THE ECONOMIC DEVELOPMENT OF
THAILAND'S AGRICULTURE

THESIS

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Agriculture is usually the largest economic sector in developing countries. Typically, most of the countries' population is employed in this sector. The economic growth is dependent upon productivity in agricultural production and its export potential. Increased production and exports from this sector result in foreign exchange earning by which to promote development of the other sectors. Given the importance of agricultural development, this thesis attempts to study the impact of the agricultural sector on Thai economy and to examine some problems concerned with cultivation, production and marketing. The study also concentrates on the development of social overhead capital (i.e., transportation and irrigation systems), which play an important role in stimulating the growth of Thai agriculture. Finally, there are some conclusions and recommendations which may be useful to the government and its agencies concerned with the development of agriculture.
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CHAPTER I

INTRODUCTION

Since World War II the problem of economic development has been a concern to many countries. Economic growth and development have become the major goals of nations throughout the world. Various ways and methods are used to encourage development and increased growth, since no single formula can always insure rapid economic development. A development strategy which works well for one country may fail for others due to political, social, and cultural differences, in addition to radically different factor endowments and country size.\(^1\) There is a great diversity of resources and institutions in developing countries. In them development begins within different historical contexts. It should therefore not be surprising that attempts to construct a general theory of development have been unsuccessful.\(^2\)

Economic development by definition is a process by which a population increases the efficiency with which it provides desired goods and services, thereby increasing the


standard of living and general well-being. This process must be a dynamic one, involving constant change in the structure and procedures of the economy. Therefore, in relatively wealthy countries where a large, complex administrative structure and a high rate of capital formation are more readily available growth tends to proceed more rapidly than in low income countries.

However, the definition of economic development can be an elusive term meaning different things to social scientists. According to Joseph A. Schumpeter,

"Development in our sense is a distinct phenomenon, entirely foreign to what may be observed in the circular flow or in the tendency toward equilibrium. It is spontaneous and discontinuous change in the channels of the flow, disturbance of equilibrium, which forever alters and displaces the equilibrium state previously existing. Our theory of development is nothing but a treatment of this phenomenon and the processes incident to it."3

In addition, economic development should be defined in terms of progress toward reducing the incidences of poverty, unemployment, and income inequalities for the people whose living standards have not been rising. Poverty here, it should be noted, is defined under the basic human needs, not in term of income but rather as the lack of good nutrition, good health, educational opportunities, and similar dimensions of welfare.4


4Zuvekas, Jr., op. cit., p. 11.
The general objective of economic development is to raise the living standards of the population. Hence, to increase the level of living, the total production of goods and services must expand more rapidly than the population. Although an improvement in the quality of living is basically a material gain, it should also involve a consideration of health, education, communication, and time for leisure. As K. K. S. Dadzie said,

The goal of development therefore is not only the betterment of the material condition but also greater human dignity, security, justice and equity. It is a transformation of lives, a liberation.5

In the early stage of development, 60 to 80 percent of the population is engaged in agriculture, and 50 percent or more of national income is generated from the agricultural sectors.6 Agriculture requires little capital per workers, but it commands a high proportion of the total capital resources of a nation. As the nation prospers, the population expands and incomes rise. To feed more people a better diet, agricultural production must increase. However, a steadily rising standard of living requires not only an increasing supply of food, but also an increasing supply of other commodities. Thus, a successful economic


development will require rapid expansion of the non-agricultural sectors, particularly the industrial sector. Growth of industry requires vast quantities of capital and raw materials. As the largest sector of the economy, at least in the early stage of development, agriculture therefore initially commands most of the population, income and capital. Therefore, it can be reasoned that the additional capital and raw material for the industrial sector must be raised from the agricultural sector and that agriculture must also be a potential source of manpower for industrial expansion. Hans W. Singer made his point in his book, Rich and Poor Countries,

Most less developing countries have a large, stagnant, agricultural sector which is linked to the small, modern, large-scale, industrial sectors mainly through the supply of resources, both labor and capital, from the former to the latter.\(^7\)

Generally, agriculture's role in economic development has been formulated in terms of the contributions that agricultural sector can make to the industrialization of the economy.\(^8\) It has been shown that agriculture can promote economic development of countries in four different ways.

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First, agriculture provides food and raw material for the population. However, its importance goes beyond the need to keep a growing population alive. If the food supply is increasing more slowly than the population, nutritional standards either will be lowered, or will be maintained by increasing food imports. Spending scarce foreign exchange on food leaves less available to import capital goods, technology, and other factors of production which tend to be in short supply in developing countries.

In addition, another important aspect of food production is its contribution to the formation of human capital. Food utilization really should be considered an investment which improves the quality of the labor force. Poor diets also affect general health. As a result, worker absenteeism is higher, and on-the-job productivity is lower, than would be the case with a well-nourished labor force.

Second, agriculture serves as a domestic market for the products of the industrial sector. Farmers will spend income on domestically-manufactured goods in preference to imports. In the early stages of economic growth, rising incomes in the agricultural sector can expand the market not only for light consumer goods (such as radios, televisions, bicycles, etc.), but agricultural instruments, tractors and other agricultural machinery as well. Therefore, a rapid increase in agricultural incomes can speed the industrialization process.
Third, agriculture contributes to economic development by transferring the resources, labor and capital, to other sectors of the economy. In the process of development, farm workers constitute a reserve of manpower on which the other sectors of the economy draw to meet their needs. Adam Smith described the importance of labor productivity in the *Wealth of Nations*.

When by the improvement and cultivation of land, the labour of one family can provide food for two, the labour of half the society becomes sufficient to provide food for the whole. The other half, therefore, or at least the greater part of them, can be employed in providing other things, or satisfying other wants and fancies of mankind.⁹

Another contribution is to serve as a source of savings to other sectors of the economy. In a developing country without mineral resources, half of the national income is likely to be derived from agriculture. Agriculture can also contribute tax revenue from such sources as levies on production of farmers (for example, a premium on rice in Thailand). Levies on production are easy to collect and can constitute an important source of revenue in countries with a large volume of agricultural exports that account for a high proportion of total exports.¹⁰

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Fourth, the role of agriculture is as a source of foreign exchange. The agricultural sector not only provides food for domestic consumption, but also supplies a major share of foreign exchange earnings from commodity exports which are based on primary products (in the case of Thailand they are rice, maize, rubber, sugar, etc.). It is true that reliance on just one or two major agricultural exports can be risky. The more agricultural products a country can export, the more foreign exchange it has available to purchase those items required for industrialization as well as for other imported goods. Hans W. Singer had stated the importance of foreign exchange in the developing process:

A large number of other researchers have shown that poor countries have extensive foreign exchange requirements. Half of the country had their growth limited by the scarcity of foreign exchange; the other half had the required foreign exchange and skilled manpower. This shows that the external sector can play a crucially important role in determining the pace and direction of a poor country's development.\(^{11}\)

While increasing agricultural productivity and industrial development clearly can benefit each other, and hence improve economic growth, the problem of establishing priorities which faces the development planners is a very difficult one. Some economists believe that economic analysis shows a high degree of correlation between industrialization and

\(^{11}\text{Singer, op. cit., p. 55.}\)
standard of living and that industrialization has been a
determining factor in successful economic growth.\textsuperscript{12} On the
other hand, some favor giving priority to agriculture based
on the functions of agriculture in the process of develop-
ment. In order to serve as contributor to the other sectors
of economy, agriculture must modernize and improve its pro-
ductivity. Another idea produced from this controversy is
the "balanced growth concept," which emphasizes expansion
of industry and agriculture. Overall growth is a result of
the expansion of these two sectors, and of the transfer of
resources from agriculture and industry.\textsuperscript{13} The process of
development leads to an increase in the exchange of goods
between the agriculture and industrial sector. This approach
to the relationship between two sectors is more beneficial
than one which argues in favor of either agriculture or for
industry.

No matter how varied the arguments are, we cannot deny
the fact that the role of agriculture in economic develop-
ment is very important, particularly in light of contribu-
tions to other sectors of economy, especially industry.

\begin{quote}
Purpose of Study
Agriculture plays several important roles in the growth
and development of a healthy economy, such as providing food
\end{quote}

\textsuperscript{12}Malissis, \textit{op. cit.}, p. 161.

\textsuperscript{13}Ibid., p. 165.
and raw materials, supporting employment, supplying savings and serving as a market for the input of the industrial sector. Therefore, growth in the agricultural sector can promote the possibilities for growth elsewhere in the economy. On the other hand, poor agricultural performance hinders economic growth and limits the resources available to promote development, particularly so in Thailand, where agriculture is a major factor determining national policy. About 67 percent of the country's population, 73 percent of the labor force, and 80 percent of total exports are accounted for by agriculture. Moreover, foreign exchange, which is a very important factor in the development of the country, is mostly derived from exporting agricultural products such as rice, maize, and sugar.

Therefore, the purpose of this study is to analyze the structure of Thai agriculture and its problems in order to understand why this sector is so important to the Thai economy, to suggest how future development should proceed, and to examine the impact of overhead capital and modern technology on the stimulation of agricultural development. We should then be able to recommend national agricultural policies such as prices, production, and land reform and how they can be adjusted according to Thai needs, in order to increase the growth of the agricultural sector and the economy as a whole.
Scope of the Study

This study is centered on the most important sector in the Thai economy, namely agriculture. Topics will include the cultivation, production, and marketing of farm products as well as the development of an agricultural infrastructure (i.e., irrigation and transportation). Thus, some answers to these problems may benefit both economic planners of Thailand and any international organization concerned with the future development of Thai agriculture.

Data Sources

Information and statistical data for this study are based on texts, bulletins, and reports, from many publications of international agencies and organizations such as the Asian Development Bank, Ford Foundation, and UNESCO, as well as the Thai government and its organizations. In addition to these sources, the study is drawn from a number of books about Thai agriculture and related topics.

In order to understand agricultural development in Thailand better, it is necessary to examine the general background of Thailand regarding her history, geography, religion, political, and economic structure.

Historical Background

Thailand, "Land of Freedom," extends over some 200,000 square miles.\textsuperscript{14} The Thai took this land by migration and

conquest from their original home in South China. Around 2,000 B.C., Chinese sources report, Thai people were still settling the land north of the Yangtze river. Four hundred years later, such reports referred to Thai settlers within the Yangtze region itself, thus indicating a southward migration trend. At the end of the thirteenth century these people had migrated down all the principal river systems of the Southeast and had built central cities near the sites of modern Chiengmai, namely Lanna Thai. By continuous migration, frequent wars, and skillful diplomacy, Thai power followed down the northern tributaries of the Chao Phraya river and fanned across the great plain of the Chao Phraya itself. In this period two Thai chieftains defeated the Khmer commander at Sukhothai, and built there the first capital of a powerful and vigorous Thai Kingdom in 1238. Under several successful dynasties, Thai power alternately reduced and advanced in struggles against the Cambodian and the Burmese. Meanwhile, contracts with European powers began early in the sixteenth century and gradually increased. Diplomatic envoys were exchanged, treaties were concluded, and numerous foreigners were

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17 Ibid., pp. 23-24.
employed to help reform the government administration and to assist in the development of natural resources.

Early Thailand was known to foreigners as Siam. However, the Thai people felt that name did not properly apply to them. In 1939 it was officially changed to Thailand (Land of Free).\(^{18}\) In 1945, as a concession to foreign influence it was again changed to Siam, but soon a nationalistic spirit reasserted itself, and the name of Thailand was again adopted in 1949. Except for a brief period, Thailand has been ruled only by the Thai. The nation has jealously and successfully guarded its political independence. Among the countries of Southeast Asia, Thailand alone has never been under Western colonial domination, a fact which affects every aspect of its modern life.\(^{19}\)

Geography

Thailand is a tropical land of mountains, plateaus, and alluvial plains, with an area of about 200,000 square miles roughly three-fourth the size of Texas.\(^{20}\) On the West and North it is bordered by Burma, on the Northeast by Laos and Cambodia, and on the South by the Gulf of Thailand and


\(^{20}\)Donner, op. cit., p. 2.
Malaysia. It is divided into four major geographical regions (see Figure 1).

The northern region is mountainous region, its boundaries with Burma and Laos are indistinctly marked. Most of the population, however, is composed of Thai, who live in the narrow, alluvial valleys separated by high ridges and covered with forests. Such valleys yield valuable products such as teak and various resins, both of which are commercial assets. In this mountainous region there are small communities of hill people accounting for 2.1 percent of the total population in the North. 21

The northeast region or the low plateau of Khorat accounts for almost a third of the total area of Thailand. This region is an infertile region of scrubby savanna, with a scattering of low hills and patches of scrawny jungle. Lack of water and poor soil make much of it unsuited to wet rice farming. Compared to the other regions, the north-east region has fewer natural resources, more limited transportation and communication facilities, and considerably less economic development. 22 Therefore, its living standards and per capita productivity are lower than those of other regions.

21 Ibid., p. 698.

Fig. 1--Map of Thailand
The southern region is composed of a narrow mountainous strip running down the west side of the Gulf of Thailand to Malaysia. The East coast contains many small harbours. There are several sizeable plains and lowlands, and unlike the rest of Thailand, this region has two rainy seasons. As a result, almost the entire area is thickly covered with rain forests, edged along the coasts with swamps. It is a land of rubber plantations and rich tin mines whose products are highly desired in the world market.23

The last area of discussion is called the Central Plain, the heartland of the country surrounding the Chao Phraya river. This very flat plain, with a maximum width of about 150 miles, extends some 300 miles from the northern mountains to the Gulf of Thailand with a barely perceptible gradient.24 Chao Phraya is the most important river in this region and for Thailand. It serves as an excellent means of transport and provides excellent soil for rice production by depositing alluvium on the Central Plain. More than 80 percent of the area is rice cultivation, the rest being suitable for corn, beans, and sugar cane.25 Bangkok, the largest city in this region, is the nation's

24 Donner, op. cit., p. 213.
capitol. It is not only a center of commercial, industrial, financial, political, transportation and higher education, but also the nation's cultural center.

Population

The Thai population of 46 million in 1980, consisted of 24 million males and 22 million females. The highest population density is in Bangkok, estimated to have about 5 million; 85 percent of the total population live in the rural areas. The largest proportion of the labor force, about 78 percent, is engaged in agriculture occupations.

The people of Thailand represent many ethnic, racial, and linguistic divisions. However, racial differences have little importance, because Thai people pay little attention to it as a determination of behavior. The great majority of the people, almost 90 percent, share a common or related ethnic origin. Minority groups are found in various sections of the country. Chinese constitute the largest minority group in Thailand, and they are found in all the main cities. The remaining minority groups consist of the Malay, living in the South, the Vietnamese in the Northeast, and the hill people, living mostly in the North. Except for the


Chinese, these minority groups have exerted little influence on the country's economy and politics.28

Religion

Buddhism, the religion of 90 percent of Thai people, has contributed to their feelings of independence and individualism.29 Buddhism originated in India and arrived in the area that is now Thailand in the Third Century B.C. Thai Buddhism is practiced in conjunction with a large number of Brahmanic rituals and the worship of natural spirits.30 Buddhism, so intimately a part of Thai culture, has often been thought of as the key to understand the Thai. One may consider it as the mainspring of the Thai language, literature, ethics, and art, including Thai customs. There is no doubt that Buddhism is a dominant force in Thai life and behavior.

Political Structure

After World War II the political structure moved from a system of monarchy to military authority. Since then power has been concentrated in the hand of a small, elite

28Ibid., p. 226.


military group, and this is the key factor in shaping the political destiny of the country. However, the government has changed by revolution from time to time during the forty-eight years since 1932.

Revolution in Thailand has never been more than court revolution, as it seldom required the participation of the people. The key to the success of a revolution is not the will of the people but the will of the military. Therefore, the movements for constitutional democracy launched as challenges to the military leader failed again and again.

Economic Structure

The structure of the Thai economy has changed considerably in its recent development. Thailand has observed several major changes in its economy brought about by central planning. These are often referred to as the First National Development Plan (1960-1966), the Second Plan (1967-1971) and the Third Plan (1972-1976). The Fourth Plan is now underway. The main efforts that are characteristic of these plans (which necessitate government administration) are tangible public investments, mainly in the infrastructure, such as road construction, national

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31 Yoneo Ishii, Thailand: A Rice-Growing Society, translated by Peter and Stephanie Hawkee (Kyoto, 1978), p. 130.

energy production and irrigation investments that have encouraged substantial change in the economy and agriculture. During the last two decades of economic development, the Thai economy experienced a high rate of growth. The Gross Domestic Product registered an average growth of approximately 8.0 percent per annum. In 1980 the Gross Domestic Product was estimated about 6.4 percent.33

The agricultural sector still continues to dominate economic activity, despite growth of other sectors. The proportion of agricultural production in the Gross Domestic Product was 27 percent in 1979. It employed more than 75 percent of the labor force and provides about 60 percent of export income.34 Among agricultural products, rice is the most important crop, not only for domestic consumption but also for export. In 1979 Thai exported about 2,722.8 million tons of rice, which is the largest share of the world rice market.35 Other major agricultural exports were cassava, rubber, coconut, maize, and sugar.

Livestock is second in importance, being raised primarily for domestic consumption. The chief animals are poultry, while beef and dairy cattle farming are still

limited. Fisheries earn substantial amounts of income for the country. Forestry has decreased in importance, both in production and exports due to forest conservation.

Another aspect of Thai economy, industry, is still conducted on a small scale for the most part, with emphasis being placed on the processing of agricultural commodities and the fabrication of consumer products and building materials. The proportion of industry production in Gross Domestic Product has steadily increased from 12 percent in 1960 to 22 percent in 1979 and has expanded at an average growth rate of about 10 percent annually.36 The shift to industrial production and diversification of exports led to an increase in the value of the country's export trade. At present Thailand has only a few large-scale industries, for example oil refining, cement, and textiles.

The present day government of Thailand tries to participate in many kinds of agricultural processing and manufacturing enterprises, and controls a large share of transport and communications, agricultural marketing system, domestic and foreign trade. Nevertheless, the private sector still generates by far the largest share of the national product, and the essentially free economy of Thailand appears likely to endure.

After presenting the purpose of study and general background of Thailand, the next chapters will discuss more detail about the characteristics and problems of Thai agriculture such as rice cultivation, the major crop production, marketing, irrigation, and the transportation system.
CHAPTER II

RICE PRODUCTION AND CULTIVATION

Rice is a staple in the diet of Southeast Asia. For Thailand, it constitutes a major portion of the country's Gross National Product and produces a large amount of foreign exchange each year.\(^1\) Thailand has a total land area for its initial rice crop of approximately 25.5 million acres, yielding around 12-13 million tons of paddy annually. The second rice crop is grown on 1 to 1.6 million acres of land giving another 1 to 2 million tons of paddy each year.\(^2\)

Rice is grown throughout Thailand, and about 70 percent of the area is suitable for cultivation. The area of largest production is in the Central Plain, accounting for 47 percent of the country's total area under rice cultivation. The Northeast Region is next with 38 percent of the country's area devoted to rice.\(^3\) Rice growing in Thailand is still labor intensive, with a labor force of at least 10 million, usually composed of small family units. A major

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\(^3\) Wibulseth, *op. cit.*, p. 11.
proportion of the fields are outside irrigated areas and are heavily dependent on rain water. The use of fertilizers is not widespread, adoption of new technology is still rare, and productivity is therefore low when compared with other countries such as Japan, Taiwan, and South Korea. Moreover, production per acre within the past ten years has not greatly increased. The increases that have taken place may be ascribed largely to expansion of cultivated area rather than increase in productivity.\footnote{Ibid., p. 236.}

Although all provinces of Thailand grow rice, many do not produce sufficient quantities to feed their own population, whereas others produce enough to distribute throughout Thailand and for export abroad.

In the Northern Region, rice is grown on about 6.5 percent of the Thailand rice producing area and contributes 11 to 12 percent of the national rice production.\footnote{Wolf Donner, \textit{Five Faces of Thailand} (New York, 1978), p. 706.} Most of this area grows glutinous rice, a type preferred by local people. An estimated 86 percent of total acreage is under glutinous rice production, and it contributes about 98 percent of the total rice harvest. In this region, the provinces producing more than their own needs are Chiang Rai, Sukho Thai, Pitsunu Lok, Phichit, Kampang Phet, and Nakorn Sawan.
Within the Northeast Region, each province generally grows enough to feed its own people since the area for rice covers about 450,000 acres for each of the sixteen provinces.\textsuperscript{6} The Northeast has excess rice production to send to Bangkok as well as to Laos, Thailand's neighboring country. However, rice yields per acre in this region are low compared with other regions, due to persistent floods, drought and pests. About two-thirds of the total area under rice cultivation here is devoted to glutinous rice.

For the central region, the typical crop of Central Thailand is a swamp rice, grown mainly along principal streams, using the annual floods as irrigation water. This region of flat, fertile land centering on Chainat includes Singburi, Suphanburi, Ayudhya, Nakorn Pathom, Pathum-thani, and Bangkok, in addition to other provinces to the West and East.

In the southern region, although the rural economy of the South is characterized by perennial tree crops such as rubber and coconuts, production of swamp rice remains a foremost field crop. Because this area's rice harvest is insufficient to feed its own population, rice is imported from provinces in the Central and Northeast region. Only a few provinces such as Surat-thani, Phatalung, Nakorn Sri Thammarat and Narathivas within this region are

self-sufficient. There may be some occasional excess but usually this region must buy about 30,000 to 50,000 tons of rice each year from the Central Region.

Climate and Rice Growing

In all climatic regions of tropical Asia the temperature during the rice-growing period is considerably higher than 13°C (55°F), the minimum limit for rice-growing, and therefore does not appear to present a problem. However, there are marked fluctuations in amount and distribution of rainfall between these climatic regions. In Thailand, rice cultivation relies completely on rain water, and traditional rice growing has adapted to excess water conditions. For example, during monsoons precipitation is concentrated in a few months while other months receive almost no rain. Another important climatic factor is the great variation in climate from year to year. This does not refer to long-term climatic change, but to the erratic weather patterns throughout the country. For example, the start of a monsoon season may be as much as one month later than the average, and rainfall may vary from the average by 50 percent. Extreme

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7Yoneo Ishii, Thailand: Rice-Growing Society, Translated and edited by Peter and Stephanie Hawkes (Kyoto University, 1978), p. 163.


examples of monthly rainfall of 1500 mm, daily rainfall of 700 to 800 mm, and recorded hourly of 100 mm, are not uncommon. These violent natural fluctuations in the amount and distribution of rainfall add to the widespread instability of water supplies. In Thailand, the area that cannot be planted because of the late arrival of the monsoon rains and the area that cannot be harvested due to insufficient rainfall often total several hundred thousand hectares a year.\textsuperscript{10} Thailand's traditional rice cultivation developed by adapting to these unstable climatic conditions. However, with a rapid increase in population and the introduction of a modern commercial economy, there have been compelling factors to change traditional peasant-based rice cultivation. The climate itself cannot be changed, but Thai rice cultivation is now moving toward an adoption of new technology.

Type of Soil

Soil ecology within the monsoon tropics is characterized by severe weathering and eroding. In Thailand the rice-producing soils, as in many other rice-producing countries, consist of three classes: sandy, loamy, and clayey.

Sandy and loamy soils dominate the Northern, Northeast, and Southern Regions. Central Plain soils are mostly clay.

\textsuperscript{10}Ibid., p. 169.
while sandy or loamy soils are found near the foot hills in the western and eastern portions of the central plain.

Clayey and clay-loam rice soils of the three other regions are typically found as narrow strips along rivers and streams, especially in the lower courses of tributary drainage where topography is generally flat and low.

The heavily textured soils of the Northern, Northeast, and Southern Regions are more fertile than sandy and loamy soils of the highland. One distinctive characteristic of northeastern and coastal rice areas is the presence of saline soils, either in spots or in wide areas, particularly on the coastal southern soils. On the other hand, the central plain has areas of acid sulphate soils containing soluble aluminium, a deleterious growth factor to young rice plants which also tends to stunt adult plant growth when aluminium is not sufficiently drained away. In general, Thailand rice soils are alluvials derived from sedimentary formations which are poor in natural fertility.

Varieties of Rice

The many varieties of rice grown in Thailand are usually divided into four groups based upon growth characteristics and habitats.¹¹

1. Wet-land rice is a traditional variety that requires field flooding or possibly controlled watering during

the growth period. It is confined to low lands with sufficient water, or to the bottoms of valleys in mountainous parts of Thailand. Wet-land rice harvests are recorded together with floating and glutinous rice, which makes individual yields difficult to ascertain, but apparently its yields vary in different regions and on different soils of the kingdom. Wet-land production is mostly concentrated within the Central and the Southern Region.

2. Deep-water or floating rice is a specific type of wet-land rice typically found in areas of the Central Plain where the rain, together with high-flowing rivers, quickly floods the paddy fields. It is estimated that floating rice in Thailand is grown on about 800,000 hectares in the Lower Central Region.

3. Upland or mountain rice, entirely dependent on rainfall, is grown primarily as a crop utilizing shifting cultivation (slash and burn) in the hill areas of Northern Thailand, and occasionally on low-lying dryland in the North and Northeast. Its extent is recorded neither by area nor by output and is not an important factor in the rice production sector.

The three types of rice varieties mentioned are non-glutinous rice that cover about 65 percent of the area under

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rice and 68 percent of the total annual production. Estimated production for 1978 was 17 million tons, with 15 million tons coming from the first crop and another 2 million tons from the second crop.\textsuperscript{13} Nonglutinous rice is Thailand's major export rice.

4. Glutinous rice is characterized by a peculiar stickiness after it has been cooked. About 80 percent of the area under glutinous rice and most of its production was consumed by the people in the North and the Northeast Region.\textsuperscript{14}

Thailand has also developed some outstanding varieties of rice for monsoon weather which have already been utilized by a number of farmers. Some of the best monsoon strains now in use are listed in Table I.

Average national yields of rice, 0.7 ton per acre, are low compared to those of Japan and Taiwan.\textsuperscript{15} They vary somewhat throughout the country, from a high of 0.9 ton per acre in the Northern Region to a low 0.6 ton per acre in the Northeast. Between these two extremes the Central Plain and the Southern Region produce just a fraction above the national average.

\textsuperscript{13}\textit{Bangkok Bank Monthly Review}, V (Bangkok, May 1979), 173.

\textsuperscript{14}Ichimura, op. cit., p. 98.

\textsuperscript{15}\textit{Bangkok Bank Monthly Review}, op. cit., p. 236.
TABLE I

VARIETIES OF RICE

<table>
<thead>
<tr>
<th>Region</th>
<th>Variety</th>
<th>Kind</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>Gam Pai 15</td>
<td>Glutinous</td>
</tr>
<tr>
<td></td>
<td>Leuang Yai 34</td>
<td>Nonglutinous</td>
</tr>
<tr>
<td>Northeast</td>
<td>Gam Pai 41</td>
<td>Glutinous</td>
</tr>
<tr>
<td></td>
<td>Jao Leuang 11</td>
<td>Nonglutinous</td>
</tr>
<tr>
<td>Central</td>
<td>Leuang Pratew 28</td>
<td>Nonglutinous</td>
</tr>
<tr>
<td></td>
<td>Jao Leuang 11</td>
<td>Nonglutinous</td>
</tr>
<tr>
<td></td>
<td>Gow Ruang 88</td>
<td>Nonglutinous</td>
</tr>
<tr>
<td></td>
<td>(floating rice)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pin Gaew 56</td>
<td>Nonglutinous</td>
</tr>
<tr>
<td></td>
<td>(floating rice)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bahng Chalawng</td>
<td>Glutinous</td>
</tr>
<tr>
<td>South</td>
<td>Bang Pa-yah</td>
<td>Nonglutinous</td>
</tr>
</tbody>
</table>

Over the years, yields have tended to increase steadily although not at a particularly fast rate. Increases in yields are noticeably greater in these areas of the Central Plain and the Northern, where improved seed varieties have been introduced and where fertilizer is more widely used.

Technique of Planting

As already mentioned, rice planting methods very both in water and land utilization. Two methods of cultivation
practiced can be further distinguished as broadcasting and transplanting.16

Transplanting is generally favored by Thai farmers, though it is a very labor-intensive method, requiring between five and ten times as much labor for the planting as the broadcast method. Nearly 80 percent of rice is produced by transplanting.17

The season begins in the late April or May, after the first rains have softened the ground for plowing.18 Land preparation for transplanted paddy is more laborious, especially on clay soil where at least two plowings and two harrowings are necessary to prepare the soil before seedbeds can be formed or transplanting done. On sandy soils usually only two plowings are needed. The first plowing turns under the weeds and plant residues, while the second loosens the sandy soil for the immediate transplanting of the seedlings.

The seeds, which have sprouted in a special frame, are planted in a nursery plot and allowed to grow while the fields are being plowed, harrowed, and flooded by rains or by water admitted through the low dikes around each plot.

16 Donner, op. cit., p. 83.
18 Ishii, op. cit., p. 248.
In four to six weeks, when they are about fifteen inches high, the densely growing plants are pulled up and transplanted to fields, where they will mature. This task is carried out both by men and women, who work in rows, planting clumps at intervals of about a foot.

Transplanting wastes less seed, and the quality of rice is usually much better; nevertheless, a few selected types of seed suitable for broadcast sowing are reported to be only a little inferior to the output of transplanted rice. However, transplanted rice can be planted more carefully to make maximum use of the available space.

Broadcast sowing is used on about 20 percent of the rice area, usually on low lands with an excess of rain, irrigation, flood water comes quickly and is apt to be fairly deep.\(^{19}\) Broadcast rice varieties are therefore quick-growing ones.

Land preparation for broadcast sowing starts early in the dry season by burning the rice straw and weeds of the previous harvest and then plowing. Tractors are used and broadcasting seed is relatively quick and simple, coinciding with the first showers in late April or early May, when soil clods can disintegrate.\(^{20}\) Further rain showers continue to break down and mix the soil with the seeds, the soil absorbing

\(^{19}\)Ichimura, *op. cit.*, p. 152.

sufficient water to make seeds germinate and grow. Further weeding is not required, and plants grow with the rising water level, particularly so floating rices which are of the broadcasting varieties.\(^{21}\) The crop is harvested in late November or December, or sometimes as late as January. Broadcast rice production is a lengthy process that requires a cultivation-to-harvest period of eight or nine months.

The question of whether transplanting or broadcasting methods are preferred is answered mainly by circumstance. Transplanted rice generally brings quicker and better quantity and quality, but requires water control to some extent. This method utilizes labor-intensive techniques which are often the best since there are ample populations and work forces in rural areas.

Second Crop Developments

In many countries, notably in Thailand, farmers are able to raise two or more rice crops each year.\(^{22}\) The production of a second crop (dry season) is not new to Thailand. In the past some farmers in the Central Plain rice bowl of Thailand grew rice in the dry season to avoid monsoon floods. However, production requires adequate supplies of water from reservoirs that are replenished by the monsoon

\(^{21}\)Ibid., p. 248.

rains. Moreover, the double cropping or rice has been practiced in some areas of Northern Thailand for centuries. It was not, however, until recently that the government became involved in an all-out effort to expand dry season production. This program under leadership of the Ministry of Interior and the Royal Irrigation Department is still just a step beyond the development stage. In 1966-1967 it covered only 168,000 planted acres of which 125,000 were harvested, in 1970 about 600,000 acres, for production of 750,000 tons, and in 1980 1.6 million acres area, for production of two million tons of paddy.

Though the dry season program is nationwide, it is most intensive in the Central Plain's provinces of Nonthaburi, Nakron Pathom, Pathum-thani, Ayudhya, Suphanburi, Lopburi and Chacheongsao. Yields in some paddies here have increased to 1.25 to 1.50 tons per acre with the use of adequate water, fertilizer, and pesticides. And the dry season average yield is 54 percent above average yields in the monsoon season.

For eventual use in the Northern and Northeastern provinces a promising new glutinous nonsensitive strain of rice has produced nearly 2.6 tons per acre on experimental

plots. When seed is adequately available from this strain, or similar material is used by producers, a marked increase in output can be expected, especially since about three-fourths of the Northern region's rice and nearly 90 percent of the Northeastern's are of this type.

There is good potential for substantially expanding the second crop's average. There are, for instance, some 4.5 million acres in the Central Plain now under state irrigation projects around the edges of the Chao Phya state system. While rice is not expected to become the sole second crop in these areas, just a million acres planted in dry season could add an extra 1.5 million tons of paddy to the annual crop. As highly productive experimental lines are released and water and pest control is improved, yield increases would further boost output.\textsuperscript{25}

Rice Export and Export Expansion

Thailand is one of the world's top producers of rice, while the United States and China are her most important competitors. Thailand exports about 1 to 2 million tons of rice each year, which is only 10 to 15 percent of the total rice trade in the world. Therefore, it does not have much influence over world market prices which are determined

\textsuperscript{25}John Wong, \textit{ASEAN Economics in Perspective: A Comparative Study of Indonesia, Malaysia, the Phillipines, Singapore and Thailand} (Philadelphia, 1979), pp. 105-106.
by supply and demand. In the year when world production is high, prices are depressed and they are higher in poor crop years. Even though Thailand exports only 14 to 17 percent of the total production, rice remains one of her principal foreign exchange sources. Moreover, it provides larger sums of revenue to the government each year through export tax (premium). For example, in 1978 Thailand exported 1.6 million tons of rice valued at about 518 million U. S. dollars, providing the government with a revenue of 76 million U. S. dollars in export tax.

Rice export is carried out on a government to government basis and by private traders, 40 percent by the former and 60 percent by the latter. The government, therefore, constantly intervenes in the rice market. The history of that intervention has been complex, but is usually confined to export tax or export premiums and to export quotas.

During the past ten years, Thailand's rice exports have demonstrated notable shifts in destination. New markets have opened up including Bangladesh, Laos, and certain countries in the Mideast, Africa and Europe. In the same period, Thai rice imports by some other countries, particularly Japan and India, have declined.

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27 Ibid., p. 238.
28 Ibid., p. 238.
In 1972 Thailand's rice export was about 2.1 million tons, became the world's leading rice exporter, and continued to give the United States a close race during 1972. Thailand's total 1972-1973 rice production was about 10 percent below the 13.5 million tons harvested in 1971-1972. Much of Thailand's rice export total is sold to neighboring countries. The ASEAN countries, Indonesia, the world's largest importer of rice, Malaysia, Phillipines and Singapore, have doubled imports of Thai rice since 1965. Between 1965 and 1977 imports rose from 611,196 tons to 1.3 million tons. The ASEAN market share has risen from 34 to 45 percent during those ten years. In 1977, Thailand supplied the ASEAN group with 50 percent of its total rice imports.

In recent years, most ASEAN countries have come to depend on Thailand for the bulk of their rice import. Malaysia, which took 55 percent of its rice imports from Thailand in 1965, pushed the percentage to 90 percent in 1977. Similarly, Philippines went from 22 percent to 96 percent and Singapore from 73 percent to 99 percent.


31 Ibid., p. 12.
However, the volume of total imports by Philippines has been down from past years: in 1975 Philippines imported only 70,980 tons.\textsuperscript{32}

Indonesia, whose huge demand has forced it to import rice from many sources, received more than 40 percent of its total rice imports, almost 2 million tons, from Thailand in 1977. This represented 29 percent of Thailand's rice exports, up from only 5 percent in 1965.\textsuperscript{33}

Bangladesh, Laos and Vietnam are Thailand's major Asian customers outside the ASEAN grouping. Recently improved relations with Southeast Asian Socialist countries should further strengthen Thailand's position as a major rice supplier. This is especially true as long as production in Burma, a rice producer that could compete strongly with Thailand, continues to be hampered by a lack of vigorous production policies. However, larger exports to Southeast Asia and Bangladesh are not likely to make up for the cut in Thailand's sales to the Indian, Japanese, and Philippine markets. Significant increases in domestic grain production, particularly rice, have enabled these countries to decrease their Thai rice imports sharply.


The greatest shift in destinations for Thai rice exports during the ten years had been the move away from Asian to African markets, which is a new market for Thai rice exports. In 1965 only 8 percent, 160,245 tons, of Thai rice exports went to Africa. By 1977 this figure had increased to 26 percent, or about 753,165 tons, and 702,800 tons in 1979. Thailand also has boasted its market share of total African rice imports.

In 1979, Senegal purchases of 229,000 tons made it the second largest importer of Thai rice, after Indonesia, and the single largest African buyer. Nigeria was the second largest, taking 202,200 tons.

Mideastern imports of Thai rice doubled between 1965 and 1977, with purchases the latter year reaching 233,735 tons. Standing at about 31 percent in 1965, Thailand's share of the Mideast market fell to 16 percent in 1977. Thai rice exports to the Middle East as a percentage of total Thai rice exports have remained fairly stable at 9 percent. Saudi Arabia and South Yemen have been the most important long-term Mideastern customers for Thai rice since 1965, with South Yemen acting as distributor to other Persian Gulf states. In 1979, Thai rice exports of 35,500

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34 Wibulseth, op. cit., p. 10.
36 Ibid., p. 8.
tons to the Yemen Arab Republic matched those to South Yemen. The number of Middle Eastern countries now buying rice from Thailand has risen to eleven countries in 1979.

Total rice imports by West Europe have nearly doubled since 1965, but the share from Thailand has slipped by more than 60 percent. The United States rice exports have largely replaced Thailand's lost sales (U. S. is also the principal rice exporter). Larger purchases of Thai rice by Belgium and Luxembourg and West Germany have been more than offset by sharp cutbacks by Denmark, France, and the United Kingdom. Ironically, Denmark and especially the United Kingdom, Thailand's largest European rice importers, have reduced purchases to a point where they were Thailand's smallest European customers in 1979. In that year Western Europe's imports of Thai rice amounted to about 1 percent of Thailand's total rice exports.

Since 1967, Thai rice production has increased by about 50 percent from 7.7 million tons to 15.8 million tons in 1980. During the 1967-1980 period, Thai rice exports have averaged 1.5 million tons annually, ranging from a low of 849,000 tons in 1973 to a high of 2.8 million tons in 1980.

37 Ibid., p. 8.
The future of Thai rice exports is likely to remain tied to the factors governing both supply and demand. The most important factor, government demand, is the expansion of domestic demand which increase rapidly due to population growth. The other factor is the world price of rice which is strongly influenced by the degree of self-sufficiency in rice of the countries importing Thai rice. However, the experience of the past ten years suggests that the world price is very difficult to forecast. The factor governing supply of Thai rice is the country's production level, which is based on the monsoon weather, irrigation system, technical change such as new rice varieties, fertilizers, and the areas of rice cultivation. However, the production level usually can be raised by increasing the areas of cultivation rather than by improved technology.

Problems in the Rice Industry

Rice, which is grown throughout Thailand, is the most important for domestic consumption and also is the primary export product which contributes a large sum of revenue to the government each year. However, Thailand is still confronted with a number of rice problems since the processing and marketing. The important problems are the inadequacy of credit facilities, which hampers expansion of cultivation, the need for expansion of modern irrigation to minimize dependence on nature for the distribution of water, and others to be discussed in the following pages.
There is a problem of land holding. More than a third of the farms in the Central Plain are operated by tenants, and in parts of the Plain nearest to Bangkok, especially in Rangsit area, the ownership is concentrated in large units, and the incidence of tenancy is extremely high.\textsuperscript{41} Most of the owners are absentees and members of the nobility with important positions in the government. Tenancies are usually granted for a year only and they, therefore, lack inducement to improve efficiency. Tenants are concerned only with taking as much from the land as they can in the shortest time. The landlord, like the tenants, has little interest in improving the land, because he is able to take advantage of the increasing competition for land due to population growth, and he increases with every change of tenancy.

We can say that the average farm indebtedness, particularly in the Central Plain, is clearly high. More than a third of the farmers in the Central Plain are in debt, and the average farm debt amounts to almost two-thirds of average annual net farm income. These facts in large part reflect the higher incidence of tenancy in the plain and the limited opportunities for obtaining credit. The situation obliges farmers to seek credit from the landlord or middleman which are always unsatisfactory. The most common

\textsuperscript{41}John Wong, ASEAN Economics in Perspective: A Study of Indonesia, Malaysia, the Philippines, Singapore, and Thailand (Philadelphia, 1979), p. 110.
of all forms of credit is the Tok Khao system in which farmers have to dispose of rice production to the middleman for cash in advance of the harvest, and the effective interest rates may amount to as much as 50 percent per month.

Another problem is the specific export duty for rice production or "rice premium," which traders who want to export must pay to the government. However, the traders or exporters do not actually receive the tax burden. That falls to farmers in the form of a lower price for their production than what it otherwise would be. The export tax or premium amounts to nearly 100 percent of the farm price. The premium has encouraged farmers to consume more of their own rice output. The premium has promoted a shift in other crops which were untaxed, such as jute, kenaf, cassava and pineapple. Rice farms are reduced in size. Farmers do not devote all their resources to rice production but cultivate other crops as well. The rice premium has been the subject of much contention. Some Thai economists feel that it prevents the farmers from realizing the full world market price for their output, a fact which greatly discourages their initiative and produces distortions in the economy.

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43 Ibid., p. 5.

There is also a lack of effective cooperatives. Thailand possesses three forms of cooperative organizations, the main purpose of which is to serve welfare goals, prevent Thai farmers from becoming heavily indebted to Chinese middlemen, and preventing farmers from losing their land. The three forms of cooperatives are:

1. Credit Cooperatives,
2. Land Cooperatives (dealing with the acquisition of land farm improvement, equipment and technical assistance), and
3. Marketing Cooperatives.

All cooperative organizations are closely controlled by the government, which has invested substantial resources in promoting and expanding them for over three decades. Credit cooperatives are the most important. They help small farmers by providing loans for agricultural investment, selling farm materials, and buying farm products. Though the number of cooperatives and of their members have increased significantly, their operations are not very successful. They cannot provide their members with sufficient funds, and their services are not broad enough to benefit their members fully. 45

Moreover, the strong government control (since the state provides 95 percent of the financial capital of

of cooperatives) is the major reason which limits the degree of success. Many members of cooperatives feel no sense of social obligation, because so little of their own resources are at stake. Moreover, many farmers pledge their crop to middlemen against a cash advance and hence have little for disposal to marketing cooperatives. The cooperatives render few advertising services to their members and they do not provide services for assembling paddy any better than what is provided by the middlemen. In addition, members of cooperatives are sometimes corrupted by the cooperatives' agents by receiving a lower price for paddy and incorrect measurement for selling their products.46

Despite their support by the government, cooperatives are hopelessly undercapitalized. They can neither offer their members the advantage of low prices through the bulk buying of equipment, fertilizers, tractors and other farm necessities, nor do they have the advantage of storage facilities.47 They are deficient in managerial personnel and pay low salaries to cooperative officials who are always tempted to use their positions to exploit members.

There is also a crucial problem of insufficient irrigation systems. The Thai government has spent large sums


of money on irrigation with the assistance of the World Bank and developed countries, but the efficiency of these systems is so poor that many rice farmers must still depend on rainfall. This lack of a dependable irrigation means that rice, especially in the lower Central Plain, must compete with a number of other crops and industries for scarce water. In addition, irrigation in Thailand is multi-purpose use rather than for crop cultivation only. Therefore, although there are many storage dams, they lack terminal facilities such as small canals which will carry water to the fields. As the World Bank comments on this situation,

The present system of water regulation is essentially designed to reduce flood hazards, to distribute flood waters more evenly and to supplement rainfall, if necessary, during the main monsoon period, rather than to perform the functions of a real irrigation system. The regulatory effects of this system are probably the main reason why the differences between planted and harvested paddy areas have narrowed considerably in recent years. However, present irrigation facilities are still far below the standard required for performing the function of raising paddy yields during the monsoon season by supplying the proper amounts of water at the desired times. The problem is not so much one of design and construction of canals and laterals, but of terminal facilities.48

It is necessary that Thailand quickly improve its irrigation system, actively undertake land reform, increase agricultural credit, and improve the structure of internal trade. Only then can farmers earn more from their sales

and be encouraged to more widespread use of fertilizers and higher yield seed varieties. There are good prospects, if production can be increased by large quantities, for Thailand to realize high export income essential for a developing economy.
CHAPTER III

OTHER AGRICULTURAL PRODUCTS

For the past three decades, Thailand's agricultural products and exports were dominated by a few items such as rice, rubber and teak. Exports of these items accounted for 70 to 80 percent of total exports at that time, compared with only 20 to 30 percent at present. Recently, substantial diversification in agricultural production and exports has taken place. A number of crops including maize, cassava, sugarcane, coconuts, soya beans, sorghum and kenaf have become economically important, significantly increasing the area under cultivation and its output. Expansion is even more apparent in the group of upland food crops, particularly maize, sugarcane and cassava. Total area planted with upland food crops increased tremendously from only 0.4 million acres in 1950 to 6.7 million acres in 1977, as indicated in Table II. At the same time output rose from 0.9 million tons to 35.5 million tons. Sugarcane production increased from 135,000 acres yielding 839,000 tons to 1.1 million acres and yielding 22.6 million tons in the 1976/77 season. Maize production rose from 90,000 acres yielding 27,000 tons in 1950 to 3.2 million acres,
<table>
<thead>
<tr>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C**</td>
<td>P</td>
<td>C</td>
<td>P</td>
</tr>
<tr>
<td>Upland crops</td>
<td>360</td>
<td>941</td>
<td>1,416</td>
<td>6,456</td>
</tr>
<tr>
<td>Maize</td>
<td>90</td>
<td>27</td>
<td>714</td>
<td>544</td>
</tr>
<tr>
<td>Cassava</td>
<td>34</td>
<td>256</td>
<td>179</td>
<td>1,222</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>135</td>
<td>839</td>
<td>394</td>
<td>5,382</td>
</tr>
<tr>
<td>Oil seeds</td>
<td>484</td>
<td>671</td>
<td>858</td>
<td>1,279</td>
</tr>
<tr>
<td>Fiber crops</td>
<td>116</td>
<td>29</td>
<td>714</td>
<td>355</td>
</tr>
<tr>
<td>Rubber</td>
<td>842</td>
<td>114</td>
<td>1,232</td>
<td>172</td>
</tr>
<tr>
<td>All crops other</td>
<td>1,180</td>
<td>1,776</td>
<td>4,260</td>
<td>9,023</td>
</tr>
<tr>
<td>than rice</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


**Cultivated area (1,000 acre), P=Production (1,000 ton)
yielding 2.7 million tons during the same period, and then rose further to 3.7 million acres with output reaching 3.5 million tons in the 1979/80 crop year.¹

This rapid agricultural diversification can be attributed in part to at least three factors: greater foreign demand, expansion in irrigated areas, and the relatively low return on rice resulting from a high export duty imposed on it. Expansion of land under irrigation made increases possible in the production of both rice and other crops. Increase of the area planted with crops other than rice occurred mainly in areas where rice cannot be cultivated profitably due to lack of water. However, there has been some shifting from rice to other crops in areas where both rice and other crops can be cultivated.

The most remarkable increase occurred in the production of exportable crops other than rice, of which domestic consumption is reduced. Maize production rose rapidly after Japan started importing it from Thailand late in 1957.² Sugarcane production has increased a great deal during the last five years as a result of strong overseas demand.


Maize

Maize has been grown throughout Thailand for many years, but only since 1950 has it been a commercial grain crop. At present, maize production is concentrated in the nine provinces, to the north and east of the Central Plain rice bowl, where the climate is suited for raising two crops of maize annually. The first crop is planted in April and the second in August or September. Four provinces, Nakhon Sawan, Lopburi, Saraburi, and Nakhon Ratchasima, account for more than half of the total maize production. Total area under maize cultivation increased steadily from 285,600 hectares in 1960 to 771,000 hectares in 1970, and to 1.5 million hectares in 1979. National production increased from 543,900 tons to 1.6 million tons and to 3.3 million tons in the corresponding years.

Since the introduction of Guatemala-type hard maize seed in 1959, farmers have been rapidly clearing timber areas so they could plant this new feedgrain. As a result, yields per area increased from below 2 tons per hectare to above 2 tons per hectare in 1970 and 2.3 tons per hectare in 1979. With these yields, Thailand's productivity is

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5Ibid., p. 12.
above most Asian countries, the average of which is 1.8 ton per hectare and is nearing the world average of 2.8 ton per hectare.

Maize first became one of the country's major exports in 1960, when its production passed 540,000 metric tons and exports reached 500,000 tons. Since then maize has increased significantly each year, as Table III indicates.

Today exports account for roughly 80 percent of the total maize production, 3.2 million tons, and have moved Thailand into the top ranks of world maize trade. Thailand is usually the fourth or fifth largest exporter, while the United States is the largest exporter, providing 50 to 60 percent of the maize of the world market.

Japan and Taiwan have traditionally been the chief customers for Thai maize. Every production season, an agreement is signed between the importer's associations in those countries and the Thai government, fixing the total amount and the pattern of delivery. The price is set with reference to the quotations of the Chicago Exchange. Because of certain peculiarities in the contract, there is a tendency every year for speculation to develop in the Bangkok wholesale market. The Thai government is then obliged to intervene in order to ensure that the contract is kept.

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### TABLE III*

THAI MAIZE EXPORTS TO MAJOR IMPORTING COUNTRIES

<table>
<thead>
<tr>
<th>Year</th>
<th>Hong Kong</th>
<th>Singapore</th>
<th>Malaysia</th>
<th>Japan</th>
<th>Taiwan</th>
<th>Others</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1963</td>
<td>111,642</td>
<td>78,848</td>
<td>49,655</td>
<td>453,414</td>
<td>9,911</td>
<td>40,576</td>
<td>744,046</td>
</tr>
<tr>
<td>1964</td>
<td>108,079</td>
<td>73,774</td>
<td>50,612</td>
<td>844,936</td>
<td>9,573</td>
<td>28,067</td>
<td>1,115,041</td>
</tr>
<tr>
<td>1965</td>
<td>81,832</td>
<td>81,601</td>
<td>53,912</td>
<td>559,749</td>
<td>8,990</td>
<td>18,296</td>
<td>804,380</td>
</tr>
<tr>
<td>1966</td>
<td>76,856</td>
<td>142,260</td>
<td>66,653</td>
<td>826,289</td>
<td>57,116</td>
<td>49,363</td>
<td>1,218,573</td>
</tr>
<tr>
<td>1967</td>
<td>82,507</td>
<td>100,063</td>
<td>67,291</td>
<td>670,612</td>
<td>143,993</td>
<td>26,296</td>
<td>1,090,762</td>
</tr>
<tr>
<td>1968</td>
<td>130,600</td>
<td>145,512</td>
<td>110,525</td>
<td>665,459</td>
<td>395,475</td>
<td>33,270</td>
<td>1,480,841</td>
</tr>
<tr>
<td>1969</td>
<td>132,036</td>
<td>154,552</td>
<td>110,283</td>
<td>486,686</td>
<td>450,498</td>
<td>141,781</td>
<td>1,476,106</td>
</tr>
<tr>
<td>1970</td>
<td>91,430</td>
<td>79,249</td>
<td>69,789</td>
<td>649,689</td>
<td>447,299</td>
<td>33,973</td>
<td>1,371,474</td>
</tr>
<tr>
<td>1971</td>
<td>117,339</td>
<td>138,190</td>
<td>72,287</td>
<td>923,912</td>
<td>322,098</td>
<td>219,987</td>
<td>1,793,813</td>
</tr>
<tr>
<td>1972</td>
<td>95,843</td>
<td>183,900</td>
<td>86,836</td>
<td>842,047</td>
<td>502,775</td>
<td>46,178</td>
<td>1,757,579</td>
</tr>
</tbody>
</table>

*Source: Foreign Agriculture (August 19, 1974), p. 3.*
It does this by imposing quotas or banning exports to other markets.

A bilateral maize trade agreement with Japan is by far the most important ever concluded by Thailand and has the longest history. Begun in the 1966/67 season, it is renewed each year, with such terms as a specific formulation by which monthly export prices for sales are determined, the total volume of maize to be shipped for the year, and the general agreement on the monthly pattern of these exports. This agreement developed as part of Japan's efforts to diversify trade and generally encourage Asian development. It has reserved for Japan the major part of Thailand's maize exports. In 1972, Thailand exported about 0.8 million tons of maize, or about 50 percent of its total maize export trade. In 1978 maize exports increased to 1.97 million tons (with export value of 214 million U.S. dollars), with 40 percent of the total amount or 750,000 tons to Japan.

Other important markets for Thai maize are Taiwan, Singapore, Hong Kong, Malaysia and the new market such as the People's Republic of China which took 100,000 tons of Thai maize in 1978.


9 Ibid., p. 9.
In contrast to the growing export market, domestic use of maize in Thailand is limited, consuming only about 15 percent of production. A few varieties of white and yellow waxy maize and yellow sweet maize are grown commercially near the large cities as a vegetable for human consumption. But the use of maize as feed is still very low. Even though it has had great success thus far in expanding maize production and trade, Thailand is experiencing some problems, stemming in large part from its dependence on traditional production and marketing practices.

Marketing, for instance, is still complicated by a preponderance of middlemen. These include the district dealer, the one most benefiting from maize trade, who buys and collects maize from the farmers and then resells to a Province broker. The broker then transports the maize to Bangkok and sells it to maize exports. Occasionally a farmer will sell directly to the Province broker, but seldom does he sell it to the exporter.

Cultivation practices, too, are much like those of the past, with little use of fertilizer, improved seed or other inputs that might improve yields.

Another problem is the year-round humidity which causes seed stored under normal conditions to deteriorate and be destroyed by insects within a few months. There is

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Wibulseth, op. cit., p. 3.
thus a need for better seed distribution and a reduction of storage time.

Sugarcane

In the mid-1960s sugarcane was grown commercially in some districts of the northern, northeastern, and southeastern parts of the country, but mainly in the Central Region. Geographically, production centers have developed that together produce about three quarters of the total sugarcane. The Province of Chonburi contains 37 percent of the sugar-cane area, followed by western Thailand from Supan buri to Prachuap Kiri Khan Province covering 23 percent. Finally, a small sugarcane belt in the Northeast from Udon Thani to Ratchasima Province covers 14 percent of the total area.\(^{11}\)

Sugarcane is a large perennial grass requiring sunshine and rice-moist soils in order to grow up to 3-7 metres. Propagation starts by planting pieces of stalks that grow quickly responding well to fertilizer. Depending upon local conditions, harvest takes place eight to thirty months after planting, lasting from December to May. During the past ten years cultivated area and total production have steadily increased, as seen in Table IV.

Sugar production in Thailand has also gone steadily upward in the past fifteen years both in terms of area

### TABLE IV*

**THAILAND: SUGARCANE AND RAW SUGAR**

1971/72-1976/77

<table>
<thead>
<tr>
<th>Year</th>
<th>Planted Area Hectares</th>
<th>Cane Production Metric Tons</th>
<th>Raw Sugar Production Metric tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971-72</td>
<td>141,238</td>
<td>5,925,566</td>
<td>501,775</td>
</tr>
<tr>
<td>1972-73</td>
<td>183,478</td>
<td>9,512,794</td>
<td>648,438</td>
</tr>
<tr>
<td>1973-74</td>
<td>187,989</td>
<td>12,694,492</td>
<td>922,827</td>
</tr>
<tr>
<td>1974-75</td>
<td>313,274</td>
<td>13,413,442</td>
<td>1,060,330</td>
</tr>
<tr>
<td>1975-76</td>
<td>375,672</td>
<td>19,099,070</td>
<td>1,603,590</td>
</tr>
<tr>
<td>1976-77</td>
<td>498,990</td>
<td>26,000,000</td>
<td>2,212,302</td>
</tr>
</tbody>
</table>


Planted and output. The country now produces enough sugar to meet its own needs with a sizeable surplus for export. Thailand is climatically suited to large scale sugar production, but the country did not reach self-sufficiency until about 1970. By 1971, Thailand began to export large amounts of sugar and four years later sugar was one of Thailand's top foreign exchange earners. Most sugarcane goes towards the production of sugar and at present no less than 20 million tons of cane is grown every year. From this at least 1.7 million tons of sugar is produced by 42 mills throughout the country. About 600,000 tons is consumed locally, and the rest is exported or stored.

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In 1971 sugar was Thailand's tenth most important agricultural export. By 1972, the world sugar market had improved, and the future of Thai sugar exports brightened. In that year, raw sugar exports rose to fifth place as an agricultural export and earned more than 60 million U. S. dollars in foreign exchange.\(^4\) Within 2 to 3 years sugar exports had become substantially more important in the economy. Importing countries such as Japan, Malaysia, the United States, and the People's Republic of China began to give more serious consideration to Thailand as a sugar source. By 1974 sugar exports had risen to 524,713 worth 957 million U. S. dollars. In 1975 Thai raw sugar exported 594,850 tons to various destinations as shown in Table V. Thailand has a long-term sales contract with four Japanese companies for the sale of 1.2 million tons of sugar over a five year period beginning in 1975. Export value is to be based on the sugar price at the London Sugar Market at the time of shipment.\(^5\)

Some 1.12 million tons of Thai raw sugar were sold abroad in 1976, with foreign exchange earning amounted to 336 million U. S. dollars. The average export price was 291 U. S. dollars per ton in the same period.\(^6\) In 1979 the volume of export increased slightly to 1.2 million tons with

\(^{14}\)Haviland, Jr., op. cit., p. 8.

\(^{15}\)Ibid., p. 9.

# TABLE V*

**THAILAND: RAW SUGAR EXPORTS, CALENDAR 1975 AND 1976**

<table>
<thead>
<tr>
<th>Country of Destination</th>
<th>1975</th>
<th></th>
<th>1976</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Metric Tons</td>
<td>Dollars</td>
<td>Metric Tons</td>
<td>Dollars</td>
</tr>
<tr>
<td>Japan</td>
<td>318,376</td>
<td>152,978</td>
<td>693,068</td>
<td>209,026</td>
</tr>
<tr>
<td>Malaysia</td>
<td>69,644</td>
<td>31,247</td>
<td>110,722</td>
<td>31,217</td>
</tr>
<tr>
<td>United States</td>
<td>118,643</td>
<td>51,379</td>
<td>66,690</td>
<td>21,053</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>29,328</td>
<td>11,961</td>
<td>34,813</td>
<td>10,629</td>
</tr>
<tr>
<td>South Korea</td>
<td>--</td>
<td>--</td>
<td>34,974</td>
<td>9,211</td>
</tr>
<tr>
<td>Morocco</td>
<td>23,901</td>
<td>8,392</td>
<td>25,819</td>
<td>8,266</td>
</tr>
<tr>
<td>Iran</td>
<td>13,239</td>
<td>11,529</td>
<td>22,847</td>
<td>6,688</td>
</tr>
<tr>
<td>Syria</td>
<td>13,259</td>
<td>7,467</td>
<td>20,609</td>
<td>5,648</td>
</tr>
<tr>
<td>People's Republic of China</td>
<td>--</td>
<td>--</td>
<td>65,987</td>
<td>20,614</td>
</tr>
<tr>
<td>Other</td>
<td>8,460</td>
<td>6,165</td>
<td>45,494</td>
<td>13,916</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>594,850</strong></td>
<td><strong>281,121</strong></td>
<td><strong>1,121,023</strong></td>
<td><strong>336,268</strong></td>
</tr>
</tbody>
</table>


A total value of 240 million U.S. dollars. Major sugar importers in 1979 were Japan, the People's Republic of China, Malaysia, Iran, the United States and Singapore. It is anticipated that the Thai sugar industry will continue to prosper due to strong demand in the world market.

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Kenaf

Kenaf is a fiber, the major use of which is to manufacture gunny bags and, to a lesser extent, rope and paper. In Thailand, it is the leading fiber crop as far as area, production and market value are concerned. Kenaf is an upland crop and can withstand drought. It is therefore one of the most important cash crops of the fifteen northeastern provinces where soil conditions are poor. Thailand grows both kenaf and jute, which are similar in appearance. Both produce fiber for the manufacture of twines, hessian, burlap and carpet backing.

There are two kinds of kenaf grown in Thailand. Native or Chinese kenaf has apparently been grown wild or under cultivation in limited quantities in Thailand for centuries. Cuban kenaf was introduced in 1951 by the United States Operations Mission. Cuban kenaf has a higher yield and matures more quickly. The advantage of a quicker maturing variety is that it may be harvested when sufficient water is available for retting, obtaining better grades of fiber.

Economically, the crop is dependent upon the situation in foreign markets. Kenaf production fluctuates annually, in years when jute harvests in India and/or Bangladesh fall,

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19 Ibid., p. 141.
there is a great change for the Thai kenaf farmers or traders. However, there has been a general upward trend over the years. In 1960 the planted area for kenaf was about 346,590 acres, yielding 181,300 tons. In 1970, 1,039,771 acres yielded 380,900 tons, but declined slightly in recent years (see kenaf production in Table VI). In 1978 kenaf planted area was about 812,000 acres with output of 320,000 tons.

**TABLE VI***

<table>
<thead>
<tr>
<th>Year</th>
<th>Area Planted Acres</th>
<th>Area Harvested Acres</th>
<th>Production Tons</th>
<th>Domestic Consumption Tons</th>
<th>Exports Tons</th>
<th>Year End Stocks Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973/1974</td>
<td>1,418</td>
<td>1,388</td>
<td>570</td>
<td>200</td>
<td>289</td>
<td>123.6</td>
</tr>
<tr>
<td>1974/1975</td>
<td>1,000</td>
<td>933</td>
<td>400</td>
<td>210</td>
<td>150</td>
<td>163.6</td>
</tr>
<tr>
<td>1975/1976</td>
<td>800</td>
<td>680</td>
<td>300</td>
<td>220</td>
<td>180</td>
<td>63.6</td>
</tr>
</tbody>
</table>


Though kenaf is grown without much need for water, the processing of the fiber vitally depends upon it. This poses

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a serious problem in the Northeast of Thailand during the season when kenaf is harvested, for after the monsoon rain water becomes increasingly scarce. This often keeps the farmers from receiving a sizeable income, since rotting of kenaf in shallow water produces a dark fiber with little market value.

The harvesting process is very simple; the plant is cut, bundled, and kept under water about 10 to 12 days. After this, the bark loosens easily and the fiber is freed with beating and washing. It is then dried over bamboo poles for another 2 to 3 days before sending to the market. 22

Farmers take their raw fiber to the nearest trading place. Such kenaf trading centers have developed in a number of places throughout the Northeast where the production of the fiber is of some importance. The main trading, baling and forwarding centers today are provinces of Khon Kaen and Ubon Ratchatani which stretches from the central Phetchabun Range to the mouth of the Mune River. Secondary trading centers are Chaiyaphum, Roi Et, Surin and Udonthani provinces.

Thailand leads the world in exports of raw kenaf, while Bangladesh is the leading exporter of jute. Pakistan, France, and Japan were the largest buyers of Thai kenaf, followed by Indonesia, Poland and South Africa. In 1974

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22 Donner, op. cit., p. 604.
Thailand exported about 289,000 tons of kenaf, with average price per metric ton on the London market of 260 pound sterling. Hong Kong, Japan and Belgium were Thailand's leading market for raw kenaf during the same period.

However, in recent years Thai kenaf exports sharply declined exporting 180,000 tons in 1976 and only 150,000 tons in 1979. The reasons for this decline are due to many factors. First, inflation and rising petroleum costs lead to cost increases in production and transportation. A second factor which is rather important is the rise in domestic consumption. About half of the kenaf production made in Thailand is of gunny sacks for rice and sugar, and Thai production of both of these commodities is expanding. As a result, the domestic demand for gunny sacks is on the rise. In 1979 total output together with leftover stock of 80,000 tons amounted to 400,000 tons, but half of this total amount was domestically consumed. Surplus for export was only 150,000 tons.

Thailand is now looking toward the developing countries in South America, Africa and Asia, particularly, the People's Republic of China and North Korea as potentially major markets for Thai kenaf. Thailand will have to rely on the

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new markets to replace much of the business she has lost with Europe and Japan. Some of the developing countries, on the other hand, are establishing gunny sack factories for packing their expanding output of agricultural products. Those countries will probably plant kenaf to provide raw materials for the factories, but self-sufficiency will take some time to achieve. Meanwhile, Thailand will attempt to fulfill their short term needs for raw kenaf.

Coconut

All parts of the coconut tree are useful for both domestic consumption and industrial uses. Its stem can be used to produce high quality paper. The sweet liquid from its spadix can be consumed fresh or used to produce sugar. Coconut coir is used for making scrubbing brushes, rope, mats, bags and mattresses. Coconut shell can be used as fuel or as a decolorizer and deodorizer in the form of active carbonized charcoal. The kernel is consumed fresh or used to produce coconut milk for food. Copra is used to produce coconut oil which is an important raw material for many industrial products such as margarine, cooking oil, drugs, and paints. Finally, coconut cake is used as animal feed.

Thailand is the world's seventh largest coconut producer, surpassed only by the countries of Southeast Asia and

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25 Ratanapanachote, op. cit., p. 11
Mexico. Other major producers are Tanzania, Ghana and Brazil.\textsuperscript{26} Over 80 percent of the country's production is consumed directly as food and the rest is used for industrial purposes and export. The growing of coconut palms is a standard occupation of Thai farmers and the nuts are an integral diet of Thai people. In the last century there was no landscape without extensive stands of coconut palms. During the following decades, coconut production in the Central Region and the Northeast became negligible, leaving the Western and Southern Thailand as the only areas with stands of palms. Lately, however, coconut trees have been reestablished all over the kingdom, but the Southern Region still predominates.\textsuperscript{27} Area planted with coconut has increased steadily from about 200,000 acres in 1950 to over 800,000 acres in 1976. However, the size of farm holding is generally small, about 50 percent of the farms are only 24 acres.\textsuperscript{28} Nevertheless, the number of trees rose from 14.3 million in 1950 to 49.7 million in 1976.

Coconut production dropped from 1,051 million nuts in 1956 to only 535.5 million nuts in 1976. The yield per tree dropped from 61 nuts in 1956 to 24 nuts in 1970 and back to 28 nuts in 1976, as indicated in Table VII.


\textsuperscript{27}"Coconuts," Thailand Business (Bangkok, November 1980), p. 53.

TABLE VII*

PRODUCTION OF COCONUT 1970-1976

<table>
<thead>
<tr>
<th>Year</th>
<th>Planted Area 1,000 acres</th>
<th>Number of Trees 1,000 units</th>
<th>Fruit-bearing Trees 1,000 units</th>
<th>Production 1,000 units</th>
<th>Yield per Tree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>752</td>
<td>46,897</td>
<td>23,783</td>
<td>570,788</td>
<td>24</td>
</tr>
<tr>
<td>1971</td>
<td>765</td>
<td>47,427</td>
<td>23,533</td>
<td>564,795</td>
<td>24</td>
</tr>
<tr>
<td>1972</td>
<td>777</td>
<td>47,964</td>
<td>22,354</td>
<td>558,864</td>
<td>25</td>
</tr>
<tr>
<td>1973</td>
<td>792</td>
<td>48,506</td>
<td>21,269</td>
<td>552,996</td>
<td>26</td>
</tr>
<tr>
<td>1974</td>
<td>803</td>
<td>49,055</td>
<td>21,046</td>
<td>547,190</td>
<td>26</td>
</tr>
<tr>
<td>1975</td>
<td>816</td>
<td>49,610</td>
<td>20,054</td>
<td>541,444</td>
<td>27</td>
</tr>
<tr>
<td>1976</td>
<td>829</td>
<td>49,752</td>
<td>19,134</td>
<td>535,759</td>
<td>28</td>
</tr>
</tbody>
</table>


This decrease in average yield per tree occurred mainly because the coconut trees in the important plantation areas are generally more than fifty years old; consequently the fruits have become smaller and the quantity has decreased gradually. In addition, these coconut trees were grown with the wrong techniques and the plants were not well selected. However, after 1972, when the new trees were planted and began bearing fruits, the yield per tree rose slightly.

Exports of coconut products have not been secure, amounting to less than 1.5 million dollars. Coconut coir and cake constitute over 90 percent of annual exports. Exports of copra and coconut oil have been small and have been negligible during recent years. The important importing countries of Thai coconut production are West Germany, Japan, Netherland and France.

Coconut is an important part of the Thai diet. About half the fat components of Thai food come from these nuts. Annual national consumption accounts for more than half of the total production. Exports, therefore, are small. In addition, there has been the downward trend in the output during the last ten years due to the reasons mentioned earlier. To discontinue this downward trend, a replantation scheme is needed, and financial aid and technical assistance from the government are essential. High yield varieties of coconut trees should be introduced now. Application of chemical fertilizers is also necessary. Planters should be organized so that they can join hands with government officials in coconut development projects.

Fishery Product

The Thai fishing industry has grown steadily and rapidly during the last ten years, except in 1974 and 1975.

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31 "Coconuts," op. cit., p. 54.
during the oil crisis. Marine catches rose from 762,200 tons in 1967 to 1,538,000 tons in 1973 and then rose further to 1,628,000 tons in 1977. Consequently, Thailand has become Asia's third largest fishing nation.\textsuperscript{32}

During the last few years, export of shrimp, squid, and fish have been growing steadily. Export values for these three products, in 1979, stood at 234 million dollars. Exports of all fishery products increased from 153 million dollars in 1977 to 292 million dollars in 1979.\textsuperscript{33}

Over 60 percent of the marine catch is from international waters. Consequently, the 200 mile exclusive economic zones announced by Thailand's neighboring countries will adversely affect the industry. Thailand plans to solve the problem by bilateral agreements on joint ventures in fishing. So far, agreements have been made with Bangladesh, India, and Indonesia. Successful joint venture agreements will greatly contribute to the growth of Thailand's fishing industry, which currently employs 55,000 households, totaling 300,000 people. Expansion in fishing grounds will assure an adequate supply of seafood for domestic market and larger exports, as well as higher demand for larger fishing

\textsuperscript{32}Bangkok Bank Monthly Review, XX (Bangkok, February 1979), p. 64.

vessels, thus encouraging the expansion of the fishing vessel building industry.

Realizing the value of a successful fishing industry, the Thai government has initiated a number of projects involving joint ventures with other countries such as those previously mentioned. Another is to improve the quality of fishing boats and methods that require less fuel, to reduce dependency on foreign oil. This will also mean that fishing will be concentrated in coastal waters. Fortunately, along the Southern coastline 1,500 metres from shore, the water is shallow, and the temperature sufficiently high for artificial breeding of a variety of fish and shrimp. Songkla province, a breeding center, has recently been established. Financed in part by Japan, this cooperative venture is to encourage and support fisherman who will engage in this type of fish breeding.

Dairy Farming

The physical and climatic conditions of Thailand permit the practice of animal husbandry at high altitudes. However, the country has thus far developed little in this direction. Dairy farming is located mostly in the Northern and Northeastern regions of the country. In 1975 the number of dairy cattle in the country was estimated at 9,887 and rose to 20,384 in 1979. The number of cattle is about 4.66
million in the same period.\textsuperscript{34} The top five provinces with largest cattle populations are Khon Kaen, Nakhon Ratchasima, Ubon Thani, Sakhon Nakhon and Chaiyaphum.\textsuperscript{35}

In recent years the production of dairy farming increased slowly. From 1975 to 1978 production of milk rose from 11,264 tons to 16,208 tons.\textsuperscript{36} Growth rate of milk production was estimated at an annual 12.93 percent, while demand for milk in same period is about 14 percent. Therefore, during that period, Thailand had to import milk. In 1979 imported dairy products valued at 52 million dollars and 45 million dollars in 1980. The fact that supply of milk has been short of demand is due, in part, to a very limited milk production area in the country.

At present dairy farms are concentrated only in localities where milk collection centers or milk processing factories are situated. These factories, such as the one operated by the Dairy Farming Promotion Organization of Thailand in Saraburi province, collect and process milk bought from farmers in Saraburi and Lopburi province. Another factory is operated by dairy cooperatives in Ayuthaya and Nakhon Pathom province, serving farmers in these two provinces.


\textsuperscript{35}Ibid., p. 48.

Production is also hampered by insufficient pastures. Farmers generally own a limited amount of farmland, which it is a severe constraint on expansion programs. Furthermore, water supplies are usually insufficient in the dry season, while that water which is available is frequently unpure.
CHAPTER IV

MARKETING AND TRANSPORTATION

The marketing of Thailand's agricultural products is not as efficient as it should be, with the result that product prices lack stability. This is true especially for such major crops as rice, maize, sugarcane and rubber, whose prices fluctuate according to international market conditions. In respect to rice, marketing in local areas can be summarized by Figure 2.

![Local Rice Marketing Process Diagram]

There are comparatively few exporters. Therefore, the potential for a significant overseas market is restricted. Exporters are role in a buyers market with prices to a large extent manipulated by buyers. Decisions to plant are also influenced by prices in the previous year. It's common, for example, for farmers in the northeast to substitute cassava for kenaf since cassava's price was better than that of the latter. This practice has often led to surpluses of certain crops and shortages in others.
Unfortunately, the government cannot control this situation, since its influence on price stability in the local commodity market is almost non-existent. The authorities have tried to intervene through the establishment of such groups as the Farmers' Marketing Organization and by special budget allotment to buy crops in the hope that prices can be supported.

Nevertheless, the amount purchased by the government often falls short of annual production, resulting in largely ineffective measures. Scattered agricultural cooperatives lend support, but their aid is largely confined to seeking and securing credits for members, rather than operating directly by purchasing and selling members' products. Only the largest cooperatives satisfy the need to buy and sell for their members. The Federation of Agricultural Cooperatives of Thailand, which was designated an exporter for a number of crops has not been able to operate efficiently and has sustained losses.¹

The marketing of agricultural products from local to export level is consequently in the hands of a relatively few in the private sector. Merchants in rural areas act as credit sources for farmers who are obliged to sell them their products. The traders and money lenders in turn sell the products to wholesalers and exporters in Bangkok.

Marketing on the rural level can be seen as largely monopolistic in nature.²

For a century or more, trading has been conducted predominantly by aliens, mostly Chinese. Although the majority are Thai citizens by birth, they remain culturally Chinese.³ Chinese traders have been entering Thailand for centuries, but a great flood of Chinese immigration occurred in the second half of the nineteenth century and the first quarter of the twentieth. By 1964 the Chinese had gained almost complete control of Thailand's trade.⁴ They carried goods into regions accessible only by water transportation and to a lesser extent even into the remote interior villages, exchanging their goods for money or for produce. Some Thais have described the characteristics of Chinese traders in this way:

The greater activity of the Chinese and their roving and adventurous spirit have made them the principal channels of trading operations in all parts of the country. There are no districts too remote to be explored by them, no object of traffic too small to escape their notice. They are awake to everything which is to leave profit in their hands; they are masters of the art of exploring and exploiting. There is no class of settlers who are so likely to be useful. The very quality,


⁴Ibid., p. 69.
the passion for acquiring wealth, which leads them to dare all danger and difficulty, is a most valuable recommendation.⁵

At present, Chinese traders still control the majority of domestic trade, even though the government encourages Thai participation in commercial pursuits and despite certain measures taken to bar Chinese from some aspects of economic activity. Chinese traders are wholesalers, retailers, exporters, importers, peddlers, and produce dealers in the rural areas. They are the ever present middlemen who conduct trade between the farmers in extremely remote villages to the Bangkok market.

The Role of Middlemen

Marketing of agriculture in Thailand deserves a serious examination for a number of reasons, by the fact that the backwardness of Thailand's agriculture can be explained. Thailand has never been overtly colonized,⁶ and a large and socially-powerful landlord class does not exist. Somehow, middlemen are made the scapegoats for all the problems of Thai agriculture. Middlemen are blamed for depressed prices, particularly in staple crops such as rice, maize, sugar and kenaf.⁷

Middlemen maintain a dominant, relevant force in Thai agricultural market system and usually have two major roles: product transformation and transport, which includes processing and distribution activities, and product storage.

The first function relates changes in the form that are made on the product, the second is a change in time. Time is as essential as form, because most agricultural commodities can come off nature's assembly line only in lump sums over a period of a few months while they are consumed more or less evenly throughout the years. It is therefore necessary for some persons to bear the burden of commodities storage. Sometimes farmers can bear the burden and at other times consumers can make bulk purchases and assume part of the burden. In most cases, however, it is the middlemen who do the storage. Middlemen also perform other functions, such as advancing money to farmers and selling them goods from Bangkok for cash or credit. They usually own warehouses and some transport equipment, and also own a good deal of land.\textsuperscript{8}

Generally, there is no quality standard of agricultural commodities, particularly commodities with low shifting cost such as rice, maize, cassava, and kenaf. In the case of kenaf, the buyer makes his own highly subjective evaluation of its moisture content and its cleanliness by just

\textsuperscript{8}Baldwin, op. cit., p. 193.
examining it.\textsuperscript{9} The acid content of cassava is judged by breaking it in half and looking at the color. For rice, the practice is to press the sample rice between two blocks of wood and thus judge the milling out-turn of rice. In all these cases, it is the middlemen (owning several rice mills or kenaf bailing plants) who set the standard and determine quality.

Interest in quality standard of farm products determined by the middlemen is not a constant factor. It seems to vary inversely with expected price changes. When middlemen anticipate profiting from price increase, there appears to be much less concern with quality and grading. But when prices are low or falling, the middlemen will be extremely concerned, for example, about minute amounts of dust and particles in kenaf.

For agricultural commodities such as rice, maize, and kenaf, the barriers to entry into the middlemen business seem to be very low. The only impediment that the middlemen themselves consider important is something they call "experience." The important experiences are experience in being able to predict price fluctuations and experience in grading. These experiences, however, do not carry a high training cost, and many middlemen apprentice themselves by working as clerk or even laborers for some other middlemen.

It is often said that middlemen usually make much of their profits by buying from farmers when prices are extremely low and supplies are high, and selling them later when prices climb and stocks dwindle just before the following harvest. Small farmers, due to their severe money problems, are particularly prone to this type of exploitation. Middlemen who do speculate successfully can accumulate large earning. This accumulation is taken at the expense of those who speculate poorly. Farmers and consumers who sell or buy in a nonrandom speculative fashion will not thus be contributing to the earnings of the successful speculator. It is thus rather dangerous to try to encourage farmers into speculation by granting them credit for storage because they lack information about price and market situations.

The primary sources of income for most middlemen involved in the trade of agricultural products is from speculation. Whether or not they survive and acquire large profits depends on their ability to forecast prices.

Large Scale (Processing) Crop

Commodities discussed earlier are mostly small scale processing industries. A rice mill can be established for only 150,000 dollars to 200,000 dollars, compared to sugar

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mills which may cost at least 10 million dollars. Recently a modern plant was established at a cost of 50 million dollars. A pineapple canning plant costs about 700,000 dollars. For commodities that require a large scale processing, such as sugarcane and pineapple, it is not surprising that investments in these areas have a significant impact on the market structure.

In Thailand, sugar mills are located close together but sometimes at great distance from the farm. This contrasts with other countries where mills are generally centralized on the larger sugar plantations. In the country, the larger mills are capable of establishing a predetermined harvest allotment by concluding contracts at planting times with a people who agree to supply them with the required amount of cane at harvest. The people who conduct these contracts with the mills are known as quotamen, and the amount contracted for is the quota. Mills do not buy cane which has not already been contracted. Most quotamen are themselves large growers of cane, but not all of their quotas come from their own farms. These quotamen are therefore middlemen between the mills and the large numbers of small growers.

11 Ibid., p. 44.

The mills prefer to deal through quotamen rather than directly with growers themselves, because they can reduce costs. The quotamen are necessary because the mills cannot make a contract for the small amount of the harvest from each of the numerous growers. Not only would high costs arise from large numbers of contracts, but they also would have delivery problems.

To ensure that enough cane is delivered over the entire season, sugar mills issue to each quotaman a delivery schedule. The quotamen in turn inform the farmers who contract with them of the delivery schedule. The quotamen usually interact with many mills, and if the farmers' sugarcane is ready for cutting, the quotamen can have it sent to any of the mills. Quotamen, of course, do not provide this service free. They charge a fee of 3 to 5 percent of the price of sugarcane, depending on how high the price is.\(^\text{13}\)

Generally, contracts are drawn between the mills and quotamen, and between quotamen and growers. The contracts are only concerned with quantity, not price. This gives the mills the opportunity to depress prices when the sugarcane is delivered, since growers then have little choice. Nevertheless, in recent years the quotamen have been able to organize, and force the mills to accept collective bargaining for sugarcane prices.

\(^{13}\text{Siamwalla, op. cit., p. 45.}\)
Sugar mills and quotamen usually do not concern themselves with improvement of sugarcane production (i.e., improve technique planting, provide new variety of cane and fertilizer), though they would certainly profit in the long-run, from more efficient sugarcane production. Due to this lack of interest, sugarcane's yield per acre is quite low. However, the sugar industry as a whole in Thailand is now firmly established and continues to grow enough sugar to be a prime source of foreign exchange.  

Pineapple production and canning conditions are similar to those observed in the sugar industry. Processing is on a large scale which requires a dependable source for raw materials. However, some pineapple firms (there were 15 pineapple firms in Thailand in 1980) attempted to force the growers to accept binding contracts, by offering loans and even by teaching them new production methods. The rate of default was surprisingly high, and this mode of procurement has been given up.

The Role of Government in the Marketing System

At present Thai government does not formally restrict the operations of private enterprise and marketing. The market plays a very active role itself. Government does

14 Haviland Jr., op. cit., p. 12.

provide certain safeguards against foreign control of any segment of the economy, including foreign trade. Though in recent years, foreign and economic controls were necessary to the recovery of the economic health of the country. However, most of these have now eased and, in general, the government pursues a laissez-faire policy toward the market.

Some traders and middlemen are, however, criticized for taking too large a share of the profit of agricultural trade at the expense of farmers. The government has made attempts to break the hold on businesses and limit the middlemen's profits. The government also enforces standards for weights and measures, and a legal maximum for interest rates. Moreover, the government provides regulatory assistance to ensure that the private sector conducts itself according to proper business ethics in its dealings with farmers.16

The government plays a part in the market through regulation and promotion or private trade. The principal government departments concerned with trade are the Ministry of Economic Affairs, the Ministry of Agriculture, and the Department of Credit and Marketing Cooperatives in the Ministry of National Development.

In recent years the government has sponsored an interest in the encouragement and development of marketing by assisting the expansion and improvement of transportation systems. Large foreign loans have been negotiated to extend the railroad system and add to its rolling stock, particularly in the northeast where transport is poor.

Transportation System

Adequate transport is critical to economic growth in Thailand, not only because of the growing significance of Thailand as a major center in international trade, but also for developing fully the hinterlands of Thailand and for expanding her international commerce. The efficiency of a country's transport system, greatly enhanced the potential for internal specialization and division of labor, and lowers the retail price of food and other items produced for domestic trade.17

Modern strategy provided the motivation for adoption of modern transport methods in Thailand, especially those additions and improvements since 1945.18 The greatest weakness in national security have tended to receive the greatest investment, although the metropolitan area has also attracted


a substantial share of expenditure on new transport facilities. The metre-gauge national railway system has tied all regions to Bangkok, but among the regions, largely traditional forms of transport prevail.

**Waterways**

Waterways remain the traditional means of transportation in Thailand. Rivers and canals have been the major arteries on inland transport for centuries. Such waterways are centered on the Plains of the Chao Phraya Lowlands, north of Bangkok. They constitute a network of rivers, canals, and branch streams. Nearly 80 percent of the rice crop is moved to the mill via waterways; and about one-third of the bulk cargo, such as petroleum, and construction materials, sand and gravel, moves by water.

Boat traffic has developed to meet the transport requirements of the population. There are speed boats for travelers and bulky sailing or motor boats for the transport of farm products and other goods. Markets and whole market centers have developed close to or even on the water, some built on stilts, or on free-floating boats.

The traffic density is dependent on the season, and when, in winter, rice is harvested, there is a continuous flow into Bangkok to mills and exporters.\(^{19}\) The great

fluctuations in water level caused by rainy and dry seasons handicaps much of the river traffic.

**Railways**

The railway system has played an important role in stimulating the country's agricultural development. Rail transport expanded by about 12 percent in 1979. The chief item of rail freight into Bangkok is rice from the central valley, as well as hogs, cattle, and forest products. Goods carried from Bangkok into the provinces include petroleum products, sugar, sea salt, and manufactured goods. The Thai railways are government owned and operated. Lines radiate south, east and north from Bangkok, the hub of the system, providing connections with important administrative and commercial centers.

At present a number of new lines are under discussion mainly to bypass agglomerations such as Bangkok and Nakhon Ratchasima province, and to extend the network to the north and possibly with new seaports in the southeast. There is little doubt that the competition from developing road service has put the state railway in a difficult position. However, much could be done to make the railway more efficient by modernization, raising the axle-load, strengthening

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bridges etc., and smoothing the organization of the freight service.

**Roads**

Since river transportation is limited to the Central Plain and rail service is available only along the main lines to the north, northeast and south, transport by road is tremendously important in rural Thailand. An increasing number of villages are accessible to trucks or buses year round, and most are accessible during the dry season. Without any doubt, the bulk of farm products in trade such as sugarcane, maize, kenaf and cassava throughout the country is moved by road.

The present highway system is the result of many years of development, substantial financial aid, and technical effort from the World Bank and many developed countries such as the United States, Australia, Japan, and Canada. Compared to other Asian countries, Thailand has been slow to realize the importance of highways. Nevertheless, it can be said that Thailand is well-served with a network of all-weather roads.

The current Five Year Plan foresees the construction of some important connections to fill in the most bothersome highway gaps and to open up the last agricultural areas.

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which so far have been neglected. Apart from certain important connections and by-passes in metropolitan areas, the northeast will have a southern connection to Ubon Ratchathani, the Central Region will finally get a road along its eastern flank, and the penninsular will receive one along the east coast. Many more existing roads will be improved to enable them to serve the growth of agricultural and industrial products.

Although mechanized transport is increasing fairly rapidly on both land and water, men and animals still play a large role in the delivery of farm products. Many boats are now motor driven, especially in the vicinity of Bangkok, but great numbers are still propelled by oars and paddles. On land, carts drawn by buffalo and oxen are widely used to take products to market and to shipping points on railroads, rivers and canals.

As in other developing countries, agricultural development of Thailand is dependent to a large extent on social overhead investment. The type of investment that the country needs most is not only transportation, but also irrigation which will be discussed in detail in the following chapter.
CHAPTER V

IRRIGATION SYSTEM

Irrigation and flood control are necessities in Thai agriculture. Rice, the main crop, needs about 70 inches of rain to grow and mature. Except for the Peninsula, where rains are heavy and occur the year around, Thailand has a rainy season beginning in May and ending in October. The rains are unpredictable, however, and great fluctuations are common from year to year and from place to place. Most of the country, therefore, is dependent on the flooding of rivers for sufficient water to produce the rice harvest. River floods, however, often result in widespread damage to the paddy fields and the rice crop. In general, most irrigation systems serve several different water uses, namely (a) water control to reduce flood hazards, (b) water distribution during the monsoon or rice growing season, (c) water supply during the dry season in order to grow additional crops, and (d) generating electricity power.²


Irrigation methods in monsoon Asia have always been determined by the requirements of rice cultivation, thus foreign agriculturists, who think that irrigation primarily supplies water to crops during the dry season, are somehow disconcerted when studying Asian irrigation systems and techniques. Here, Irrigation is carried out in conjunction with natural rains. The technique is designed to compensate for periodic shortages and to smooth irregularities in rainfall and so maintain an adequate supply of water to the rice fields.

Rice irrigation, however, does not exclude dry season irrigation, and specialists visiting Thailand again and again stress the necessity for and possibility of making more use of water during the dry season. Unfortunately, this requires more than Thai technicians and farmers, using the existing schemes, are at present able and ready to provide. At present, 7 to 10 percent of the area under cultivation is used for double cropping. Rice irrigation means diversion of river water by simple wood, earth, or stone dam into a canal system that carries it to the farmers' fields, a technique that is well known, particularly in the north of the country. The water requirements of the rice grown is never fully satisfied by rain alone and must be supplemented by diverted river water. By building a dam

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across the river, the water is lifted high enough to flow into a side canal somewhat above the mean river level. The main canals then carry the water along a slope from which most fields can be reached by gravity.

Type of Irrigation

Irrigation in Thailand is usually concentrated in the area under rice cultivation, especially in the Central Plain and the Northern part of the country. Therefore, the type of irrigation of a paddy area is dictated by its topography.

In the north of Thailand the traditional agricultural irrigation, "fai," is predominant.\(^4\) Fai are constructed of readily available materials, combinations of bamboo stakes and brush wood, stones and earth, or wire mesh and rubber, and are often destroyed by strong floods. The fai irrigation system ranges from small family units to, for example, a 2,500 hectares system fed by the Ping river in the Chiang Mai province, and in all cases are characterized by extremely regular networks of irrigation channels called "muang." Many of the muang have been constructed by canalization of the numerous natural streams and are provided with secondary and tertiary fai at branching points. The small terminal channels usually feed three or four paddy fields, though in some

areas irrigation water is supplied in rotation to individual unconsolidated paddy plots.

The successful operation and maintenance of such an irrigation system requires a stable human organization. People must cooperate and provide a considerable work force to repair the annual damage to the fai, to dredge the muang, and to implement the rotation system of irrigation. Areas irrigatable by fai irrigation are variable. Operation of a large system may serve more than ten villages; a small fai system may serve one family or one village.

The problems in establishment of fai and muang irrigation systems are the stability of the river flow relative to the water requirement for irrigation, the availability of a stable human organization for its operation and maintenance, and also the resolution of problems pertaining to water rights in each system. Where many fai and muang systems are dependent on a single river system, the problem of water rights occurs in times of water shortage, since upstream users often take water without regard for those downstream. The success of the traditional fai and muang system rests on the solution of this problem, and any move to increase paddy area or to expand dry season crops will pose a threat to the stability of the system. One solution is the construction of an integrated headworks system. The numerous small fai intake structures are replaced by a single diversion dam built at the most suitable section or
river, which directs water to a trunk canal or canal running roughly parallel to the river. The new trunk waterways feed the existing muang, thereby improving intake and distribution of water to the irrigatable areas of the former fai and muang system. In Chiangmai, Lampang and Phare provinces such systems installed with government backing now irrigate a large area of paddy fields.

In the Central Plain river channel area, individual or communal water control is impossible. The water is too powerful and any local efforts to control it are likely to be wrecked by the slightest quirk of nature. Therefore, the government must sponsor a large scale project in this area, such as the Chai Nat dam in the Greater Chao Phraya Irrigation Project. In contrast, conditions in the north region allow individual and community approaches to water control. In the central region, the peasants seem to react slowly to large scale irrigation works, gazing almost indifferently at the activities of the government officials. When they do learn to control and utilize the water from these projects, perhaps community solidarity and organizational ability will grow stronger.5

In the northeast region irrigation is carried on by means of storage ponds called tanks. This is known as tank

irrigation. Most are situated in the water-deficient Khorat plateau. In the shallow valleys of this region, earth dams have been constructed to store the runoff from the small catchment areas, and these shallow tanks provide water for supplementary irrigation of wet season rice. Areas irrigatable from a single tank range from 20 to 8,000 hectares, most being a few hundred hectares.

Tank irrigation also poses its problems. First, the volume of available water is uncertain and variable. Since construction often precedes adequate investigation of the rainfall and runoff characteristic of the catchment area, in most cases the water requirement and supply do not balance. Second, because the necessary channels for water utilization and systems for their operation and maintenance were not speedily provided, the stored water is not being utilized efficiently. When the stored water is insufficient for the region's needs, as in case of most tanks, only the area nearer the tank is guaranteed a supply of water. Because water rights have not been expressly laid down in Thailand, they naturally rest with the upstream users.

Contributing to the inadequate construction of terminal networks and the inefficient operation and maintenance of the existing networks in the northeast are a lack of enthusiasm on the part of the farmers, a shortage of capital, the
weakness of community organizations, and the farmers' lack of knowledge and technology to modernize. In addition there are technical deficiencies in the basic facilities: irrigation plans are fairly uniform and often carelessly drawn up. When the government's intention diverges from the hopes of the local populace and only the government sponsored part of the work has been completed, naturally the farmers have no motivation to follow through. Although not all tank irrigation systems in the northeast are deficient, water is not managed skillfully and these human, technical, and organizational factors combine to hamper development.  

**Government Irrigation Project**

Since the government policy to furnish water to an area is intended to improve farm production and the farmers' standard of living, much support is needed in areas depending on an irrigation project as a water supply. The degree and extent of the support depends on government policies and the needs of the area. Where strong support has been provided for projects in the region, services and input have been well repaid by increased farm production. The government project began with the great Chai Nat Project in the central region in 1950, with the assistance of an $18 million loan.

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7 Ishii, *op. cit.*, p. 224.

8 Donner, *op. cit.*, p. 162.
from the International Bank for Reconstruction and Development (IBRD), or World Bank, to cover the foreign exchange costs. 9

The Chai Nat Project

The Chai Nat Project covered 18 provinces and after completion, about 1.5 million hectares have been irrigated. 10 Most of the region had already been fully developed as paddy field. The dam was completed in 1956. The key structure in the system is a large barrage at Chai Nat province. Five main waterways, each provided with a headgate, lead from different sites upstream of the dam. From Chai Nat the water supply to the whole region can be controlled. Originally the Chai Nat Project had the following objectives which determined the position of the water ways, the configuration of the irrigation networks, and their capacities:

1. To provide supplementary irrigation to stabilize the wet season paddy crop.

2. To increase the yield of wet season paddy. To achieve this directly by application of fertilizers requires cultivation of transplanted varieties which, in turn, require control of the water supply.

3. To increase the irrigated area by distributing the water of the Chao Phraya river to as large an area as

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9 Moore, op. cit., p. 403.

possible, and at the same time to limit flood damage in the high water season by dispersing the flood water.

For the third objective, two trunk canals were constructed along margins of delta, one to the east and one to the west. The other trunk waterways are from west to east, the Puphan river and the Noi river, both tributaries of the Chao Phraya river, and the Chai Nat-Ayuthaya canal. The first two are the original river channels which have been canalized, and the last is a newly constructed canal running along the high natural levees of the left bank of the Chao Phraya river. The conveyance and distribution systems were simplified, and the channels were arranged not to intersect natural rivers, existing canals, or backswamps, thus avoiding excessive construction cost. The successful use of the Suphan and Noi rivers as trunk waterways and the skillful division of land tracts also reflect painstaking planning.

The Chai Nat Dam Project was completed in 1956, and by 1962 the main part of the trunk and the lateral canal system for conveyance and distribution of water were finished. The density of the secondary system was high enough to change completely the traditional irrigation environment, but at the terminal parts, neighboring channels were between two and five kilometers apart. This meant that only flooding irrigation was practicable and, at best, that water could only be distributed more evenly across the areas. The first and last objectives of the project seemed achievable.
However, the second objective, the time of advent, the duration of standing water and the depth of water on the fields needs to be controlled more precisely. For this purpose a project utilizing a technique termed ditch and dike, meaning land preparation for proper water use,11 was begun in 1963 under the direct supervision of the Royal Irrigation Department (RID). Ditches were constructed at 400 metre intervals, perpendicular to the lateral channels, to carry water to the lower-lying lands. This project was completed in 1970.

The Bhumipol Dam Project

Another government undertaking is the Bhumipol Dam in the Yanhee multipurpose project farther to the northwest on the Ping river.12 After completing the Chai Nat Dam in 1956, heavy machinery and the construction technology developed there were transferred to the Bhumipol Dam, the largest tributary of the Chao Phraya river, and in 1964 this large arch-type dam was completed. Although constructed principally for hydroelectric power generation, the enormous 12.2 billion ton capacity of the dam means it can also be used for flood control and to provide water for irrigation, navigation, and prevention of salt water incursion into the

11Donner, op. cit., p. 166.
river mouth during the dry season. This dam also made dry-season cropping possible on a large scale.

**Integrated Headworks Project**

In North Thailand, the traditional fai and muang irrigation system still remained. But in all areas where the irrigated area has grown too large, that is where water supply becomes unstable and problems pertaining to water rights have arisen, integrated headworks installations are being introduced. These include the Mae Kuong and Mae Taeng Projects in Chiang Mai province, the Mai Wang project on both banks of that river in the Lampang province, and the Mae Lao Project in Chiang Rai province. The future task will be to construct storage dams upstream from the diversion dams to further stabilize hydrologic conditions and expand the cultivatable area of dry season crops.

An additional government project is the Kengkrachan Dam on the Petchnuri river which now feeds a system of trunk canals, laterals and ditches. These installations are typical of the modern water resources development schemes which seem to have become standard in Thailand. Another project is the Mae Klong Project, which irrigates the area around the lower reaches of the Mae Klong river.

**Problems of Irrigation Systems**

Though irrigation systems have been in existence in Thailand for many years, Many projects have been completed,
with assistance from the World Bank and other developed countries both in the form of capital and technicians. But it is still unsuccessful. Farmers have not taken full advantage of such facilities. This is because there are many problems concerned with irrigation. However, the problems are most severe in the Central Plain Irrigation Projects such as the Chai Nat Project and Bhumipol Dam Project. Therefore, these projects will be used as examples in the following discussion of irrigation problems.

Cost of Construction

As discussed earlier, the cost of construction of each project is high. Thailand must have assistance in the form of loans from the World Bank and developed countries. The construction cost of the Chai Nat Project is presently about $200 per hectare compared with other smaller scale works. The improvement of water resources in the project is extremely economical. However, the huge area covered results in a total cost that puts severe pressure on the national economy.

Although the Chai Nat Project has provided the most basic conditions for stabilization of the region's rice production, and moreover has brought the peasants of the region an improvement in real income, the overall economic returns
on the investment in irrigation projects are low.\textsuperscript{13} It is not because the potential of the system has not been fully realized, but because the existing system does not have the capacity to support a revolution in production techniques.

**Problem of Management**

It is obvious that irrigation schemes in Thailand have not brought about the complete change in the area's physical, social and economic structures, as has been seen in other countries. Most farmers follow tradition and care little about how and how expensively, water is carried to their fields through the government effort.\textsuperscript{14}

In Thailand the planning, design and construction, and operation and maintenance after completion are almost without exception controlled directly by the Royal Irrigation Department. For the peasants, government-guided organizations called irrigation associations are being formed. But peasant participation is minimal, and essentially non-existent. Without the participation of the peasants, the government and irrigation technicians alone will be unable to operate and maintain the irrigation system to bring about a radical reform in rice farming.\textsuperscript{15}


\textsuperscript{14}Donner, *op. cit.*, p. 166.

Future Prospects

The Royal Irrigation Department of Thailand has tried to concentrate on improvements in the present irrigation and drainage system, and development of terminal irrigation networks in many dam projects, particularly in the Central Plain. Their main policy objectives are the following: rectification of the defects in the main system, with a view to improve dry season irrigation; improvement of the technological faults in the ditches and dikes projects; establishment of operation rules for the system, involving research into rationalization of the distribution of irrigated regions in the main system, and training of competent individuals to increase the efficiency of water distribution operations in the terminal network; and the fostering of irrigation associations among farmers.

In the immediate future, the improvement of the present system for dry season irrigation and future stabilization of wet season paddy cultivation are the major objectives. The approach will be as follows. First, the cropping for a whole year must be estimated. Second, after deciding the seasonal unit water requirements and the schedules and the method of irrigation, the necessary capacity and optimal layout of ditches can be determined, from which the necessary capacity of the lateral channels and the rotating water supply schedules can be decided. Finally, conditions in the trunk system can be determined by balancing the
following considerations: the integrated capacity of the lateral channels; the changes in available water resources (i.e., the volume of stored water and river conditions), resulting from developments inside and outside the region; the flow needed to permit navigation and prevent incursion of salt water; water required for other purposes; and the basic limitation that the trunk system cannot be greatly modified.
CHAPTER VI

CONCLUSION AND RECOMMENDATIONS

Much of the impressive economic growth recorded by Thailand is due to continued expansion of the agricultural sector. Harvests have provided enough food for the rapidly growing population, whose level of nutrition compares favorably with other developing countries in Southeast Asia, and at the same time have allowed significant surpluses for export. The Thai farmer's ability to adapt to changing market conditions has contributed to this success; however, the availability of large tracts of virgin land for cultivation has been most important. Unlike many underdeveloped countries, Thailand has put a great deal of money and effort into developing an agricultural infrastructure such as irrigation, the roads and railways, even research and extension activities which raise productivity. In the past decades, Thai's exports were dominated by a few commodities such as rice, rubber, and teak. However, at present a substantial diversification in agricultural production and exports is taking place.

For a century, Thai agriculture was dominated by expansive rice cultivation encompassing an ever-increasing area while using traditional methods. Modern technology
and social overhead investment had little influence upon agricultural development. During recent years, a number of modern techniques and facilities have been used, particularly in the Central Region. These developments, by no means complete, indicate that farmers are more willing to experiment with scientific techniques as well as new varieties of crops. They are also employing more fertilizer, machinery and irrigation facilities, as well as information and services provided by the government regarding prices, market trends and new farming methods.

The Thai government of today plays a very active role in agricultural development. The main contribution is the provision of social overhead investments—transportation and irrigation. Road and railway improvement have received international assistance since World War II. Now every provincial capitol, except for some districts in the far north and south, is served by either paved or good gravel roads. Moreover, new roads are being constructed to link the northeast with the southeast and the north. The last decade has also seen a great expansion of feeder road, so that few villages are unconnected with road, and most roads carry bus services and transport goods.

The effort in irrigation has been considerable. Flooding of the Central Plain has been brought under control by the Chai Nat Dam. The Bhumipol Dam has also helped to
impound water for the Central Plain system. The Klawng river plan in the west is expected to provide additional irrigation land in the Central Region and also to improve the already very productive fruit and vegetable in the southwest. On the whole, however, irrigation seems so far to have had relatively less impact than has transportation.

There have been some problems in completing the distribution systems. There is also a problem of unequal benefits for use between farmers who are far from the distribution canal and those close by one, hindering cooperation and maintenance. This problem is particularly evident in the small tank projects in the arid northeast. More local cooperation between the Royal Irrigation Department and local administrations and between local administrations and farmers would greatly benefit the irrigation system. Although not all of the promised benefits have been achieved, irrigation undoubtedly contributes to the increased yields of recent years.

Foreign aid has enabled the government to improve greatly its research work. Improved strains of rice and maize have been developed. A group of specialists from the International Rice Research Center of the Philippines working with Thai scientists were successful in the development of several new varieties of rice. This success began a new era for better quality rice and high yields per acre. Essential to success is the requirement that these new
varieties are received by the farmers, otherwise all the effort and expenses would be wasted. The Rice Division distributes the new rice varieties to be planted at experimental fields in the provinces, and selects farmers to also plant the new seeds which are then sold back to the experimental stations for resale to farmers. For those farmers living further from the stations, the responsibility for production and distribution must rest with the Department of Agricultural Promotion.

Research programs cannot succeed unless farmers have academic knowledge and sufficient training. Therefore, an education policy must be encouraged throughout the country. Education not only provides the necessary skilled manpower, but also creates a thinking desire among the masses of people to change the existing social and cultural environment in which they live. In Thailand, the majority of the populace are farmers who have maintained a tradition-bound, conservative way of life, with little contact with the outside world. Modern education has played a dominant role in the transformation of the pattern of life.

Marketing studies initiated by Kasetsart University, and now also provided by the Ministry of Agriculture, have made it less likely for new monopoly positions to emerge. The diversification of agriculture away from rice has also helped to maintain a fluid and competitive situation. Moreover, the government's efforts to intervene in the market
have reduced the influence of middlemen upon farmers by creating many types of cooperative organizations such as Credit Cooperatives and Marketing Cooperatives. Nevertheless, these cooperatives were not fully successful. Farmers are still indebted to and exploited by the traders and middlemen.

In order to overcome these problems, the following programs should be adopted.

First is the price support program. Normally, a price support program can be practiced in two different ways:

1. Price guarantee: in this case the government guarantees that farmers will be able to sell their produce at certain prices fixed by the government.

2. Price support: with this method the government has to pull the prices up to the target level either by manipulating the market, accelerating exports, adjusting export tax, or building up stocks.

A price support program requires considerable financial resources and storage capacity to enable the government to purchase when prices are low and sell when prices rise. The program will be effective if there is a wide network of offices and storehouses throughout the country. Such a program will have some promotional effect on the commodity to which it is applied. Farmers may switch from other crops to those which come under a price support program. It can
be used as a measure to encourage production of any crop, like kenaf, whose production has fallen during recent years.

However, farmers must be made to understand that the implementation of the program and the levels of the support price rely on a yearly or seasonal basis and are not-once-and-for-all time measures. This is to avoid possible arguments between the government and the farmers who try to demand the same price, even though both domestic and world market prices are low. The program theoretically should not affect the long-run optimal allocation of resources. The purposes are merely to rule out seasonal fluctuation in prices and to reduce exploitation by local middlemen.

A clear price program should be announced well in advance of each cultivating season. Farmers can then decide which crops they will plant. To provide further aid to farmers making decisions, information on prices and market situation should be made easily available.

Another important idea is agricultural credit. The objectives of this program are to prevent farmers from becoming heavily indebted to traders and middlemen, and at the same time, to stimulate them to cultivate more productively. The government can operate effectively through the Bank for Agriculture and Agricultural Co-operatives (BAAC), and commercial banks. According to this philosophy, the following strategies should be practiced:
First, government should provide more funds for agriculture, while the BAAC should concentrate its efforts on those sectors where middlemen are not operating, since capital shortage is more acute among the farmers. Government, in fact, should allocate a healthier financial budget to the BAAC, for more effective operations.

Second, the BAAC should try to undercut the dominance of middlemen, especially in areas where they are strongest, and where the rate of exploitation is high. Government also should minimize the activities of commercial banks in support of the middlemen.

Third, the BAAC should provide long-term credit to finance capital investment and medium length credit to finance big commercial farms. However, these credits should be channeled through agricultural cooperatives in order to strengthen the farmer's organizing process.

Fourth, government should also force commercial banks to increase farm credit to either individual farmers or groups and to support the BAAC activities by supplying more capital.

Finally, agricultural development programs will not be successful if the government cannot remain politically stable. The government should eliminate officials, both military and civilian who use their positions to corrupt the people. Political security throughout the country will
provide a good economic climate in the agricultural sector and elsewhere.

Though there are many problems in Thai agriculture, we cannot deny the fact that it has played an important part in the Thai economy, both in domestic consumption and international trade. However, if it's possible for the government and its agencies to adopt the recommendations in this study, they may be useful for them to overcome these problems, and to continue the growth of agricultural sector.
Books


Articles


Falvey, Lindsay, J., "Sacrifices Involving Large Livestock in the North Thailand Highlands," The Journal of Developing Areas, April, 1979, pp. 275-282.


Reports


Public Documents


