavy labor. However, it may not be profitable because of too small farming scale. Although joint farming is an idea for the solution, to build up a rental system and a contracted farming service system with machinery will make farming of small scale farmers more effective and profitable than joint farming.

The expected merits of farm mechanization are summarized as follows:

- To release farmers from heavy work including transplanting which is commonly considered as women's task
- To increase production by implementing timely operation for efficient working (especially the effect will be remarkable in Summer-Autumn rice cultivation through efficient land preparation and transplanting)
- To increase production by decreasing harvesting loss with the introduction of reaper (harvesting machine) and power thresher
- To enable beef production to extended by replacing buffalo which is used for farming labor presently
- To save labor force to obtain other income sources including hog raising and other industry

In consideration of such circumstances the Agricultural Mechanization Service Center is established. The Center is official organization of the Nam Dan District and which prepares farming machinery to rent and to be service of contracted farming.

(2) Purpose

The Center get a complete set of farm machinery and carry out timely rent of machine or contracted farming service. The Center aim to promote agricultural mechanization in the region by means of demonstration that the agricultural mechanization contributes to increase agricultural production and to increase farmer's income and to keep farmer's health through mitigation of farmer's heavy labor, production increase by timely farming , increase of income sources by farm labor saving.

(3) Outline of Project

The Center get a complete set of farm machinery to cover 1,400 ha of fields which are located in the Priority Irrigation and Drainage Improvement Project Area. Main activities of the Center are as shown follow:

- Training of operation technique of farming machine and conferment of the license
- Lending of farming machine to licensed farmers
- Implementation of contracted farming
- Maintenance and repair of machinery
- Advice and guidance on farm mechanization
- Guidance on farm mechanization for the Farming Model Farms assisting the Agricultural Extension Center

(4) Facility and Equipment

It is to be desired that the facilities are constructed at two sites, each one at the right bank and the left bank of Lam river, in considering of the convenience for service and the location of project objective area. In addition, it is advisable to have the headquarters at the left bank because of the convenience of transportation and expansion of project in the future. Therefore, the facility of the right bank will be sub-station although its scale of facility is lager than that of the left bank because of larger scale of the project objective area. In consideration of the circumstances, it is desired that the sites of the headquarters and the sub-station are at Nam Thanh and at Khanh Son respectively. The provided facilities and equipment are as shown below:

Facilities				
Item	Unite	Headquarters (Nam Thanh)	Sub Station (Khanh Son)	Total
Office building	m^2	140	60	200
Agr. machine warehouse	m^2	630	1,570	2,200
Equipment warehouse	m^2	200	500	700
Nursery facility	m^2	400	1,000	1,400
Garage	m^2	110	290	400
Workshop	m^2	140	360	500
Worker post	m^2	60	140	200
Car wash area	m^2	30	70	100
Equipment				
Item	Unite	Headquarters (Nam Thanh)	Sub Station (Khanh Son)	Total
Power tiller with rotary set	pcs	70	180	250
Rice transplanter	pcs	30	80	110

Reaper	pes	10	30	40
Power thresher	pes	10	40	50
Trailer	pes	40	100	140
Nursery equipment	set	1	3	4
Plow	pes	40	100	140
Ridger	pes	40	100	140
Truck(2 ton)	pes	2	6	8
4WD Vehicle	pes	1	0	1
Motorbike	pes	3	7	10
Equipment for workshop	set	1	1	2
Spare parts 1 set				

Necessary machine number for farming of 1,400 ha of field and their specification are shown in Table D.5.3 and D.5.4, respectively.

D.5.4 Implementation Plan

Implementation of the Projects consist of the preparation period (design of facilities, selection of materials, tender) and the construction period (construction of facilities, supply of materials). The former take one year and the later is implemented during a dry season of the next year in principle. It is necessary to study the time of supply of materials in consideration of the time of completion of equipment warehouse. It is also necessary to arrange required staff including extension workers in order to start smoothly operation of the Centers as soon as the facilities and equipment are fully equipped. System and organization for project implementation are as shown follow:

Agricultural Extension Center:

The Agriculture and Rural Development Department of the Nam Dan District which becomes the core for implementation of the Project executes the Project working in closer connection with the Agricultural Extension Station of the District under support and supervise of the Nghe An Provincial Agricultural Extension Center.

Seed Supply Center:

The Agriculture and Rural Development Department of the Nam Dan District which becomes the core for implementation of the Project executes the Project working in closer connection with the Nghe An Provincial Crop Seed Company under support and supervise of the Nghe An Provincial Agriculture and Rural Development Department.

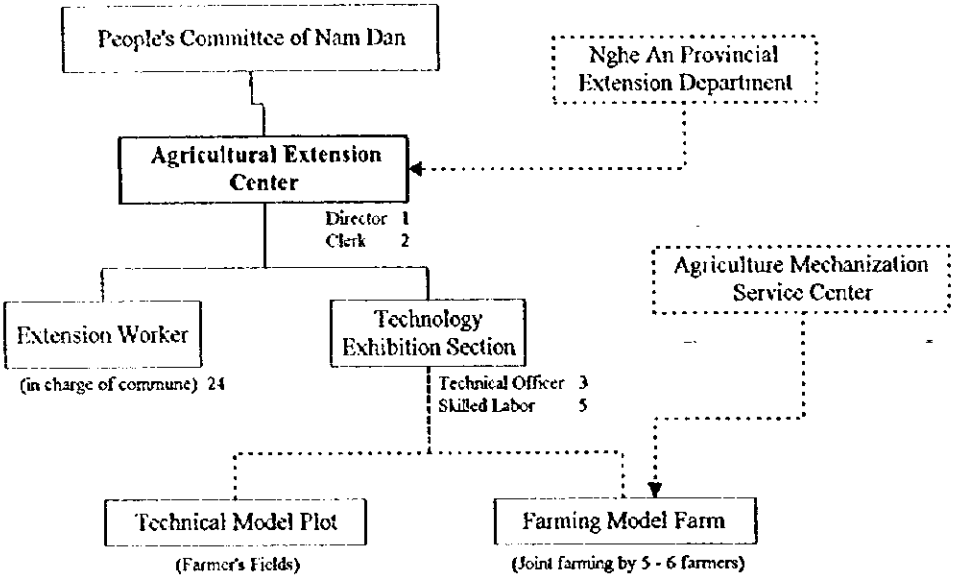
Agricultural Mechanization Service Center:

The Agriculture and Rural Development Department of the Nam Dan District which becomes the core for implementation of the Project executes the Project working in closer connection with the Agricultural Extension Station of the District under support and supervise of the Nghe An Provincial Agriculture and Rural Development Department.

D.5.5 Operation Plan

(1) Agricultural Extension Center

The Center increases extension workers in charge of communes and arranges skilled laborers who assist the technical officers in charge of technology exhibition. Total staff number is 35 including 3 technical officers and 24 extension workers.

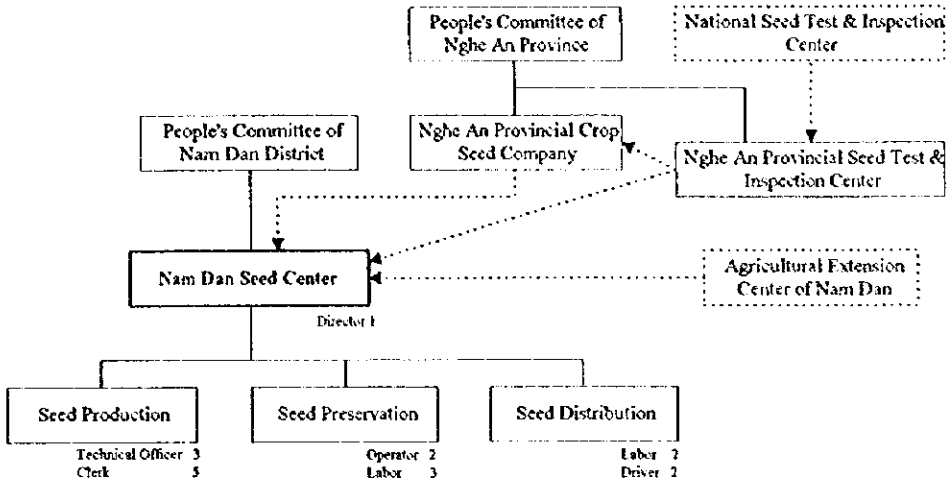


Appointment of extension workers are carried out between the preparation period to completion of the construction and they are made to participate in the training courses concerning method of extension activity, new technologies of farming practice and animal feeding etc. provided by the Nghe An Provincial Agricultural Extension Center. This training includes practical training under the extension workers actively engaged in extension. In addition, they are dispatched to the Northern Central Vietnam Agricultural Research Center to learn new technologies. Term of the training is 2 months. In addition, some extension workers are also made to participate in the short term training courses provided by the Nghe An Provincial Agricultural Extension Center for grading up of their technical level every year.

(2) Seed Supply Center

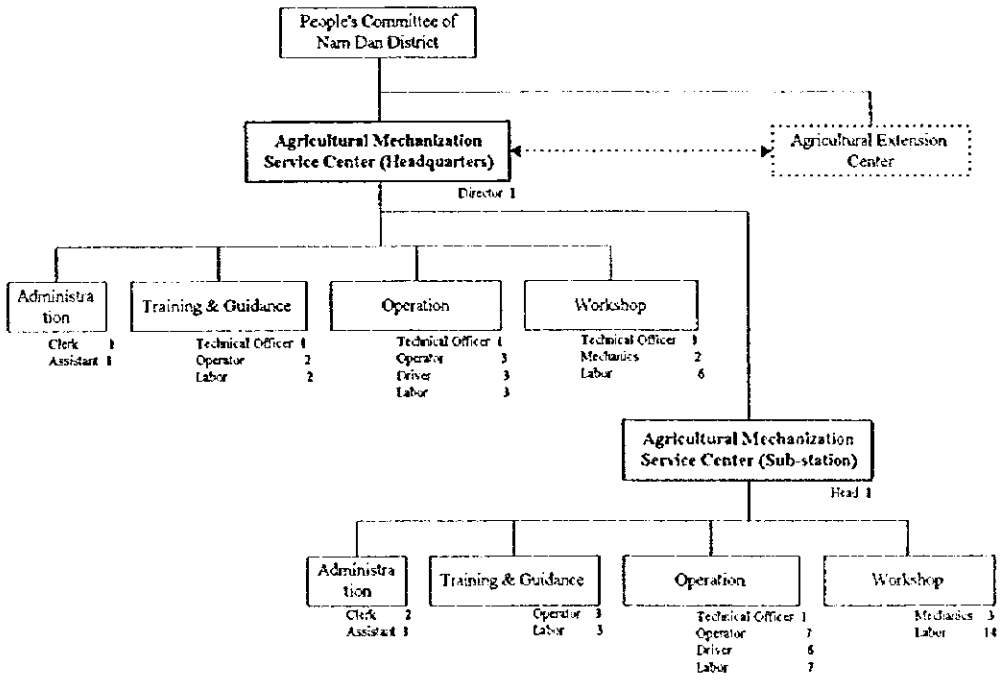
The Center consist of 3 sections such as Seed production by contract basis, Seed processing and preservation of seed, Seed distribution. Total staff number is 16. The Center should request the redeployment of 6 staff including 3 technical officers from the Nghe An Provincial Crop Seed Company. Other 2 technical officers who are appointed before completion of construction are dispatched to the Nghe An Provincial Crop Seed Company during 1 month in order to learn seed supply practice. Operators are appointed before sending of the seed processing equipment and the thermo-humid automatic control equipment of seed storehouse, and they lean operation technologies of the equipment from these deliverers during 2 weeks. In addition, the Center requests deliverers to take good care of the equipment during 1

year after its delivering.



(3) Agricultural Mechanization Service Center

The Center consist of 4 sections such as Administration, Training & Guidance, Operation and Workshop. Total staff number is 76 including 4 technical officers, 15 operators and 5 mechanics.



Technical officers, operators and mechanics are appointed before sending of the agricultural machinery, and they lean operation technologies of the machinery from these deliverers. The technical officers lean mainly general knowledge on farm mechanization and technology for rearing of seedling. The operators take part in the practical training for operation of machinery: it is necessary to take 10 days for power

tiller and rice transplanter respectively, and 1 month for reaper, power thresher and other machinery. The mechanics learn maintenance and repair technique of whole machinery and operation method of equipment in the workshop. In addition, the Center requests deliverers to take good care of the machinery and the equipment during 1 year after its delivering.

D.5.6 Project Cost and Operation & Maintenance Cost

Project Cost

Name of Project	Project Cost		
	L/C (mill.VND)	F/C (mill.VND)	Total (mill.VND)
1 Agricultural Extension Center	134	1,951	2,085
2 Seed Supply Center	3,270	18,449	21,719
3 Agricultural Mechanization Service Center	6,667	35,138	41,804
Total	10,071	55,538	65,609

(Note) Project cost includes engineering cost and material reserves, but rise in prices.

Annual Operation & Maintenance Cost

(mill. VND)

Name of Project	Operation & Maintenance	Annual Average of Replacement	Annual Total O/M Cost
Agricultural Extension Center	531	187	718
Seed Supply Center	2,781	723	3,504
Agricultural Mechanization Service Center	1,432	3,477	4,909
Total	4,744	4,387	9,131

Note: Replacement cost is the annual mean value according to the life of equipment.

APPENDIX D : TABLES

Table D.2. 1 A Sample of Actual Farm Mechanization

(A sample of survey result of farmers who use power tiller)

(1) Outline of the Power Tiler

Description	Farmer 1	Farmer 2	Farmer 3
Year of introduction	1996, March	1996, Jan.	1995, March
Manufacturer	China	Viet Nam	China
Horse power (HP)	16.5	12.0	6.0
Accessory			
Power rotary	*	*	
Plow			*
Harrow		*	*
Trailer	*	*	
Purchase price (VND)	16,000,000	25,000,000	7,500,000
Seller of the machine	in Vinh city	Other farmer	Other Province

(2) Working Efficiency of Land Preparation (working time per hectare)

Work	Farmer 1	Farmer 2	Farmer 3	Buffalo
1st plowing (or tilling)	T 8 hours	T 3.5 hours	P 13 hours	P 40 hours
1st harrowing		H 3.5 hours	H 5 hours	H 40 hours
2nd plowing (or tilling)	T 8 hours	T 3.5 hours		P 40 hours
2nd harrow.(or leveling)		L 3.5 hours	H 5 hours	H 40 hours
3rd harrowing			H 5 hours	
Total	16 hours	14 hours	28 hours	160 hours

(note) T: tillering with rotary, H: harrowing with harrow, L: leveling with leveler or board, P: plowing with plow

(3) Working Day and Area per year for Farmer-self Field

Work	Farmer 1		Farmer 2		farmer 3	
	Days	Hectare	Days	Hectare	Days	Hectare
Land preparation	2.0	1.0	7.0	4.0	2.5	0.8
Transport	*		*			8.3
Threshing			*		*	
Pumping			*		*	

(4) Contract works per year

Work	Farmer 1		Farmer 2		Farmer 3	
	Day	Unit price	Day	Unit price	Day	Unit price
Land preparation	60(24 ha)	400,000/ha	25(10 ha)	700,000/ha	28(8 ha)	?
Transport	240 time	15,000				
Pumping					180 hours	7,000
Threshing					30 hours	?

Table D.4.1 Outline of Proposed Projects Concerning Agricultural Supporting System

Title	Type of Organization	Facility/Equipment	Activities/Functions	Precondition/Requirement	Benefits expected
Agricultural Extension Center	Official Organization under The People's Committee of Nam Dan District (New establishment)	1) Facility Office building, Equipment warehouse, Garage, Parking 2) Equipment Computer, Copying machine, Audio-visual instruments, 4WD Vehicle, Motorbike	1) Analysis of limiting factors of productivity 2) Introduction & propaganda of good varieties 3) Exhibition of single technologies (through Model Plot) 4) Exhibition of model farming practice (High profitable farming system by original idea of farmers themselves, in addition to the instruction by the Center) 5) Visiting instruction by commune specialist 6) Technical training course tours	1) District Authority should prepare land 2) District Authority should arrange 35 staff 3) District should prepare budget	1) Definition of essential factor for productivity up 2) High yielding & high profit farming is achieved by introduction of good varieties and new technology 3) Farmers of model farm understand necessity of level up by self-effort 4) Many farmers who visited model farm can get easily new technology
Seed Supply Center	Official Organization under The People's Committee of Nam Dan District (New establishment)	1) Facility Office building, Processing room, Seed storage (with equipment for low temperature & low humidity), Equipment warehouse 2) Equipment Seed processing equipment, Truck, 4WD Vehicle, Heat insulator panel, Thermo-humid automatic control equipment of seed storage	1) Production of high quality seed on the contract basis 2) Preservation of the produced seed keeping high quality 3) Timely distribution of the high quality seed to farmers	1) District Authority should prepare land 2) District Authority should arrange 16 staff 3) District should prepare budget (Income by sale of seeds are appropriated for the budget)	1) Cash income of farmers increases by sale of farm surpluses which are got owing to use high quality seeds 2) Cropping increase of more profitable crops becomes possible 3) Crop diversification becomes easy
Nursery Center	Official Organization under The People's Committee of Nam Dan District (New establishment)	1) Facility Office building, Working building, Equipment warehouse, Garage, Nursery field 2) Equipment Hand tractor with implement Truck, Motorbike	1) Introduction, multiplication and distribution of seedlings of good variety of fruit tree	1) District Authority should prepare land 2) District Authority should arrange 5 staff 3) District should prepare budget (Income by sale of seedling are appropriated for the budget)	1) Increase of production and improvement of quality of fruits are achieved
Agricultural Mechanization Service Center	Official Organization under The People's Committee of Nam Dan District (New establishment)	The Center covers 1,400 ha of fields which are located in the Priority Irrigation and Drainage Improvement Project Area 1) Facility Office building, Agr. machinery warehouse, Equipment warehouse, Nursery facility, Workshop, Garage, Worker post, Car wash area 2) Equipment Power tiller with rotary set, Rice transplanter, Reaper, Power thresher, Trailer, Plow, Ridger, Nursery equipment, Truck, 4WD Vehicle, Motorbike, Equipment for workshop	1) Training of operation technique of farming machine and conferment of the license 2) Lending of farming machine to licensed farmers 3) Implementation of contracted farming 4) Maintenance and repair of machinery 5) Advice and guidance on farm mechanization 6) Guidance on farm mechanization for the Farming Model Farms	1) District Authority should prepare land 2) District Authority should arrange 76 staff 3) District should prepare budget (Income by lending of machinery and contracted farming service are appropriated for the budget)	1) Increase of crop production is resulted through timely farming 2) Farmer's income increases because surplus labor force is used to animal feeding, fish culture and fruit tree cultivation, and is used also other industry which makes get higher wages

Table D.5.1 Necessary Field Area for Seed Production

Item	Mark	Cropping season			Remark
		W_Sp	Su_Au	Summer	
Quantity of seeding (kg/ha)	A	40	40	40	
Cropping area for food production (ha)	B	6,844	6,771	614	
Necessary quantity of seed (kg)	C	273,760	270,840	24,560	C = A × B
Yield of seed production culture (kg/ha)	D	2,800	2,500	2,450	
Necessary field for seed production (ha)	E	98	108	10	E = C ÷ D

Table D.5.2 Specification of Seed Processing Equipment

Item	Specification
Seed processing unit	Processing capacity: 0.5 t/hr Pre-cleaner Type: Oscillating sieve type Function: An oscillating sieve to separate impurities Attachment: Anti-clogging device (Tapping balls) Receiving hopper: 10 kg Aspirator Control: Air flow control damper Attachment: A cyclone and a duct for connecting the aspirator of 5 m length Gravity separator Type: Oscillating tray with rectangular mesh and air flow type Function: To separate clean (heavy) seed out of materials utilizing difference of specific gravity Attachments: A hopper to discharge lighter grains separated A hopper to discharge clean seed with mixture discharging damper Bucket elevator: 2 units Type: Vertically installed centrifugal discharge, belt and buckets enclosed type
Scale shutter	Type: Semi-auto shutter gate and platform type scale with load cell Scale range: 7-10 mm Accuracy: (+/-) 1/100, minimum scale of 5g
Portable bag sawing machine	Seam: Double thread chain stitch Stitch range: 7-10 mm Auto cutter equipped
Box dryer	Capacity: 3 m^3 Air flow: 110 m^3/min Static pressure: 20 mm Ag Fuel: Kerosene

Table D.5.3 Necessary Machine Number for Farming of 1,400 ha of Field

Work	Machine	Efficiency ha/8hr.	Restricted Days	Machine number*	Capability** ha
Plowing and harrowing	Power tiller with Rotary set	0.80	11	160	1,408
Puddling	Power tiller with Rotary set & Cage wheel	1.80	9	90	1,458
Transplanting	Transplanter (4 rows)	0.65	20	110	1,430
Harvesting	Reaper	1.80	20	40	1,440
Threshing	Power thresher	1.00	30	50	1,500

Note: 1. Power tiller and Trailer are made in Viet Nam , and other machines are made in Japan.

* This is machine number required for farming field of 1,400 ha.

** This means "possible maximum working area with all machines during restricted days "

Table D.5.4 List of Farming Machines

(1) General List

Item	Specification	Unit	Unit Price 1,000 VND	Quantity	Amount mill. VND
Power Tiller	Type: Rotary mounted power tiller, Speed: forward 5, Reverse 2 Tilling speed: 4(2 speeds by changing auxiliary sprockets), Tilling width: 600-750 mm No. of blades: 18-22, Tires: 6-12, Brake: Inner, expansion type Main clutch: Dry multi plate type, Wheel tread: 420-780 Engine: Horizontal water cooled, 4 cycle diesel engine Rated output: 10 .5 HP, 2200 rpm, Stating system: Double speed handle manual Measurement (with rotary): 2290 mm L × 710 mm W × 1200 mm H Cage wheel (Attachment) Outer diameter: 50 cm, Length of Rotor: 57 cm, Nos of Lug: 8	pcs	13,000	250	3,250
Rice Transplanter	Walking type rice transplanter Planting: 4 rows at a time Distance between rows: 30 cm, Distance between hill: 18, 21 cm Distance between hill: 18, 21 cm, Number of hill: 15, 18 per m^2 Engine: 4 cycle gasoline engine, Total displacement 121 cc, Cont. output: 2.8 ps, 1800 rpm, Starting system: Recoil starter near the handle Driving: Wheel's vertical adjustment: Hydraulic system Wheel: High lug solid rubber, outer diameter 660 mm Speeds: Forward 2, Planting 1, Reverse 1 (steps) Planting speed: 0.74 m/sec, Traveling speed: 5.4 km/hr Seedling condition: Mat type Seedling height: 10-25 cm, Leaves required: 2-4.5 leaves	pcs	70,500	110	7,755
Reaper	Harvesting and windrows machine for rice Applicable plant height: 60-120 cm Applicability to inclined crop plant: Up to 60 degrees of inclined angle Cutting width: 120 cm, Device: reciprocating knife bar, Height: 10-30 adjustable Engine: 4 cycle air cooled gasoline Total displacement: 130 cc, Cont. output: 2.3 ps, 1800 rpm Starting system: Recoil Travel speeds: Forward 59 m/min, Reverse 50 m/min Tire: High lug tire for dry and wet field Operation: Main clutch, Harvesting clutch: Dog clutch Height adjustment of handle: 750-900 mm	pcs	52,500	40	2,100
Power Thresher	Stationary type Working capacity: 1200-2000 kg/hr (unhulled rice) Threshing cylinder width: 500 mm, Diameter: 414 mm Threshing teeth: 76 mm (H) × 52 pieces Threshing cylinder revolution: 430 rpm (at rice) Engine: Water cooled diesel, Cont. output: 5 HP, 2200 rpm, Displacement: 340 cc Stating system: Manual handle	pcs	52,500	50	2,625
Trailer for Power Tiller	Loading capacity: 500 kg, Loading space: 1890 mm L × 910 mm W × 300 mm H Tire size: 4.50-14-6 PR	pcs	7,000	140	980
Plow for Power Tiller	Reversible single type, Tilling width: 25-33 cm, Weight: 52 kg	pcs	900	140	126
Ridger for Power Tiller	Width of ridge: 15cm, Height of ridge: 40 cm, Ridge angle: 58°	pcs	300	140	42
Nursery Equipment	Details are described in next table	set	785,000	4	3,144
Total					20,022

(2) Details of Nursery Equipment

Item	Specification	Unit	Unit Price 1,000 VND	Quantity	Amount mill. VND
Seedling box	Material: Plastic, Inner dimension: 580 mm L × 280 mm W × 30 mm H	pcs	1	70,000	70
Soil crusher	Crushing method: Rotating claw, Number of claw: 32 pcs Revolution: 780 rpm (50 HZ), Motor: 1.5 kw, 200V triple phase		20,000	4	80
Soil sieve	Size of sieve flame: 1060 mm L × 467 mm W, Mesh of sieve: 6 mm Motor: 0.2 kw, 100 V single phase	pcs	35,000	4	140
Paddy bag	Capacity: 5 kg (of rice seed)	pcs	1	500	1
Water tank	Capacity: 2000 liter	pcs	2,300	7	16
Sprout promoting pump	Thermal range: 0-40 °C (heating only), Circulation of water: 80-100 liter/min Mixing air: 10-20 liter/min, Heater: 4.9 kw, Motor: 0.1 kw, 200 V triple phase	pcs	23,500	4	94
Sowing plant for rice	Hopper: Bed soil: 130 liter, Covering soil: 130 liter, Seed: 54 liter Working capacity: 900-1700 box/hr (adjustable), Seedling: 80-220 g (adjustable) Total power consumption: 0.45 kw, Power: 200 V triple phase Dimension: 8021 mm LO~530 mm WO~1420-1520 mm H	pcs	65,000	3	195
Awing machine	Hopper capacity: 15 kg rice seed, Working capacity: 65-95 kg/hr Treatment type: one pass, Adjustment of awing: lever Motor: 0.2 kw, 100 V single phase		8000	4	32
Irrigation pump	Diesel engine driven Centrifugal & Self priming pump Pump: Suction and discharge diameter: 4" × 4", Capacity: 1600 liter/min Total dynamic head: 23 m Engine: Horizontal water-cooled 4 cycle diesel engine, Rated output: 7HP, 2200 rpm Displacement: 443 cm^3, Starting system: Manual speed-doubling handle		4,000	12	48
Vinyl sheet (transparent)	Spreading under the nursery box in the field, One roll: 2.1 × 50 m		210	240	50
Vinyl sheet (white)	To cover the seedling box at greening, One roll: 2.3 × 50 m		210	240	50
Wheel barrow	One wheel, Capacity: 0.055 m^3		400	24	10
Total					786

APPENDIX E : AGRO-INDUSTRY AND MARKETING SYSTEM

THE STUDY
ON
MODEL RURAL DEVELOPMENT
IN
NAM DAN DISTRICT, NGHE AN PROVINCE

FINAL REPORT

APPENDIX-E AGRO-INDUSTRY AND MARKETING SYSTEM

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E.1 THE STUDY AREA

90% of the Nam Dan District population are engaged in agricultural production although some households are also involved in other economic activities. The agriculture base is dominated by rice monoculture where the average return is low. There is a strong inverse correlation between low income and degree of diversification within regions. That is households which are more diversified have higher living standards than others.

Since the introduction of the Doi Moi policy in 1988, the Government has been implementing a comprehensive agricultural development strategy in rural area which aims at achieving the increased production of not only food products but also other products as raw materials for processing industry.

Increasing the productivity of the farming and diversifying its sources of growth from rice monoculture to commercial crops could raise more productivity. Continued growth of the agriculture is critical because of its potential for generating strong linkages with non-farm activities. Actually, the labor absorption capacity of the agricultural sector is extremely limited, due to overcrowding on arable land. Therefore it is necessary to develop non-farm employment opportunities to complement agriculture based economic activities. While employment in the Nghe An Province is still small, this sector could have potential for growth and could serve as a sustainable income base if the appropriate and enabling circumstance in place. Then the Development Plan in Nam Dan District should involve agricultural sector initiatives such as introduction of commercial crops which are linked to agro-processing industries.

Therefore, the rural development strategy would seek to buildup rural infrastructure and institutions which would foster higher value of agricultural productivity and off-farm opportunities in rural areas. This should lead to higher incomes and stimulate demand for rural industries. At the same time, higher agricultural productivity should lead to a labor surplus and release workers in the rural areas to work in other sectors.

In this direction, the Team elaborates the current condition and constraints in the field of marketing system and industry processing agricultural products in the Study Area based on the data and information collected during the field work period.

E.1.1 Present Condition

(1) Agro-industry

With the background above in mind, the Study Team collected and study information, and visited agro-processing factories in Nam Dan District and surrounding area including Vinh City. Table E.1.1 and E.1.2 were compiled to give an outline of the current condition on production and management of factories visited.

Although official statistic data on enterprises especially non-state enterprises are unavailable, the current conditions of the agro-industry in the area are summarized as

shown below. The findings are based on the information that the Study Team could get by visiting the factories and interviews with peoples involved in these activities.

a) Poor machinery and equipment
Almost all factories visited use antiquated and/or simple machinery and equipment with the exception of a beer factory and knitting factory, which are both state-owned. The factories in Nam Dan District are characterized by being too conventional and having a small capacity. It would be difficult to collectively denominate them as an "industry" even considering their potential contribution to rural development.

b) Small-scale production
The production scale of the factories are relatively small. Those products such as beer, edible oil and frozen marine products of which production growth is expected, are working beyond their production capability.

c) Lack of adequate marketing activities
All state-owned enterprises visited have not established any sales and/or marketing section in their organization and do not implement enough sales or marketing promotions for their products. They tend to rely on their historically established close links with state-owned trading enterprises to select raw material suppliers at lower prices, to find out new clients and to expand their markets.

d) Lack of investment resources
Almost all those interviewed, who were in charge of managing the factories explained clearly their plans for expanding their activities, and looked for ways to access investment funds and technology. Their biggest problems in executing the plans are those related with credit access and required information on technology needed to be introduced for the execution of their development plans.

e) Lack of market information
Although most persons of the factories lacked international marketing experience and it is evident that they require international marketing information, official services do not provide such information. Thus to access to necessary information is blocked. On the other hand, many person interviewed especially in export - related factories cited external sources of marketing support including the joint venture partnerships. However, in case of some private enterprises, the idea for expanding activities and products improvement resulted from individual private efforts that are motivated by higher profits.

(2) Marketing System

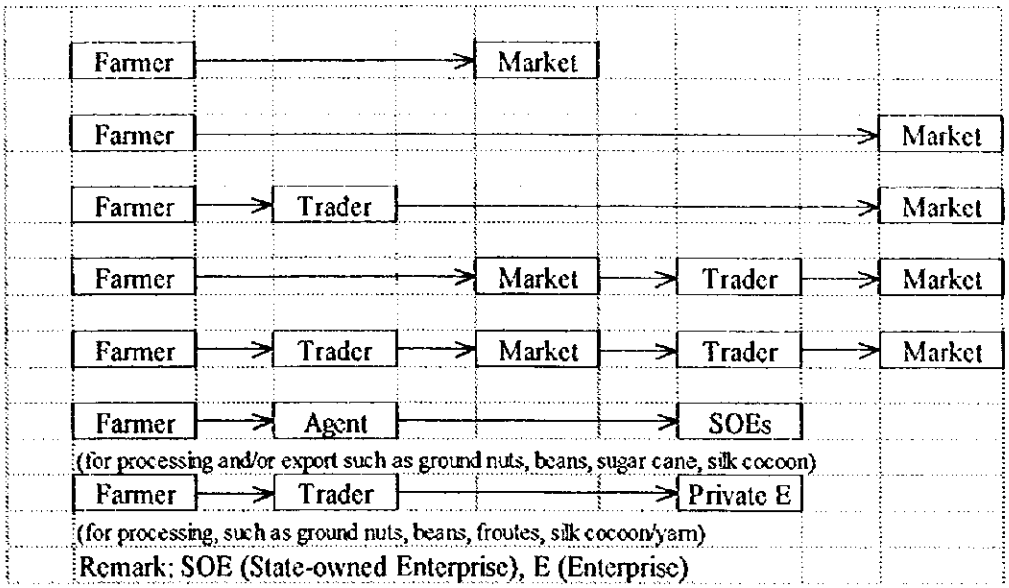
Generally, price controls in all stages of trading agricultural commodities have been eliminated in 1989 (with the exception of few products). Agriculture producers can set and negotiate their own prices and trade with anybody they choose. This free price mechanism is basically essential to the market economy.

Fig.E.1.1 shows the marketing channels of agricultural products produced in Nam Dan District and transported to markets in Nam Dan District. It also includes the

channels in Vinh City where the most important market as of consumers for the products in Nam Dan District.

The present marketing system has been in transitional period yet from the former central controlled mechanism to free market mechanism, and farmers are seemed that they have been starting to intend producing more profitable crops changing from the farming practice based on self- sufficiency , mainly producing staple crops, affected by the former mechanism. In this reflection, there are too various channels generated by traders mainly small household middlemen using bicycles. Principal marketing channels for agricultural products in this area focusing on Nam Dan District are categorized below:

Principal Marketing Channels for Agricultural Products



The Study Team investigated markets, agencies and persons concerned in Nam Dan District including Vinh City which is the biggest consuming market for agricultural products in Nam Dan District and the linkage to Vinh market should be an unavoidable subject to consider the marketing aspects for products in Nam Dan District.

The price information on various stages and places in market channels were collected and compiled in Table E.1.3.

The main observation made during the survey on the marketing system in this area are summarized below:

a) Small middlemen of household who are women at all are almost all traders for agricultural products and use bicycles for transportation. The rest use motor bicycles and small trucks (Cong Nong).

b) There are very limited number of traders using ordinary trucks, who can cover wider area even out of Province, sometimes going as far as Hanoi.

c) The number of state owned trading enterprises have been decreased only 28 in Nghe An Province after the policy change which are still having leading role in several activities such as export and import, providing essential materials (cement, steel, fuel etc.) and distributing complementary goods to remote areas. However their activities are mainly concentrated in urban areas; rural areas are covered by the private traders.

d) Major flow of agricultural products mainly vegetable is to/from Vinh City. Middlemen buy and collect products from farmers and in the nearest market, and pack them in baskets, hang them on the back of their bicycles, and transport them to Vinh markets and/or other distant markets early morning on the following day.

e) So far as during the survey period, it was recognized there ware many agricultural commodities sold in markets in Nam Dan District excepting some products such as rice, ground nuts and animal meats, which come from other areas mainly through Vinh Market. These are as follows:
Apple (from China), Orange (from China), Orange (local), Black sesame, Cabbage, Cauliflower, Garlic, Green bean (String bean), Green onion, Kohlrabi, Mustard green, Onion, Potatoes, Salad green, Small tuber onion (fresh and dried), Tomato, White radish

f) Trading prices are decided by negotiation as their practice but without reasonable and sufficient data because of limited information which is mainly based on oral transmission. By the result of interview to sellers in some markets in Nam Dan District, less than one forth of them only knew the broadcasting program of market information by TV and radio but most of sellers did not use them for their trading because of low reliability and limited kinds of commodities.

g) Trading prices are decided without reasonable negotiations because of limited information of mainly oral transmission. Middlemen as a majority can cover a very limited area for their trading due to their limited mobility by bicycles and it was not seemed that they frequently change destination markets to seek more profit according to market information.

h) Thus, the private traders activities have been sharply expanded and become a major force in trading.

i) In Nghe An Province, only Vinh Market and Station Market in Vinh City have wholesaling function in addition to retailing function. Markets having more than 500 registered traders belong to the People's Committee of Province. These markets are Vinh Market (3,000 registered trades) and Station Market in Nghe An Province. The rest are belonging to the District or City's People's Committee.

j) The authorities of all markets in Nam Dan District and Vinh City do not collect daily trading information such as quantities and prices by commodities.

k) According to the price information collected in the Study period and even considering the limited number of samples, market prices do not seem to widely fluctuate too much. This may not be taken as a sharp signal of a balance between supply and demand of commodities in those markets. On the other hand, it is known some enterprises are very worried about fluctuations of purchase prices due to changes in availability of commodities quantity in market. For example, the purchase price of ground nuts has fluctuated from 3,500 - 7,000 VND/kg during last a year according to one exporting enterprise.

l) As almost commodities are traded in small quantities due to the limitation set by the transportation means, their prices may not be reflect the whole market condition in the area. On the other hand, in case of big-volume trading, i.e, ground nuts case mentioned above, it may be affected directly by the whole market condition in this area.

m) Although market information is limited and disseminated mainly by traders through oral transmission system, there are many commodities in markets distributed from/to out of Nghe An Province during the survey period as follows:

<u>From other Provinces</u>
Apple: China
Carrot: Hanoi, Da Lat
Orange, Maize: Hanoi, Southern Provinces
Rice: Southern Provinces
Bean: Buon Me Thuot Prov., Dak Lak Prov.
Cabbage, Potatoes, Tomatoes, Onion, Garlic: Hanoi
Kohlrabi, Tomatoes, Garlic, Cabbage and Ginger from Thanh Hoa Province
Radish: Thai Bin, Hai Hung
Potatoes and Onion from Ha Tay Province.

<u>To other Provinces including export</u>
Ground nuts: Export
Squid (dried/frozen): Export
Shrimp(frozen): Export
Frozen pork: Hanoi
Lemon: Hanoi
Orange: Hanoi
Dry chilly: Other Provinces (mainly produced in Nam Dan)

E.1.2 Existing Constraints

(1) Agro-imdustry

As the result of the survey, the following problems are recognized:

a) Lack of accessibility to credit
Difficulties access investment credit for establishment of enterprises as well as expanding activities in existing enterprises were one of the most critical constraint which impede proper development of agro-industry sector in this area. It seems that development would be self generated if sufficient amount of credits could be timely available for suitable enterprises and persons

b) Lack of services including market information
The development of agro-industry in the area require services to support, marketing activities, acquisition of machinery and workers training. It also require services that help old style enterprises to adjust themselves to changing business conditions under a free market mechanism.

c) Inadequate transportation network in Nam Dan District
As mentioned above, small enterprises in Nam Dan District have limited access to capital, technology, marketing information and technical assistance. Additionally, they dispersed and hampered by inadequate transportation network. Thus they are suffered by disadvantaged in terms of gaining access to official assistance and obtaining and sharing with information with other enterprises in similar activities.

d) Difficulties of processing factories of industrial crops
The state-owned sugar mill located adjacent to the Study Area operates only four months a year. In fact, it is very old plant and seems to be unprofitable. Due to the fact that farmers in surrounding area are having favor on rice cultivation over sugar cane production, it seems difficult that the mill could be provided with enough amount of sugarcane on continuous base and keep a longer operation period to become profitable. The situation will not change unless the farmers change their self-sufficiency farming practice into commercial - oriented farming practice.

e) Disadvantage of the export and import factory
Currently many export commodities such as frozen marine products and garments produced in the area are once transported to Hai Phon Port and exported. It is disadvantage to the same kinds of factories located in neighboring area of international ports in view of transportation costs to exporting ports . To the contrary the same condition is applied to the factories procuring imported commodities as raw materials.

(2) Marketing system

Introducing free market mechanism, market opportunities for farmers to be involved in commercial farming are increasing as a change from self-sufficiency farming system. However, there are many crucial constraints remaining in the current marketing system in the area. Such constraints to be solved and improved are as follows:

a) Lack of accessibility to credit
In rural areas of Nghe An Province, almost traders are household capacity which are having major role of agricultural products trading. Their trading scale are too

small to generate more dynamic commodity flows reflected markets needs among markets. It is difficult to expect that trading companies with bigger activities using trucks would appear and generate dynamic commodities flow in markets. Because entrepreneurs hardly receive financial assistance such as credit especially in rural areas.

b) Lack of reliable market information
Additionally, as the areas of their activities are small and limited due to the limitation of transportation means such as bicycle and motorbike, they can obtain only limited information. As a result, it would be difficult for them to have more profitable opportunities in other area. At the same time it is difficult for farmers to acquire market information for improving and adopting their farming system to market needs in order to achieve more profitable operation. As farmers are mainly relying on traders for market information, they do not have enough bargaining power to set appropriate price for their products.

c) Lack of institutional market information system
There are no institutional ordinance concerning set up of market information system to producers, traders and consumers in the area. This fact is crucially augmenting the problems mentioned in 2) and 3).

d) Deficient supply of products
There are many kinds of agricultural commodities coming from out of Nam Dan District and it seems the deficit District for satisfying markets demand of agricultural products excepting some products.

e) Bad road condition
The condition of road between communes located in Nam Dan District are inadequate especially in rainy season, and impede trading activities as well as access to information.

f) Insufficient wholesaling function
Wholesaling function in Vinh Market and Station Market are not well operated and it seems only to pay the role of an intermediate step in a continuous stream of commodities from producers to consumers. It is affected by the trading condition mentioned in point 1) above.

E.2. DEVELOPMENT PLAN

E.2.1 Target, Strategy and Objectives

From the present condition recognized by the field survey, the target, strategy and objectives ware considered and fixed as follows for settling the development plan.

(1) Target

1) To Generate Off-farm Job Opportunities
The labor absorption capacity of the agricultural sector is extremely limited in the area, owing to already overcrowded arable land. It is therefore necessary to

develop off-farm employment opportunities to complement agricultural based economic activities. While employment in rural industries and marketing sector is still small in this area, this sector could have potential for growing and could serve as sustainable income base in the area.
To cope with this subject, development of agro-industry and marketing system in this area including surrounding area should be encouraged.

2) To Rise Up Living Condition in the Area
The agriculture base is dominated by rice monoculture where average income to farmers is low. Therefore, farmers should change to do more diversified farming from relying on traditional rice production. Thus rural development requires greater diversification while increasing various needs of market due to free market economy.

The development of rural agro-industry especially agro-processing industry and trading activities in marketing system could support and emphasize the diversification of farming, and promote to increase off-farm job opportunity as well. As results, the development of rural agro-industry and marketing sector is one of the essential factors to achieve improvement of the living standard of inhabitants through increasing their income.

(2) Strategy

1) To Organize Farmers Group
For the national development, Viet Nam Government is adding special attention to minimize the differences on economic and social condition between regions as well as households in the area.

In this regards, the development of agro-industry and marketing sector should be focused on the majority of population of the area, farmers as beneficiaries and give them the chances to participate off-farm activities in agro-industry and marketing sector with organizing groups.

2) To Change Farmer's Living Means for Free Market Mechanism
To cope with the Government issue mentioned above, the development of agro-industry and marketing sector should provide the function of inspiring farmers to know the appropriate means of their economic activities and making them to create their competitive activities in the free market mechanism.

3) To Strengthen and Expand Existing Activities
The priority should be given to the existing agro-processing factories, marketing facilities and individual household activities in consideration to formulate the measures for development of agro-industry and marketing system in this area.

4) Necessity of Development in Surrounding Area
Nevertheless the development of agro-industry and marketing system in Nam Dan District could be achieved by maximum capacity in future, it would be absolutely impossible to fulfill absorbing all extra labor generated in agricultural sector as well as consuming all commercial agricultural products in the District.

Therefore, it should be recognized that the Targets defined in the previous section could be satisfied by creating proper and smooth development in the surrounding area especially Vinh City and it's neighboring area in parallel with development in the District.

(3) Objectives

1) Agro-industry

a. To Establish Farmers Groups
- Establishment of farmers group
- Construction of agro-processing facilities
- Introduction of group activities
- Introduction of appropriate technology
- Introduction of management system in cope with free market economy

b. To Expand Activities of Existing Factories
- Renovation of existing agro-processing facilities
- Introduction of appropriate technology
- Strengthening management and marketing activities in cope with free market competition

2) Merketing

a. To Establish Farmers Groups
- Establishment of farmers group
- Construction of information processing facilities
- Construction of forwarding facilities and warehouse for agricultural products
- Introduction of group activities
- Introduction of appropriate technology
- Introduction of management system in cope with free market economy

b. To Improve and Expand Activities of Existing Facilities
- Renovation of existing marketing facilities
- Introduction of appropriate technology
- Strengthening management activities in markets
- Improvement of regal condition of market activities

E.2.2 External Requirements

To realize proper development on agricultural production, agro-processing and trading system in Nam Dan District, the improvement and upgrading in level of a country and a province are indispensable about many conditions concerned such as law and regulation and announcement of market information, as well as a self effort in a district level through implementation of the development projects. The details of such requirements are shown in Table E.2.1.

E.2.3 Basic Concept of Project Formulation

With the process that Viet Nam is promoting free market economy the agriculture in the survey area is the place where started the conversion of production system from self sufficiency to market correspondence. In this circumstances, it is planned the development plan as policy induction model that have the following basic concept, concentrating to the farmers as the large majority of population in the region.

- To change a way of thinking in farmer's activities to the new and advanced one adapted to free market economy.

- To prepare the situation in which farmers can advance their activities into the field of agro-processing and trade as a down-stream field of agricultural production.

- To create new group activities of farmers along with the above objectives.

- To display these activities as the model of an advanced farmers' activities and induce other areas to introduce them.

E.2.4 Long list of Projects and Prioritization

(1) The Projects for Agro-Industry and Marketing Improvement

According to the precondition and the basic concept above, the five project were formulated due consideration with the present condition recognized in the survey area and fields. These project contents for agro-industry and marketing improvement is summarized in Table E.2.2. The relation between the proposed project and agricultural activities expected in the future, required input and proposed output in the flow from the production stage to market stage are illustrated as shown in fig. E.2.1.

a) Agro-processing Complex
b) Market oriented forwarding center
c) Improvement confectionery factory
d) Group facility for silk yarn production
e) Pine tree gum processing facility
f) Group facility for soy-source production

(2) Prioritization

Prioritization of those projects have been studied based on inhabitant needs, impact, model, economy and synergistic effect in the agricultural sector.

Inhabitant needs : a rank is given to the projects required for most of the farmers and b rank is given to other projects which are not.

Impact : a rank is given to the projects which are related to most of the farmers, c rank is given to the projects which are related with special-interest farmers and B rank is given to other projects which are not.

Model : a rank is given to the projects which can be applied to other districts, c rank is given to the projects which can be applied only for Nam Dan District and B rank is given to other projects which can not.

Economy : a rank is given to the projects which have the potentiality for high return and b rank is given to other projects which do not have it.

Synergistic effect : a rank is given to the projects which largely influence to the agricultural production in the District and c rank is given to other projects which do not.

Comprehensive Assessment:

If a rank is given for all items above mentioned, the project rank should be A. For other cases, the project rank should be B.

Project Name	Inhabitant Needs	Impact	Model	Economy	Synergistic Effect	Comprehensive Assessment
Agro-processing Complex	a	a	a	a	a	A
Market-oriented Forwarding Center	a	a	a	a	a	A
Improvement of Confectionery Factory	a	a	a	a	b	B
Group Communal Facility for Silk Yarn Production	b	b	b	b	c	B
Pine Tree Gum Processing Facility	b	b	c	b	c	B
Group Communal Facility for Soy-sauce Production	b	c	c	b	c	B

E.3 PRIORITY PROJECTS

The result that carried out an preliminary design on the basis of information that was obtained with a field survey, about two priority projects ("Agro-processing Complex Project" and "Market oriented Forwarding Center Project) that were proposed in the Master Plan is as follows.

E.3.1 Objectives

With the process that Viet Nam is promoting free market economy the agriculture in the survey area is the place where started the conversion of production system from self sufficiency to market correspondence. In this circumstances, it is planned as policy induction model projects that have the following objectives, for the farmers as the large majority of population in the region.

- To change a way of thinking in farmer's activities to the one adapted to free market economy.

- To prepare the situation in which farmers can advance their activities into the field of

agro-processing and trade as a down-stream field of agricultural production.

- To create new group activities of farmers along with the above objectives.

- To display these activities as the model of an advanced farmers' activities and induce other areas to introduce them.

E.3.2 Activity

The activity that are carried out in the each projects to achieve the above objectives are as follow: (The details are shown in Table E.3.1)

(1) Agro-processing Complex Project

1) Rice mill
   - To process as much as possible of paddy produced in the project area.
   - To carry out a wage processing for the part of paddy for farmers' self-consuming by the same rate of existing millers in the area. Therefore, it results that qualitative and quantitative merits by technology improvement is given to consignment farmers.
   - To buy the part of paddy for farmer's selling by the rate of market price.
   - To make effort of selling the higher price by quality improvement and expand profits by selling to proper place on suitable time.

2) Ground nuts oil mill
   - To process as much as possible of ground nuts produced in the project area.
   - To pursue profits qualitatively and quantitatively by technology improvement.
   - To acquire the confidence in the market and expand the regular customers by selling the good products with stable quality.

3) Feed mill
   - To produce and sell the combination feed that is mainly concerned with for a pig raising due to the advancement of an animal breeding industry in the area.
   - To produce feed with mainly rice bran and oil cake generated from the two mills above and other materials procured.

4) Grain dryer and ground nuts sheller
   - To make the farmers using the dryer and the shelling machine freely for the purpose of advancing the procurement of ground nuts that is the material of the oil mill and reduction of loss occurred by insufficient drying.
   - To use the waste such as husk and ground nuts shell generated from this facility as fuel of the dryer, and reduce the operation cost.

5) Miscellaneous
   In Future, it is expected that the farmers groups engaging the activities above would develop and create new individual business lines as follows:
   - Wholesaling of rice
   - An general edible oil production sales business including the rice bran oil and salad oil

- An overall combination and concentrated feed production sales business
- A intensive raising and sales business of the pig, chicken and beef cattle etc. that is not as the side job of a farmer.

(2) Market Oriented Forwarding Center Project

1) Accumulation of market information
   - To collect and accumulate market information widely and daily including information that is offered by the peoples committee.

2) Processing and analyzing of accumulated information
   - To grasp trading trend and needs in markets by processing and analyzing of accumulated information.

3) Farming oriented by market needs
   - To plan the kind of crops, harvest time, sales time, destination place, sales unit etc. that high profits are expected on the basis of the analysis result of information.
   - To promote group farming as much as possible, not individual farming by each farmer, in accordance with the plan above.

4) Group collection and forwarding
   - To adjust harvest schedule in advance among farmers and carry out joint collection by a truck.
   - To carry out group works by farmers such as sorting by destination places and binding, packing and grading in case of market requirement, and forward by a truck.
   - To store the products such as beans that can be stored in a warehouse at first and ship it in good time of market condition.
   - To transport the products to markets in the neighboring area by truck and to even markets out of the province when the increase of a profit is expected as a possible area.

E.3.3 Implementing Organization

As the both projects are carried out by farmers group, the grouping of farmers is indispensable. In this regards, the study team discussed officials concerned in Vietnamese side in all of more than once, and concluded the existing cooperative function is the most reliable and efficient to formulate the farmers group and itself is realistic and suitable as implementing organization.

The present cooperatives are continuing some service activities such as supplying seeds and fertilizer to farmers even though their economic status has been weakened relatively in the area after finishing their role under the previous central planning economy system. Then, Vietnamese government issued the "New Cooperative Low" on 1 January 1997 that intends to reform them by carry out new various activities in conformity to the free market mechanism. Following this, the district peoples' committee take measures to reform and strengthen cooperatives with new activities under the district.

Traditionally, there is farmers group society unit by village under a cooperative, therefore the formation of farmers group is easy if there is a concrete plan like this plan and such activities is expected as a new model of a cooperative activity.

Accordingly, the implementing organization of the project is the cooperative located in the area where the facility of the project is constructed. Actually, it assumed that the facility is managed by the farmers group of a proper scale directly that is selected by a village unit out of the all member farmers in the cooperative.

There is the Managing Board in each cooperative. After the decision will be made for the project execution, the project will start upon getting approval by the cooperative's general meeting for the plan of new organization and activities prepared by the Managing Board. The new organization for the project is expected as Fig. E.3.1 and becomes additional service activities to the existing various services to member farmers.
Also, operation and management organization expected for the facilities of each project are shown in Fig. E.3.2 and E.3.3.

E.3.4 Project Site

(1) Agro-processing Complex

One of the important activities by this plan is a commerce activity. At least, the access of the facility to a production area and markets needs to be fine and the location is desirable to face to a major road. Furthermore, as a result that carried out a mutual comparison of each area for site selection in consideration with a social and economic background as well as agriculture production, all District were able to be divided into six zones as Fig. E.3.4. The major comparative items on the works above are shown in Table E.3.2.

Table E.3.3 shows the result of evaluation for the zone priority of project site with the following factors.
- The easiness of a material procurement
- The easiness of product (mainly feed) sales
- The properness of environmental condition such as a relation to markets, quality of cooperative's activity

Table E.3.3 Comparison Result of Zones

Zone	Material procurement	Products sales	Background condition
I	easy	easy	better
II	easy	easy	good
III	difficult	difficult	average
IV	easy	easy	good
V	easy	average	average
VI	average	easy	good

From the result, the facility location is judged to be considered among the zones from I to II and IV.

(2) Market Oriented Forwarding Center

From, the character of the project, there is not the special condition for site selection because the facility can be used correspondingly to the condition of agricultural production in each area. And the followings are pointed out as the matters to be considered.

- The location along a major road.
- The enthusiastic area of cooperative management and activities.
- The area in which cooperation nature between farmers is high.

E.3.5 Preliminary Design of Agro-processing Complex

(1) Precondition

On the occasion of beginning of this project implementation, Vietnamese side will carry out the decision of construction place and cooperative as the implementing organization. In the report, the preliminary design was carried out based by the following condition prepared as an average model under Nam Dan District.

Background condition
Project area: a cooperative or commune scale (10 village, 1,000 farmers)
Farm area : about 300ha
Production of major products: as Table E.3.4 prepared in accordance with the production plan for the district.

Table E.3.4 Production plan in Project Area

Cap.	About 10 villages			
	No. of farmers	1000	Area	689.05ha
Name of crop	Cultiv. Area (ha)		Production (t)	Yield (t/ha)
Paddy	413.14		1,840.61	4.46
W-S		200.67	953.16	4.75
S-A		197.72	858.08	4.34
S		14.75	29.36	1.99
Maize	70.82		111.81	1.58
W-S		4.43	9.56	2.16
W		66.40	102.25	1.54
Sweet potato	54.59		294.80	5.40
W-S		1.48	7.97	5.40
W		53.12	286.83	5.40
Ground nuts	66.40		106.90	1.61
Soy bean / green bean	20.66		17.35	0.84
Sesume	2.95		2.12	0.72
Vegetable	44.26		309.41	6.99
W-S		13.28	92.82	6.99
S-A		13.28	92.82	6.99
W		17.71	123.76	6.99

(2) Application plan of each facility

a. Rice mill

- Target processing amount of paddy is about 80% of total production in the project area.
- To Collect processing wage from farmers for the part of paddy for their own consumption among all processed. In this case, wages charge comes the same actual rate of existing rice millers in the area. Accordingly, The consignment farmers enjoy economic merit by qualitative and quantitative improvement of the product that is brought by this rice mill.
- To procure the part of paddy other than for farmers consumption by actual farm gate price in the area and process and sell the white rice.

b. Grain dryer and ground nuts sheller

It is intended to reduce qualitative and quantitative loss of products, by what farmers in the project area can use freely these machines.
Accordingly, the Complex promote an active use of the machines by farmers and only collect actual expenses such as an electricity charge from a user.

c. Ground nuts oil mill

- To purchase ground nuts produced in the project area and process and sell ground nuts oil.
- Target purchasing amount is about 50% of total production in the project area as purchasing from bad quality of ground nuts by lower market price such as bad shape of kernels.
- The purchase price from farmers makes actual farm gate price when purchasing.

d. Feed mill

- To produce mixed feed from rice bran produced in the rice mill and oil cake produced in the ground nuts oil mill as major raw materials, and maze, sweet potato etc. procured additionally.
- To produce and sell the products corresponding to needs of farmers to develop animal raising activities in the project area, and for a moment concentrate to support the lack of farmers' self-producing feed for centering pigs.

(3) Preliminary design

a. Rice mill

- Design condition

Paddy production	:	1,840 ton
Receiving amount	:	1,500 ton (Rate to total production 81.5%)
Designed processing capacity	:	1 ton(paddy)/hour
Average working condition	:	300 days/year、5 hours/day
(To extending operation time for peak season after harvesting)		
Designed yield	:	65%/paddy processed

- Material flow

The material flow is shown in Table E.3.5 estimated by the condition above.
And the flow chart drawing is as Fig. E.3.5.

Table E.3.5 Material Flow of Rice Mill

Material		Amount (t)	Remarks		
Paddy	100.0%	1,500.0	94% for consignment		
Impurities	3.5%	52.5	Immatured, straw, sand etc.	*1 40	→ Feed/Fuel
Stone	0.5%	7.5			
Cleaned paddy		1,440.0			
Husk	22.0%	330.0			→ Fuel
Brown rice		1,110.0			
Bran	9.0%	135.0	Including starch fine	*2 50 23234	→ Feed
White rice		975.0			
		▼			
		612.21	For consignment *3		
注：		362.79	Procurement		
*1 : Figure shows amount (t) excluding sand and dust.					
*2 : Figure shows amount (t) coming from procurement amount					
*3 : Estimated from per-capita consumption (0.1633t/y, 1995,FAO) and average No. of family (4.6 persons)					

As the above, 612 ton of white rice are returned to farmers and 363 ton is sold. Also, the by-products other than stones and sand, are utilized as a material and fuel with other facilities.

b. Grain dryer and ground nuts sheller

As mentioned before, those machines are used by farmers freely. Major specification of each machine is as follows:

- Grain dryer
  - Type : Flat bed
  - Holding capacity : 800 kg
- Ground nuts sheller

Capacity : 700 kg/hour

c. Ground nuts oil mill

- Design condition
  - Ground nuts production : 106.9 ton
  - Receiving amount : 50 ton (Rate to total production 46.8%)
  - Amount without shell : 38 ton
  - Designed processing capacity : 100 kg/hour
  - Average working condition : 100 days/year、3.5 hours /day

  (To extending operation time for peak season after harvesting)

  The cocker is also used for rice bran treatment for eliminate enzyme activity. 100 days/year, 3 hours/day.
  - Designed yield : 40%/ground nuts without shell processed

- Material flow

  The material flow is shown in Table E.3.6 estimated by the condition above. And the flow chart drawing is as Fig. E.3.6.

Table E.3.6 Material Flow of Ground Nuts Oil Mill

Mterial		Amout (t)	Remrk		
Goundnts	100.0%	380	Without shell		
Oil cake	58.0%	220		→	Feed
Losses	2.0%	08	Minly moisture		
Goundnts oil	40.0%	152			

d. Feed mill

- Design condition

Variety of feed for design : The feed for raising pig (weight 30~70kg) is selected as the model for design because it is expected to have the most demand.

Composition of feed : Material Composition was set up on the basis of the standard nutrients requirement for a design model, centering rice bran and oil cake that are produced as by-products in the complex. The standard nutritional composition of raw materials and the standard nutrients requirement for a design model are shown in Table E.3.7 and E.3.8, and the distribution of raw materials and the nutritional composition of the product are as Table E.3.9.

Production plan : 200 ton/year、amount of each raw material is shown in Table E.3.10.

Table E.3.10 Amount of Raw materials and Distribution

Raw material	Composition	
	Amount (t)	Distribution
Maize*	60	30%
Paddy**	15	8%
Sweet potato*	45	23%
Oil cake	22	11%
Rice bran	50	25%
Dried fish*	8	4%
Total	200	

* Procured materials, others are by-products in the Complex

** Separeted from impurities rejected in rice processing

Designed processing capacity : 400 kg/hour

Average working condition : 100 days/year、5 hours/day

- Flow chart

The flow chart drawing is as Fig. E.3.6.

e. General design

- Layout plan

The general layout plan including the facilities mentioned above is shown in Fig. E.3.7.The contents are as Table E.3.11.

Table E.3.11 Contents of Layout Plan

Contents	Area (m^2)	Detail
Office	30	Office area including inspection area for raw materials received
Raw materials warehouse*	570	Area of storage capacity for approx. 300 ton of paddy, 10 ton of ground nuts without shell, 15 ton of maze, 10 ton of sweet potato, 10 ton of rice bran and 15 ton of oil cake. And area for grain drying and ground nuts shelling
Processing area I	280	Area for rice mill and feed mill
Processing area II	40	Area for oil mill
Products warehouse*	285	Area of storage for approx. 30 ton of white rice, 5 ton of ground nuts oil and 5 ton of mixed feed.
Work shop	30	Storage area for maintenance tools and equipment and repairing work area for parts and materials of facilities.
Drying yard	50	Used for sun drying for high moisture materials

* To avoid the loss of quality and quantity of the products especially of white rice and feed, production is carried out on shipment basis as much as possible. As the result, the capacity of warehouses were designed smaller for the products and larger for raw materials.

- Machinery and equipment plan
  Table E.3.12 shows the major machinery and equipment which are procured and installed for the complex.

Table E.3.12 List of Major Machinery and Equipment

Name	Q'ty	Remarks
<Office>		
Personal computer	2sets	With OS and application software
Printer	1set	
Facsimile equipment	1set	
Inspection equipment and tools	1unit	Such as moisture meter, test husker, test mill.
<Raw material warehouse>		
Grain dryer	1set	Flat bed type with husk fed furnace.
Ground nuts sheller	1set	
Belt conveyer	1set	Removable
<Processing area I>		
—Rice mill—		
Receiving hopper	1set	
Paddy cleaner with de-stoner	1set	
Husker	1set	

Name	Q'ty	Remarks
Whitening machine	1unit	Combination of an abrasive type and a friction type
Bran collecting equipment	1unit	Including fan and cyclone
Small broken rice separator	1set	To separate white rice smaller than 1/4 of ordinary size in order to increase market value. Not used for consignment.
Weighing and packaging machine	1unit	Table scale, auto-shutter, sawing machine
Miscellaneous	1unit	Bucket elevators, tanks, pipes etc.
−Feed mill−		
Receiving hopper	2set	
Premix mixer	1set	
Magnet separator	1set	
Milling machine	1set	
Mixing machine	1set	Vertical type
Weighing and packaging machine	1unit	Table scale, auto-shutter, sawing machine
Miscellaneous	1set	Belt conveyors, tanks, pipes, etc.
<Processing area II>		
Cooker	1unit	With boiler
Expeller	1set	
Filter press	1set	
Filling machine	1set	Manual
<Products warehouse>		
Belt conveyor	2sets	Removable
<Work shop>		
Tools	2set	Such as open end wrench, offset wrench, pliers, driver, hammer.
Electric tool	1set	Such as grinder, sander, drill
Inspection tool	1set	Such as electric tester, tachometer
Arc welder	1set	With Helmet、holder、cable, etc.
Air compressor	1set	With gun, horse, connector, etc.
<Others>		
8 ton truck	1set	For transportation of materials and products
Pickup truck	1set	For transportation of materials and products, and for sales promotion
Folk lift truck	1set	Used in warehouse

E.3.6 Preliminary Design of Market Oriented Forwarding Center

(1) Precondition

The project site has not been decided yet, and there is not even sufficient market information for the project. Therefore it is extremely difficult to hypothesize an agriculture production state to meet market needs in future. However, hypothesizing an average farm village condition under Nam Dan District the preliminary design were carried out.

a. Background condition

Project area : a cooperative or commune scale (10 villages, 1,000 farmers)

Member farmers : For a moment starting from dozens of farmers, 100 farmers (scale of average village) is made as a goal. The

member farmers participate to a production activity in the group based on the analysis of market information, in addition to bearing the operation of the Center independently.

Handling products : Every kinds of products produced in the project area are possible to be handled in the center. In the early period of the project, It is needed to carry out a commerce activity that purchase the products from farmers in the surrounding area and sell in markets for effective utilization of the Complex facilities and truck because there is little amount of products procured from the member farmers. And this situation is effective on the occasion when extensive market information is collected.

(2) Application plan of each facility

- Information accumulation and processing facility
  To accumulate market information daily, and process and analyze price fluctuation between areas, in time, etc., and expect market tendency in the future.
  To collect market information from not only in Nam Dan district and Vinh city but also from market outside of Nghe An province where transportation of products is possible by a truck.

- Collection and forwarding facility
  Those activities are carried out by the member farmers group, that are to purchase the products centering from member farmers, sort for each destination places and carry out selection, grading, binding, packaging that may be necessary to meet markets requirement, and forward by a truck.
  To store the products such as grain, bean and tuber in a warehouse at first and forward them in good time of market condition.
  To purchase the products principally by the price of actual farm gate price when purchasing. Even the other method may be conceivable that the Center, as the representative of producers for selling their products, pays to the producers after deducting a regular service charge in addition to actual expenses such as a cost of transportation from the selling price.

(3) Preliminary design

- Design condition
  The possible amount of procurement, that is an possible selling amount of farmers, estimated from the production plan of major crops shown in Table E.3.4 before is as Table E.3.12.

Table E.3.13 Possible Procurement Amount of Major Crop

(ton)

Capacity	1000			100	
Name of crop	Production	Self-consumption	Possible procure.	Possible procure.	Per-capita consumption
Maize	111.81	51.98	59.83	5.98	0.0113/y,cap.
Sweet potato	294.80	89.24	205.56	20.56	0.0194/y,cap.
Ground nut	106.90	-	106.90	10.69	
Soy bean/green bean	17.35	-	17.35	1.74	
Vegetable	309.41	223.10	86.31	8.63	0.0485/y,cap.

* Per-capita consumption:actual result in1995 (FAOSTAT), 4.6 persons/farmer

- Handling condition of fresh products :
  There is not an exact figure of a trading volume of vegetable and we can not estimate quantitatively. However, it is certain to increase a trading volume by both demand and supply as long as our judgement of the current situation of markets in the study area. Also it is a vegetable to be being transported and traded a lot by bicycles daily in a survey area. Thereupon, a handling condition of fresh products including fruits are as follows:

  Handling amount : 100 ton/year
  Working days of a year : Basically to collect products and forward them in the next day.Collection 100days/year, forwarding 100days/year
  Working days of a week : Average 2 days for collection and forwarding, total 4 days a week a day
  Handling amount : Average 1 ton a day

- Condition of warehouse : Used for grain, bean and tuber.
  Storage amount : About 200 ton as 50% of total production in the project area.
  Capacity : 60 ton, 50 % of estimated handling amount of maize and sweet potato harvested on winter season as peak through a year. The circulation rate is 3.3.

- Layout plan
  The general lay out plan is shown in Fig. E.3.8. The contents are as Table E.3.14.

Table E.3.14 Contents of Layout Plan

Contents	Area (m^2)	Detail
Office	45	Area for office work
Information processing room	Included above	Area for accumulating and processing market information
Warehouse	120	Area of storage capacity for 60 tons of sweet potato with cooling function up to 15 °C
Working place for collection and forwarding	155	Working area for forwarding products such as sorting
Materials storage	15	Storage of materials for handling products such as container boxes, bags and strings.
Drying yard	120	Area used for sun drying for high moisture products

- Machinery and equipment plan
  The major machinery and equipment introduced to the Center are listed in Table E.3.15.

Table E.3.15 List of Major Machinery and Equipment

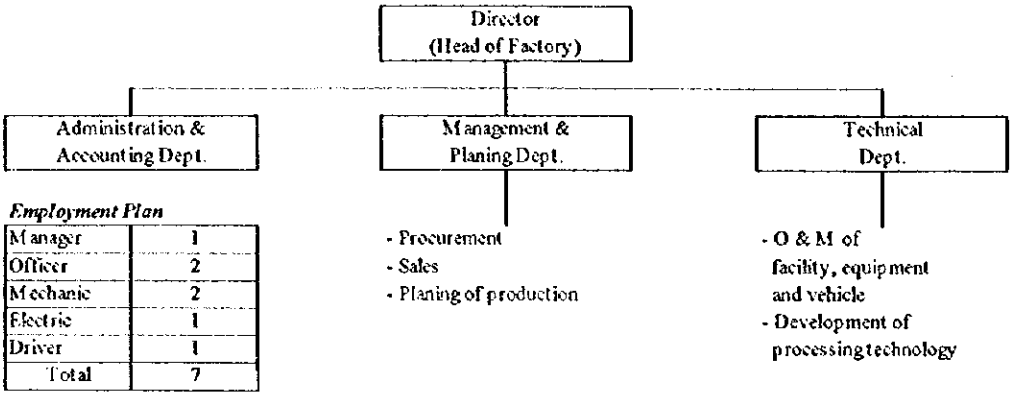
Name	Q'ty	Remarks
<Information processing room>		
Personal computer	2sets	With OS and application software
Printer	1set	
Facsimile equipment	1set	
<Warehouse>		
Cooling unit	2sets	
<Working area>		
Belt conveyor	3sets	Removable
<Material storage>		
Container box	200pcs	Plastic
<Others>		
4 ton truck	1unit	For transportation of products
Pick up truck	1unit	For transportation of products and sales promotion

E.3.7 Implementation Plan

As implementation of these projects will be carried out after achievement of improvement of agricultural productivity and increasing the treatment amount for rural market, the implementation of projects for irrigation and agricultural supporting sectors is one of preconditions for these projects. On the other hand, it is necessary to consider the connection with the projects of rural road and electrification sectors for effective generation of project benefit. Therefore, the implementation of those sectors projects should be precede and this sector projects should be implemented after improvement of those conditions. Furthermore, it is recommended to establish the new organizations in the Nam Dan District said "new agricultural management promoting committee" which is in charge of coordination for overall activities and "new agricultural management promoting division" which executes these project with keeping the relation of cooperatives.

E.3.8 Operation and Maintenance Plan

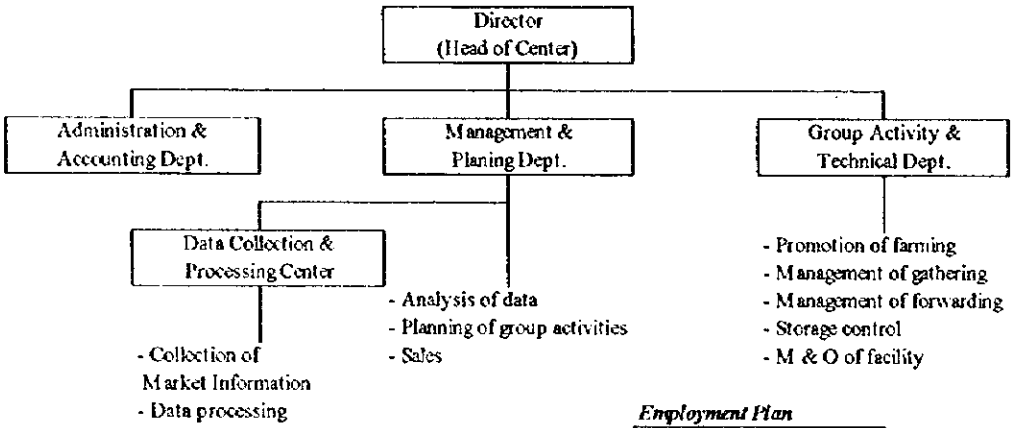
The management agencies are sub-organizations belonging to cooperative and the activities are carried out under instruction and supervision of "new agricultural management promoting division". The proposed organizations are shown below. Staff will be ensure by completion of facility construction and procurement of equipment. Temporary employee will be available for seasonal simple work. For mechanic and electric staff, the training concerning operation and maintenance of equipment will be carried out for approx. a month by the supplier.



Employment Plan

Manager	1
Officer	2
Mechanic	2
Electric	1
Driver	1
Total	7

Organization of Agro-processing Complex



Employment Plan

Manager	1
Office	3
Driver	2
Total	6

Organization of Market Oriented Forwarding Center

E.3.9 Project Cost and O/M Cost

The project cost and O/M cost are estimated as below:

Project	Project Cost		
	L/C (mill.VND)	F/C (mill.VND)	Total (mill.VND)
1 Agro-processing Complex	9,327	6,907	16,234
2 Market-oriented Forwarding Center	1,510	2,517	4,027
TOTAL	10,837	9,424	20,261

Note: Engineering cost and physical contingency are included in the project cost. Price escalation are excluded

Project	Operation Cost (mill. VND)	Wage (permanent) (mill. VND)	Wage (temporary) (mill. VND)	Annual Total (mill. VND)
1 Agro-processing Complex	93	90	39	222
2 Market-oriented Forwarding Center	44	70	15	129

E.4 Recommendation

(1) These projects can not completed through introduction of facilities only, and the success is mostly owe to the contents of activities how the farmers and staff concerned can manage and utilize it. Accordingly, it is conceivable that the technical assistance of the following fields is indispensable in the enforcement of the project implementation.

(Agro-processing complex)
Long term assistance
- General management

Short term assistance
- Rice mill operation including inspection technology
- Oil mill operation
- Feed mill operation and designing technology for feed composition

(Market oriented forwarding center)
Long term assistance
- Management (marketing)

Short term assistance
- Storage technology

(2) The center of trading activity of agricultural products in Nam Dan district is a woman with bicycle. Loading the products bought from the neighboring farmers or produced themselves to the platform of bicycles they are selling them in the markets of the vicinity or distance. On the contrary, they are selling the products in the vicinity that purchased in the markets of a distant.

As a trading activity goes being modernized in the future such as "to a truck from a bicycle", the symbolized words used in this study report, the importance of such activity by local women becomes small and go reducing it. Accordingly, the special attention should be paid for expanding the working chance for women in the projects activities as much as possible.

APPENDIX E : TABLES

Table E.1.1 Outline of Agro-processing Factory in Nam Dan District

Products	Type	Capacity	Condition of Production	Labor	Raw Materials	Sell to	Constraints
Candy	State-owned	Cottage	Few small machines such as press & extension roller, cutting machine.	Concentration	Ground nuts, sugar, flour	Trader & shops within District	1)Lack of money for expanding activities 2)Lack of access to technology
Soy source	Private	Household	Conventional way using ceramic vessels & cocking tools For subsidiary income	Small production by family	Soy bean, rice, salt, green bean	State company	
Ground nuts oil	Private	Household	Conventional way using horizontal press by manual & cocking tools For subsidiary income	Small production by family	Ground nuts	Trader	Law profit
Silk yarn	Private	Cottage	Simple equipment moved by foot	Concentration	Cocoon	Knitting enterprise managed by relatives Sell to Siamese trader finally	1)Lack of money for expanding activities 2)Lack of access to technology
Pine Tree Resin	State Farm	Only collection	No equipment for processing Having heating equipment of Cuba before	300 workers (100 for full time, 200 for temp.) Concentration	Pine Tree Resin	Mainly Plastic Processing Factory in Vinh City	1)Lack of money for get processing machine 2)Lack of access to technology

Table E.1.2 Outline of Agro-processing Factory in Vinh City and Surrounding Area (1/3)

Products	Type	Capacity	Condition of Production	Labor	Raw Materials	Sell to	Constraints
Beer (Lager, Draft)	State owned	Big	New plant of Denmark was installed in last year	Saving	Molt, hop, chemicals are imported excepting rice	Almost in Vinh City, the small rest to other Prov.	Importing materials are bought through state importing company without any alternatives.
Beer(Draft)	Private Established last year joining five investors	Small	Conventional Only tanks and filter	10 workers	Molt, hop, chemicals are imported excepting rice through state company	Within Vinh City	Expecting market demand and want to expand capacity but lack of investment
Ice cream	Private Started this year	Small	Soaking chamber, freezers & refrigiraters	18 workers	Rice powder, Sugar, flavors (local) Milk-powder imported through state company	Expanding selling agents in the Prov.	Lack of investment is the most problem to expand selling area
Instant noodle & soup	State owned	Middle	Two lines of noodle production	220 workers including carton- box production Not labor saved	Wheat flour, vegetable oil & seasoning are imported, some part of seasoning are local	Some 10% of noodle are exported	1)Recruiting foreign JV partner 2)Increasing No. of same kind factories market has been more competitive
Knitted materials	State owned	Big Seems to run well	German knitting machines More than 500 sawing machine (Japanese, German of new & Russian of old)	1200 workers Concentration	From Nam Dien Prov. & Hanoi Some special colors from India	80% of products are exported	To be made efforts are improvement quality (technologies) & shortening deliver time

Table E.1.2 Outline of Agro-processing Factory in Vinh City and Surrounding Area (2/3)

Products	Type	Capacity	Condition of Production	Labor	Raw Materials	Sell to	Constraints
Garment	State owned	Middle	300 sawing machine	500 workers Concentration	From Taiwan Korea	Almost for export	1)Lack of investment for expand activities 2)Now under consideration of joining some JV company in Ha Tin Prov. 3)Effort done for better quality, lower price & more marketability
Frozen marine products	State owned	Middle	Conventional Only two refrigerators Difficult to be good quality of products	200 workers Concentration	From fishermen in surrounding area	All for export from Hai Phon Port	1)Some 100 competitors in Viet Nam 2)Need investment to improve technologies & facilities
Sugar	State owned	Middle	Very old Chinese plant (4,000t/y designed cap.) installed in 1959 Seems to be replaced	200 workers Concentration for this plant, not for modern plant	From farmers in surrounding area within 25km distance (Nam Dan/Hong Hguya/Duc Tho Dist.)	80% to state company & 20% to consumers directly	1)Very difficult to procure enough amount of canes because of less favor by farmers than rice 2)Only 5 months operation a year
Ground nuts oil	State owned	Middle	Very old 5 sets of German expeller with cooker (500t/y designed cap.) installed in 1959 Seems to be replaced One other factory in Nghia Dan and new plant (1,000t/y) is planned to be installed in one of both	120 workers Concentration for this plant	65% from export company (of low quality for export) & the rest from farmers at gate of factory	70% to private wholesalers in Hanoi & Danan, 30% to consumers directly & small to state company	Only 150t produced (3-4 months) a year

Table E.1.2 Outline of Agro-processing Factory in Vinh City and Surrounding Area (3/3)

Products	Type	Capacity	Condition of Production	Labor	Raw Materials	Sell to	Constraints
Sweets of peanuts	State owned (mainly trading company including exp. & imp.)	Middle as trading company	Conventional Only 5 coating equipment (butch type) and some hand impulse sealers Almost manual processing especially for packing Having plan to have oil expeller for ground nuts & meat processing facility	120 workers including trading Concentration for processing	Ground nuts from farmers in the Prov. mainly in Nam Dan	Some for export	Procurement prices are fluctuated due to market condition and their demand, 3500-7000D/kg for ground nuts for example
Froutes wine	Private Established last year	Middle	Not survey	40 workers	Pineapple, appricot, apple, grape, tamarind (local)	Already having 500 sales agents of sparkling drinks of rlative company by which channel they started to sell Plan to expand 100 agents in the area from Quang Binh to Thanh Hoa	1)Lack of investment for expand activities 2)Difficulties of marketing by lack of information

Table E.1.3 Survey Result of Market Price in Last One Year as of July 1996

(Cont)

Commodity		Unit	(A) Vinh City					(B) Nam Dan District					(C) Farm Gate Price in Nam Dan District					Comparison (A:B)			Comparison (A:C)			Comparison (B:C)		
			Highest Average	Lowest Average	Middle figure	Balance	Balance (%)	Highest Average	Lowest Average	Middle figure	Balance	Balance (%)	Highest Average	Lowest Average	Middle figure 13	Balance	Balance (%)	Highest	Lowest	Middle	Highest	Lowest	Middle	Highest	Lowest	Middle
			1	2	3((1+2)/2)	4(1-2)	5(4/1)	6	7	8((6+7)/2)	9(6-7)	10(9/6)	11	12	((11+12)/2)	14(11-12)	15(14/11)	16(1-6)	17(2-7)	18(3-8)	19(1-11)	20(2-12)	21(3-13))	22(6-11)	23(7-12)	24(8-13))
Rice	203	Kg	3,100	2,600	2,850	500	16	2,731	2,279	2,505	452	17	2,971	2,714	2,843	257	9	369	321	345	129	-114	7	-240	-435	-338
	1820	Kg	3,192	2,500	2,846	692	22	3,304	2,696	3,000	608	18	3,400	3,050	3,225	350	10	-112	-196	-154	-208	-550	-379	-96	-354	-225
	17494(13/2)	Kg	2,817	2,313	2,565	504	18	2,925	2,379	2,652	546	19	2,981	2,763	2,872	219	7	-109	-67	-88	-165	-450	-307	-56	-383	-220
	N352	Kg	4,100	3,281	3,690	819	20	4,215	3,729	3,972	486	12	4,286	3,757	4,021	529	12	-115	-449	-282	-186	-476	-331	-71	-28	-49
	Bao Thai	Kg	3,300	3,000	3,150	300	9	3,500	3,034	3,267	467	13	3,250	2,867	3,058	383	12	-200	-34	-117	50	133	92	250	167	208
	Tam Thom	Kg	6,083	3,750	4,917	2,333	38																			
Paddy	203	Kg						1,727	1,513	1,620	213	12	1,673	1,456	1,564	217	13							54	58	56
	1820	Kg						1,997	1,750	1,873	247	12	1,913	1,630	1,772	283	15							83	120	102
	17494(13/2)	Kg						1,717	1,553	1,635	163	10	1,654	1,433	1,544	221	13							63	120	91
	N352	Kg						2,244	1,933	2,089	311	14	2,213	1,843	2,028	370	17							32	90	61
	Bao Thai	Kg											2,050	1,950	2,000	100	5									
	Tam Thom	Kg																								
	For feed	Kg	2,000	1,500	1,750	500	25																			
	Bran	Kg	1,467	1,200	1,333	267	18	1,082	686	884	397	37	1,200	917	1,058	283	24	384	514	449	267	283	275	-118	-231	-176
	Broken Rice	Kg	1,700	1,600	1,650	100	6	1,500	1,200	1,350	300	20						200	400	300						
Maize		Kg	1,750	1,500	1,625	250	14	1,984	1,689	1,836	295	15	1,975	1,617	1,796	358	18	-234	-189	-211	-225	-117	-171	9	72	40
Sweet Potato		Kg						1,250	313	781	938	75	500	350	425	150	30							750	-38	356
Cassave		Kg						1,050	525	788	525	50	633	500	567	133	21							417	25	221
Potato		Kg	3,250	2,650	2,950	600	18																			
Groundnut	Big w/t shell	Kg	7,389	6,337	6,863	1,052	14	5,027	3,880	4,453	1,147	23	4,638	4,018	4,328	619	13	2,362	2,457	2,409	2,751	2,318	2,535	389	-138	125
	Big w/o shell	Kg						7,492	6,067	6,779	1,425	19	6,440	5,767	6,103	673	10							1,052	300	676
	Small w/t shell	Kg											3,933	3,500	3,717	433	11									
	Small w/o shell	Kg											5,500													
Green Bean	Grade I	Kg	8,500	7,500	8,000	1,000	12	8,583	7,167	7,875	1,416	16	7,500	5,667	6,583	1,833	24	-83	333	125	1,000	1,833	1,417	1,083	1,500	1,292
	Grade II	Kg																								
Soy Bean	Grade I	Kg	5,500	5,000	5,250	500	9	7,410	4,917	6,163	2,493	34	8,667	5,333	7,000	3,333	38	-1,910	83	-913	-3,167	-333	-1,750	-1,257	-417	-837
	Grade II	Kg						9,000																		
Mustard green		B.	892	346	619	546	61	446	150	298	296	66						446	196	321						
Chinese spinach		B.	1,917	578	1,247	1,339	70	742	189	466	552	74						1,175	388	782						
Green onion		B.	2,842	1,000	1,921	1,842	65	2,470	940	1,705	1,530	62	4,000	2,500	3,250	1,500	38	372	60	216	-1,158	-1,500	-1,329	-1,530	-1,560	-1,545
Gourd	Big	K.	2,348	1,008	1,678	1,339	57	985	508	746	478	48						1,363	501	932						
Bitter gourd		K.	7,438	2,137	4,787	5,301	71	4,285	1,186	2,736	3,099	72	4,000	1,500	2,750	2,500	63	3,152	950	2,051	3,438	637	2,037	285	-314	-14
Beef	I	Kg	29,556	25,444	27,500	4,111	14	24,400	19,500	21,950	4,900	20						5,156	5,944	5,550						
	II	Kg	21,944	19,111	20,528	2,833	13	17,400	13,500	15,450	3,900	22						4,544	5,611	5,078						
	III	Kg	19,750	17,000	18,375	2,750	14	9,600	9,250	9,425	350	4						10,150	7,750	8,950						
Pork	Lean I	Kg	22,833	17,500	20,167	5,333	23	36,125	12,875	24,500	23,250	64						-13,292	4,625	-4,333						
	Lean II	Kg	13,750	9,500	11,625	4,250	31	12,917	9,854	11,385	3,063	24						833	-354	240						
	Fat	Kg	11,444	6,783	9,114	4,661	41	9,490	7,071	8,281	2,419	25						1,954	-288	833						
Chicken meat		Kg																								
Egg	Hen	Kg	928	722	825	205	22	897	623	760	274	31	771	600	686	171	22	31	99	65	156	122	139	125	23	74
	Duck	Kg	1,022	753	888	270	26	959	712	835	248	26	817	750	783	67	8	63	41	52	206	3	104	143	-38	52

Table E.2.1 External Requirements for Development of Nam Dan District in the Field of Agro-industry and Marketing (1/2)

A. National / Provincial

Requirement	Contents	Effect to be expected
1. Expansion and strengthening Credit Program	- To increase amount of fund - To simplify requirements and procedure for application - To prepare simple and fare procedure of examination for applicants - To eliminate different treatment on application of credit between state-owned enterprises and private ones	- To increase chances for new-comers on business - To increase chances for improving and expanding activities of existing enterprises - To eliminate oligopolistic condition due to more investments - To generate fare competitive condition between enterprises including state-owned ones
2. Improvement of laws and regulations concerned such as tax law and trading law, and strengthen means of application	- To make betterment to more effective contents of laws and regulation and strengthen official activities concern - To improve provisions to meet market regulation and avoid restriction on free market competition	- To strengthen official services due to making stable condition of tax income - To know actual condition through tax collection - To minimize irregular economic activities
3. Collection and proclamation of market information	- To prepare system to collect market information in conformity with market mechanism - To collect and accumulate market information and proclaim timely	- To generate proper commodities movement - To introduce and ensure activities of production, processing and trading in cope with market needs - To avoid unfair condition due to uneven distribution of market information
5. Dissemination of improved technologies	- To develop and disseminate necessary technologies for development of economic activities based on free market mechanism, such as farming, processing, storage, management and marketing - To train and supply experts having necessary technologies	- To improve and reinforce quality of human resources as fundamental condition of economic activities - To support and ensure development of economic activities
6. Improve and prepare laws and regulations for trading	- To improve and prepare necessary laws and regulations to create proper trading such as standard of agricultural products, food sanitation law and weighing law - To strengthen official services to instruct and supervise trading condition	- To generate smooth and efficient trading and transportation practices - To improve sanitary condition for consumers
7. Prepare market law	- To define facility requirements such as treatment of garbage, water supply, power and lavatory - To prepare regulation and rule for wholesale trading - To collect and proclaim data and information of trading in market - To strengthen management and supervision activities	- To make effective activities in market - To generate smooth and efficient commodities flows - To introduce and ensure activities of production, processing and trading in cope with market needs - To avoid unfair condition due to uneven distribution of market information

Table E.2.1 External Requirements for Development of Nam Dan District in the Field of Agro-industry and Marketing (2/2)

B. Nghe An Province

Requirement	Contents	Effect to be expected
1. Renovation of markets in Nghe An Province including in Nam Dan District	- To improve and prepare market laws and regulations - To renovate facilities such as for truck cargo, access road, garbage treatment, water supply, power supply and lavatory - To collect and proclaim data and information of trading in market - To strengthen management and supervision activities - To make and specify Vinh Market as wholesalers market and introduce proper trading mean in place of current face to face trading with small units	- To make effective activities in market - To avoid unfair condition due to uneven distribution of market information - To generate smooth and efficient commodities flows - To adjust conditions for increasing trading amount by truck and of wholesaling - To introduce and ensure activities of production, processing and trading in cope with market needs
2. Renovation of Cua Lo Port	- To renovate condition of port to meet requirements for international trading	- To eliminate disadvantage of present condition, far distance to export ports, and ensure advantage to enterprises engaging export and import
3. Training and supplying experts and specialists	- To train and supply experts and specialists having necessary technologies due to free market mechanism as well as competition in agro-industry	- To meet needs of enterprises and contribute development of this sectors - To enforce absorbency of extra-labors in agriculture providing pre-training to them
4. Advertisement and selling promotion of local products	- To establish display shop in Vinh City and in major cities such as Hanoi City and HCMC if possible in which local products would be displayed and promoted selling - To feed back visitors' information to producers - To have exhibition timely inviting traders in local as well as foreign	- To support local producers and traders providing buyers and consumers needs, promoting to sell products and expanding markets
5. Renovation of existing agro-processing factories such as sugar mill, ground nuts oil mill and frozen sea products factory	- To establish new management system to give raw-materials suppliers in surrounding area profitable condition by contract and make them cultivating and/ or harvesting certain raw-materials in favor - To renovate old facilities based on new management plan	- To ensure proper and stable income to suppliers - To ensure stable production and profitability, and increase export amount

Table E.2.2 Contents of Projects formulated by the Study in the Field of Agro-industry and Marketing (1/2)

No.	Title	Type of Organization	Facility/equipment	Activities/Functions	Precondition/Requirements	Benefits expected
1	Agro-processing Complex	Private Enterprise by Farmers Established newly	1)Rice Mill 2)Husk Fed Grain Dryer 3)Feed Mill 4)Ground Nuts Expeller 5)Raising Facilities for Cows, Chickens and Pigs 6)Warehouse 7)Workshop	1)Rice milling service by reducing processing losses for farmers and procurement of husk and bran 2)Drying service for farmers to avoid losses in rainy season 3)Producing ground nuts oil for farmers and by commercial and procurement of oil cakes 4)Producing feeds using by-products of services above and additional materials procured 5)Intensive raising animals and fishes by extra manpower in the area using produced feed, in addition to operating members' VAC farming in their own lands 6)Sell ground nuts oil ,extra animal feed and raised animals	1)Organizing Farmers 2)District Authority should allocate appropriate land with pond for the enterprise a)Training of machinery operation and maintenance b)Training for improvement of raising animals and fish	1)Demonstration effect of modern advanced group farming system in conformity with VAC programs and free market mechanism 2)Demonstration effect of better post-harvest processing method to reduce losses and improve quality 3)Provision of profit to member farmers by supplying qualified feed by lower price 4)Generating bargaining power of products to markets 5)Generating procurement power for raw materials 6)Generating profit by selling products 7)Possibilities of expanding activities in the fields of agro-industry as meet processing and of marketing as group forwarding and trading 8)Absorption of extra labor in agricultural sector in the area
2	Group Facility for Silk Yarn Production	Private Enterprise by silk worm raising farmers Established newly	1)Facility for group raising worms and for yarn production 2)Yarn producing equipment from cocoons	1)Group raising worms in a place during first 2/3rd days of whole period to reduce losses occurred by diseases and uniform the quality of silk, after which member farmers raise worms as usual 2) Produce and sell yarn by the Enterprise	1)Organizing Farmers 2)District Authority should allocate appropriate land for group activities to the Enterprise a)Research and introducing appropriate worm variety for exporting market	1)Demonstration effect of modern advanced group silk yarn producing system 2)Demonstration effect of better silk worm raising method to reduce losses and improve quality 3)Generating bargaining power of products by quantity 4)Provision of more profit to member farmers by selling yarn in place of cocoons 5)Possibilities of expanding activities in the fields of agro-industry as knitting silk and of marketing as group forwarding and trading 6)Absorption of extra labor in agricultural sector in the area

Table E.2.2 Contents of Projects formulated by the Study in the Field of Agro-industry and Marketing (2/2)

No.	Title	Type of Organization	Facility/equipment	Activities/Functions	Precondition/Requirements	Benefits expected
3	Market-oriented Forwarding Center	Private Enterprise by Farmers Established newly	1)Information center equipped with computers and telephone transmission apparatus 2)Forwarding facility with warehouse for agricultural products 3)Trucks	1)Collecting and accumulating daily and / or weekly market information of several markets such as Nam Dan, Vinh, Hue and Hanoi 2)Analysis of information to know market needs in view of many parameters such as trend of pricing, quality requirement and trend of exporting by each commodities and by which forecasting markets condition 3)Plan of the strategic farming schedule in view of all farm area of members not for each farm to meet markets needs and more profit 4)Gathering and combining and / or packaging convenient unit to market requirements, and forwarding to markets 5)Utilizing warehouse and watching daily market information, forwarding products on the best time and to the best destination markets by trucks	1)Organizing Farmers in the area which various kinds of commercial crops could be produced through a year 2)District Authority should allocate appropriate land for group activities to the Enterprise 3)Market authorities should give market information with favor a)Training of marketing to the management staff b)Training of information collection and analysis	1)Demonstration effect of strategic group farming system relied on information analysis for market demand 2)Demonstration effect of better storage to reduce losses and improve quality 3)Generating purchasing power for agricultural inputs 4)Generating bargaining power to markets 5)Generating more profit to member farmers by strategic farming to meet market demand 6)Possibilities of expanding activities in the fields of agro-processing industry adding value to their products 7)Absorption of extra labor in agricultural sector in the area
4	Confectionery Factory	Existing State-owned Enterprise under People's Committee of Nam Dan District	1)A series of machinery producing confectioneries such as candy, cake and snack 2)Packaging, storage and forwarding facilities with trucks 3)Workshop	1) Renovate existing facilities 2)Development new products in additon to candy using local products as raw materials 3)Producing various products with empetitiveness in markets in view of price, quality and design	1)District Authority should assign enough No. of qualified workers a)Training of marketing b)Training of machinery operation and maintenance	1)Increasing consuming amount of local products as raw materials 2)Absorption of extra labor in agricultural sector in the area 3)Introduction to new comers of agro-processing factory in the area 4)Possibilities of expanding activities to the general food-processing industry
5	Pine Tree Gum Processing Facility	Existing State Farm for implementing National Program of planting trees in mountainous area in the District	1)A series of processing machinery such as steam distillater (study continuation)	1)Introduction of processing machinery 2)Producing proper products with competitiveness in markets in view of price and quality.	a)Training of machinery operation and maintenance b)Training of marketing	1)Increasing income by emphasizing activities of producing qualified resin and sell it. 2)Generating proper incentives for workers even for workers engaging planting activities
6	Group Facility for Soy Source Production	Private Enterprise by soy-source producing farmers Established newly	1)Machinery and equipment for preparation and post-fermentation processing 2)Storage facilities to avoid quality deterioration	1)Formulate group activities on preparation process of raw materials and post-fermentation process such as bottling and labeling 2)Fermentation process by each member farmers conserves traditional method.	1)Organizing soy-source producing farmers a)Training of machinery operation and maintenance b)Training of marketing	1)Providing stable subsidiary income to farmers 2)Increasing profitability by stable forwarding in quantity and uniform quality through a year

Table E.3.1 Activities of Project for Agro-Industry and Marketing (1/2)

a. Agro - processing Complex

Activity Name	Member Farmers Executing Org.	Other Farmers	Main Point	View
1) Rice milling	To mill the rice they produced. To procure husk and bran as by-products of milling.	To mill their rice with wages. To procure husk and bran.	To intend to increase milling wages and expand consignments with farmers by improving yield and decreasing mixing rate of broken rice in product.	A wholesale business of paddy including purchasing from the vicinity farmers and milling and selling. A noodle production business using broken rice separated from products of milling.
2) Grain drying	To dry the product in the rainy season to avoid damages in quantity and quality.	To undertake wage drying of the product in the rainy season.	To lower a fuel cost by utilizing combustible waste such as husks obtained in a rice milling operation.	
3) Ground nuts oil production	To purchase ground nuts and process, or initiating wage processing of ground nuts oil production. To collect and purchase ground nuts oil cake.	To purchase and process ground nut, or initiating wage processing of ground nuts oil production. To purchase ground nuts oil cake.	To try to collect shell and oil cake.	An oil manufacturing business of purchasing ground nuts and selling the oil.
4) Animal feed production	To produce and sell mixed feed systematically. To purchases and utilizes products.	To procure raw materials of feed in conformity with a production plan. To sell products.	To sell the products that have economic efficiency for farmers feeding cow / pig / chicken. To sell the product to the member farmers in the early stage of the project, expecting a demonstration and advertisement effect. To promote sales of products to the vicinity farmers.	A sales business of mixed feeds in commercial productions.
5) Research and development			(Rice milling and grain drying business) To establish the appropriate milling technology to minimize broken rice generation and maximize production yield according to each variety. Furthermore, to diffuse the improvement technology for threshing and drying process. (Animal feed production business) To carry out the research on materials, processing method and combination rate for each raw materials etc. To sell proper products suitable to the circumstances of animal feeding in the area.	
6) Group feeding	To carry out a group feeding of a cow, pig and chicken in neighboring land of a facility.		To initiate group feeding business by that utilizing the mixed feeds produced after feed production businesses are developed properly.	A animal feeding business that is not the side job of a farmer.

Table E.3.1 Activities of Project for Agro-Industry and Marketing (2/2)
b. Market-oriented Forwarding Center

Activity Name	Member Farmers Executing Org.	Main Point	View
1) collection and processing of Information	To study the trend of a market, by collecting and accumulating the information of the markets located mainly in surrounding area.	By using trucks for transportation, destination area of commodities becomes wider not only in neighboring area. Accordingly, market information is desirable to be collected from even a big city in distant such as Hanoi, Hai Phong and Hue, not only the markets within Nghe An Province. To consider other proper method of collecting market information in addition to investigating the vicinity markets individually. For example, it shall be reported periodically (every day / every week) by registered merchants in each market in a remote place by a contract basis. For market survey, information should be collected for kinds of commodities which can be cultivated in this area as much as possible. Items of market information such as the price, traded volume, production place and price as well as the quality, size and unit weight that affect trading price should also be collected as much as possible. However, in making the effort that improves the collection capability, information collection of limited items such as the price and a production place would be started in the first stage of the project, because even these information in each market are not collected and announced by the authority in a present condition.	In the future, it is expected that the government would upgrade the system of handling market information, but as the information privately collected always exceeds the government information in a quality and a quantity, its efficiency as a market strategy resource is not lost.
2) Information analysis	To make production plan based on analysis result of accumulated information.	To predict the future trend of the markets and to know the most profitable crops, sales time and destination places. To formulate a production and sales plan among the member farmers on the basis of this result.	Contents of the plan is the most valuable information in this business and know-how that is accumulated in this activity can play an important role that leads the future of agricultural production in this area.
3) Group production	To carry out group production on the basis of a production plan.	To exchange information, to carry out joint purchase of necessary materials with member farmers and to improve productivity, quality and profitability.	It is assumed that by the new groups production businesses based on market needs and profit pursuit motivation.
4) Collection and shipment	To carry out the schedule adjustment of harvest for each farmer in advance and to collect products jointly by a truck. To classify collected products in terms of destination, packaging requirment and bind in case, and to forward by a truck. To keep the products which can be stored in the storage and forward it on suitable time and to suitable place while monitoring the condition of markets.	To clarify proper needs of markets and to improve profitability by grading and packing corresponding to market needs.	(same as the above). To carry out grading on presence of damage, size, color etc. of products. To seek more profit by implementing the practice of grading introducing private marketing standard in this area.

Table E.3.2 Comparison of Zones by Agricultural Production and Other Factors

Zone	Agricultural Production									Other Factors				
	Paddy	Maize	Sweet po. Cassava	Ground nut	Bean	Veg.	Fruits	Cow Buffalo	Pig Chicken	Coop. activity 1)	Non-agri. labors 2)	Condition of Transport 1)	Markets 1)	
													Condition 3)	Acessibility 4)
I	***	**	~	**	**	***	*	*	***	***	***	***	***	***
II	**	***	~	***	***	**	**	***	**	**	**	*	**	*
III	*	*	*	*	*	*	**	**	*	*	*	**	*	*
IV	***	**	~	**	**	*	*	**	***	***	*	**	**	**
V	**	**	~	***	***	*	**	**	**	*	**	*	*	*
VI	**	**	*	**	**	***	***	**	***	**	**	**	**	***

Zone

I. Xuan Hoa, Van Dien, Hong Tien, Kim Lien, Town
II. Khanh Son, Nam Trung, Nam Phuc, Nam Kim, Nam Cuong
III. Nam Nghia, Nam Thanh, Nam Thai, Nam Hung
IV. Xuan Lam, Hong Long, Nam Cat
V. Nam Thuong, Nam Tan, Nam Loc
VI. Nam Anh, Nam Xuan, Nam Linh, Nam Giang

Symbol

***: Excellent
**: Many
*: Little
~: Rare

1)
***: Good
**: Average
*: Weak/Wrong

2): Labor in non-agri. sector
***: Many
**: Average
*: Little

3): Condition of markets in the zone
4): Accessbility to markets in other area

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Table E.3.7 Standard of Nutritional Composition on Raw Materials

Raw materials	Dry material (DM)	Protein		Energy		Mineral		Amino acid				
		Crude protain (CP)	Digestive CP (DCP)	Digestive energy (DE)	Total digestive nutrients (TDN)	Calcium	Phosphorus	Licin	Methionin	Cystin	Threonine	Tryptophan
	%	%	%	Mcal/kg	%	%	%	%	%	%	%	%
Maize	86.5	8.8	6.7	3.56	80.7	0.03	0.27	0.24	0.15	0.17	0.30	0.10
Paddy	86.3	8.9	5.8	3.43	63.4	0.16	0.51	2.16	0.58	0.49	1.30	0.41
Sweet Potato	88.0	4.2	1.0	2.80	79.4			0.16	0.08	0.03	0.22	0.05
Oil Cake	91.1	45.0	39.6	3.50	69.4	0.32	0.56	1.37	0.27	0.39	1.08	0.94
Rice Bran	88.0	14.8	10.5	3.06	75.5	0.03	2.06	0.57	0.28	0.19	0.46	0.19
Dried Fish	91.4	61.2	53.2	3.33	69.6	5.20	2.96	4.18	1.53	0.59	2.37	0.67
				3.07	78							

Source:"Japan Feeding Standard for Swine (1993)", Ministry of Agriculture, Forestry and Fishery

Table E.3.8 Standard Nutritional Requirement for Designed Model

Raising pig (Weight: 30-70kg)	Dry material	Protein		Energy			Mineral	
		Crude protain (CP)	Digestive CP (DCP)	Digestive energy (DE)		Total digestive nutrients (TDN)	Calcium	Phosphorus
	kg	g	g	Mcal	MJ	g	g	g
	2.2	324.0	266.0	7.14	29.90	1620.0	11.90	9.70

Source:"Japan Feeding Standard for Swine (1993)", Ministry of Agriculture, Forestry and Fishery

Table E.3.9 Distribution Plan of Materials and Nutritional Composition

Product unit: 2.2 kg

Material	Amount	(CP)	(DCP)	(DE)	(TDN)	Calcium	Phosphorus
	kg	g	g	Mcal	g	g	g
Maize	0.66	58.1	44.2	2.35	532.6	0.20	1.78
Paddy	0.17	14.7	9.6	0.46	104.6	0.26	0.84
Sweet Potato	0.50	20.8	5.0	1.73	393.0	0.00	0.00
Oil Cake	0.24	108.9	95.8	0.74	167.9	0.77	1.36
Rice Bran	0.55	81.4	57.8	1.83	415.3	0.17	11.33
Dried Fish	0.09	53.9	46.8	0.27	61.2	4.58	2.60
N. Comp.		337.7	259.1	7.39	1674.7	5.98	17.91
Balance		13.71	-6.86	0.25	54.7	-5.92	8.21