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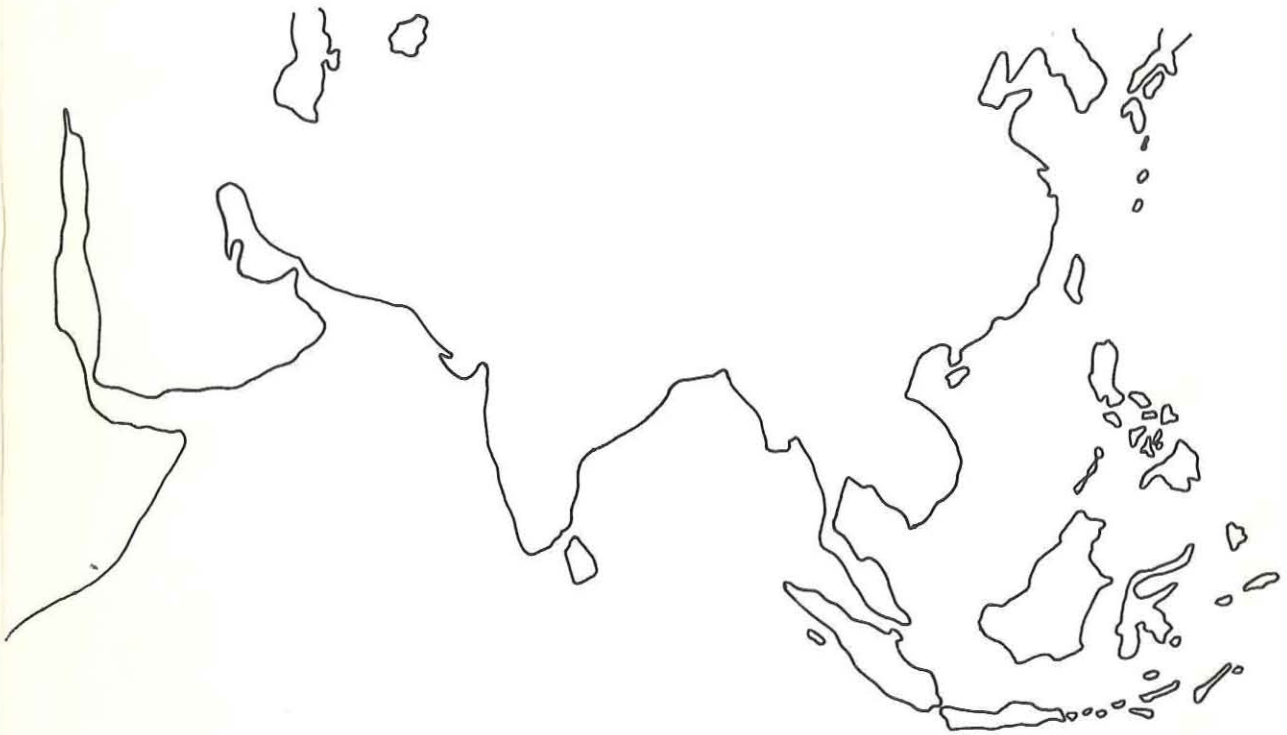
Strategic Measures for the Agricultural Development

– Comparative Studies on Five Asian Nations –



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The Asian Population and Development Association

Foreword

The population increase in many Asian regions surrounding Japan is precariously balanced on top of economic development. Moreover, in most cases of these economic development, agricultural development is of prime importance. Therefore, the advancement of agricultural development in these regions must be thought of as a very pressing, important part of solving population problems, but measures taken towards that end are in no way the same. This is not only because conditions found in each country such as natural conditions, historical process and cultural milieu are different, but because the social conditions and social infrastructure that directly support agriculture differ in various ways as well.

In order to find a solution to these problems, our organization has performed several studies in Asian countries to discover possible agricultural cooperation measures and policies that Japan could implement. This book attempts to clarify the distinctive feature of agricultural development in these regions and the role of international cooperation in it.

In this case, this volume emphasizes the importance and the role of intangible assistance which is often overlooked, since it is hidden in the more visible, end-result project assistance such as for dam and waterway construction and development, as well as fertilizer plant construction. It will be blessing if this report could be suggestive for Japan's future agricultural cooperation, as well as international cooperation and assistance from other developed countries towards these areas.

Lastly, I would like to express my profound gratitude to the Japan Shipbuilding Industry Foundation (Chairman: Ryoichi Sasakawa) as well as to the United Nations Fund for Population Activities (Executive Director: Nafis Sadik) for their valuable support in the preparation of this report.

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Chapter 1

Agricultural Development in Asian Countries

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1. The Logic of Agricultural Development

Modern people cannot go on living without food, nor can they survive without clothing. The two major forms of production which satisfy these needs are agricultural and non-agricultural industries. A social division of labor has already been established between these two sectors of industry in the nations of Asia. Therefore, in order to increase the income levels of the people of these countries, it is necessary to increase the productivity of both sectors of the nation's industry. However, because of the particular characteristics of agricultural production, there are special difficult problems involved in increasing agricultural productivity.

One of the particular characteristics of agricultural production is the need for special methods and counter measures to control the conditions which are physically the fundamental basis for production; sunshine, water, and land etc., at the stages when the producer is most dependent upon them. Thus, it becomes necessary to provide and maintain the so-called infrastructure and social capital in these areas as public works, or putting it another way, it is extremely burdensome and expensive for each individual small farmers to deal with these problems.

The facts that, historically the issues of irrigation, drainage, flood control, road construction and maintenance had been implementated by the government or local administrative bodies comes from these facts. And, to what extent these public works are provided was an extremely important condition determining the productivity of the small production and management units such as farmers which depend upon them.

The nature of the natural conditions which must be managed vary widely from country to country. It is unnecessary to point out the sharp difference in conditions between countries such as the Philippines and Indonesia which are composed of islands of various sizes, and nations on the coast of the continent, India, Bangladesh, and the countries of Indochina. In the former, gravitational irrigation is feasible, but the coastal countries are crossed by rivers hundreds of kilometers in length, the Mekong, the Menam, the Irrawaddy etc. As a result, much of these countries are composed of deltas less than several meters above sea-level. This means that the status and role of public works such as irrigation projects in the two regions are radically different, both technologically and economically. In addition, there are problems related to the efficiency and the cost of improving plants and animals, cultivation management, animal breeding and rearing technology, and the necessary input resources, for example, fertilizer, medicine and farm machinery. When a nation's agricultural sector is competing in the international marketplace, its productivity and competitiveness is determined by how well it meets international standards.

The important conditions which determine a nation's ability to compete internationally include the way it conducts technological research--experimentation and study of all production factors and production conditions including plants, animals, and the resources invested in agriculture--and how efficiently it imports the fruits of agricultural research from foreign countries and introduces them into its own agricultural production.

But these are not the only problems. The most fundamental condition is the management ability of individual producers, their skill and technological knowledge, their judgement and confidence as managers, and their capacity to acquire information.

Even if a number of farmers using the same irrigation system are given exactly the same seeds, the same manure and fertilizer and so on, their productivity will vary widely depending upon differences in their skills as managers and producers. Agriculture is quite different from other forms of production, chemical and manufacturing production for example, which are carried on as completely mechanized assembly-line operations. The personal ability and judgement of individual producers is a major factor governing the results of agricultural production.

This brings me to the subject of so-called agricultural extension works and extension policies; i.e. general education, specialized training, and practical training, and whether or not information is thoroughly distributed. However, education, training, etc. are not things which can be abruptly implemented to introduce certain knowledge and techniques simply because they are necessary for agricultural producers. First, reading and writing skills must be disseminated to all the producers. In other words, before the topic of agricultural education can be raised, everyone in the country, including the farmers, must achieve a certain educational and cultural level.

I have based the above discussion of this issue completely on the logical premise that increased agricultural productivity becomes the primary force behind economic growth and development in the non-agricultural sector of a nation's economy. In other words, an increase in agricultural productivity invites an oversupply for agricultural products because of the relative inelasticity of the demand for them, and this oversupply liberates resources devoted to agricultural. Logically, these flow into the non-agricultural sector causing it to expand and develop, and as a result the whole economy grows. However, this is a so-called long range view based on the premise that prices are determined by productivity, and incomes are determined as they are, by this productivity.

However, in the short term, there are other problems. First, there is the problem of short term adjustments in supply. There is no guarantee that the same quantity of produce will necessarily be obtained

from equal areas of land sown with the same volume of the same kind of seed, and nourished with equal quantities of manure and fertilizer.

There is always a strong possibility that the production process itself will be disrupted by flood or drought conditions and the production volume and its quality cannot be guaranteed. As a result of this, the outcome of the harvest is unstable.

So the need to bring stability to the people's economic life by directly stabilizing the household finances of producers and consumers brings us to the issue of government intervention in the price mechanism. A number of policies are adopted which are in a broad sense, agriculture development policies. They are price support and price controls maintained by a number of government measures which include the procurement and sale of agricultural produce, and the creation of related storage and marketing organizations.

The second problem is not merely supply stabilization. In order to promote non-agricultural expansion, in simpler terms, industrialization, the formation of agricultural income is deliberately controlled as a political policy. There are many ways of doing this; the direct method is to tax agricultural income more heavily than other forms of income.

With another method known as the delivery system, the government forcibly buys either a fixed quantity or a percentage of the country's agriculture produce at a price below the market price. Another is to promote the export of agricultural products at fixed multiple foreign exchange rates. In this way they also promote and coercively obtain foreign currency. It is often noted that in some developing countries, at a certain stage the price of agricultural medicine and chemical fertilizer is twice as much as it is in advanced countries while the price of agricultural products is half as much as in advanced countries. This can be seen as part of a policy to reduce agricultural income, aiming at inducing industrialization.

2. The Situation in Asian Countries

The above applies to all developing countries in general but there are a number of special characteristics which are only found in Asian countries.

The first is changes in the system. This issue, which was not dealt with above, is a topic that must not be omitted from a discussion of agricultural development in the nations of Asia. I am referring to the subject of reform in the land system. In China, public land ownership was achieved as part of the revolution. In Korea and Taiwan land reform was implemented to redistribute the ownership of land and to

stabilize and strengthen the land ownership and cultivation rights of small farmers.

These reforms were carried out under conditions of great social upheaval or as postwar occupation policies, and it would be ill advised to attempt them as economic policy during normal times. Nevertheless, they had an important effect upon agricultural development.

To begin with, as long as other conditions remain unchanged, the redistribution of land ownership is accompanied by a redistribution in income from land rents which in turn brings about a trend to the equalization of income. It stimulates an increase in the income and the consumption levels of those who formerly had low incomes, tenant farmers and small-scale farmers. It results in an increase in the production of food and agricultural products. The price of food and agricultural goods rises, and there is a short-term increase in the maximum quantity produced and the maximum cost of production.

For society as a whole, there is a natural reduction in savings, but on the other hand, those who formerly belonged to the low-income class are able to save a little money. So along with the aforementioned rise in the price of food and agricultural products, land reform can function as a motive force which promotes increased investment in agriculture by the former tenant class.

In fact, in the short term, this increase in the demand for food can lead to the adoption of measures such as controlling food prices using the delivery system, compulsory restrictions on the consumption of the agricultural products, and forcible increases in the volume they sell. For the sake of immediate social stability, it is sometimes necessary to work very hard to diminish and ameliorate the effects of these policies to prevent the situation from returning to the other extreme.

Nevertheless, we must not overlook the fact that in the long run, land redistribution encourages agricultural production. This is probably a result of the effect on production of the owner-cultivator doctrine expressed by the statement, "I grow it myself, and the harvest is mine."

Secondly, in almost every case, agricultural development in Asia is to varying degrees, carried on with international cooperation and international assistance. Sometimes dams are built, or manure plants are introduced and chemical fertilizer factories are constructed. In other cases, it takes the form of provision of production materials for free or a nominal charge, and even assistance in the form of supplies of food. It is sometimes part of a program set up to supply the necessities of daily life according to increases in so-called local currency which accompanies domestic investment. In other cases,

technologists are dispatched, and laboratories and training centers are set up in the developing areas, and everything from research to technical training is carried on at these centers.

However, the focus of this aid and cooperation is on hardware: the provision of agricultural supplies and construction of physical facilities--the building of plants, dams, and waterways. But as I have already stated, this hardware alone will not move an economy. The essential factors are human capacities and conditions. It is necessary that in every area related to production, all the social conditions which will organize and mobilize the human factors, what might be called the "software" side of agricultural production, be provided.

Also, not all the physical conditions or "hardware" can be provided from the outside through international cooperation and assistance programs. When a nation relies completely upon aid and international cooperation, there is a tendency for the emphasis to be placed upon the need to expand the markets of the country providing the aid with the result that the help is not grounded in reality. The original idea was that even if aid was received, it was to be done according to a subjective plan based on the real situation in the nation receiving it, and this is the area for the receiving country--the developing country--to make efforts, including its own efforts, to implement practical development plans.

Thirdly, with this in mind we conducted a survey of process and conditions in agricultural development in 5 countries in Asia: India, Nepal, China, Indonesia, and Thailand. If we were to do it again, we would concentrate the study more on the soft aspects related to agricultural development instead of the hard issues. That is an area of aid and cooperation which remains to be dealt with. But I believe that first and foremost, it is a fundamentally important area which the developing countries themselves must devote great effort to, both autonomously and subjectively. It has broad implications for every area of economic activity. To sum it up, it is relatively easy to make external adjustments in daily consumption but it is not necessarily so easy when it comes to production. In this area there are difficulties and problems and my impression is that it is this point that will be the focus of efforts to solve these problems.

Chapter 2

Comparison of the Agricultural Development in Five Asian Countries

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1. Tasks of Agricultural Development

The role of agriculture in the national economy is, of course, not same throughout all Asian countries.

Basically, tasks of agricultural development differ depending on the economic development phase which is represented by the degree of development of non-agricultural sector. The role of agricultural development in the national economy will differ between a country that has a low per capita income, with higher population in agricultural sector, and a country with a high per capita income with a lower population in agricultural sector. This can be quite easily understood if we refer to the fact that economic role of agriculture has changed, in the process of industrialization and economic development, within the same country. So starting from this point of view, let me try to summarize the tasks of agricultural development in Asian countries.[1)]

At first, I would like to refer to agricultural development in those countries where agriculture is still very important in terms of both production and employment. In those countries, the role of agriculture in the national economy is crucial in supplying foods to the people of the country, as well as providing the people with productive employment opportunities. Furthermore, many countries in such growth phase have still high population growth rate. Especially the population growth rates are high in rural society, and because the room for expanding arable land is strictly restricted, the rapid increase of population results in increase of the rural poors such as landless families. In such circumstances, agricultural development should play the role of providing employment opportunities as much as possible. Moreover, since the increase of the income of the farming people can realize the market expansion of non-agricultural production activities, agricultural development could provide a precondition for industrialization.

India, Pakistan, Bangladesh and Nepal located in South Asia are now in such an economic growth phase, and the agricultural development itself is the most urgent task of the national economy. China can also be regarded to be in a similar phase, although the condition might be a little different from South Asia. The agricultural development itself is forced to play a leading role in the total development of the national economy in these countries. Such importance of agriculture can be termed as a need for an agriculture-led growth strategy.

The second is the agricultural development in the countries where the non-agricultural sector has developed reasonably. Since the industrial sector has grown either due to the growth of foreign markets or of domestic markets, the growth of agriculture itself would not lead directly the growth of the national economy. Once the economy arrives

at such an economic phase, the most important task of agricultural development shifts towards how to adapt agriculture to the development of the non-agricultural sector and to the changing national economy. For example, it become most crucial to diversify agricultural production by responding to the changing pattern of urban residents' food consumption due to their income growth in the development of the non-agricultural sector.

Since the growth of the non-agricultural sectors can absorb the increasing population of the rural sector, the role that agriculture should play in the employment side becomes not so significant as that in the first phase. Nevertheless, the population of the rural sector itself is still, in many cases, showing an increasing trend, and then we should not undervalue the role of agricultural development, in such an economic phase, to provide the rural people with employment opportunities comparable to urban opportunities.

Agriculture in Southeast Asia, particularly in Thailand, Malaysia and Indonesia, which have realized distinct growth of industrialization is now facing such tasks.

When non-agricultural sector makes further development in the national economy, the agricultural work force itself starts to decrease. For an economy in such a phase, the most important policy-issue is how to bring the income of the agricultural laborers closer to that of the non-agricultural laborers. This is similar to the problem that post-war Japanese agriculture has faced. In this sense, the economy which entered in such a phase might have the task similar to developed countries. Taiwan and Korea, which are said to arrived at the developed countries stage as a result of their industrialization, are now facing the policy-issue very similar to the developed countries.

The tasks of the agricultural development in many diversified Asian countries can be classified into the above mentioned three categories. The task of the agricultural development for the three different phases of economic growth can be named as a agriculture-led growth, agricultural diversification, and structural adjustment of agriculture.

Now, what sort of agricultural development strategies or policies are effective in dealing with these tasks? The author will try to investigate this issue, by observing the experiences of agricultural development of the five countries we have surveyed in the past.

Our previous survey does not include any country in the third phase, which has been attempting structural adjustment of agriculture. For this reason, the description of this chapter is restricted to the agricultural development of the first and second phases.

2. Agricultural Development in Five Asian Countries

(1) India

Agricultural development in India is essential not only for the purpose of increasing production of foodstuffs, but also for the growth and stability of the national economy. In India, many policy makers have now recognized the fact that it is no longer possible to continue economic policy which does not emphasize the agricultural sector, both economically and politically, and since the mid-1980s agriculture has been given the highest priority.

The critically important task is to improve the labor-absorbtive power of agriculture. The population growth rate is still high, particularly in rural areas. The absolute number of rural poors such as landless families and tenant farmers seems to be increasing. Although some strategies aiming directly at expanding the employment of poor farmers, such as the "Food for Work" Project, have been adopted, it is not sufficient to have only these strategies.

Since the middle of the 1960s, the Indian government had adopted agricultural development strategies introducing new technologies under the name of the "New Agricultural Strategy." This strategy was based on the assumption that the previous strategy, which emphasized the institutional reform, had not proved to be so effective. In order to facilitate the introduction of new technologies, the government adopted policies to increase the buying price of wheat by the Indian Food Corporation, and at the same time, to grant subsidies in fertilizer, water pumps and tubewells. What is most noticeable is the fact that this strategy tried to introduce new technologies, mainly in the regions where a sufficient amount of water for irrigation had been already assured, because a huge amount of money was needed to construct a new large-scale water storage facility on a big river like the Ganges river. Such strategy should require large investment either from non-agricultural sector or from the government.

How did the rural society accept the new technologies under this government's strategy? Northwestern India, represented by the State of Hariyana where we made the field-survey was quick to introduce a high-yield variety of wheat. The basic conditions for irrigation had been already developed in Northwestern India, and since people recognized that the introduction of new technology increases the profitability of their farming, new technologies were quickly introduced. Even for irrigation, there was active investment in tubewells, which can be constructed by private investment. Our survey clarified clearly that the introduction of new technology was decided by the individual farmers.

On the other hand, in the rice-producing regions in Eastern India, represented by the State of Bihar which was also covered by our field-survey, new technology was not introduced in such a smooth manner. The major obstacle might be the unsuccessful development of irrigation system which was the basis for introducing new technologies. The ecological condition of the Ganges plains might be one reason for such unsuccessful development of irrigation. Another reason might be the weakness or non-existance of cooperation among the farmers due to the private-property system of farming lands.

A comparison of Northwestern India and Eastern India has revealed the profound influence which the ecological system and the internal structure of the rural society are having on the spread of new technology.

The following two points should be added regarding this New Agricultural Strategy.

Although the production of wheat in India has increased dramatically due to the introduction and diffusion of new technologies, it should be mentioned that the raising up of buying price also influenced strongly the increase of agricultural production. Due to this price policy, market prices of wheat did not decrease, and then the growth of demand was restricted. This has resulted in a phenomenon of production exceeding demand.[3] Since it is not so easy to gain competitiveness in the international market, such a production increase plan should be re-examined.

The second is the impact of new strategy on the welfare of the rural poors. New technology was a technological change of labor-using type. Employment opportunities might be increased by this new technology. It is represented by the active migration of people from the East Indian provinces such as Bihar to Northwestern India such as Hariyana. However, as I pointed out before, the grain price did not decrease. Therefore, it can be said that the real level of living of the landless workers, who have no other choice but to buy their food on the market, did not increase, even if employment opportunities had been expanded.[4] This point is also a serious problem of plan of increasing the production of grain under the strategy of import-substitution of food.

Now these problems of the New Agricultural Strategy are rather clearly recognized and, India should reformulate the agricultural development strategy that will emphasize much more to increase the income of the rural poors.

(2) Nepal

Nepal is a land-locked country, and it is very difficult for her

to attempt industrialization either as import-substitution or export-oriented industrialization. Agricultural development is very much important in Nepal.

The past pattern of agricultural development in Nepal was the raising up of utilization of the environment such as hill, without changing the agricultural technology, in response to its high population growth. This type of utilization of hilly plains is already reaching the limit, and there clearly appears the trend of a shortage of arable land. In the Kathmandu Basin where we made field-survey the farming land is very scarce due to its high population growth. It seems that agricultural development such as raising up of the utilization rate of the environment against population growth can no longer be maintained in the future.

In the hilly areas, the arable land is restricted by the geographical features, and it is no longer possible to expand it. The farmers are poor and they cannot bear the expense of purchasing fertilizer, and seeds. In the hilly areas, the production of staple food such as rice is not increasing, because crops such as jute, sugarcane, tobaccos, vegetables and oil-extracting crops are profitable. Since the utilization of arable land is reaching its limit, it is becoming difficult to preserve the farm land resources. Environmental deterioration, such as erosion, is becoming a critical issue.

While the agriculture in the hilly areas exposes these problems, Nepal is concentrating their development effort in the Terai Plain. The intention is to develop the agriculture of this district by receiving foreign aid for the construction of irrigation system, and to absorb the increasing population in the mountainous and hilly districts in this region. Various projects in the Terai Plain are proving to be highly economical, and the development of this region will progress without any doubt.

However, this does not mean that the agricultural development of the hilly area can be ignored. An essential theme in promoting the agricultural development of the hilly areas is to develop the farming system of mixing crop production and stockbreeding which accounts for approximately 1/4 of the gross national agricultural products.

At any rate, without any doubt that agricultural development is the basis of the total growth and provides stability of the national economy as a whole. In order to realize such an agriculture-led strategy for the growth of the national economy, the development of infrastructure, including the construction of roads, communication facilities, electric-power facilities and so on, are needed at the present.

(3) China

Although the industrialization of the coastal area is attracting people's attention, there's no doubt that the development of agriculture and rural economy is extremely important when considering the development phase of Chinese economy. In China, which is a big country like India in terms of both national land and population, agricultural development is critically important in terms of regional development. Although the problem of great inequality in the rural society in the traditional China was resolved by the land reforms just after the revolution, it is also true that an excessive accumulation of population is observed in rural economies due to high population increase. Agricultural development is very important for the absobing this increasing population.

The basis of the current strategy of agricultural development is the changes in the economic control system for liberalizing the economic activities of individuals.

Since the late 1970s, the so-called contract farming system is introduced. Under the state property land system, the contract period for leasing land from the government is 15 years. However, the farmers' understanding is that it is to be for an indefinite period. Although the compulsory delivery of basic food crops still exists, this changes in farming system have provided the great incentives for family farmings. It has promoted diversification of agriculture, including stockbreeding, marine-products and forestry.

Secondly, on the distribution side of the agricultural products, farmers could have the freedom to sell their products to market, except some portions which should go to the government at the contracted prices. Then, after 1978, policies were implemented to increase the prices of these products which are sold to government, and at the same time, reduce the prices of chemical fertilizer and so on.

Agricultural production started to show rapid growth in the 1980s by being induced by these changes in economic policies related to agriculture. After 1985, food imports were reduced by half. On the other hand, exports of food, centering around corn, have reached nearly 10 million tons.

Furthermore, as was clarified by our survey, the above-mentioned improvement of agricultural production power bore agricultural surplus labor, and it has become the condition for the expansion of local enterprises. Local enterprises have been growing at a fairly rapid pace, having been affected also by the policy to allow credit loans for fostering these enterprises. As income has increased, the new business, such as fishery and stockbreeding, has expanded and also transportation and processing industry has arisen. Generally speaking, the improved

agricultural productivity has enabled not only the expansion of the agriculture-related sector but also the expansion of other industries and service sectors.

Though it may be partial, the fact that the agriculture-led local economy growth through a system for liberalizing individual economic activities can be confirmed, is important when thinking of the progress of agricultural development in China. It would be important to make the following two remarks as the preconditions for the actualization of such agriculture-led growth in China.

In the first place, as a result of land reforms, the big inequality within the rural economy has been disappeared. We can say that social condition that enables each family compete within the rural economy has been provided. Although competition has brought some inequality, it is important to emphasize that the land reform could establish the social condition which gave each family the equal opportunity for competition.

The second point is the fact that the infrastructure that is the precondition for agricultural development had already been developed, before the adoption of the current strategy for agricultural development, during the period of the Cooperative Movement and the people's commune. We should not ignore the fact that the irrigation canal had been developed, sometimes through massive mobilization of rural people, in the period of group-oriented development strategy. The irrigation construction movement since the end of the 1950s made the precondition for the current agricultural development. The development of the irrigation canal in Jiangsu Province before 1977, which was covered by our survey, would be a typical example. We should not overlook the fact that recent agricultural development in China was not only actualized through the recent economic reformation, but also based upon the above mentioned conditions prepared before the recent economic reform.[5)]

(4) Indonesia

Currently, the most important theme in the economic development strategy of Indonesia is how to break away from the oil-dependent economy. In such a situation, agricultural development is expected to shift from mainly emphasizing the increased production of rice to diversifying agriculture, including the expansion of exportable agricultural products.

The basic strategy of agricultural development in the past was the increased rice production project called BIMAS program. This was started in the middle of the 1960s and was implemented on a full scale under the Suharto administration. It was positioned as part of the import-substitution strategy of the national economy. In a similar way to India, this was an attempt to increase rice production by introducing

new technologies. Under the strong support of the government, rice production in Indonesia, centering around Java, has shown a distinct increase, and in the middle of the 1980s, Indonesia could achieve self-sufficiency in rice production. Policy makers have even thought about the possibility of exporting rice.

The fact that an irrigation system had already been developed in the colonial period under the Netherlands was very important as the precondition of the reasonable success of this strategy for agricultural development, which aims at introducing new technologies, such as high-yielding varieties and fertilizers. For example, in the villages of South Sulawesi which we investigated, the irrigation canals that had been developed during the colonial period under the Netherlands are still in use. Furthermore, coinciding with the commencement of this strategy for agricultural development, the irrigation facilities have been developed by positively receiving foreign aid and cooperation. Brantas River Project on the Northern coast of Java is a typical example. Also that immigration project to move the congested population of Java into other islands contributed to the increase of rice production in other islands. A village in Lampung Province which we investigated is an example of that. Anyhow, the production of rice increased significantly and Indonesia stopped importing rice since the mid-1980s.

It is necessary to stress the fact that the rural society and farmers were positive about accepting new technologies stressed. The most important incentive was of course that the new technologies were highly profitable, but it should also be mentioned that the farmers' cooperatives, represented by the unit cooperative KUD and the farmers' organization, "kelompok tani," contributed to the acceptance of new technologies.

By the way, due to the drop in the international oil price in the middle of the 1980s, the Indonesian economy was pressed to change its direction to a great extent. Although macroeconomy policies such as reduction of financial expenditure and the drastic devaluation of the rupiah had been adopted, these policies had a great impact on agriculture, which could achieve self-sufficiency in rice at that time.

After achieving self-sufficiency in rice, the agricultural development of Indonesia can be said to have faced a turning point within a situation where rice exports are not very promising because of lack of international competitiveness. However, major changes in the macroeconomy offered a strong effect to agriculture. The reduction and abolition of fertilizer subsidies, which were conducted as part of the reduction in financial expenditures, were giving disincentives to the production of rice. On the other hand, the devaluation of the rupiah gave an strong incentive for exportable agricultural products. Through such changes in economic policies, the basic policy regarding

agricultural has shifted from the increasing of rice production to the diversification of agriculture, including the development of agricultural products for export.

Indonesia is currently shifting its focus from the production of rice to the production of edible crops, called as Palawija. Production increases of soy beans, corn and cassava are the major policy target, and the re-planting of the rubber plant and palm oil, mainly for export, is also being stressed. In the villages of Lampung, West Java, South Sulawesi where we conducted our survey, the diversification of agriculture was already realized to a great extent at the family level. If the diversification is proved to improve the profitability of farmers, the diversification of agriculture in Indonesia can be realized very smoothly.

Anyhow, the agriculture of Indonesia has clearly entered the phase of changes. This change is needed mainly for the structural adjustment of the Indonesian economy as a whole. In addition to this macro-economic aspect, there are still a large number of poor farmers such as landless in the rural society, though not to the extent found in India. The diversification of agriculture is desirable for these poor people because it will provide more productive employment opportunities.

(5) Thailand

Thailand is currently achieving the highest growth rate in Southeast Asia. When looking at its industrial structure, the country already entered a stage where the share of the manufacturing industries in GDP exceeds the share of agriculture, and it can no longer be called an agricultural country. The biggest task for Thailand at present is how to adapt agriculture to the rapid growth of non-agricultural sectors. It is crucial for Thai to make the shift from agriculture centered around rice production, to the diversification of agriculture especially the growth of stockbreeding.

The delta in the central region has been the center of rice production in Thailand because the irrigation system was developed since the 1950s. Especially influenced by the increase of international price after the middle of the 1970s, twice cropping of rice was started in this region. Also in the North-eastern part of Thailand constituted of a plateau, dry farming represented by corn, was developed by the expansion of the international market. Such agricultural development in both regions was realized based on the voluntary decisions of farmers. Such a quick response by the farmers in Thailand to the economic stimuli is even impressive.

Such agricultural development since the 1960s has entered a major turning point in the mid 1980s. In the middle of 1980s, the international rice and crops market has been greatly depressed mainly

due to the increase of production in the conventional importing countries and also the overproduction trend in the developed countries adopting protective measures. International prices have started to show a declining trend. This situation has placed a large burden on the agriculture of Thailand. As being made clear in our survey, in the central region of Thailand shifting to once cropping of rice per year from the twice cropping was widely discussed, and in Northeastern Thailand reducing exporting crops such as maize, kenaf, and cassava was also discussed. The changing trends of the international market are strongly influencing the agriculture of Thailand in this way.

Thailand's national growth itself, the major force of which is the development of labor-intensive exporting manufacturing sector, is starting to have a significant impact on the agriculture of Thailand. Basically, the economic profitability of stockbreeding has started to increase due to the expansion of demand for livestock products, through changes in dietary habits due to the increased income of urban residents. The stockbreeding industry has currently become a high-growth sector in Thailand, especially in Northeastern region. Furthermore, as is represented by poultry farming, the new exporting industry has been created in the agriculture-related fields. This is an attempt by the food-processing industries to vertically consolidate agricultural production activities.

Anyway, agricultural development in Thailand, which has developed since the 1960s under the influence of the changing international market of crops, as well as the changing domestic economy for industrialization, has now reached a situation in which fundamental changes are required. The change can be as a change from the agricultural development of rice productions in the central delta region and dry farming in Northeastern Thailand, towards agricultural diversification the core of which is to foster stockbreeding industry. If this change is not realized efficiently, the farmers' demand for an income that is comparable to those of urban people should be materialized by a price-supporting policy for agricultural products, and the same kind of problems which the developed countries currently have will emerge in Thailand in the future. As past experience clearly shows, since farmers in Thailand are very responsive to economic stimuli, the decisive point would be whether the government policy can promote such a necessary change efficiently.

3. Implications

I have roughly observed in the above the course of agricultural development in the five countries which we have covered in our past survey. In this section, I would like to discuss some implications from the experiences of agricultural development in these 5 countries, by

maintaining the hypothesis that agricultural development should respond to phase in economic development discussed in Chapter 1. Although I will not attempt to make any definitive remarks, the discussion here will help us when considering agricultural development in other countries. It will also provide us with useful information when thinking of future cooperation from Japan.

I would like to make one additional remark. That is typology, whether the country is big or small in terms of land or population. My viewpoint is that the tasks of agricultural development might differ depending on the different typology of the country, i.e., whether it's a big country or a small country. Since the economic development of a small country is obliged to be an outward-looking type emphasizing international trade, the task of agricultural development will be determined in relation to this outward-looking development. On the contrary, it is not so crucial for a big country to take an outward-looking strategy for the economic development of the country because of the potentiality of large domestic market. It is easy to imagine that the task of agricultural development in such country would differ from that of a small country which is obliged to adopt an outward-looking strategy. In short, it is necessary to take into consideration the typology as well as the phases of economic growth.

(1) Experience of agriculture-led growth

Let me first discuss the agriculture-led growth by comparing the experiences of India and China. As economy and trade were liberalized in India and economic reform and the open-door policy were implemented in China in the 1980s, both countries attempted to convert their strategies into the direction of outward-looking strategies. However, in terms of typology, both are big countries. In terms of the typology of the national economy and its economic phases, both countries need an agriculture-led growth strategy in the sense that the growth of the agricultural sector is an indispensable precondition for the growth of the national economy as a whole.

Agricultural development itself is considered to be successful at least in the northwestern part of India and in South China. It is almost certainly true to say that in both regions, agricultural development itself is inducing the growth of non-agricultural sectors, including agriculture-related industries.

The common element of success in agricultural development and agriculture-led growth in both countries is the increase of agricultural product prices and the reduction of input material prices by subsidies. In both cases, this government policy has functioned as an economic incentive to individual farmers, and agricultural development has been realized. It should be obvious that farmers in both China and India are capable of responding fully to economic incentives.

However, when we take the failure of agricultural development in Eastern India into account, we start to see a big difference in the agricultural development of the two countries. The experience of failure in agricultural development in Eastern India, including Bihar, tells us that a precondition such as infrastructure development (especially irrigation systems) is crucially important for each farmer's fully utilization of the given incentives. After 1950, the construction of irrigation systems was under way in China through a collective mobilization method, and the development of an irrigation system was started in the colonial period at the end of the 19th century in the northwestern part of India. In the eastern part of India, on the other hand, infrastructure was not fully developed in the ecological system of the lower reaches of the Ganges river since it was impossible to construct an irrigation system without a large amount of public investment that exceeds the solvency of the respective farmers. The point that the development of infrastructure is a precondition for the use of economic incentives is one of the important lessons to be drawn from comparing the agricultural development of both countries.

Another lesson contained in a comparison of India and China is that it is essential to discuss to what extent the respective class of farmers participated in the course of agricultural development when clarifying the mechanism of agriculture-led growth. The distribution of assets in rural societies had been made far more equal in china than in India, due to the Post-Revolution land reforms, and then the participation of rural people in agricultural development since the late 1970s can be said to be fairly high. It is true that the income differentials among families in rural societies widened under free competition, but that this high participation in development induced the growth of non-agricultural sectors. Compared to China, the social stratification is very distinct in India's village, being linked with the Caste tradition. Although agricultural development in Northwestern India, by the introduction of new technologies, had expanded the employment opportunities for rural poor, all the classes in the rural societies did not participate equally in agricultural development. Furthermore, as I stressed when observing the experience of India, the real income of rural poor who were given employment opportunities did not increase so significantly due to the increase of food prices. Such a situation might be the major reason for the insufficient growth of non-agricultural development, despite the agricultural development in India.

The experiences of India and China mentioned above are meaningful when considering agricultural development in Nepal. Although Nepal may be a small country, it has difficulty in adopting the normal development strategy such as outward looking that a small country would take, because it is a land-locked country surrounded by other countries. Therefore, we can say that it requires an agriculture-led development strategy because its growth phase is similar to those of India and

China, though it is a small country.

By the way, when compared to India and China, the current agricultural development strategy of Nepal is not sufficient due to lack to the economic incentives offered to farmers, including both product prices and input prices. Granting economic incentives to farmers through price policies calls for a fair amount of financial expenditure. Although we can understand that it is difficult for a poor country like Nepal to implement such measures, economic incentives are no doubt essential for its agricultural development. Development of infrastructure should be a precondition for the functioning of economic incentives. In this regard, the hilly regions other than the Terai Plains are in a very difficult situation. It is essential firstly to stop the deterioration of farming land resources, such as land erosion, and try to develop a widespread irrigation system.

(2) Diversification of agriculture

Let me now examine agricultural development in Indonesia and Thailand. Both can be categorized as small countries in comparison to India and China, and therefore, they are countries that require outward-looking strategies of positively utilizing opportunities for foreign trade. Agricultural development in both Indonesia and Thailand is now in a turning point. In spite of the difference of exporting industries or import-substitution, the agricultural development of both countries has emphasized rice production. Both countries have now entered the phase of diversifying the agricultural production from the rice production.

Indonesia has succeeded in increasing the rice production by adopting a strategy similar to India's, and achieved the self-sufficiency of rice production. The reduction in oil prices has obliged the national economy to get away from oil, and the development of exportable agricultural products has been emphasized as part of this effort. These are the major factors that have required agricultural diversification in Indonesia.

The major factor for changing agricultural production in Thailand is that dependence on rice exports has become difficult due to a change in the international market, which was mainly caused by the increases of production in former rice-importing countries, such as Indonesia, and overproduction in developed countries under their agricultural protection policies.

The international factors that have forced both countries to change the agricultural production are different. However, the domestic economic factors that have necessitated the agricultural change seem to be common. Though there may be a difference in degree, industrialization has developed reasonably well and the average income

of urban family increased steadily. The increase of the income of the urban family has changed their dietary habits and this, in turn, is requiring diversification in agricultural production. The stockbreeding in Thailand and soy bean in Indonesia are the typical examples.

The agricultural diversification of both countries are a recent phenomenon, and it is too early to make the full evaluation of it. However, judging from past trends among the farmers of both countries, the diversification of agriculture, in principle, has been realized on the basis of farmers' response to economic incentives. One problem in this regard is that, even if the government implements price policy of increasing incentives for these crops, the price level should not be kept far above the international prices. The income differential among farmers or regions is expanding in the industrialization process of both countries. This is particularly apparent in Thailand, and is posing a big problem for their economic policies. In such a situation, possibility of establishing a price supporting-policy with the aim of improving the farmers' incomes is rather high politically. Though it is not included in our investigation, this is the reality of the agricultural policies in Korea and Taiwan, which I mentioned in the first section. And, same as the agricultural policies of many developed countries, such a price policy is very likely to bring about major problems for the national economy. The policies for agricultural diversification which are called for in Thailand and in Indonesia will need price policies which are different from this type, otherwise they will have big problems at later stages.

Anyway, it is a very interesting subject to see what sort of policy measures Indonesia and Thailand will use in their trials for diversifications.

Notes

1) Concerning this point, please refer to Peter Timmer, "Agricultural Transformation," H. Chenery and T. N. Srinivasaned. Handbook of Development Economics, Vol. 1, 1988.

2) Pranab K. Bardhan, "Private Property and Growth Constraint in a Hydraulic Economy" Land, Labor and Rural Poverty, 1983

3) World Bank, World Development Report, 1986

4) Regarding the problems of new agricultural strategies, please refer to H. P. Binswanger and J. B. Quizon, "What Can Agriculture Do for the Poorest Rural Groups," I. Adelman and Sylvia Lance, ed. The Balance between Industry and Agriculture in Economic Development, 1989

5) Concerning this point, please refer to K. N. Raj, "Mobilization of the Rural Economy and the Asian Experience," G. Ranis, ed. The State of Development Economics, 1988

Chapter 3

Agricultural Development in Five Asian Countries

India , Nepal

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1. India

Sample surveys based on questionnaires and interviews were conducted in two target communities in India. One is Morsand in Samastipur District in the state of Bihar, a low-income region where agricultural development projects have made little headway. The other is Mukhalan in Hissar District in the state of Haryana, a region which is considered to be relatively highly developed.

Farms in Bihar, traditionally a rice-growing region, are almost all extremely small. Annual per capita income is 995 rupees (1981 - 1982), the lowest in all the states of India. The rice and wheat harvests per unit of land are extremely small: 945kg/ha, and 1394kg/ha, respectively, and only 34.7% of the land is irrigated (1978 - 1979). The rate of chemical fertilizer use is 18.5kg/ha, and 12.5% of the population lives in cities (1982). According to the 1981 census, the agricultural population was 62,141,000 people, including 7,135,700 agricultural laborers and 2,868,000 people involved in extremely restricted, small-scale agriculture.

Haryana, on the other hand, which is in Northwest India, is located in the area which benefited most from the so-called "Green Revolution" which began in the late 1960s. Its annual per capita income is 2,581 rupees, second only to the state of Punjab. The volumes of rice and wheat harvested per unit of land, and the irrigation rate are extremely high. Rice and wheat production are 2536kg/ha and 2358kg/ha, respectively, and 52.5% of the land is irrigated. The rate of chemical fertilizer use is 47.4kg/ha, and 21.9% of the people live in cities (dates of statistics are the same as above).

Overall, Bihar agriculture is about 40% as productive as it is in Haryana.

Samastipur District, the location of the town of Morsand, is in northern Bihar, a particularly densely populated region. Its population density is 729 people per square kilometer (1981). A large community located beside a paved highway, its population was estimated to be between 5,500 and 5,600 in 1984. Rajendra Agricultural University is about 8 kilometers to the Northwest, and it is a 3 to 4 hour drive to Patna, the state capitol. Morsand is under the jurisdiction of the Pusa development block, which has its office at the agricultural college. Within the community, there is 1 University, along with elementary, middle, and high schools. Also, a subcenter office of primary health center is located in the town. As a Bihar community, Morsand is located in a relatively convenient location in terms of transportation, and has advanced facilities of several kinds.

Farm workers comprise 90% of Morsand working population, and 45% of

them are farm laborers. About 23% of the people are members of the so-called "designated castes." Along with rice, the farmers grow vegetables and tobacco as cash crops. However, most cash-crop production is carried on by moderately well-off farmers. The rates of irrigation in 1971 and at the present time are almost identical: about 14%.

Within the region, there are striking social differences based upon caste. The caste system is characterized by discrimination, caste endogamy, and hereditary occupations based on people's ritual status, and doctrinally, is completely unrelated to economic wealth. In the cities, some low-caste people are actually wealthy. But in farming communities, members of the lower castes are, generally speaking, the victims of economic, as well as social and ritual, discrimination. In Morsand, most farmers with more than 10 acres of land are members of the high caste Bhumihar Brahmin group. Most of those with relatively large farms of around 5 acres belong to the middle caste Koeri group. The poor farmers with less than 2.5 acres are mostly from other middle castes. Most landless members of the community belong to the designated castes and service castes.

Many of the moderately well-off farmers live in brick or cement houses with 4 or 5 rooms built around a central garden. Lower-caste people live in small 1 or 2 room houses made of woven grass. The majority get their drinking water from common-use, hand-operated wells. The commonest fuels are firewood and dung. Aside from stores in the shopping district and the homes of prosperous farmers, there is almost no electric service.

Mukhalan is located about 10 kilometers from the city of Hissar, the major city in Hissar District in the state of Haryana. It is a middle-sized town with a 1981 population of 2,100. Agricultural workers comprise 61% of its population, and 13% of these are farm laborers. There are more opportunities for non-agricultural employment here than in Morsand. Because Hissar city is nearby, many people work as industrial laborers and in the service field. Wheat is grown in the winter, and Bajra (millet) is cultivated in the summer. The farmers also produce a great deal of feed, and cash crops such as cotton. Farm labor income is nearly 50% higher than in Morsand, and generally, the standard of living is high. The community is provided with educational facilities. Along with elementary, middle, and high schools, there is a nursery school for the children of working mothers.

Like many villages in Haryana, Mukhalan is controlled by the agricultural community groups called Jat. The Jat include the operators of small, medium, and large farms, while most of the farm laborers and service workers are from the designated castes. About 42% of the population are members of the designated castes. Mukhalan is laid out in the collective village pattern common to Northwest India. The people's homes are concentrated in the middle of the town, with the

homes of the designated caste members located around the edges. Almost every house has electric lights. Simple pure water supply facilities and pipes are installed at the edge of the village, and taps providing water for daily use are found at a number of locations. Dung is the only fuel used in the community.

The federal and state governments are working in harmony on a new 20-point agricultural development program, an all-embracing project involving the expansion of agricultural production through irrigation, the provision of employment opportunities for the rural unemployed and landless farmers, assistance for the designated caste members and tribes at the bottom of the social hierarchy, enhancement of the environment by providing drinking water, electrification, health protection facilities etc., and even reforestation and family planning. Every year, each state sets material goals and works hard to reach them. The success of the programs varies regionally, and there are many communities where fundamental agricultural development programs such as the IRDP (Integrated Rural Development Plan), the NREP (National Rural Employment Plan), and the RLEGP (Rural Landless Employment Guarantee Plan) are not really being implemented.

The farmer's feelings about and awareness of the agricultural development programs vary. In Morsand in Bihar, 8 of the 26 households surveyed were benefiting from the development projects. They were receiving IRDP financing, getting seed and fertilizer from the Federation of Agricultural Cooperatives, or receiving occupational training while being subsidized by TRYSEM (Training of the Rural Youth for Self Employment).

Asked if the development projects were beneficial, 19 of the 26 households surveyed answered that they were, and 5 responded that they were extremely beneficial. Despite this, local problems prevented all but 8 households from participating. The reasons given for non-participation included lack of information and the complexity of the procedures. It is noteworthy that some complained of being unfairly exploited by officials who demanded bribes. Dishonesty on the part of those responsible for the development projects is obstructing their progress.

Even in Mukhalan, a community in which relatively large-scale agriculture is carried on, the vast majority of the farmers believe that the development projects are useful, but few actually participate in them. The small farmers gave lack of information and the difficulty of procedures as the reasons why they did not take part. Some young middle-level farmers said that they did not need to participate in the development projects. They are well educated and independent, and seem reluctant to rely upon the government. This indicates that in areas where agricultural development is well advanced, the farmers have become self-reliant.

In these and other ways, the development plans are plagued by problems preventing them from progressing as well as the federal and state governments would like.

Also, the social structure itself hinders agricultural development. Basically, village corporate bodies are unified by their own norms and customs. The mechanisms which govern the maintenance of social order and economic exchange and distribution are not modern market mechanisms. People's concerns focus on matters close to their own lives: this year's harvest and the realms of marriage and death, matters linked to the gods and a supernatural world. The things that are important in people's lives are not matters of concern to modern society. In Hindu society, there are many religious observances and festivals, and it is extremely important to perform them in strict conformity to religious practices and traditional customs. Consequently, in both Morsand and Mukhalan, mutual-aid practices are almost completely intertwined with ceremonies celebrating the transitions in the lives of the inhabitants.

Another serious obstacle to Indian agricultural development is the population problem. Despite vigorous efforts by the government and private groups to promote family planning, India's population is continuing to grow rapidly. As agricultural development advances, it improves the people's environment, and this, in turn, causes a shift from the previous "many births-many deaths" pattern to a "many births-few deaths" situation. The ironical result is that successful development is overwhelmed by the growing population.

According to the results of the sample survey, the average number of children per family was almost the same in Morsand and Mukhalan, 2.97 and 2.96, respectively. The average for mothers over 30 were 3.29 and 3.95 children, for mothers over 40 they were 3.0 and 4.92 in Morsand and Mukhalan, respectively. The latter figures show that women's child-bearing years are quite long. Another characteristic of the Indian population is the preference for boys. According to Hindu doctrine is extremely important to have male descendants, and farm families require sons to help them cultivate their land. Therefore, Indian families will continue to have children until one or two boys are born. Consequently, there are more men than women in India, a situation found in few countries in the world. This tendency was reflected in the survey. In Morsand, 19 out of 36, and in Mukhalan, 18 out of 29 of the sample households surveyed expressed a preference for boys. The reasons given for this preference varied between the two towns and according to the social class of the respondents. In Mukhalan a preference for boys was strongest among the middle- and upper-level Jat farmers, but not among the landless. In Morsand on the other hand, many landless people want boys who can take responsibility for the family's economic welfare in the future. This difference seems to be a reflection of various conditions: whether farm labor is primarily family labor or mainly paid labor, whether there are opportunities for non-agricultural employment

or not, and so on.

The commonest method of family planning is surgery to sterilize both men and women. It is done in many middle- and upper-class households after 2 or 3 boys are born. It is uniformly difficult to promote family planning among the landless, who view children as the most important way to guarantee their future security.

2. Nepal

In Nepal, two villages -- Balakot in Bhaktapur District and Bhagabati in Kavrepalanchok District -- were surveyed. Bhaktapur District is situated in the Kathmandu Valley. In the center of the county is the town of Bhaktapur which was one of the capitals of the Malla Dynasty, which was at the zenith of its prosperity until it was destroyed by the present Shah Dynasty in the latter half of the eighteenth century. Around this old town is a granary where rice and wheat are grown twice a year. The percentage of the distribution of agricultural production of the district is 53.4 percent for rice, 32.1 percent for wheat, 0.0 percent for barley, 13.9 percent for maize, and 0.1 percent for millet. In other word, rice and wheat account for 85.9 percent of the total (average for 1983/84 to 1986/98). The district's annual average yield per unit acreage of rice for the past four years is 4,150 kg/ha, which is more than double the national average. Likewise, the district's average annual yield per unit acreage of wheat for the same period is the highest in the nation, being a little less than double the national average.

On the other hand, Kavrepalanchok District is situated in a hilly area beyond the outer rim of the Kathmandu Valley. Of the working population in the district, 93.3 percent are engaged in agriculture. They are making a livelihood by cultivating terraced fields on the slopes of the hills. The percentage distribution of production of the main farm products is 33.3 percent for rice, 21.0 percent for wheat, 43.2 percent for maize, and 2.0 percent for millet. Rice is grown in the paddy fields along the rivers. Some dry field rice is also grown. Maize is mainly grown halfway up the hills and upward. The yield per unit acreage for rice, wheat and maize in the district is lower than the national average. That for rice, in particular, is only about 40 percent of that in Bhaktapur District.

Balakot in Bhakatapur District is a village where agriculture is well developed because of its topographical advantages situated in a basin and its proximity to urban areas, while Bhagabati Kavrepalanchok District is a village where agricultural productivity is very low and where the central government's agricultural development policy measures have just been taken.

Balakot Village has a population of 4,037. The total number of households is 664 and the average number of household members is 6.1. Approximately 40 percent of the village's residents belong to the Newar, who have long used the Kathmandu Basin as the base for their activities. Another 40 percent belong to a higher caste of people called Parbati who speak Indo-Aryan Nepali. The remainder belong to lower castes or are of other Tibet-Burmese origins. There are no specific places for people belonging to the specific castes to live in. With the exception of only

a few cases, the people of the different castes and the different ethnic group are living together.

In the village, there are three primary schools (first to fifth grade), a primary and lower secondary school (first to seventh grade) and a secondary (eighth to tenth grade). Approximately 80 percent of the village's children attend the primary schools, but many secondary school students leave school before graduation. Generally, more girl students leave school before graduation than boys. On the other hand, some families send their children to private schools in Kathmandu to give them educations of a higher level.

Electricity was installed nine years ago in this village. At present, a majority of the households are using electricity as a light source. Well water was used as drinking water until community water supply facilities equipped with a water tank were constructed about five years ago. Currently, about half of the total number of households are utilizing these facilities. The main fuels are firewood, cow manure and wheat straw. Only a limited number of households use electric heaters.

The results of a 21-household-sample survey show that there are few farmers who are earning incomes by agriculture. Agricultural income accounts for only 16.1 percent of the total income of the villagers surveyed. It is only large families belonging to the Newar that are earning adequate agricultural incomes. The results of an interview survey also show that farm products are grown for self-consumption and that cash income is earned by other means.

The acreage under cultivation per household ranges from 0.2 to 1.5 ha, the average being 0.42 ha. Nepal society is made of patrilineal families and land is inherited solely by sons, divided equally. Thus, the land area per household is bound to diminish indefinitely.

Although there are few farmers who have no arable land in the village, about three-quarters of the total arable land is now used for tenant farming. The farm rents differ according to the type of tenant land used. In the case of wet-fields, the rent is about 15 percent of the yield, if the yield is large enough. As the rent is decided according to the size of the land, the rent becomes relatively high if the yield is small. In the case of maize fields, tenant farmers have to pay from 40 percent to nearly 50 percent of the yield in farm rent. If wheat is granted as a secondary crop, however, the tenant farmer need not pay the farm rent for it. Most of the landowners are temples or residents in the cities, such as Kathmandu and Patan. There are no large landowners near this village and the relationships between the landowners and tenant farmers are very complicated.

Many of the village's residents are earning some type of income other than agricultural income by working as employees of government

offices, public corporations and private companies in Kathmandu. The monthly salary ranges from 1,500 to 1,800 rupees (about 75 - 90 US dollar) for clerical work, 700 to 800 rupees (35 - 40 US dollar) for lower clerical work, and 500 rupees (25 US dollar) for odd jobs. Some engage in construction work during the dry season. Some others are operating tailor's shops, tea shops or small restaurants. During the busy farming season, the villagers work together. Male villagers receive a daily wage in the amount of 50 to 60 rupees, and female villagers receive a daily wage that is half that of male villagers. The average annual non-agricultural income per household is 11,086 rupees (554 US dollar).

Fertilizers were introduced in this village about 20 years ago. At present, most farmers are utilizing fertilizers. On average, 1,091 rupees are paid for the use of fertilizers per household annually. This sum accounts for 8.3 percent of the gross annual income. Fertilizers used to be purchase at the Saja (cooperative). At present, however, they are purchased at private stores, partly because the cooperatives are inactive nowadays and partly because fertilizer is in short supply. Many farmers complain that they cannot obtain the necessary quantities of fertilizers when they need them. While rice prices are now twice as high as they were some ten-odd years ago, fertilizer prices are nearly three times as high, making the farmers' financial burden heavier.

Eight junior technicians and twelve junior technical assistants are stationed in Bhaktapur District, but in Balakot Village there are no villagers who have seen these agricultural specialists at work. The Agricultural Development Bank is seldom utilized. These facts imply that the central government's agricultural policy measures are not yet implemented in remote farm villages.

The agricultural facility most urgently required by the farmers of this village is an irrigation facility. Only rain water is used for most of the village's paddy fields. This means that this village's agricultural system is greatly affected by weather conditions. For example, the village's crop yield declined sharply from 1985 to 1986 when there was a severe drought in the village. According to the village's farmers, the introduction of a large-scale irrigation facility will not only stabilize the rice yield but also make it possible to change many maize fields into paddy fields. Also, many farmers are demanding that seeds and fertilizers be made more readily available.

However, the villagers' greatest concern are employment opportunities. There are so few job opportunities within the village, that few high school graduates can find good jobs. As the total area of arable land is limited, most of the farmers find it very difficult to earn cash incomes from farming. As a consequence, the size of non-agricultural income determines the standard of living in a farmer's household. How to take advantage of the village's proximity to

Kathmandu and Patan is one of the greatest challenges facing the village.

On the other hand, Bhagabati Village is situated in an area which stretches from the hillsides to the ridges of the hills. This village's agricultural system is centered around maize growing. In 1987, the village had a population of 3,192 (513 households). In the villages, the social and agricultural conditions differ from one ward to ward (The village is divided into nine ward.) In ward No.9 of the village, many farmers have their paddy fields along the rivers. The results of our sample survey of this ward show that the percentage distribution of production of the village's main farm products is 42.0 percent for paddy rice, 4.9 percent for dry-field rice, 4.0 percent for wheat, 44.1 percent for maize, 2.4 percent for beans, and 2.4 percent for millet. In ward No.6, however, maize accounts for 72.0 percent, and millet for 10.1 percent, of its total agricultural production.

Similar differences are seen in the social and economic conditions in each ward. In ward No.9 the houses of those villagers belonging to the Newar are on both sides of the streets and around these houses are those of people belonging to the higher caste of Parbati. Some of the residents go to Kathmandu during the agricultural off-season to engage in wage labor. It is this ward's residents who are the most enthusiastic about legislative activities in the village assembly and the economic development of the village. On the other hand, many residents of the ward No.6 belong to the lower castes of Parbati or the Taman people. Few residents of this ward have ever been to Kathmandu. Few of them know much about, or take an interest in government policy.

There is a primary school in the ward No.1 and another primary school in ward No.7. The village's junior high school is in ward No.8. The students who attend the high school in a neighboring village have to walk for about an hour to and from school. Families belonging to the Newar who have kept the relation with Kathmandu and Braman who have a long educational tradition, are very interested in education. Many of these families want to have their children receive at least a high-school level education. By contrast, few of the adults in ward No.6 have received a school education, or they have left primary school before graduation. Although aware to some extent of the importance of education, they do not exactly understand what education is. A primary school was established in this village with financial aid from the district government, but it does not have desks or chairs. No licensed teachers have been dispatched to this school.

Since two years ago, when electricity was transmitted to the center of the village, the gap has widened between the central part of the village and its outer region. At present, it is only the residents of ward No.8 and No.9 that can utilize electricity as a light source. Upon the installation of electricity, an electrically powered water-pumping

machine was installed and a total of 14 community water supply sites were established in the central area, where drinking water supply problem was resolved. However, the problem is not yet resolved for the residents of the remote area as ward No.6. It takes women there one and a half to two hours to draw the necessary quantity of water from the spring every morning and evening. Women also engage in the feeding of farm animals and collecting firewood, in addition to their housework and farming. The women of this area are still suffering under heavy labor conditions.

The introduction of electricity has brought some income sources to the residents of ward No.9 because the introduction of electricity was accompanied by electrical maintenance and drinking-water-supply projects. One of its residents purchased a rice mill and a corn mill upon the installation of electricity. He is lending the mills to others, taking five percent of the milled rice and corn. This has also contributed to the widening of the income gap.

In both Balakot and Bhagabati Villages, it is impossible to further expand the arable land. In order to stabilize the village's agricultural production, therefore, it has been strongly demanded that a reliable irrigation facility be built in the village. Although many of the farmers are utilizing fertilizer, cow manure is still the main fertilizer in ward No.6, where there are few opportunities for earning cash income. On the other hand, the farmers' confidence in the effects of fertilizer is growing. For this reason, many farmers are demanding that fertilizer be made more readily available.

The shrinking of the individual farms due to the equal division among sons of the inherited farm land is causing worries about the future of agriculture among farmers. In this area, too, agricultural improvement instructors, the agricultural cooperative and the Agricultural Development Bank are inactive. In ward No.9, however, the residents are becoming more positive about agricultural development, in keeping with the improvements being made in the agricultural infrastructure. In this district, heated debates on the promotion of stockbreeding, centered around the breeding of goats and domestic fowl, have been going on. On the other hand, in ward No.6, which has been isolated from the other wards, the situation is serious because few of the residents are able to cope with the narrowing of farms and the continuing decrease in agricultural production. The outflow to the urban areas of the excess youth population, which is already seen on a small scale, will be accelerated by the worsening of the arable land shortage.

3. China

We visited Yuhantai District and Jiangning County (both in Nanjing City, Jiangsu Province) to conduct an interview study. Jiangning County, situated in the south of Nanjing City, is a region planting rice and wheat within a year, endowed with water from a tributary of Yangtze River which flows through its center. We visited the local areas of Fanshan Township and Moling Township, and also listented to conducted interviews at the village level in Gaoshan Administrative Village in Fanshan Township. Yuhantai District, in contrast, is one of ten districts located in the southwest of Nanjing City. Its main agricultural product is vegetables supplied to Nanjing City. Within Yuhantai District, we visited Jiangdon Township and conducted a village-level inquiry in Xianglong Village as well.

Significant expansion in several sectors of economy due to the economic reform implemented from the beginning of the 1980s was confirmed in our observation conducted at every level of village, township and county. Agriculture, industry, commerce, subsidiary businesses and other forms of production increased greatly, and the average individual's income rose dramatically. For example, total production in Fanshan Township, Jiangning County, rose 4.24 times from 1980 to 1986, and that for Moling Township increased over 6 times from before 1979 to 1986. In the midst of this rapid economic expansion, growth is especially noteworthy in the categories of manufacturing industry and subsidiary businesses. In contrast, the importance of agriculture in the overall economy fell considerably, despite of its general growth in production. This is shown by the example of Xinglong Village in Jiangdon Township, Yuhantai District, where agriculture accounted for 43% of total production (287,000 yuan) in 1978, but this figure dropped to 6% (425,000 yuan) in 1986. This expansion in the non-agricultural sector is also clearly seen in the changes in labor force composition. Prior to 1979, agricultural sector occupied 70-80% of total labor force, but this figure has dropped to 35% in 1986.

As is shown in the above, the place of agriculture in the overall economy has fallen significantly over the last several years in the process of shifting to an open economy. But as is indicated below, it was confirmed that agricultural production was not stagnant but increasing and being diversified in parallel with institutional reforms going on.

First of all, in the region of rice and wheat cultivation, yield per unit area is increasing. In the Gaoshan Administrative Village in Fanshan Township, Jiangning County, where the irrigation system had completely covered the fields before 1949, the average yield of grain reached 500 kg per mu (7.5 tons per hectare, but this accounts the total of wheat and unmilled rice added together) before 1979, but it increased

to 617 kg per mu in 1986. This increase is attributed to a changes in the farmers' consciousness that is to say, for example, more interest in greater production and in adoptation of new varieties with good quality, especially the introduction of the F1 hybrid variety. The average production of this hybrid rice is 50-100 kg per mu greater than that of the Japonica variety, but its taste is inferior and its price therefore is somewhat low.

Moreover, in this region, the introduction of other crops, livestock raising and fish-culture was attempted in order to diversify production. At the Jiangning County level, fruits such as watermelon and grapes, sugar cane, livestock raising, for instance, ducks, and chickens, as well as fish-culture were being introduced in an attempt of diversification. At the Gaoshan Administrative Village, cultivation of grapes (Japanese "Kyoho" variety) was started on a piece of land with the area of 15 mu as a new business since the year before our visit. Watermelons had been planted prior to the grapes, but they replaced watermelon with grapes because grapes would fetch better market prices. Furthermore, in Moling Township, while fish-culture were growing as a subsidiary business, the culture of crabs and eel was also being put to trial.

On the other hand, Jiangdon Township, Yuhantai District, which had been supplying vegetables to Nanjing City before the economic reform, continued to fill one fifth of the city's demand for vegetables through a contract purchases at the time of our visit. Jiangdon Township's total vegetable production was 35,959 tons in 1982, but this figure rose to 36,472 tons in 1986. The contracted amounts between the town and the city were 31,000 and 32,500 tons, respectively. One of the problems concerning its vegetable production was the improvement in quality and the alteration in the shipping period through such a method as forcing cultivation in order to get a better price.

Not only its development of vegetable production, but also the growth of livestock raising and pisciculture in Jiangdon Township is truly remarkable. For instance, from 1982 to 1986, the number of pigs supplied increased over ten times from 1,620 to 17,420, and the number of fish supplied more than doubled from 216 tons to 514 tons during the same period. The number of eggs produced also rose in 1986 to 157.2 tons. In Xinglong Village, groups of villagers engaged in subsidiary businesses were formed in 1977. These groups were engaged in pig raising, milch cow raising, greenhouse cultivation of flowers, and pisciculture.

The expansion and diversification of the production was advanced by reforms in the economic system such as the introduction of the individual household management and the free market system.

The farmers had come to make decisions on shipping according to the

prices in markets. The previously mentioned grapes in Fanshan Township are shipped through the town's cooperative, obtaining market information sometimes through Shanghai fruit merchants. Moreover, in the case of Jiangdon Township which produce vegetables to supply Nanjing City, the amount of vegetables shipped to free market is about 10% of the total production, supposing the difference between the total production and the amount supplied through the contract account for the amount for free market. As for the portion of contracted production for Nanjing City, the government set the price, which seems much lower than the market prices that we observed during our visit.

Nearly all the regions we visited had switched to the responsibility system by 1982. Except for in Jiangdon Township, which will be elaborated on later, an individual farm had become the principal management body. Households designated as specialized farm household, semi-specialized farm households as well as individual economy were growing with the revenue from subsidiary businesses. In the example of Moling Township, specialized farm households and semi-specialized farm households that obtained 60% of their income from forestry (fruit trees, etc.) and that made up 20% of total number of households in the town, earned 35% of total income of the town.

However, there is no reason to think the collective framework disappeared. Although the role of individual farms was positively evaluated, the continuing importance of the roles of collective was emphasized in such fields as land preparation before planting, research and development including seed selection, as well as the construction and management of infrastructure.

The nature of the relationship that exists between the individual and collective varies according to circumstances from one village to the next. Needless to say, the above mentioned production increases and diversification were also sustained by services provided by public sectors at every level.

Irrigation systems in all the regions we visited, which were blessed with natural conditions, had been completed before 1979. Xianlong village, Jiandon Township, for example, a fully equipped automatic irrigation system, involving over ten irrigation canals covering 700 mu of cultivated land, had been completed prior to 1977. And even after the economic reforms took place, there was no switch to complete individual farm management in order to maintain the irrigation system. Without alloting land to each farm, the village appointed villagers as members of various production units which were responsible for certain productions. Among the nine production units in the village, one performs the task as an agriculture service center doing such words as seed selection, and another serves as a service unit responsible for transportation of produce to the market and maintenance of the irrigation system. The remaining seven units, one for each

natural village, perform vegetable production. There are other production units created to handle the previously mentioned subsidiary businesses of pig raising, milch cow raising, flower cultivation, pisciculture, and transportation as well.

Furthermore, organizations called agricultural science centers and agricultural service centers at village, township and county levels bore the task of introducing the new varieties and crops. In Jiangning County, for example, an agricultural science center was established in each town (staffed by six persons in the case of Fanshan Township), supplemented by an agricultural service unit in each administrative village, and extension workers in each natural village. In addition, the supply of pesticide and chemical fertilizer is in the hands of public sector such as the village administration. One of the immediate tasks that both the agricultural service centers in Moling Township and in Yuhantai District were facing was adjustment of the shipping timing by forced and controlled cultivation.

Village enterprises is another important attempt to support the above mentioned development in rural area by absorbing the surplus labor force and increasing household income. The total production of village enterprises in Jiangsu Provinced amounted to 45,93 billion yuan which ranked top in the nation and the labor force serving the enterprises reached 30% of the total rural labor force in the province. The profit from the village enterprises supplements the income of rural households in villages where the land for cultivation is scarce due to high population density, and, in addition, is spent to provide farm machinery and other infrastructure.

In Fanshan Township and Moling Township in Jiangning County, as well as in Jiangdon Township in the Yuhantai District, the number of village enterprises counted were 76, 71, and 69, respectively (as of August, 1987). Taking Gaoshan Administrative Village in Fanshan Township as a village level example, the four following village enterprises had been created: 1. Electrical machinery (1970s); 2. Spare parts (1984); 3. Construction material-tiles (1984); 4. Textiles-cotton/undergarments (1986). A total number of 264 people were employed. The following village enterprises were founded in Jiangdon Township: 1. Oxidization devices for combustion machinery (1971); 2. Quality control devices for electrical equipment (1987); 3. Metal parts (1987). (figures in brackets represent year in which each enterprise was established).

The remarkable expansion of village enterprises in terms of quantity should of course be noted. But further more, in Jiangning County, the formation of a new style network years was noted as a new development in recent years. That is to say, taking advantages of the abundant land and labor in rural areas, a liason between rural enterprises and big urban enterprises are being formed. The previously

short term ad hoc relationship between cities and rural enterprises has become longer term relationship.

However, on the other hand, several problems such as the quality of skilled engineers and management staffs and needs for their re-training, shortages in energy and resources especially electric power, as well as capital were pointed out.

Thus the rural areas in Jiangsu Province are undergoing great transformations. One phenomenon that symbolizes these transitions in a positive way is the appearance of the "10,000 yuan farm", a name give to households with a yearly income that exceeds 10,000 yuan. At the time of our study, there were 50 such farms in Fanshan Township (1% of the total number of 5,111 households in the town), and they were specialized farms engaged in transportation, pisciculture and livestock raising businesses. Besides the 10,000 yuan farms, in Fanshan Township, 206 households earned over 5,000 yuan per year and 2,147 households with annual income over 1,000 yuan per year (1986). With this increased income, construction and rebuilding of houses, as well as the purchase of durable goods, were in progress.

4. Indonesia

Tatakarya, Sidmukti, and Purbasakti are three settlement villages in East Abung District (North Lampung Prefecture, Lampung Province, Island of Sumatra) that were formed by a migration program in the 1960s. Purasari Village in Leuwiliang District, West Java Prefecture, Bogor Province, was founded by tea plantation laborers at the beginning of the nineteenth century and today is conducting highly intensive agricultural production on small tracts of land. In Alatengae Village in Bantimurung District, Maros Prefecture, South Sulawesi Province, small-scale paddy rice cultivation is being performed. These three regions with their distinctive features were the placed for our survey. (The questionnaire survey was conducted at 50 farms each in the three villages in East Abung District, Purasari Village and, Alatengae Village, making a total of 150 farms).

The differed features that characterize agricultural production in these three regions becomes clear upon examining land ownership and operation, as well as the use of land among the sample households.

Small-scale operation with dense population is conspicuous in both Purasari Village and Alatengae Village, in contrast to the new frontier settlements in East Abung District. In the latter's case, at the time of the migration, 2.0 hectares of land had been offered to the setters and, according to the survey, an average of two hectares was owned and operated by a farm in these three villages in East Abung, where owner-operators consisted most of the farms. In Purasari Village and Alatengae Village, according to the survey, average area owned was 0.47 and 0.51 hectares, respectively, and average area operated was 0.47 and 0.88 hectares, respectively. In Purasari and Alatengae, rural stratification in terms of ownership and operation of land was under way, and tenancy was reported in both villages. Purasari Village differed from Alatengae Village on a particular point that agricultural laborer households with no land existed in Purasari.

Now let us take a look at land use and agricultural production.

Among the three villages in Abung District, in sidmukti, paddy rice farming with irrigation, which had become available since two years prior to this study, is its major production. However, in Tatakarya and Purbasakti, the main product is in mixed cultivation of corn, upland rice and cassava in fields during the rainy season. If we take a look at 11 sample farms with a high annual income of more than 1,000,000 rupiah (the average income of the whole sample was approximately 800,000 rupiah per year) reveals that 10 of the eleven were the farms that have irrigated rice fields. Rice sales were the main source of income of these high income farms. But to take an average of all the farms surveyed, cassava sales consisted an important source of income.

In Purasari Village in West Java, double-cropping paddy production on irrigated fields is the principal of agricultural production, complemented by cassava and cloves, as well as bananas and papayas on household compounds. The average income of the sample farms was about 770,000 rupiah, while non-agricultural income (mainly from agricultural labor) consisted over half of that figure. And with respect to agricultural income, high priced cloves in particular were far more important than rice as a source of income. Within the three regions studied, households of agricultural laborer were found among the sample farms only in Purasari Village. And their income is markedly low. In addition, the average income of farms with non-irrigated land was not even half the average income of all sample farms and their income almost entirely relied on non-agricultural sources.

Alatengae Village in South Sulawesi Province is a village of wet-rice cultivation, taking advantage of its bountiful average rainfall that reaches 3,500mm per year and the irrigation system set up during the Dutch rule which covers half the paddy fields in the village. It has the average annual income of 960,000 rupiah, the highest among the three regions surveyed. In addition to the sale of rice, chickens also provide an important revenue source. Here, also a noticeable income difference is observed between farms with irrigated fields and those without it. We could see that the existence of a basic infrastructure such as irrigation means fundamental difference to the individual farm economy concerned.

What kind of changes have been accomplished in recent years, then, in those regions with different natural environments and resource endowment?

First of all, in Sidmukti village, as previously mentioned, an irrigation system was set up two years before our study and double-cropping of rice had become possible. A new, high-yielding rice variety (IR56) which was resistant to insects was adopted and cultivated under the guidance of agricultural extension workers. The yields per hectare of the sample farms were 2.51 ton in the rainy season and 2.63 tons in the dry season. But according to the agricultural extension center, the figure could possibly as high as seven tons. Changes have also occurred in the villages of Tatakarya and Purbasakti where field production was predominant. The extension workers have promoted the introduction of peanuts and soybeans to supplement the present mixed cultivation of corn, upland rice and cassava. As for the variety of upland rice, all surveyed farms but three have adopted an improved variety.

In the same way, double cropping of rice is performed in both Purasari Village in West Java and Alatengae Village in South Sulawesi, but in contrast to all the farms sampled in Purasari Village that used a traditional variety, farms surveyed in Alatengae Village had all adopted the high-yielding varieties. Yield per unit area also differed between

Purasari Village (rainy season: 2.64 tons/ha; dry season: 2.44 tons/ha) and Alatengae Village (rainy season: 3.8 tons/ha; dry season: 3.2 tons/ha). However, when this latter figure of samples in Alantengae is compared with the average of the whole village (5 tons) or that of Bantimurung District (5.245 tons), it is found to be quite low. Furthermore, it is only about half the yield mentioned by the agricultural extension workers, which is 6-7 tons per hectare.

In 1963-64 an improved traditional rice variety with a shorter growth duration was introduced in Alatengae Village and double-cropping began on irrigated rice fields. At the same time, fertilizer was started to be used. The average yield which had previously been 1.5-2 tons were risen to 2-3 tons.

This improved variety becomes widely spread around the year 1967. Then, they participated Bimas Plan to adopt the high-yielding rice variety in the following year. Nevertheless, as we could see, it cannot yet be said with conviction that the full potential of the new high-yield variety has been fully achieved.

In this same village in 1983, immediately prior to our visit, the agricultural extension workers had initiated a trial to introduce young corn which would fetch a good market price between the double-cropping rice cultivation, which would realize 2 double-croppings of rice cultivation plus one young corn, altogether 5 harvests in 2 years. At the time of its introduction, the farmers would receive a guidance in cultivation methods from the agricultural extension workers. The workers were also promoting the introduction of beans as a second crop in the dry season for rainfed fields with no irrigation.

The governor of Sulawesi Province raised the issue of change of crops from rice to others as one of the most important problems in agriculture of the province and on the level of Maros prefecture the issue of crop alteration to beans was also raised. The gross estimation of the profits per hectare from such crops as soybeans and peanuts is certainly better than that from rice, but we could not find examples among the surveyed farms that had already introduced young corn or beans. As the agricultural extension workers said that the education and training of farmers was quite important for the extension of new technology, it would be rather impossible to introduce a new crop on the instant no matter how profitable it would be.

When new technologies including new varieties and crops are to be introduced, the agricultural extension workers promote its extension by making direct contact with the farmers. For example, in Lampung province, there were 78 agricultural extension centers in the 76 districts in the Province. The Province is divided into 833 agricultural extension zones, with at least one extension officer per zone. There is also an agricultural extension center in East Abung with

two extension workers.

Krompok tani is a farmers group organized to play a role as a contact in a process of the extension of new technology. The agricultural extension workers in East Abung for example, contact Krompok tani when they try to introduce a new technology. That leader, called Contact Tani, is the key person in touch with the extension workers. Besides in case of extension work, the members of Krompok tani help each other through labor exchange on accommodating cattle for cultivation. In Maros prefecture, South Sulawesi, the prefectural governor was taking leadership in contacting krompok tani once every three months and encouraging members from each group to jointly contribute money in order to purchase agricultural equipment like water pumps and tractors. One year prior to our visit, 79 tractors (approximately 2 per village) were purchased through this project, and there was a plan to purchase pumps in the same manner in the following year. In Alatengae Village, a woman's version of the group called krompok wanita tani had been established. Here, activities such as religious study, a mutual financing called arisan, the promotion of chicken raising, as well as promotion of cultivation of vegetables and fruits on household compound were conducted by the members.

Also, in all the villages visited, the KUD was found to function as a channel for fertilizers and agricultural chemicals, in addition to providing storage warehouses and rice mills for harvested grain. However, some farmers indicated problems of insufficient administration and some thought that it was not adequately serving its function.

In addition to the above mentioned crop cultivation, the importance of cattle raising, for labor force, as a food, and as additional sources of income was pointed out. For instance, the number of work cattle was increased all over Lampung Prefecture to compensate for an insufficient human labor force. With the support from the World Bank, a program was being implemented to raise the proportion of cattle owned up to one head per every five farms. On the other hand, in Alatengae Village, there were examples of farmers raising chickens on a scale of, say, 400 and 1,000, and ducks on a scale of 80 and 100 ducks, respectively. Among seven sample farms which earned high income of over 1,000,000 rupiah, three were raising chickens and ducks on a large scale, which probably accounted part of their high income. In Purasari Village the importance of fish-culture was also noted. Since it absorbs the labor force all year round, the promotion of fishery in the village was also under consideration.

Lastly, we will touch population. In contrast to the above mentioned villages in the East Abung area that were formed through a trans-migration program, Purasari Village is among those villages whose villagers would emigrate through trans-migration programs. Of the three villages in East Abung, especially in Tatakarya, an influx of workers

that came for the construction work of the irrigation system two years before our study led to a population increase by about 1,000 people. Contrarily, in Purasari Village, among the households surveyed, there were 20 cases in which the family members live outside the village and many more people wished to leave the village to find employment. Some of them actually participated in a migration program. Changes in Alatengae Village was relatively small; it received some seasonal laborers for harvests from other districts.

If we take a look at the population composition of each region surveyed in terms of age reveals that there are less children of 0-4 years old than those of 5-9 years old. This indicates the spread of family planning.

Among the three sample regions, East Abung started the introduction of the family planning 5-7 years prior to our visit while in Purasari, 3-4 years and Alatengae 1-2 years before.

5. Thailand

In Thailand, we visited Wat Yai Village (Ban Wat Yai, Tambon Ta Chanuan) in Manorom County, Chai Nat Prefecture, and Yang Village (Ban Yang, Tambon Tat) in Rattanaburi County, Surin Prefecture. We conducted a questionnaire survey at 30 farming households in each village.

Wat Yai Village is situated at the apex of the Chao Phraya Delta. The Chao Phraya River flows through the western edge of the village. Thanks to the irrigation provided by the Royal Irrigation Department's water pumps, which bring water from the Chao Phraya River, as well as over 100 wells dug by the village headman's own initiative, rice production has been made possible even in dry seasons. The village at the time of our survey was made up of 153 households (population: 613; men: 279; women: 334) forming a long narrow strip on a natural embankment alongside the river. In contrast, Yan Village consists of 105 households (population: 666; men: 317; women: 349) surrounded by rice fields. The Mun River flows through the northern side of the county, but besides the use of a small reservoir, the village's rice fields rely almost entirely on rain water. This difference in natural conditions concerning water availability in these two villages still has been a major factor creating a disparity in agricultural development.

One point that agriculture in these two villages has in common is that they both depend heavily on rice cultivation. That is, all of the area cultivated which was reported by surveyed households in Wat Yai Village was used for paddy rice cultivation in both the rainy and dry seasons (rainy season: 444 rai; dry season: 225 rai). In the same way, the rice was planted in 99% of the total area planted which was reported by the household surveyed in the rainy season (598.5 rai) and 30% of those in the dry season (15 rai). With respect to the crops besides rice, it was reported that sample households in Yang Village devoted 6 rai to flax in the rainy season, and 24 rai to corn, 4 rai to cassava, and 2 rai to fruit trees in the dry season. Incidentally, the average area operated by the farms sampled was 26.3 rai in Wat Yai Village, and 22 rai in Yang Village (1 rai = 16 are).

All of the rice planted in Wat Yai Village and over 95% of that planted in Yan Village is of high-yielding variety. This high-yielding variety was introduced to Wat Yai Village in the mid 1970s. At that time, rice had good prices in market and this provided incentive for the adoption of new technology. This new rice variety with shorter growth duration made double-cropping of rice possible. Of course, water from the Chao Phraya River and the 124 wells dug under the village headman's initiative played a great role in making dry season cultivation possible. The farmers in Yang village was also quite willing in adopting the new technology. Among the sample households, the earliest had started to try the new technology as early as in mid 1970's, and the

majority followed at the turn of 1980 under the guidance of local agricultural development worker (Kaset tambon). It is possible to say that at the time this study was conducted, the Green Revolution that began in the 1970s had already infiltrated northeastern Thailand, which is not blessed with favorable natural conditions.

The diffusion of the high-yielding varieties greatly changes agricultural methods and management. The wide-spread of chemical fertilizer, the replacement of water buffaloes by tractor (especially in villages where dry season cultivation is possible), and the use of hired labor in place of traditional labor exchange are some examples of this. In both of the villages surveyed, the sample households used an average of 100 baht of fertilizer per rai. And as for the farms sampled in Wat Yai Village, no farm possessed water buffaloes and there were two farms which owned small tractors, whereas in the entire village, 49 small hand tractors and one large tractor were being used. And there was only one among the samples where all agricultural works were performed just by the member of the household; all the other samples used hired labor. At the time of this survey, wages of agricultural labor were 120 baht per rai for planting and 140 baht per rai for harvesting. Assuming they have an average of 26.3 rai of operated area per sample farm with 100 baht per rai as an average cost of fertilizer and of hired labor in both planting and harvesting, the total cost per farm would approximately be as much as 10,000 baht per season.

In contrast, there were no farms among those samples in Yang Village that owned tractors; water buffaloes were used in all cases. The use of hired labor on a daily basis had become predominant, but mutual labor exchange practices were widely used compared with Wat Yai Village.

Both villages have adopted high-yielding rice varieties, yet a large difference in average yield was observed on sample farms.

Average Rice Yield (1984/5)

(per rai)

Wat Yai		Yan	
rainy season	dry season	rainy season	dry season
552.2 kg	881.0 kg	337.0 kg(1)	333.0 kg

(1) Includes traditional variety. High-yielding varieties alone would account for 361.0 kg/rai

In Yang Village, which is greatly restricted by natural conditions such as water availability and soil fertility, it was noticed that the

well proven potential of the new high-yielding rice varieties was not realized. Furthermore, even among the sample farms in Wat Yai Village, yields on each farm per rai differed from 213 kg - 750 kg in case of the rainy season and 434.8 kg - 1,233.3 kg in case of the dry season. The cause of this difference could not be readily explained, but it at least shows that the level of the skill in applying technology on an individual farm level varies from one to the next.

At the time of our visit, there was a drop in the prices of agricultural commodities, such as rice, cassava and corn. And they were devising countermeasures on a farm level as well as at every level of the administration.

At the farms sampled in Yang Village, there were only few reports of cassava and corn recently planted in the dry season, therefore we did not hear about the direct influence of the price drop. However, from what we heard at the prefectural level in Srin Prefecture that due to the drop in rice prices, rice cultivation was not promoted in places where water during the dry season was available, but rather the production of other crops, like peanuts and soybeans, was encouraged as crops to be planted during the three months after the rainy season. However, due to the damages caused by insects, the results of these alternative crops were unsatisfactory. In Yang Village as well, cultivation of peanuts and mung bean was attempted, but according to the village headman, the results were not good.

On the other hand, in Chai Nat Prefecture, the fear of soil deterioration from overuse of chemical fertilizers and the governor's own initiative led to reconsideration of double-cropping of rice and reintroduction of water buffaloes and natural fertilizer. Furthermore, listening to whether a farmer or a development worker on a county level, everyone expressed the concern about finding another source of income to replace rice production. Other crops such as beans were also attempted in this village, but damages from rats and insects made the results unsatisfactory.

Faced with this difficult situation, Wat Yai Village, with the help of its headman, promoted handicrafts production and found additional income from their sales. Mainly in the dry season, they make baskets, hats and mats from the veins of bamboo and palm leaves. The amount of income varies from one farm to the next. Some sample farms reported they earned as much as 2,000-3,000 baht per month, which was certainly no small amount. A mat weaving group and a handicraft group with 72 and 54 members, respectively, were formed in the village with the intent of improving product quality. In addition, a housewife group, a young farmers' group, and a credit union were also formed.

In Yang Village, a rice bank (thanakhan khao) was created and started its activities. Under the village headman's guidance, over 3 kg

of rice were deposited from each farm to make a total of 2,000 kg. A committee was formed to manage the bank. Village people in need of rice can borrow it from the bank (example: borrowing 5 kg of rice and repaying 6.5 kg).

This kind of village newly group/organization is playing an important role in improving the welfare and general living standards in these two villages when the prices of agricultural commodities in international market had fallen causing difficulties in rural areas.

On the other hand, the question of diversification of agricultural production still remains, with the problems such as damages by insects being left unsolved. In Green Revolution, the introduction of and the extension of high yielding varieties that requires new kinds of intensive agricultural management have succeeded to some extent thanks partly to the price incentives. But in other crops besides rice, the extension of technology necessary for their introduction still remains as a problem.

Lastly, we touch our observations made relating to population control and family planning.

With respect to the average number of child birth per wife in sample households in both villages, we can see that the number of child birth per woman in their 30s or below, when compared with women with the age of 40's or older, clearly decreased (from 5-6 children to 2-4 children). On the other hand, in a similar way, the death rate of children per wife in her 30s or of younger age was also seen to decrease. The decrease in the number of children has occurred in parallel with the drop in the infant mortality rate.

This drop in the birthrate is obviously a result of the extension of family planning. Since the mid 1970s, primary health centers established in counties and villages have played an important role as a source for acquiring information as well as obtaining contraceptives.