AN APPRAISAL OF THE RICE INDUSTRY IN THE CONTEXT OF AGRICULTURAL DEVELOPMENT IN THE PHILIPPINES

by

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B.B.A. (U.E.)

A sub-thesis submitted in partial
fulfilment of the requirements
for the degree of Master of
Agricultural Development Economics
in the Australian National University

April 1973

D E C L A R A T I O N

Except where otherwise indicated, this sub-thesis is my own work.

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C O N T E N T S

ACKNOWLEDGEMENTS

This sub-thesis was accomplished through a scholarship granted to the writer under the Technical Assistance Programme (Colombo Plan) to undertake the Master's Degree Course in Agricultural Development Economics at the Australian National University, Canberra, for the academic year 1972. Grateful thanks are due to both the Government of the Republic of the Philippines and the Government of the Commonwealth of Australia for the admission of the writer to the course, which he considers a rare opportunity and privilege.

The writer is deeply indebted to his supervisor, Dr Colin Barlow, of the Department of Economics, Research School of Pacific Studies (RSPacS), who is also Convenor of the Master's Degree Course in Agricultural Development Economics, for his valuable suggestions, sustained guidance, patient consideration of problems encountered, and constant encouragement from the inception to the final completion of this work.

Dr R.M. Sundrum, also of the Department of Economics, RSPacS, kindly offered his valuable advice, enabling the writer to incorporate important improvements in the initial outline of this sub-thesis which made possible the completion of the work on time. His suggestions, complementary to those of Dr Barlow, have greatly improved the content and organisation of this work.

Director Leonardo A. Paulino and the staff of the Bureau of Agricultural Economics, Quezon City, Philippines, were immensely helpful through their immediate response

in providing the data from the Philippines which the writer requested.

Miss Margaret Easton, Research Assistant of the Department of Economics, RSPacS, not only helped the writer assemble important reference materials on the Philippine rice industry and agricultural development in Southeast Asia, but also assisted in the typing of the initial draft, offered suggestions for the improvement of the manuscript, and proofread the final version of this work. Her encouragement and concern for the writer's efforts will be gratefully remembered.

Mrs Maree Tait of the Department of Economics, RSPacS, Mrs Shirley O'Reilly of the General Studies Library, and Mrs Nola Clarison of the Advanced Studies Library extended their wholehearted assistance in making available other important reference materials which were used in this work. Their constant encouragement to the writer is deeply appreciated. The writer is also grateful to Miss Mary McKenzie for typing the final version of this sub-thesis.

Finally, the writer wishes to thank his wife, Mrs Rachel M. Canlas, and his young children, Joy and Winston, who, from a great distance, continuously supplied him with recent supplementary data on the rice industry from Philippine magazines and newspapers and other helpful references. Above all, they have provided him with spiritual and moral support without which he could not have successfully withstood the rigours of his post-graduate work at the Australian National University from January 1972 to April 1973.

ABSTRACT

Rice, the principal staple crop of the Philippines dating as far back as pre-historic times, thrives on a favourably endowed geographic base in the largest rice-producing and consuming region of the world. The industry has increased its output by about 3.5 times from 1910 to 1960, but this period has been characterised by low national average yields and a slowly evolving technology. Imports of rice to fill shortages in the country have been recorded as early as 1903.

The national efforts to attain self-sufficiency in the cereal seemed to be rewarded in 1968 when the country did not have to import rice, but was able to produce enough for local requirements with a surplus for export. In recent years, however, the industry encountered problems of inclement weather, disease infestation, and civil disturbances. Central Luzon rice lands were adversely affected by the first two problems, while production activities in Southern Mindanao were curtailed to a certain extent by the third.

The Philippines belongs to a group of countries in Southeast Asia where progress in attaining high yields had been slow. An agrarian structure, which had evolved over many decades, and is characterised by a significant proportion of farms under the share-tenancy system, is identified as a factor hampering the industry's advancement. Inclement weather and deficiencies in the marketing system, particularly in the storage and processing facilities of the industry, are other problems where the country may

continue to encounter difficulties, if the appropriate measures are not taken to protect both producers and consumers.

Certain forces promoting the growth of the industry have fortunately been generated. The adoption and spread of the new high-yielding varieties developed by the International Rice Research Institute, together with the full support of the government in its self-sufficiency program, have significantly contributed to the increased output of rice since the late 1960s. The country's efforts to implement a land reform program, although beset with inherent difficulties, have achieved some encouraging advances in recent years. The development plans of the country continue to give high priority to promoting further progress in the industry.

The need exists to attain further production increases to match a rapidly growing demand for the cereal, caused particularly by a high population growth rate. The industry's future hinges on its capacity to sustain increases in output through the promotion of conditions similar to those which produced a rice surplus in 1968. The achievement of higher yields appears to be the remaining alternative to expansion of more land for rice production, since the so-called 'land frontier' has apparently closed, even in Mindanao.

While the prospects for maintaining self-sufficiency in the country are favourable, it is unlikely that a steady flow of export surpluses could be generated within the next decade. A crucial task lies ahead in rectifying the

existing deficiencies, inducing a faster pace of progress, and providing greater economic and social well-being for a substantial sector of its population.

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CHAPTER I

INTRODUCTION

The rice industry plays such a vital role in the economy of the Philippines that it is understandable why the Filipino people attach so much importance to their principal cereal crop.

Rice is the staple food of about 77 per cent of the country's population numbering about 37 million people. Out of nearly 9 million hectares of harvested crop area in the country in 1970, over 3 million hectares or about one-third yielded palay (rough rice or paddy). Agricultural production as a whole is undertaken by almost 2.5 million farms, 1.3 million or 54 per cent of which are regularly planted to the cereal. The industry is a direct source of livelihood for about 25 per cent of the population.

An appraisal of the rice industry should yield valuable insights essential to a greater understanding of Philippine economic development. Any measure which can be identified and adopted for the advancement of the industry may lead to enhance the well-being of a large portion of the population. If the problems of the industry remain unsolved, the country's efforts to alleviate poverty and the attendant socio-economic difficulties will be greatly hampered.

A major objective of this study is to assess the role of the rice industry in the agricultural development of the Philippines. Literature on the economic development of Southeast Asian countries has frequently included

appraisals of the agricultural growth in this country. Typical of these writings are a compilation of papers on Agricultural Development in Asia, by Shand (1969); Trade and Growth in the Philippines, by Hicks and McNicoll (1971); and The Philippines, by Power and Sicat (1971). These books have dealt in varying degrees with agricultural development by discussing a number of major sectors; they have not, however, viewed one sector in exclusive focus within the context of agricultural development. Generally, the treatment of each sector has included only the production aspects of a group of major crops.

There have also been numerous publications dealing with more specialised aspects of the rice industry. However, their great detail had precluded further discussions that would link the industry to agricultural growth. Typical of these are articles on rice production by Venegas and Ruttan (1965), Bradfield (1966), Barker (1969); a book on Philippine agricultural marketing by Darrah and Tiongson (1968); articles on rice consumption and policy by Mears (1971), Mangahas (1969), and others.

This sub-thesis attempts to encompass an area somewhere between that covered by these two groups of publications. While confining himself mainly to the rice industry alone, the writer also touches on the geographical, social and institutional factors affecting the industry, no less than the more primal aspects of production and marketing.

Students of agricultural development in the Philippines are sometimes enthused by what is now known as the break-through in rice production brought about by the development

of improved technology. This optimism has been dampened by problems posed by inclement weather and plant diseases, which greatly reduced the rice harvests of crop year 1972. A major issue now is whether or not the rice industry can recoup and meet the country's total requirements for the commodity, and even attempt a step farther: penetrate and stabilise a position in the world market.

Part One offers the reader an overview of agriculture in the Philippines. A geographical description, with particular emphasis on climate, is presented in Chapter II, together with a review of the principal products and the labour force. The writer believes that climate is both significant and particularly relevant to a thesis on the rice industry, considering the problems of inclement weather that the Filipino farmer encounters periodically. Undoubtedly, the country's climate has also influenced the direction of rice breeding at the International Rice Research Institute (IRRI) in the development of strains that would resist not only pests and diseases, but also the uncertainties of unfavourable weather.

In Chapter III, the position of agriculture in the economy is delineated. The Philippines should be seen in perspective as one of the basically agrarian economies among the developing countries of Southeast Asia.

Part Two of the thesis is devoted exclusively to discussion of the rice industry. A brief historical background is presented in Chapter IV to evaluate the significance of the industry to the economy, followed by a review of output trends over seven decades. Much

emphasis is placed on the interplay of various factors that affect present production, and their probable impact on future output. An attempt is made to assess the potentialities and limitations of the industry in the light of past and recent experience, and how these factors would influence its future. Chapter V portrays the socio-economic environment of the rice industry, starting with a view of its position in the rice economy of the world. In a closer perspective, factors that have respectively hampered and fostered the industry over the years are identified and discussed. The concluding Chapter VI recapitulates previous discussions and attempts to assess the probable influence of the industry on the overall direction of agricultural and economic development in the Philippines.

P A R T O N E

PHILIPPINE AGRICULTURE -
THE MATRIX OF THE RICE INDUSTRY

CHAPTER II

THE STRUCTURAL PATTERN OF PHILIPPINE AGRICULTURE

Geographical and Climatic Characteristics

The Philippine archipelago, consisting of 7,107 islands and islets, is just 966 kilometres (600 miles) off the cost of the Southeast Asian mainland. Only about 161 kilometres (100 miles) from the northernmost Batanes island is Taiwan. Neighbouring Borneo is visible from the southernmost island of the Sulu group. Further south looms the Indonesian archipelago - a country similarly involved in her own efforts for agricultural and overall economic development (Figure 1).

Only eleven islands comprise about 96 per cent of the total land area of the country (Figure 2). In order of their size in area, these are Luzon, 105,700 square kilometres (40,810 square miles); followed by Mindanao, 95,600 square kilometres (36,900 square miles), the second largest. The other islands, ranging from 5,000 to 1,000 square miles, are Samar, Negros, Palawan, Panay, Mindoro, Leyte, Cebu, Bohol and Masbate.

Table 1 shows that, of the total of 30 million hectares (116,200 square miles) of land in the country, 46 per cent is non-forest area. As part of this, arable land comprises just over one-third of the overall area of the country. The rest is forest vegetation of dipterocarp, mangrove and pine.

FIGURE 1


MAP OF THE PHILIPPINES
STATUTE MILES
0 50 100 150 200
N
BATANES
ILOCOS NORTE
LAOAG
CAGAYAN
VIGAN
ABRA
BANGUED
TUGUEGARAO
ILOCOS SUR
BONTOC
MOUNTAIN
ILAGAN
ISABELA
SAN FERNANDO
LA UNION
BAGUIO
BAYOMBONG
NUEVA VIZCAYA
INGAYEN
PANGASINAN
CABANATUAN
TARLAC
NUEVA ECIJA
IBA
ZAMBALES
SAN FERNANDO
PAMPANGA
BULACAN
MALOLOS
BATAAN
RIZAL
PASIG
QUEZON
MANILA
CAVITE
STA CRUZ
LAGUNA
BATANGAS
LUCENA
CAMARINES NORTE
DAET
CAMARINES SUR
NAGA
CATANDUANES
VIRAC
MARINDUQUE
BOAC
MAMBURAO
CALAPAN
ALBAY
LEGASPI
SORSOGON
MINDORO OCCIDENTAL
MINDORO ORIENTAL
ROMBLON
ROMBLON
MASBATE
MASBATE
CATARMAN
NORTHERN SAMAR
SAMAR
CATBALOGAN
BORONGAN
EASTERN SAMAR
AKLAN
CAPIZ
ANTIQUE
ILOILO
TACLOBAN
LEYTE
BACOLOD
NEGROS OCC
NEGROS OR
CEBU
CEBU
SOUTHERN LEYTE
BOHOL
TAGBILARAN
SURIGAO
SURIGAO DEL NORTE
DUMAGUETE
AGUSAN
SURIGAO DEL SUR
MISAMIS ORIENTAL
BUTUAN
MISAMIS OCC
CAGAYAN DE ORO
DIPOLOG
DIPOLOG
MALAYBALAY
ZAMBOANGA DEL NORTE
LANAO DEL NORTE
BUKIDNON
LANAO DEL SUR
DAVAO
DAVAO ORIENTAL
COTABATO
DAVAO
ZAMBOANGA DEL SUR
COTABATO
SOUTH COTABATO
SOUTH DAVAO
PALAWAN
PUERTO PRINCESA
JOLO
SULU

FIGURE 2

THE PHILIPPINES MAJOR ISLAND GROUPS AND REGIONS

* According to classification system of Bureau of the Census and Statistics.

TABLE 1

VEGETATIVE COVER: AREA AND DISTRIBUTION OF AREA TO TOTAL, BY TYPE, PHILIPPINES, 1969

Type	Area	Distribution
	ha.	%
Total Area	30,000,000	100.00
Forest Area	16,085,260	53.61
Commercial forest	8,852,514	29.50
Non-commercial forest	7,232,746	24.11
Non-Forest Area	13,914,740	46.39
Cultivated & other land	10,393,088	34.66
Open or grassland	3,303,903	11.01
Marshes	217,749	0.72

Source: Bureau of Forestry, Manila.

The Philippines has many mountain ranges. Chains of mountains, which vitally affect the climate of Luzon, are the Cordilleras, the Sierra Madre and the Caraballo. Most of the upland areas and the slopes of the ranges are covered with forest growth, but considerable portions have recently been depleted by lumber production.

The plains along the coasts are particularly suited for agriculture. The rolling uplands and extensive valleys are traversed by rivers. These often overflow, bringing rich alluvial soil to the valleys. The largest river is the Cagayan in Northern Luzon which stretches about 350 kilometres. The Agusan and the Rio Grande are in Mindanao, passing through fertile valleys. The Agno and Pampanga rivers are found in Central Luzon, the country's largest rice-producing region.

The Philippines is dotted with volcanoes. While most of them are dormant, a few, such as Mayon and Taal in Southern

Luzon, are still active. They are mentioned to account for the volcanic soil suitable for coconut production in the areas within the periphery of their past eruptions. Over the last decade there have been regular eruptions of these volcanoes.

A variety of conditions affect the climate in different parts of the archipelago. The position of the islands and local air currents are particularly significant, since they determine the periods, intensity and distribution of rainfall.

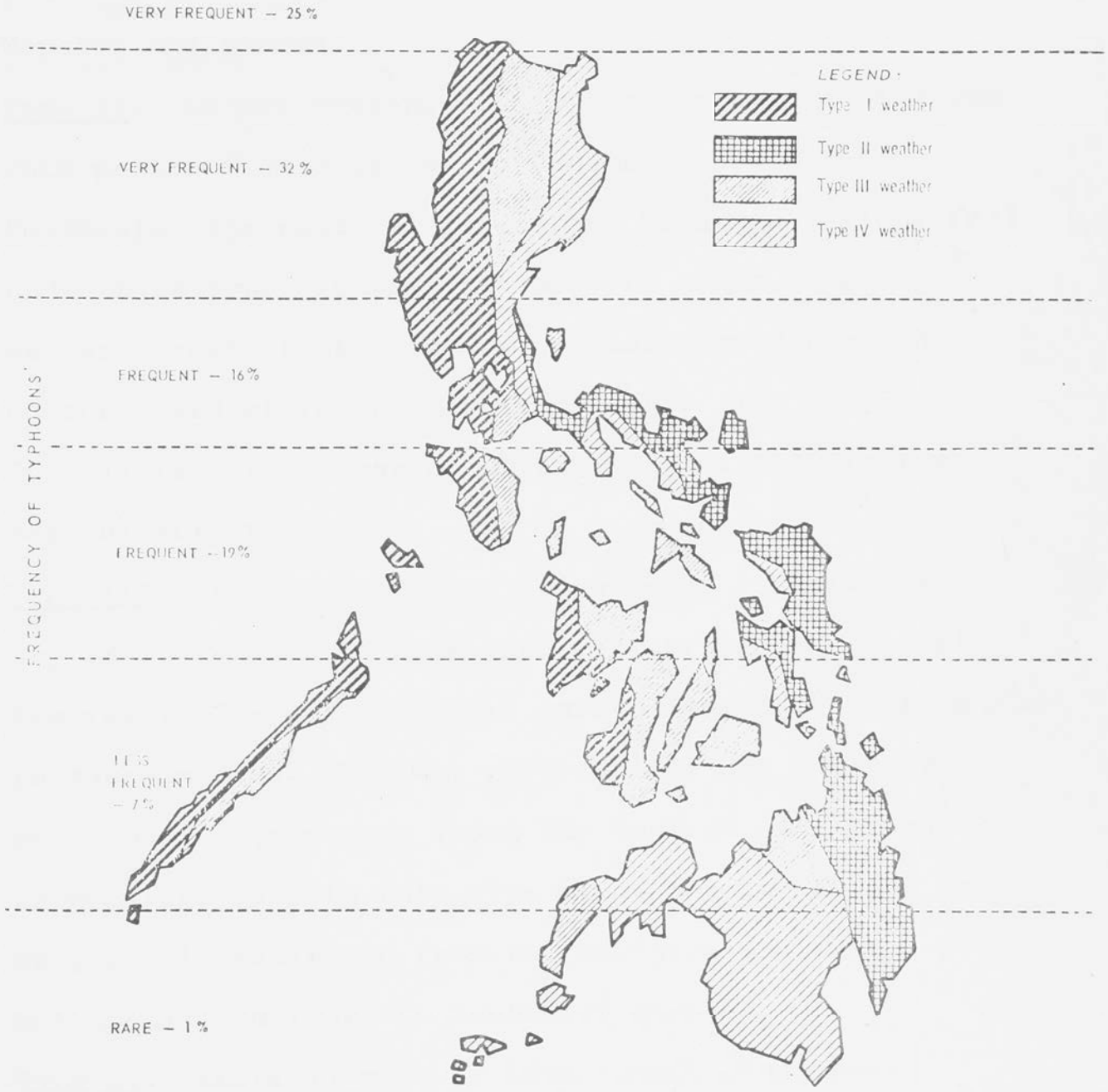
Philippine air currents are generally classified into three groups: (a) the Northeast Monsoon (Northers) along the eastern side of the Great Asiatic high-pressure area; (b) the Trade Wind, originating from the tropical high pressure area of the Pacific and crossing the islands from a generally easterly direction; and (c) the Southwest Monsoon or equatorial air, rising from the intense high pressure areas of the southern hemisphere and blowing its path across the equator.

The Weather Bureau of the Philippines has classified the climates of the country for particular reasons. While temperature differences are very slight, rainfall variations are greatly significant, due principally to the influence of topography. The direction of air streams, which have an effect on climate, has similarly been considered. On these bases, four types of climate (Figure 3) have been identified for the country, as follows:

Type I. Two pronounced seasons; one dry from November to April, the other wet during the rest of the year. The regions

FIGURE 3

CLIMATIC MAP OF THE PHILIPPINES



* Frequency percentages reflect the proportion of total annual typhoons affecting specified regions.

Source : Department of Agriculture and Natural Resources Bureau of Agricultural Economics.

on the western part of the islands of Luzon, Mindoro, Negros and Palawan may be classified under this type. Topography is a vital controlling factor in this category, the areas being walled against the trade winds and Northeast Monsoon, but largely unprotected from the Southwest Monsoon and storms.

Type II. No dry season, with a very pronounced maximum rain period from November to January. The Bicol Peninsula, the Eastern Visayas and Mindanao regions fall under this type. Unlike the western coast, the eastern coast of the country is unsheltered from the monsoons and storms by mountain ranges like the Cordilleras of the north. Typhoons generally follow this direction.

Type III. Seasons not very pronounced; relatively dry from November to April and wet during the rest of the year. The dry season is short, lasting only from one to three months. Maximum rain periods are not very pronounced. Provinces along the central part of the archipelago fall in this type since the localities are only partly sheltered from the Northers and trade winds, but unshielded from the Southwest Monsoon.

Type IV. Rainfall more or less evenly distributed throughout the year. This is the climate prevailing in the other provinces not covered by the first three types, mostly in Central and Southern Mindanao.

The western half of Luzon, Mindoro, Panay and Negros belong to Type I climate. Seasonal crops have to be planted at the start of the wet season in areas where

irrigation facilities are inadequate. Planting activities, particularly those for rice, usually reach their peak in the months of May, June and the first half of July.

Perennial crops like coconut are heavily planted in the eastern coastal regions of Luzon which have a Type IV climate, being assured of year-round water supply from rain.

The evenly distributed rainfall in most of Mindanao island allows two or three croppings per year for food crops which take three to four months to mature, like the new high-yielding varieties of rice. While this may be the general characteristic of the climate of the region, rainfall can become unpredictable during certain periods; droughts may occur occasionally. This is an uncertainty that understandably engenders reluctance on the part of farmers in non-irrigated areas to plant second crops.

During the period lasting from July to November, severe tropical hurricanes often take a great toll of damage on agricultural production. It is fortunate, however, that the Southern Visayan region and Mindanao are less exposed to typhoons. These areas are major producers of corn, poultry and livestock.

Exposure to typhoons (Figure 3), which is a crucial factor in Philippine agriculture, must be considered in appraising the different areas of this sector, and may be classified as follows:

Exposure to Typhoons	Area Affected
Nearly free	Southern part of the archipelago, up to 8 degrees North latitude. The greater part of Mindanao lies in this area.

Less frequent	From 8 to 11 degrees North, over a zone 180 miles wide. Only about 8 per cent of the more serious typhoons affect this area, such as Negros and Southern Panay.
Frequent	From 11 to 13 degrees North. This covers most of the Bicol Peninsula in Southern and Central Luzon.
Very frequent	The northern part of the archipelago.

It is interesting to note that there are typhoons which bring along rainfall lasting intermittently from three to four days in some areas. However, rain may last for longer periods, as recently occurred in the Central Luzon and Southern Tagalog regions which were ravaged by floods in August 1972. Almost three weeks of rain caused the most severe floods inflicted by storms on the regions in many years.

Agricultural production is adversely affected by typhoons and floods in the country. Coconut, one of the country's most important products, is particularly vulnerable to typhoons, as shown in Table 2.

TABLE 2

ESTIMATED DAMAGE TO COCONUT PRODUCTION DUE TO TYPHOONS, OCTOBER & NOVEMBER 1970, BY REGION, PHILIPPINES

Region	Area Affected	Production Loss	Value
	ha.	nuts	pesos
Southern Tagalog	92,260	232,687,700	34,798,200
Bicol	76,730	52,955,700	13,008,400
Eastern Visayas	770	540,000	81,600
Central Luzon	a	1,900	500
Total	169,760	286,185,300	47,888,700

Note: a = less than 10 hectares.

Source: Bureau of Agricultural Economics, Philippines.

Principal Products

The agricultural products of the Philippines may be classified into two major groups, namely, (a) food crops and (b) commercial crops.

In 1971, 9,097,000 hectares were registered as crop area harvested for the whole country, 6,345,000 hectares or 70 per cent for food crops, and 2,752,00 hectares or 30 per cent for commercial crops (Table 3).

TABLE 3

LAND UTILISATION ON MAJOR CROPS, PHILIPPINES, SELECTED YEARS
(in thousand hectares)

	1964	1967	1970	1971
Food Crops				
Palay (rough rice)	3,087.4	3,096.1	3,113.4	3,112.6
Corn (shelled)	1,897.6	2,157.9	2,419.6	2,392.2
Fruit and nuts	393.0	382.5	401.6	379.7
Root crops	287.9	252.1	252.4	246.0
Vegetables	46.5	47.7	51.1	45.7
Commercial Crops				
Coconut	1,482.9	1,820.2	1,883.9	2,048.5
Sugar cane	269.9	308.7	366.1	441.6
Abaca	210.5	186.1	173.0	153.3
Tobacco	95.5	82.5	87.4	75.6

Source: Bureau of Agricultural Economics, Philippines.

Rice, the chief staple food crop, is considered first in importance, accounting in 1971 for 3,113,000 hectares of harvested land or 34 per cent of the total. Since this thesis is mainly concerned with the rice industry, further discussions on this sector are found in Part Two.

Corn is second to rice in the food category, both in crop area harvested and in volume of production (Table 4). This cereal is the chief food of about 20 per cent of the

total population of the country, the corn-consuming sector covering the Bicol, Visayas and Mindanao regions. Livestock and poultry enterprises depend on corn production, the grain being an important animal feed by itself or as part of feed mixtures. White and yellow corn are the important varieties of the crop raised in the country. Apart from its use as food in unprocessed form, white corn is the material from which starch and other by-products are made, such as corn oil, syrup, glucose, flakes, gluten and corn meal. Yellow corn is more

TABLE 4

PRODUCTION OF MAJOR CROPS, PHILIPPINES, SELECTED YEARS
(in thousand metric tons)

	1964	1967	1970	1971
Food Crops				
Palay (rough rice)	3,842.9	4,094.0	5,233.4	5,342.9
Corn (shelled)	1,292.7	1,490.0	2,008.2	2,005.0
Fruit and nuts	1,280.5	1,431.3	1,640.2	1,725.9
Root crops	1,552.5	1,367.6	1,316.3	1,220.8
Vegetables	169.5	199.7	255.0	244.8
Coffee	39.3	44.3	49.0	49.5
Commercial Crops				
Coconut (copra)	1,487.2	1,576.8	1,656.2	1,574.1
Sugar (processed)	2,132.2	2,027.5	2,594.6	2,980.2
Abaca	134.3	117.6	122.4	104.6
Tobacco	65.0	51.1	61.2	55.8

Source: Bureau of Agricultural Economics, Philippines.

extensively used as animal feed, being the main component of commercial feed mixes.

Fruit and nuts, root crops and vegetables are important items in the Filipino diet. They have correspondingly been produced in significant quantities.

Coconut and sugar are the leading commercial crops of

the Philippines. The country is the world's largest producer of coconut products, and accordingly ranks first in the export of copra, coconut oil, copra meal and cake, and desiccated coconut. In 1962, the industry employed about 394,000 people.

Sugar has been a traditional export crop and a major source of foreign exchange earnings. Some three million people in the country are dependent on the industry for their livelihood.

The production of coconut and sugar has been receiving close attention and support by the government since these products are substantial dollar earners for the country as shown in Chapter III, Table 13. Significant expansion in both area utilised and production may be noted in Tables 3 and 4.

Abaca is an important source of fibre used in the manufacture of rope, rugs, paper, and a variety of Philippine handicrafts. The crop, however, has not achieved the same level of importance as coconut and sugarcane. A decreasing trend can be seen in both production and land utilisation. The industry has been adversely affected in the world market by competition from synthetic fibres.

Tobacco is produced both for domestic consumption and for export. Apart from the native variety, Virginia tobacco is grown, mostly in Northern Luzon. A number of cigar and cigarette factories supply local markets and foreign outlets as well.

TABLE 5

TEN LEADING PROVINCES IN PRODUCTION OF MAJOR CROPS, PHILIPPINES, 1960

Province	Production	Province	Production
Palay (in m. cavans)		Corn (in m. cavans)	
Cotabato	6.5	Cotabato	5.2
Nueva Ecija	6.4	Davao	3.5
Iloilo	3.9	Zamboanga del Sur	1.6
Pangasinan	3.6	Cebu	1.6
Isabela	3.4	Lanao del Norte	1.2
Tarlac	3.3	Negros Or.	1.1
Camarines Sur	2.8	Bukidnon	1.1
Negros Occ.	2.7	Negros Occ.	1.0
Pampanga	2.6	Leyte	0.9
Cagayan	2.6	Misamis Or.	0.8
Coconut (in m. nuts)		Sugar (in '000 tons of cane)	
Quezon	648	Negros Occ.	5,251
Samar	455	Pampanga	733
Davao	284	Tarlac	696
Misamis Or.	252	Batangas	522
Leyte	238	Negros Or.	327
Cotabato	200	Leyte	312
Laguna	188	Capiz	291
Zamboanga del Sur	187	Laguna	284
Misamis Occ.	154	Iloilo	237
Surigao del Norte	146	Cebu	234
Abaca (in m.kg.)		Tobacco (in m.kg.)	
Davao	18.0	Isabela	8.8
Leyte	8.3	Ilocos Sur	6.4
Sorsogon	8.1	Ilocos Norte	4.7
Samar	8.0	La Union	4.0
Camarines Sur	7.9	Pangasinan	3.5
Catanduanes	7.6	Cagayan	2.5
Albay	7.1	Misamis Or.	1.5
Bukidnon	4.8	Abra	1.2
Cotabato	4.6	Cotabato	1.2
Surigao del Sur	4.0	Cebu	0.9

Source: 1960 Census of Agriculture, Department of Commerce and Industry, Philippines, cited in Darrah and Tiongson (1968, p.24).

Table 5 presents the ten leading provinces in the production of major crops as recorded by the 1960 Census of Agriculture. It will be noted that four provinces of Central Luzon - Nueva Ecija, Pangasinan, Tarlac and Pampanga - are included among the heaviest palay producers, together with Cotabato, a province of Southern Mindanao. Although the region is frequented by typhoons that inflict damage on rice crops, the cereal grows well in this area of adequate rainfall which is supplemented by irrigation on farms where intensive cultivation is practised.

Of the heavy coconut producers, only two Luzon provinces, Quezon and Laguna, which lie in the southern part of the island, are listed. Since coconut is a perennial crop, it is well produced in areas where rainfall is more or less evenly distributed throughout the year, a characteristic of the climate prevailing in the southern islands. These areas, particularly in Southern Mindanao, are relatively free from typhoons, another advantage in favour of coconut production. The same conditions also prevail for abaca.

Polulation and Agricultural Labour Force

Since the late 1940s, the population of the Philippines has been growing rapidly at more than 3 per cent per annum (Table 6). From 1948 to 1960, the growth rate almost doubled that from 1939 to 1948 and is now estimated to have reached around 3.5 per cent per annum, one of the highest in the world. Such expansion has been a source of much concern for the country in assessing and

planning the course of its economic development.

TABLE 6

POPULATION AT CENSUS AND RATES OF GROWTH, PHILIPPINES, 1903-70

Census	Population	Average Annual Geometric Rate of Growth
	'000	%
1903	7,635	-
1918	10,314	1.9
1939	16,000	2.2
1948	19,234	1.9
1960	27,088	3.1
1970	36,684	3.5

Source: ADB (1971, p.548).

The accelerated growth rate has been attributed to a sustained high birth rate, combined with a rapidly declining death rate. Since 1920, this decrease has been continuous: from 19 per thousand in that year to 12.7 per thousand in 1948 and 7.7 per thousand in 1960.

Improved living conditions in the country contributed largely to the marked decline in the death rate. They were brought about by the availability of more and better medicines, the spread of health education to the rural areas, the increase in medical facilities and other advances in science and technology, all of which have enhanced the physical well-being of the population.

The latest census of 1970 recorded the total population of the country at 36,684,000, the rate of growth having been maintained at 3.5 per cent per annum.

As a result of the high birth rate in the country,

the population is predominantly young. People below 15 years of age comprised about 47 per cent of the population in 1967 (Table 7). Taking the country as a whole, a high dependency ratio seems to exist, with every person of working age having to support at least one dependent.

TABLE 7

POPULATION BY SELECTED AGE GROUP, PHILIPPINES, 1967

Age Group	Thousand Persons	Percentage
0 - 14	16,216	46.8
15 - 19	3,668	10.6
20 - 24	2,984	8.6
25 - 44	7,458	21.5
45 - 64	3,455	10.0
65 and over	875	2.5

Source: ADB (1971, p.548).

The average Filipino couple today supports six children. This dependency compares unfavourably with the five children supported by an average couple in Taiwan, and with three and two children per couple in the United States and Japan respectively (Tanco, 1971, p.154).

The national endeavours to check the fast rate of population growth in the country gained much headway when, in 1969, President Ferdinand Marcos signed an order establishing the Commission on Population to formulate control policies and provide recommendations to deal with this problem in order to avert its adverse economic and social consequences.

In 1960, about 86 per cent of the population lived

in the rural areas. More recent estimates show this proportion as 75 per cent. The urban population is unevenly distributed, about one-third living in the great urban area around Metropolitan Manila. At least six other cities in the country have populations of about 100,000 each.

Agriculture is the major occupational group in the Philippines. The sector registers the greater proportion of the employed labour force and accounted for an annual average of 57 per cent for the years 1966 to 1968 (Table 8), compared with the 61 per cent shown by the Census of 1960. The labour force refers to the population, 10 years old and over, who are either employed or seeking employment.

TABLE 8

EMPLOYED LABOUR FORCE IN AGRICULTURAL AND NON-AGRICULTURAL SECTORS, PHILIPPINES, FISCAL YEARS 1966-68

Employed	1966		1967		1968	
	'000	%	'000	%	'000	%
Agricultural	6,275	56.9	6,361	57.4	6,366	57.1
Non-agricultural	4,757	43.1	4,728	42.6	4,780	42.9
Total employed	11,032	100.0	11,089	100.0	11,146	100.0

Source: 'Economic Report, 1968', Philippine Economy Bulletin, Vol.5, No.6, 1968.

The Surveys of Households for the years 1968 and 1969 by the Bureau of the Census and Statistics reveal that more than one-quarter or 27 per cent of the agricultural labour force was underemployed, compared with about 21 per cent in the non-agricultural sector (Table 9). Under

this concept, underemployment covers a situation where a part of the labour force wants additional productive work and is generally engaged in less than 40 hours of such work per week.

Since a maximum employment level is one of the major economic objectives of the national effort to accelerate economic growth, much remains to be done to fill the existing gap towards the attainment of this goal.

TABLE 9

UNDEREMPLOYED PERSONS AT WORK IN AGRICULTURAL AND NON-AGRICULTURAL INDUSTRIES, PHILIPPINES, FISCAL YEAR 1969[a]

	Agricultural	Non-Agricultural	Total
Number of persons at work (thousands)	5,808	4,668	10,476
Wanting additional work (per cent)	27.0	20.8	24.2

Note: a. Average of October 1968 and May 1969 figures.

Source: Philippines, NEC (1971, p.209).

Underemployment in agriculture is also reflected in the generally low incomes of families, particularly in the rural areas (Table 10). Although a substantial increase (45.9 per cent) in rural incomes was recorded from 1961 to 1965, they still fall below the P2,000 per annum level. It may be noted that this increase was matched by a rise in the consumer price index of 25.5 per cent (ECAFE, 1970, p.111). A wide disparity also exists between the incomes of urban families and those of the rural areas, where most of the agricultural

population resides. In 1965, the average Philippine urban family income of P4,405 was about 251 per cent above the average rural family income of P1,755. The country ranked second only to Thailand (304 per cent) in the disparities between urban and rural incomes among

TABLE 10

AVERAGE ANNUAL FAMILY INCOME, URBAN AND RURAL AREAS, PHILIPPINES, SELECTED YEARS

Area	Average Family Income			Percentage Increase
	1956-57	1961	1965	1961-65
	pesos	pesos	pesos	%
Urban, all areas	2,427	2,970	4,405	48.3
Metropolitan Manila	4,255	4,790	6,590	37.6
Other urban	1,902	2,395	3,463	44.6
Rural	989	1,203	1,755	45.9

Source: Family Income Distribution in the Philippines, 1965, Bureau of the Census and Statistics, cited in Darrah and Tiongson (1968, p.78).

eight countries including Ceylon, India, Indonesia, Taiwan, Japan and the U.S.A. (Sundrum, 1972).

The creation of more employment opportunities is urgently needed because of the rapid and continuous growth of the number of people dependent upon agriculture for their livelihood. Unless the non-farm sector can expand employment sufficiently to absorb the growing agricultural labour force, the employment problem in the agricultural sector may remain. This possibility may be considered unlikely since the non-agricultural labour force had a substantial proportion (about 21 per cent) of the total number of underemployed people in 1969.

This situation would render more difficult its absorption of additional workers from the under-employed group in the agricultural labour force. Economic surveys have noted this situation as a characteristic pattern in developing countries.

CHAPTER III

POSITION OF AGRICULTURE IN THE ECONOMY

Contribution to Net Domestic Product

Agriculture contributed the major share, about one-third, to the Net Domestic Product in 1969 and 1970 (Table 11). The services and manufacturing sectors ranked second and third in the share of Net Domestic Product in the same years, producing consistently about 24 and 19 per cent respectively.

TABLE 11

NET DOMESTIC PRODUCT[a] BY INDUSTRIAL ORIGIN, PHILIPPINES, 1969 and 1970
(at constant 1967 prices)

Industrial Classification	1969		1970	
	m. pesos	%	m. pesos	%
Agriculture, fishery and forestry	8,367	32.9	8,750	33.1
Services	6,045	23.8	6,254	23.7
Manufacturing	4,760	18.7	5,042	19.0
Commerce	3,896	15.3	4,125	15.6
Transportation, communication, storage and utilities	1,009	4.0	1,063	4.0
Construction	873	3.5	660	2.5
Mining and quarrying	461	1.8	542	2.1
Net Domestic Product at Factor Cost	25,411	100.0	26,436	100.0

Note: a. Net Domestic Product is the total of goods and services produced in the country, net of indirect taxes and capital consumption allowance.

Source: Philippines, NEC (1971, p.12).

A substantial portion of exports is produced by the agricultural sector (Table 12). In 1970, about 32 per cent was produced by agriculture. This percentage declined in the two succeeding years, 1971 and 1972, due to progress achieved in the production of processed minerals and manufactured goods. Agricultural and agrindustrial exports combined amounted to 68 per cent of total exports in 1970, 64 per cent in 1971, and 62 per cent in 1972. As shown in Table 13, logs, lumber

TABLE 12

PERCENTAGE DISTRIBUTION OF EXPORTS BY COMMODITY GROUP, PHILIPPINES, 1970 and 1971

Commodity Group	Actual 1970	Estimated 1971	1972
Agricultural exports	31.7	28.7	26.7
Mineral ore	1.1	1.1	1.1
Industrial exports			
Agrindustrial	36.3	35.3	34.8
Processed minerals	20.0	20.9	22.1
Manufactured	3.2	3.4	4.0
Other export products	7.7	10.6	11.3
Total	100.0	100.0	100.0

Source: Philippines, NEC (1971, p. 69).

and copra exports were the major foreign exchange earners in the agricultural category for the same years; sugar, coconut products, plywood and canned pineapple yielded the largest export receipts in the agrindustrial group.

Agricultural production in the Philippines has not been sufficient to meet all of the country's requirements

TABLE 13

AGRICULTURAL AND AGRINDUSTRIAL EXPORTS, PHILIPPINES, 1970-72
(f.o.b. value in $US million)

	Actual 1970	Estimated 1971	1972
1. Agricultural Exports	343.5	353.2	363.2
Copra	80.1	84.1	88.3
Tobacco	13.6	14.3	15.0
Logs and lumber	249.8	254.8	259.9
2. Agrindustrial Exports	392.4	434.1	473.1
Sugar	187.7	206.5	223.1
Abaca	15.3	15.8	16.3
Coconut oil	95.6	109.9	123.1
Desiccated coconut	19.4	21.3	23.4
Pineapple, canned	21.4	22.5	23.6
Copra meal or cake	13.9	15.3	16.8
Plywood	19.7	21.6	23.8
Sugar confectionery	8.4	9.1	9.8
Veneer core sheets	6.8	7.5	8.2
Plywood panels	4.2	4.6	5.1

Source: Philippines, NEC (1971, p. 68).

for food. Table 14 indicates the food imports of the country for the years 1967 and 1968. Cereal and cereal preparations stand out as major import items. It may be noted that a significant reduction of about 53 per cent was made possible in the 1968 imports. This year is remembered as a period of substantial gain in rice production.

As at the year 1971, cereals and cereal preparations were still the leading agricultural imports, at $US80.3

million, followed by textile and dairy products at $US46.53 million and $US40.21 million respectively (Ramos, 1972).

TABLE 14

IMPORTS OF MAJOR AGRICULTURAL COMMODITIES, PHILIPPINES, 1967-68

Item	Value 1967	Value 1968	Share in Total 1967	Share in Total 1968
	$US m.	$US m.	%	%
Cereal and cereal preparations	84.7	40.7	8.0	3.5
Textile fibres, not manufactured	29.1	49.5	2.7	4.3
Dairy products, eggs and honey	29.4	34.9	2.8	3.5
Fish and fish preparations	19.5	22.7	1.8	2.0
Fruit and vegetables	9.2	10.9	0.9	0.9
Meat and meat preparations	5.7	9.6	a	0.1
Total agricultural imports	206.4	203.7	19.4	17.7
Total all imports	1062.2	1150.2	100.0	100.0

Note: a. Less than 0.1 per cent.
Source: Philippines (1968, p.78).

A Review of Output Trends in Agriculture

The growth of the Philippine economy has been the subject of investigations by a number of scholars, one of whom, Richard W. Hooley, has discussed the long-term output growth trends in the country (Hooley, 1968). A later work with greater stress on agriculture has also

been undertaken (Hooley and Ruttan, 1969). Philippine agricultural development has also been dealt with in an expanded work on industrialisation and trade (Power and Sicat, 1971).

Hooley's study covers the trends of output growth in the agricultural sector as far back as 1902, on the basis of the nation-wide censuses taken between that year and 1961. His findings indicate a close relation between the growth of agricultural output and foreign trade of the country which has largely been dominated by primary export products such as coconut, sugar and abaca fibre.

In Table 15, it will be noted that, during the period 1902-18, the growth rate of agriculture substantially exceeded the rates during the two succeeding periods, 1918-38 and 1938-61, and nearly equalled the resurgence from 1952 to 1968. Hooley and Ruttan (1969) attribute the early rapid growth to the opening of the United States market on a preferential basis to Philippine exports, starting in 1902. With the passage of the Payne-Aldrich Act of 1909, Philippine products were given duty-free entry into the United States under a system of quotas.

In the period 1918-61, output lagged behind population growth. The great depression of the 1930s and the Second World War were important factors that impeded agricultural development during those periods.

After the Second World War, a rapid rate of growth of 53 per cent from 1946 to 1947 slowed down abruptly in 1948 (Lawas, 1969, p. 199). The reasons cited for

TABLE 15

GROWTH RATES OF AGRICULTURE, PHILIPPINES, 1902-68

Period	%
1902-18	5.1
1918-38	0.5
1938-61	2.2
1902-61	2.4
1952-68	5.0

Source: Power and Sicat, (1971, p. 12).

the decline were (a) the unfavourable weather conditions, (b) the widening spread of dissident elements among the population in most agricultural regions, (c) the disorganisation of production, (d) the slow rate in the rehabilitation of the livestock, poultry and sugar industries, and (e) the low level of demand for some Philippine export crops.

In 1950, the outbreak of the Korean war significantly increased the demand for agricultural export crops. This boost to exports was short-lived, ending with the war in 1953. Until 1960, growth was relatively slower. Late in the year, however, the gradual lifting of exchange controls and the devaluation of the peso enabled domestic primary products to compete favourably in the world market. The upward trend in agricultural growth is clearly seen during this period.

The recent advances in agricultural technology and the effective implementation of government programs have

resulted in significant increases in output, particularly of rice and corn. The country produced enough to meet its requirements of rice in 1968, and a healthy optimism could be observed in the industry as a result of this achievement. The progress in rice production is further discussed in the following chapters.

The latter part of the 1960s is particularly important because it reflects the initial impact of the 'Green Revolution', the further effects of which are being closely examined by students of the Philippine economy.

Agricultural Productivity - An Assessment

Studies on the productivity of Philippine agriculture, especially that by Hooley and Ruttan (1969), have observed its continuous, albeit modest, decline during the first six decades of the twentieth century. This trend has been attributed to the deteriorating quality of land inputs. Average output per land area has continued to decline. Labour productivity, while characterised by fluctuations, has shown a slightly more favourable trend than land productivity. Although output per worker rose sharply between 1902 and 1918, it declined as abruptly in 1938 and increased at a much slower rate to 1961 (Table 16).

Total agricultural output has expanded considerably (at about 6.5 times) during the past six decades, but the increase has been mainly accounted for by additions of traditional inputs. The rice industry, as viewed more closely in Part Two, depended largely on the expansion of cultivated area during most of the period.

TABLE 16

INDICES FOR PHILIPPINE AGRICULTURE, SELECTED YEARS, 1902-61

	Output and Input Indices				
	1902	1918	1938	1948	1961
Output	100	224	251	254	410
Inputs:					
Land	100	186	313	286	603
Labour	100	161	256	243	350
Machinery	100	187	300	231	595
Animals	100	267	457	301	605
All inputs combined[a]	100	181	299	266	484
Productivity Measures:					
Output/land	100	120	80	89	68
Output/labour	100	139	98	105	117
Output/machinery	100	120	84	110	69
Output/animals	100	84	55	84	68
Total productivity	100	124	84	95	85

Note: a. Valuation procedures for these figures are indicated in Hooley and Ruttan (1969).

Source: Hooley and Ruttan (1969, p. 222).

Table 17 indicates that there was apparently greater stress on irrigation during the Spanish regime (1521-1898). At the end of this period, irrigated land comprised about one-quarter of total cultivated area. A drastic decline in this percentage was noted in the early part of the American regime. Thereafter the decline continued at a slower rate. Less attention to investment in irrigation and continued expansion of non-irrigated areas have been

TABLE 17

SHARE OF IRRIGATED IN TOTAL CULTIVATED AREA, PHILIPPINES, 1902-60

Year	Irrigated Area	Cultivated Area	Proportion of Irrigated to Cultivated Area
	'000 ha.	'000 ha.	%
1902	320.4	1,298	24.7
1918	324.6	2,415	13.4
1939	523.0	3,953	13.2
1948	400.1	3,711	10.8
1960	620.5	7,595	8.2

Source: Hooley and Ruttan (1969, p. 224).

mentioned as accounting for this situation.

Among the significant events that may mark a milestone in agricultural productivity in the Philippines are the recent advances in rice production achieved in the late 1960s. This subject will be examined more closely in Chapter V.

Nationwide corn (maize) yields have remained fairly stable for the greater part of the period since 1939 (Table 18). The yield index in 1954, for instance, almost approximated those in 1965 and 1967 after a lapse of more than a decade. The same applies to the years 1941 and 1960 or a period of about two decades. Increases in total output have been attributed mainly to the expansion of planted areas. Corn may produce greater yields on newly opened land, but as soil fertility becomes depleted over time, yields tend to decline.

TABLE 18

AVERAGE YIELD INDICES FOR CORN, PHILIPPINES, 1939-41 and 1954-68

Year	Index	Year	Index
1939-41	104.8	1961	98.9
1954	116.6	1962	105.0
1955	92.8	1963	109.2
1956	90.6	1964	113.9
1957	83.8	1965	114.2
1958	103.2	1966	109.6
1959	80.6	1967	115.5
1960	105.6	1968	120.5

Source: Hicks and McNicoll (1971, p.197).

The only possible factor that may reverse the decline in corn productivity is the application of new and improved technology which should be made available to the small-scale cultivator. The relatively high yields in the frontier areas are expected to decrease after several years, if improved technology is not forthcoming, and to result in the continued reduction in overall average yield.

The coconut industry has apparently achieved faster yield increases than the cereal industries. Between 1918 and 1960, yield (measured in nuts per bearing tree) increased by about 30 per cent, or at a rate of 0.6 per cent per annum. A significant portion of the increase (about 25 per cent) is attributed to a shift in the geographical distribution of trees from Luzon to the regions in Mindanao where higher yields have been produced.

Sugar cane production appears to have benefited

earlier from improved technology than rice production. Yield has increased significantly since the mid 1930s, the rise in productivity having been observed between the early 1950s and the early 1960s.

The breeding of new varieties of sugar cane has been undertaken by the Philippine Sugar Institute, a public corporation operating with the financial support of the sugar industry. Technological development has had its impact largely on the plantation, but there is evidence of its 'spill-over' effect on small farms.

There are certain aspects of productivity in Philippine agriculture which should be carefully considered. Of the cereal crops, only rice has benefited from research on improved technology. A similar development has yet to be made for corn. The coconut industry must likewise evolve new technology such as a higher-yielding variety of coconut palm. Most of the research undertaken so far has concentrated on combatting the diseases of the crop. Coconut is mainly raised by smallholders who cannot, without assistance, finance expensive research. Furthermore, even if such research were possible, it would take at least a decade to affect production appreciably.

Other countries, like Sri Lanka and India, also encounter problems in the breeding of coconut because of inherent problems of controlled cross-pollination which is difficult to achieve on a tall coconut palm. In India, the possibilities of clonal propagation of the tree are being investigated for the purpose of increasing

yields, and reasonable optimism is reported for the evolvement of this technique within a decade (Davis, 1969, p. 254). The Philippines may well consider the benefits that may be derived from the results of research in these countries.

Of the four major crops, sugar accounts for the smallest harvested area (Table 3). This crop has the advantage of being able to adopt 'transferred technology', or technology developed outside the Philippines. Foreign varieties of sugar cane have been raised successfully in the country. This is one reason why increases in sugar yields through improved sugar cane varieties had been accomplished much earlier than the recent increases in rice yields. Apart from this built-in advantage, a substantial research program is in progress through which locally developed high-yielders have been produced.

The fast rate of population growth in the Philippines accounts mainly for a decline in the ratio of cultivated area per person since the 1950s (Hooley and Ruttan, 1969, p. 246). The trend reveals a simultaneous increase in the rate of population expansion and a decline in the rate of increase in cultivated area. The existence of a land surplus in the Philippines, an awareness of which has been blamed for the past laxity in considering the problem of a growing population, has apparently become illusory, and the vast untapped resources of the country in the past are now considered a myth (Tanco, 1971, p. 154). The situation of an

exhausted land surplus is most evident in Luzon and the Visayas (Hicks and McNicoll, 1971, p.201). It is also expected that further pressures to increase output by expanding farm area may create the same condition by the early 1970s in Mindanao, long regarded as a 'land of promise' by farmers who have migrated from densely populated regions of the country.

Farmers in the Philippines are responsive to changes in the relative prices of both subsistence and commercial crops (Hooley and Ruttan, 1969, p.243). The allocation of land among these crops was found to respond significantly to prices. The declining price of rice relative to corn during the period preceding 1959-60 was found to be associated with the comparatively greater rate of increase in corn area. Observations during recent years have noted that the rapid increase in the prices of sugar and copra is related to increases in the areas devoted to these crops and a corresponding decrease in the areas devoted to the subsistence cereal crops.

Agriculture and the Rice Industry in Philippine Economic Development

Agriculture in the Philippines may be aptly described as the backbone of the country's economy. It is the responsibility of this sector to provide an adequate volume of the people's food requirements. To a certain extent, it must also produce raw materials for its growing industries and maintain its production of export crops that would ensure a continuous inflow of foreign exchange vitally needed for the country's economic development.

The advancement of the industrial sector consequently depends upon agriculture. In the present stage of the country's development, the growth of the economy still relies heavily on the primary producing sector. National efforts towards industrialisation can be made effective by maintaining a favourable balance of payments position, since manufacturing remains substantially dependent on imports. A growing economy, like that of the Philippines, requires to some extent a supply of imported machinery and equipment, as well as industrial raw materials. Industries engaged in the manufacture of capital and intermediate goods are particularly dependent on imports. On the average of the 1963-68 imports, dependency ratios of 81 per cent for capital goods production and 53 per cent for intermediate goods production have been recorded for the Philippines (Philippines, NEC, 1971, p.76). Through the capacity of agriculture to generate adequate foreign exchange earnings, vital support is thus provided for the industrial sector.

Economic policy in the Philippines has been geared to the development of a self-sustaining agro-industrial economy. The country's efforts to attain economic progress suggest an adherence to the balanced growth approach towards the achievement of economic and social goals. Primary concern is centred on a broad inter-sectoral balance between agriculture and manufacturing. Under this scheme, each sector provides the market for the other and contributes to its expansion.

With its predominant share in the country's population

as discussed in Chapter II, agriculture is the substantial market base for industrial and consumer products. This is an important reason why close attention in recent years has been given to improving agricultural productivity in the country. It is expected that, with the rise of purchasing power in the rural sector as a result of greater agricultural productivity, the demand for the products of industry from the agricultural population will correspondingly increase. Another compelling reason to raise agricultural productivity in the country is the closing of the land frontier, as mentioned previously, which precludes further expansion of output through additions of cultivated areas.

Hooley's study (1968, p.11) on the long-term growth of the Philippine economy shows a close relationship between growth rates in the agricultural and non-agricultural sectors. Among the factors considered to have caused this relationship are changes in aggregate demand for the products of industry which may have been transmitted through agriculture.

Philippine agriculture has a decisive task to undertake at present and in the future. The urgency of its development along with manufacturing has never been more pressing than in recent years. Grim demographic realities collectively pose a serious challenge to the country's leaders and others involved in national planning. The high rate of population growth, also discussed in Chapter II, can generate millions to

double the population every 26 years.

Philippine Secretary of Agriculture and Natural Resources, Arturo R. Tanco, succinctly describes the present challenge to agriculture in the country (Tanco, 1971, p.154), as follows:

> Only about fourteen per cent or 5.2 million Filipinos live in cities, and more than one-half of these reside in the Greater Manila area. Because six out of seven Filipinos live in close to 30,000 barrios or villages dotting the countryside, both the source of population growth and its alleviation, in the short run, will have to be found on land and in agriculture. Clearly, the staggering problems of employment, food and nutrition, education, medical facilities and housing brought about by an overexpanding population will have to be solved in a rural setting in the immediate future.

It is in the crucial role of providing adequately the country's principal staple food, and attaining reasonable economic stability for its sector, that the rice industry may participate in large measure in agricultural and overall economic development. The achievement of sufficiency levels of the cereal for the multiplying millions of Filipinos has far-reaching implications. It means arresting the recurrence of the annual drain, occasioned by rice imports (Chapter V), on the foreign exchange reserves of the country that may be channelled profitably to other development purposes. The industry's potentials for enhancing the economic and social well-being of a great sector in the country (roughly about one-quarter of the population) also have an advantage of great moment to offer. The advancement of the people in the industry

PART TWO

THE RICE INDUSTRY

CHAPTER IV

POSITION OF THE RICE INDUSTRY IN PHILIPPINE AGRICULTURE

Significance to the Economy

No other crop in the Philippines is as pervasive among the population as rice. So widespread is its culture, and so popular its use as food, that almost every province in the archipelago can claim to cultivate the grain in some degree or another. Although there are regions like the Eastern Visayas and Northern Mindanao where residents are predominantly corn consumers, and remote mountain villages where root crops are more commonly used as food than cereals, even the people in these areas nevertheless attempt to produce the grain in varying quantities.

Rice has been a leading food crop in the Philippines for centuries, dating as far back as pre-historic times. Evidence of the antiquity of rice culture in the country may be found in the rice terraces of Banawe and Hungduan Valleys of Northern Luzon. The scholar, H. Otley Beyer, who made studies of this area, believes that the terraces are no longer as extensive as they were 1,000 or 1,500 years ago. Beyer estimates that the technique of constructing these terraces was introduced into the country from South China or Northern Indo-China about 3,000 years ago (Huke, 1963, p.214).

In the Philippines, palay is the common name of

rough (unmilled) rice. In other countries, the cereal in this form is better known as paddy. When its unhusked form is not emphasised in literature, rice is the term which is popularly understood as the milled grain. Production of palay is measured in cavans, each weighing 44 kilograms. Milled rice is measured in cavans of 56 kilograms each.

Earlier in this work (Chapter I), the dominant proportion of the rice-consuming sector was stressed, together with the large number of farms devoted to the production of the cereal and the substantial portion of the population dependent upon the industry for its livelihood.

Rice is a major item in the Filipino diet. Over the years there has been a slight decline in rice consumption because of the increased intake of protective foods such as fruit, meat, dairy products and fish. Rice has remained, however, the dominant food item. In 1966,82.1 kilograms or 23 per cent of total food consumption was rice, compared with 46.2 kilograms of fruit and 38.8 kilograms of roots and tubers, or 13 per cent and 11 per cent respectively (Table 19).

TABLE 19

APPARENT FOOD CONSUMPTION PER CAPITA, PHILIPPINES, 1961 AND 1966

Item	1961		1966	
	Kg. per Capita	%	Kg. per Capita	%
Rice	90.5	29.4	82.1	23.5
Corn	20.3	6.6	23.9	6.8
Wheat, other	10.0	3.3	11.5	3.3
Roots, tubers	40.0	13.0	38.8	11.1
Sugar, syrup	12.1	3.9	19.1	5.4
Pulses, nuts	15.7	5.1	12.7	3.6
Vegetables	28.5	9.3	27.5	7.8
Fruit	34.9	11.3	46.2	13.2
Meat	14.7	4.8	16.6	4.7
Dairy products	12.8	4.2	14.8	4.2
Eggs	4.0	1.3	2.9	0.8
Fish	19.9	6.5	31.9	9.1
Fats, oil	2.6	0.8	3.0	0.8
Miscellaneous	1.6	0.5	19.9	5.7
Total	307.6	100.0	350.9	100.0

Source: The Statistical Reporter, Vol.VII, No. 4, October 1963, and Vol. XI, No.4, October-December 1967; and Philippines, National Economic Council, cited in Darrah and Tiongson (1968,p.93).

It will be noted in Table 20 that, of the various items that comprise the Filipino diet, only cereals provided adequate intake, amounting to 339 grams daily per capita and exceeding the requirement level of 317 grams daily per capita. The intake of all the other food groups was below the recommended allowance. The improvement in the nutritional level of the population has,

therefore, been a source of concern for the government. The current development program for agriculture seeks to attain sufficient levels of production of the protective foods.

TABLE 20

ESTIMATED MEAN DAILY PER CAPITA FOOD INTAKE COMPARED WITH RECOMMENDED ALLOWANCE IN EIGHT REGIONS OF THE PHILIPPINES, 1958-67

Food Group	Daily Food Intake Per Capita	Recommended Daily Allowance Per Capita
	grams	grams
Cereals	339	317
Starchy roots and tubers	49	67
Sugar and syrups	18	33
Dried beans, nuts and seeds	7	19
Leafy and yellow vegetables	18	68
Vitamin C-rich foods	23	87
Other fruit and vegetables	87	94
Meat, poultry, fish	76	108
Eggs	4	15
Milk and milk products	24	173
Fats and oils (including fat from coconut)	7	29
Total	652	1,010

Source: Philippines (1968, p.67).

The importance of rice in Philippine agriculture is more easily conceived when it is realised that from 1960 to 1971 an average of over one-third, or about 38 per cent, of the total crop area of the country was devoted to the cereal (Table 21). Of the total food crop area during the same period, an average of more than one-half, or

about 51 per cent, was utilised for rice. Increasing yields of the crop in recent years have achieved greater total outputs from overall areas relatively smaller than those in previous years.

TABLE 21

LAND UTILISATION OF PALAY IN RELATION TO TOTAL FOOD CROP AREA AND OVERALL CROP AREA,[a] PHILIPPINES, SELECTED YEARS

	1960	1965	1970	1971
Total palay area (m.ha.)	3.31	3.20	3.11	3.11
Total area, food crops (m.ha.)	6.01	6.00	6.41	6.35
Total crop area (m.ha.)	7.60	8.25	8.95	9.10
Proportion of palay area to total food crop area (%)	55.1	53.3	48.5	49.0
Proportion of palay area to total crop area (%)	43.6	38.8	34.7	34.2

Note: a. Harvested area, except tree crops.

Source: Bureau of Agricultural Economics, Philippines.

Early Output Trends

The history of rice production in the Philippines dramatises the national effort to attain self-sufficiency in the country's chief staple crop. This endeavour has been a long-drawn struggle to meet the continuously mounting requirements of its fast-expanding population. To fulfil its responsibility for providing the greater bulk of the people's food, the industry has tried to raise its output to higher levels every year.

After a lapse of more than six decades since the beginning of the century, the goal of self-sufficiency

for the country was still far off, and the slow momentum that was observed from the mid-1920s seemed more likely to prevail. However, an effort towards advancement, although unimpressive, was clearly evident.

During a period covering half a century, production increased by about $3\frac{1}{2}$ times, from nearly 19 million cavans in 1910 to more than 84 million cavans in 1960 (Table 22). Venegas and Ruttan (1965,p.1) in an early study of rice production in the country, identified four periods with distinct characteristics of past growth trends, as follows:

Period	Characteristics
1. Early 1900s to mid-1920s	Fluctuating but rapid growth
2. 1926-27 to 1941-42	Relative stability
3. 1941-42 to 1952-53	Rapid decline and recovery
4. 1952-53 to 1965	Lagging growth

From the mid-1920s to the early 1960s,national average yield was relatively stable at about 25 cavans per hectare. Almost the entire expansion in output had been accounted for by additions to cultivated areas.

A dramatic change in the proportionate contribution of increases in yield to total output was observed by Ona and Hsieh (1968,p.93) in a subsequent study. From 1957 to 1965, yield contributed significantly more than area to the increase in total palay production. Area increased by only 0.2 per cent while yield increased by 10.7 per cent. About 97 per cent of the rise in output was contributed by increases in yield and only 2.0 per cent by expansion in area.

TABLE 22

PALAY PRODUCTION, AREA AND YIELD, PHILIPPINES, SELECTED YEARS

Year	Production	Area	Yield
	m.cavans	m.ha.	cavans
1903	11.47	0.59	19.3
1910	18.86	1.19	15.8
1915	17.81	1.13	15.8
1917	28.28	1.23	23.1
1920	36.34	1.48	24.5
1925	45.65	1.73	26.5
1930	51.59	1.81	28.5
1935	45.83	1.96	23.3
1940	53.70	2.08	25.8
1942	55.49	2.31	23.9
1948	50.93	2.03	25.3
1950	59.23	2.21	26.8
1953	71.46	2.66	26.9
1955	72.79	2.65	27.4
1957	76.04	2.77	27.5
1959	83.74	3.33	25.2
1960	84.99	3.31	25.7
1965	90.74	3.20	28.4
1966	92.56	3.11	29.8
1967	93.05	3.10	30.1
1968	103.65	3.30	31.4
1969	101.02	3.33	30.3
1970	118.94	3.11	38.2
1971	121.43	3.11	39.0
1972	115.91	3.23	35.7

Source: Bureau of Agricultural Economics, Philippines.

The overall average yield of palay in the country is a composite of various quantities of output per hectare that are produced under different conditions. A closer

look at these conditions is essential for a better understanding of the simple yield figure for the country.

Palay is cultivated in the Philippines during both the dry and wet seasons, in which a number of different production conditions prevail. The variations depend upon the geographic base and resources of each region. The grain is raised under either lowland or upland culture. Lowland production, which is generally undertaken by the transplanting system, may be further classified into irrigated or rainfed palay cultivation. Fields, diked to impound water, become flooded. In some areas, water is supplied by rainfall; in others, it is supplied both by rainfall and artificial irrigation. Irrigated lands generally produce higher yields than those which are exclusively rainfed (Table 23), because of the greater control of the water supply, significantly allowing for more intensive cultivation of the land.

Upland palay is cultivated without impounding water. Artificial irrigation is not used; fields are totally dependent on direct rainfall for moisture. Table 23 indicates that, of all types of rice cultivation, upland culture produced the lowest yields in recent years. National average yields for upland culture were recorded in 1968 and 1969 at only 18 cavans per hectare. Another type of upland palay cultivation is the kaingin system, or shifting cultivation, which is accomplished by clearing forest areas. This type of rice culture is discussed in more detail in Chapter V.

Varying regional yields (Table 24) would then reflect the different environmental conditions, such as the culture of rice under both lowland and upland cultivation. Varying proportions of these types of culture are undertaken during a crop year. Regional variations may also be caused by differences in technology employed, such as varieties of seed used, cultural practices followed, and the use of technical inputs such as insecticides, fertilisers, etc. (Tables 23 and 24).

TABLE 23

PALAY: YIELD PER HECTARE OF IRRIGATED AND RAINFED CROPS, PHILIPPINES, 1968-71

	1968	1969	1970	1971
	cavans	cavans	cavans	cavans
Irrigated	39.4	39.0	46.6	45.3
Rainfed				
Lowland	28.4	25.0	34.4	36.3
Upland	18.8	18.0	23.3	23.3
Proportion of Irrigated Yields to Rainfed Yields	%	%	%	%
Lowland	139	156	135	125
Upland	210	217	200	194

Source: Bureau of Agricultural Economics, Philippines.

Assuming that weather conditions and other factors remain the same, the expansion of palay area will have particular effects on output and yield, depending upon the productive capacity of new land that is brought into cultivation. If new virgin lands with high and undiminished fertility are opened and devoted to palay, increases in

both total output and yield may be expected. The expansion of palay area in the Philippines, unfortunately, has not been confined to fertile lands. Marginal and submarginal lands have also been used to augment palay area in the efforts for increasing production. Under this condition, a rise in total output may still be gained, but average yields may either remain the same or even decrease.

TABLE 24

PALAY: YIELD PER HECTARE BY REGION, PHILIPPINES, 1968 and 1971

Region	1968 Yield	1971 Yield	1971 % of 1968 Yield
	cavans	cavans	%
Philippines	31.4	39.0	124
Ilocos	40.5	35.9	89
Cagayan Valley	36.8	44.1	120
Central Luzon	42.0	51.9	124
Southern Tagalog	28.8	37.7	131
Bicol	31.3	28.8	92
Eastern Visayas	19.3	30.0	155
Western Visayas	33.3	35.8	108
Northern and Eastern Mindanao	20.3	36.4	179
Southern and Western Mindanao	26.2	34.4	131

Source: Bureau of Agricultural Economics, Philippines.

It is, therefore, very likely that the phenomenon of long-term stability of the low national average yield from the mid-1920s to the early 1960s could be the result of obtaining the arithmetic mean of palay yields

under varying production conditions which may be classified into two groups: (1) the rising yields in irrigated areas and (2) the relatively low yields of rainfed and upland palay, the areas of which have increased over the years. Each of these multiple levels of palay output per hectare contributed to the annual average for the whole country. On this assumption, the predominance of the expanded low-yielding areas could be denoted as characteristic of the period.

The largest areas devoted to palay were those in 1959 and 1969 at 3.33 million hectares. The yield in 1959 and in 1960 had remained almost the same as in the early 1920s, but the area devoted to palay had continued to increase.

A modest, but steady rise in yield could be noted in the mid-1960s, although the palay area had remained relatively stable at more than 3 million hectares.

Recent Output Trends

When national efforts to attain self-sufficiency in rice achieved their breakthrough in 1968, not a few sceptical observers of the country's endeavours to infuse vigour into the rice industry were surprised. This reaction was understandable, for the country had consistently suffered shortages of the cereal as far back as 1885. Philippine imports of rice to stave off serious local deficiencies, recorded as early as 1903, attest to the elusive goal of self-sufficiency for the country. Unsuccessful efforts of national leaders to solve the rice problem were usually regarded as having contributed

to their rejection by the electorate. The ability to maintain a sufficient supply of rice for the country had become a barometer of administrative performance.

It may be recalled that in 1960, production hardly reached 85 million cavans from a harvest area of about 3 million hectares, the low yield per hectare settling at only 26 cavans. Even today, some people still refer to 1961 as the year of the pila (queues), when queues of people awaiting rice rations from government trucks were common around street corners of Manila during the lean months of July to September. Accordingly, the rice problem became a sensitive political issue in the November elections of that year, and was considered among the factors that precipitated the change of national leadership. Three years later, the situation remained substantially unaltered. Although attempts were made to boost production to sufficiency levels, they were relatively inadequate, since the shortages had persisted.

Table 25 gives an overview of rice imports in the Philippines for selected years from 1940 to 1972. Significant quantities were imported in 1946, the mid-1960s and 1971. No imports were reported from 1968 to 1970. The relatively small quantities indicated in the table are most likely residual shipments accruing from purchase orders of previous years. Instead of importing the cereal in 1968, the Philippines exported 36,000 metric tons of rice and 6,270 metric tons of certified seeds valued at about $US6.5 million (Montelibano, 1970, p.170). The 1968 output reached more than 103 million cavans and

TABLE 25

IMPORTS OF RICE, BY QUANTITY AND VALUE, PHILIPPINES, SELECTED YEARS

Year	Quantity	Value
	metric tons	'000 pesos
1940	38,261	2,452
1945	14,546	2,278
1946	117,136	39,538
1950	3,538	1,231
1955	105,352	12,823
1961	9,200	21,193
1964	298,859	135,200
1965	559,560	228,853
1966	108,184	53,800
1967	290,452	165,010
1968	8.4	11.6
1969	9.5	13.3
1970	.39	.32
1971	370,404	202,728
1972	230	n.a.

n.a. Not available.

Source: Foreign Trade Statistics, Bureau of the Census and Statistics, Philippines.

exceeded the previous year by more than 10.6 million cavans or at a rate of 11.4 per cent (Table 22).

A wave of optimism was evident among official circles for the progress of the government's drive towards self-sufficiency. Alfredo Montelibano (1970,p.170), Chairman of the Rice and Corn Administration, wrote in part:

> Today, for the first time in Philippine history, the population explosion is being met with a production explosion. We now have a much better

> chance to meet squarely our increasing population. We have now started along the road toward bringing about prosperity for the city and the town.

It may be noted that there was a significant increase in national average yield from 31.4 cavans in 1968 to 39 cavans or about 24 per cent in 1971 (Table 24). Correspondingly, total output rose from 101 million cavans in 1969 to 118.9 million cavans in 1970 - an increase of 17.92 million cavans or 17.7 per cent above the 1969 production, out of an area of 3.11 million hectares (Table 22).

It is interesting to note that a number of typhoons lashed across the country in the latter part of 1970. However, it must be considered that the damage wrought by typhoons for the crop year ending 30 June 1970 was relatively small when compared with that inflicted during the decade of the 1960s (Table 33). The typhoons apparently had their impact on the harvests of crop year 1971 which covers the period 1 July 1970 to 30 June 1971. The storm season usually lasts from July to November. It was also in 1971 when another sizeable import of rice was made, after a relative sufficiency of the grain during the previous three years (Table 25). The decision of the government to resume importing rice was further prompted by the rise in retail prices of the cereal in Manila and the Mindanao provinces. During that period, the Rice and Corn Administration, then saddled with financial problems, could not operate effectively to help stabilise the price of rice.

In 1972, the national output of 115.9 million cavans

fell below the 1971 production of 121 million cavans after the tungro* infestation of the rice crops during that year, particularly in Central Luzon. Significant decreases in production were also recorded in the other major producing regions, Western Visayas and Southern Tagalog.

The heaviest rice producers among the different regions in recent years have been Central Luzon, Southern Tagalog, Western Visayas and Southern Mindanao (Table 26). Central Luzon has traditionally been the premier producer in the industry, generally registering the highest yields per hectare in the country (Table 24). The three other regions have been steadily gaining in importance in their contributions to the national output. The Cagayan Valley showed substantial gains in both total output and yield per hectare in 1971.

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* A virus disease. The International Rice Research Institute has conducted investigations on this disease. See IRRI (1971, pp. 111-4).

TABLE 26

PALAY PRODUCTION BY REGION, PHILIPPINES, 1968 AND 1971

Region	1968 Production	1971 Production	Percentage of 1968 Production
	m. cavans	m. cavans	%
Ilocos	5.72	4.57	80
Cagayan Valley	10.93	15.92	146
Central Luzon	26.37	33.29	126
Southern Tagalog	15.23	14.57	96
Bicol	9.86	8.59	87
Eastern Visayas	6.76	7.60	112
Western Visayas	12.52	15.04	120
Northern and Eastern Mindanao	4.22	7.74	183
Southern and Western Mindanao	12.04	14.10	117
Total	103.65	121.43	117

Source: Bureau of Agricultural Economics, Philippines.

CHAPTER V

THE SOCIO-ECONOMIC ENVIRONMENT OF THE RICE INDUSTRY - A VIEW OF COUNTERACTING FORCES

Philippine Rice Production from a World Viewpoint

In an appraisal of the rice industry of the Philippines, it is worthwhile reviewing more closely its production performance in the period before the advances in production in the late 1960s. An examination of the situation would afford a greater insight into the factors that have hampered the development of the industry for more than six decades. It may be noted that the average yield in 1965 was almost equal to the yield recorded in 1930 after a lapse of three and a half decades (Table 22).

In a review of the world rice economy in 1966, the Food and Agriculture Organization of the United Nations (FAO, 1966, p.8) reported that the average yield in the Philippines had remained among the lowest in the world (Table 27). In that year, substantial advances in rice production had already been made by Japan, Australia, the United Arab Republic, and the United States. The Philippines had about 94 per cent of Japan's area sown to rice, yet the production of the former was only 23 per cent of the latter's total output in 1963-64. The area of rice sown in the Philippines was more than four times that of the United States; however, the former had exceeded the latter's output by only 20 per cent.

During the period of the review, the national average yield of the Philippines amounting to 1.2 metric

TABLE 27

RICE PRODUCTION, AREA AND YIELDS, FAR EAST AND OTHER SELECTED COUNTRIES, SELECTED YEARS

Country	Period	Production	Area	Yield
		'000 metric tons	'000 ha.	metric tons
Far East				
Japan	1963-64	16,639	3,272	5.1
Rep. of Korea	1964	3,974	1,195	3.3
China (Taiwan)	1961-62	2,508	859	3.2
Malaysia:				
Malaya	1963-64	723	338	2.4
Sabah	1962-63	69	38	1.8
Sarawak	1961-62	113	113	1.0
Rep. of Vietnam	1963-64	5,327	2,538	2.1
Nepal	1963-64	2,108	1,090	1.9
Hong Kong	1963-64	14	8	1.8
Ceylon	1963-64	1,026	632	1.7
Pakistan	1963-64	17,724	10,294	1.7
Indonesia	1963-64	11,764	7,100	1.7
Burma	1960-61	6,789	4,334	1.6
Thailand	1962-63	9,279	6,638	1.5
India	1960-61	51,861	34,128	1.5
Philippines	1963-64	3,843	3,087	1.2
Cambodia	1963-64	2,760	2,377	1.2
Other Countries				
Spain	1963-64	399	63	6.4
Australia	1963-64	142	24	5.9
United Arab Rep.	1962-63	2,039	349	5.8
Italy	1964-65	624	120	5.2
United States	1963-64	3,187	722	4.4

Source: FAO (1966, p.38).

tons per hectare fell below the world average yield of 2 metric tons per hectare. The highest yield per hectare for the countries of the Far East region was recorded by

Japan at 5.1 metric tons, Sarawak in Malaysia accounting for the lowest yield at 1.0 metric ton. The productivity of Philippine rice farms ranked closely with those of Thailand, India and Burma which were all below 2.0 metric tons.

Typical production conditions were found to prevail in South and Southeast Asian countries where yields were below the world average. Methods of cultivation were simple, and were undertaken with primitive implements. During the past thousand years, little change in techniques has evolved. Of the yield-increasing inputs, irrigation was used for the continuous cultivation of rice, but fertiliser was not significantly applied. Systematic rotation of crops was not extensively used, since semi-aquatic conditions or the nature of the soil did not permit the cultivation of crops other than rice. Some parts of the Philippines were cited with areas in Malaysia and Indonesia where rice crops, grown without any irrigation, produced considerably below average yields. Heavy losses from plant diseases were also recorded as among the causes of low yields, as well as the system of shifting cultivation in the upland areas. A large extent of upland rice grown under this system was observed in tropical Africa. Some upland areas in the Philippines were also brought into cultivation through the same means, locally known as kaingin.

After reviewing the probable causes of low yields in the rice-producing countries, an enquiry inevitably follows into the production conditions prevailing in

countries which achieved more rewarding returns from their rice lands. Much dependence on artificial irrigation was observed in these areas. Heavy fertilisation of lands and crop rotation were practised. The less variable climate in the warm temperate regions was associated with relatively smaller crop losses. In Japan rice farms are mainly managed by owner-cultivators employing relatively more efficient techniques of production and using seeds carefully selected to grow well under local conditions. The rains in Japan are abundant and well distributed; nevertheless, the country's rice crops are provided with the most comprehensive irrigation and drainage network in the region. High productivity is encouraged by relatively high government price guarantees and related measures, not only in Japan, but also in other high-yielding producers as well. Controls in the sown areas and the scarcity of land in Japan make it necessary to increase productivity further.

The foregoing discussion provides a glimpse of the productivity of Philippine rice farms compared with that of other countries in the early 1960s. While the rice industry has always occupied a significant position in the country's agriculture and its economy as a whole, it may be interesting to note that, compared with other countries of Southeast Asia, the industry has recently shown a relatively smaller proportion in its share in both the agricultural output and gross domestic product of the country, with the exception of West Malaysia (Table 28).

TABLE 28

SOUTHEAST ASIA: RELATIVE PROPORTIONS OF AGRICULTURE AND RICE IN TOTAL PRODUCTION, 1970

Country	Proportion of Agriculture to GDP	Proportion of Rice Production to:	
		GDP	Agricultural Production
	%	%	%
Indonesia	55.5	21.8	39.2
Cambodia	44.3	24.7	55.7
Thailand	34.6	11.9	34.2
West Malaysia	34.2	3.7	10.8
Philippines	33.8	6.7	26.0
Republic of Vietnam	33.1	19.8	59.7

Source: ADB (1971, p.113).

In terms of the proportion of arable land devoted to rice production, in 1970 the Philippines accounted for 38 per cent of its arable area under rice production, compared with five other Southeast Asian countries which utilised areas ranging from 55 to 79 per cent of their arable land (Table 29). An exception was West Malaysia which utilised only 14 per cent of its arable area for rice production. With about 30 per cent of its total rice area irrigated, the Philippines was exceeded in this respect only by West Malaysia with 40 per cent and Indonesia with 33 per cent.

The production objectives of different countries vary according to their levels of sufficiency, although most of them are actively engaged in high priority programs to augment rice production. Rice surplus producing countries like Thailand, China and Nepal aim at production increases to meet their growing domestic needs, due primarily to

population expansion and, at the same time, if possible to build up additional surpluses for export.

TABLE 29

SOUTHEAST ASIA: PER CENT OF ARABLE LAND IN PADDY PRODUCTION AND PER CENT OF PADDY AREA IRRIGATED, 1970

Country	Rice Area as Percentage of Arable Area	Irrigated Rice Area as Percentage of Total Rice Area
	%	%
Republic of Vietnam	79	11
Cambodia	74	3
Indonesia	59	33
Thailand	58	30
Laos	55	2
Philippines	38	30
West Malaysia	14	40

Source: ADB (1971, p.122).

In the rice deficit countries like the Philippines, India, Indonesia, Malaysia, Laos, Sri Lanka, Korea, Vietnam and Pakistan, programs are designed mainly to attain self-sufficiency levels within the next few years (ADB, 1969, pp.180-81). As a whole, the means by which this group may attain rice production goals are basically similar to those of the Philippines, as follows:

1. Expansion of rice land by: (a) opening up new land, if available; (b) reclaiming waste and unproductive land.
2. Multiple cropping of rice by expansion of irrigated area.
3. Increasing yield per unit area through improvement in: (a) high yielding varieties; (b) cultural practices; (c) fertiliser inputs; (d) irrigation and drainage

control; (e) pest and disease control; (f) farm mechanisation; and (g) land.

Factors that have Hampered the Industry

The Agrarian Structure

Farms in the Philippines are predominantly palay producers. In 1970, there were 1.34 million farms devoted to the cultivation of the grain (Table 30), accounting for 54 per cent of the country's 2.48 million farms. A significant proportion of operators is made up of farmers who do not own the land they till. Of the palay-producing farms, only 40.7 per cent were fully owned by their operators, farms under share tenancy representing

TABLE 30

PALAY PRODUCING FARMS: NUMBER AND PERCENTAGE DISTRIBUTION BETWEEN TENURE CLASS, PHILIPPINES, CROP YEAR 1970

Tenure Class	Number	Per Cent
Owned	546,600	40.7
Partly owned	236,400	17.6
Tenanted (share)	482,300	35.9
Leased	65,000	4.8
Managed	1,900	0.2
Other tenure	10,000	0.8
Total	1,342,200	100.0

Source: Bureau of Agricultural Economics, Philippines.

a further 36 per cent of the total. The remainder were partially owned, leased or operated under other forms of tenure.

The absolute area cultivated under rice production amounted to 2.39 million hectares during the same year

(Table 31). This was about 77 per cent of the total harvested area for palay amounting to 3.11 million hectares for the year (Table 21). The difference between absolute and harvested area may be accounted for by multiple cropping in the irrigated farms. Of the total area, 39.8 per cent was farmed under full ownership and 33 per cent under share tenancy.

Among the regions of the country, Southern Tagalog and Central Luzon have the highest incidence of share tenancy with nearly one-half, or 50.7 and 49.4 per cent respectively, of their total farms under this form of tenure (Appendix A).

TABLE 31

PALAY PRODUCING FARMS: ABSOLUTE AREA, BY TENURE, PHILIPPINES, 1970

Tenure	Area ('000 ha.)	Per Cent
Owned	951.2	39.8
Partly-owned	425.1	17.8
Tenanted (share)	788.4	33.0
Leased	154.0	6.4
Managed	36.7	1.5
Other tenure	36.9	1.5
Total	2,392.3	100.0

Source: Bureau of Agricultural Economics, Philippines.

The other regions show varying proportions of this tenure class among their farms, ranging from 19.0 to 41.2 per cent.

Among the samples of palay-producing farms in the Philippines taken in a recent survey conducted by the Bureau of Agricultural Economics, almost 80 per cent were below 4 hectares (Table 32). About 69 per cent

ranged from 1.0 to 3.9 hectares, suggesting that the greater proportion of rice farms in the country are of modest size. The sizes of the farms appear to have changed only slightly over the years. In 1960, the average size of rice farms was 3.17 hectares (de Guia, 1970, p.22).

TABLE 32

PERCENTAGE DISTRIBUTION: NUMBER OF FARMS REPORTING, PALAY AREA AND PRODUCTION, BY SIZE, PHILIPPINES, 1970

Size in Hectares	No. of Farms Reporting	Palay Area	Production
	%	%	%
Below 0.6 to 0.9	10.43	2.86	2.97
1.0 to 3.9	68.98	58.41	60.27
4.0 to 9.9	17.63	29.86	29.64
10.0 to 19.9	2.18	4.54	3.30
20.0 to 29.9	0.44	1.20	1.34
30.0 and above	0.34	3.13	2.48
Total	100.00	100.00	100.00

Source: Integrated Agricultural Surveys, Bureau of Agricultural Economics, Philippines.

It may be observed that the highest proportion of land ownership on palay-producing farms is in the island of Mindanao (Appendix A). Since the latter part of the nineteenth century, it has always been noted that the provinces which had relatively lower incidences of tenancy were those in the regions remote from Manila or those with difficulty of access. These are also areas where commercial crops are not significant. Furthermore, they have a relatively lower population density, and the productivity of the land is poor (Huke, 1963, p.197).

From 1948 to the early 1960s, a significant increase was noted in the proportion of all types of farms in the whole country which were operated by tenants, the estimates ranging from 47 to 58 per cent.

Two principal types of tenancy relation exist in the Philippines: (1) kasama system, or share tenancy, and (2) inquilinato system, or leasehold tenancy.

The kasama system is more common than the inquilinato system. Under the former, the tenant contributes his labour and work animals while the landlord furnishes the land, farm implements, seeds and expenses for transplanting and harvesting. The division of the yield between them is made according to their agreement, which is invariably influenced by the customs of the place where the farm is located. There are cases where the landlord simply furnishes the land and all other factors of production are provided by the tenant. Generally, tenants under this system receive a higher share of the yield, but many cases have been observed where the sharing system is not equitable, to the prejudice of the tenant (Huke, 1963, p.203).

The inquilinato system is leasehold tenancy, whereby the inquilino, or leasehold tenant, pays the landlord for the use of the land. The rent is either in cash, kind, or both. The inquilino provides his own work animals and farm implements, labour in the cultivation of the land, and defrays expenses for the farm. The landowner collects the fixed annual rent, regardless of the quantity of the harvest which may be meagre during certain periods as a result of crop failures. The leasehold tenant thus assumes

the risk involved in the enterprise.

Over the years, problems have arisen from strained landlord-tenant relations, mainly through disagreement in the sharing system and through abuses committed between the parties. In an attempt to solve these problems, the Agricultural Tenancy Act of 1954 (Republic Act No. 1199) was passed by the Congress of the Philippines. Under this law, the class of land the the contributions given by the landlord and tenant determine the shares of the produce accruing to each party. First class rice lands normally produce an average of more than 40 cavans of palay per hectare. On this type of land, after deducting the costs of fertiliser, pest and weed control, harvesting and threshing, the proportionate share of each party is allocated as follows:

Contribution	Participation
	%
1. Land	30
2. Labour	30
3. Farm implements	5
4. Work animals	5
5. Final harrowing of field immediately before transplanting	5
6. Transplanting	25
	100

Land is classified as second class if the normal average yield is 40 cavans or less per hectare, in which case the proportionate share given to land is 25 per cent while that of labour is increased to 35 per cent.

Rental for the use of the land under leasehold tenancy shall not exceed 30 per cent of gross produce for first class land and not more than 25 per cent for second class land. Contracts between landlord and tenant are not considered valid if they do not conform to these requirements.

Distortions of resource use may arise from share tenancy in agriculture. A clue to the stagnation of Philippine agricultural productivity during the period reviewed in Chapter III may be found partly in the operating relationship of the parties under share tenancy which exists in the country.

The underlying cause of uneconomic use of resources under this system is that each party uses input contributions that belong to the other. From his own standpoint, each considers the other's contributions as having zero price. Each party is thus induced to use these inputs up to a point where their marginal product is zero; that is, where each additional input ceases to generate a corresponding return. Theoretically, the optimum output is produced at a point where marginal revenue is equal to marginal cost. Under the share tenancy arrangement, the tendency of each party is to operate at variance with the optimum level because of their conflict of interests, which negates an economic use of inputs.

The conditions obtaining under three types of tenure - full ownership, 70-30 and 50-50 sharing arrangements - are shown in Figure 4.*

The marginal revenue curves are depicted by horizontal straight lines, since it is assumed that additional units of output from the farm would not have any influence on the market price of rice. The marginal cost curves rise in the normal direction.

MR_1 represents the marginal revenue curve for an owner-operator; MR_2 for a share tenant under a 70-30 sharing arrangement, the tenant in this case providing all inputs with the exception of land; MR_3 for a share tenant under a 50-50 sharing system.

Curves MC_1 and MC_2 are identical because both owner-operator and tenant in these cases completely defray the variable expenses of operation. MC_3 represents the cost curve of the share tenant who shares costs equally with the landlord. The optimum output is equal for both owner-operator and the tenant under a 50-50 sharing system. This is shown at point OC, directly under the intersections of MC_1 and MC_2 with MR_1; and MC_3 with MR_3. The optimum output for the 70-30 share tenant is at OB, directly beneath the intersection of MC_1 and MC_2 with MR_2, which is less than OC but greater than OA. OA is the output at which the tenant paying half the crop as rent also defrays all the variable costs.

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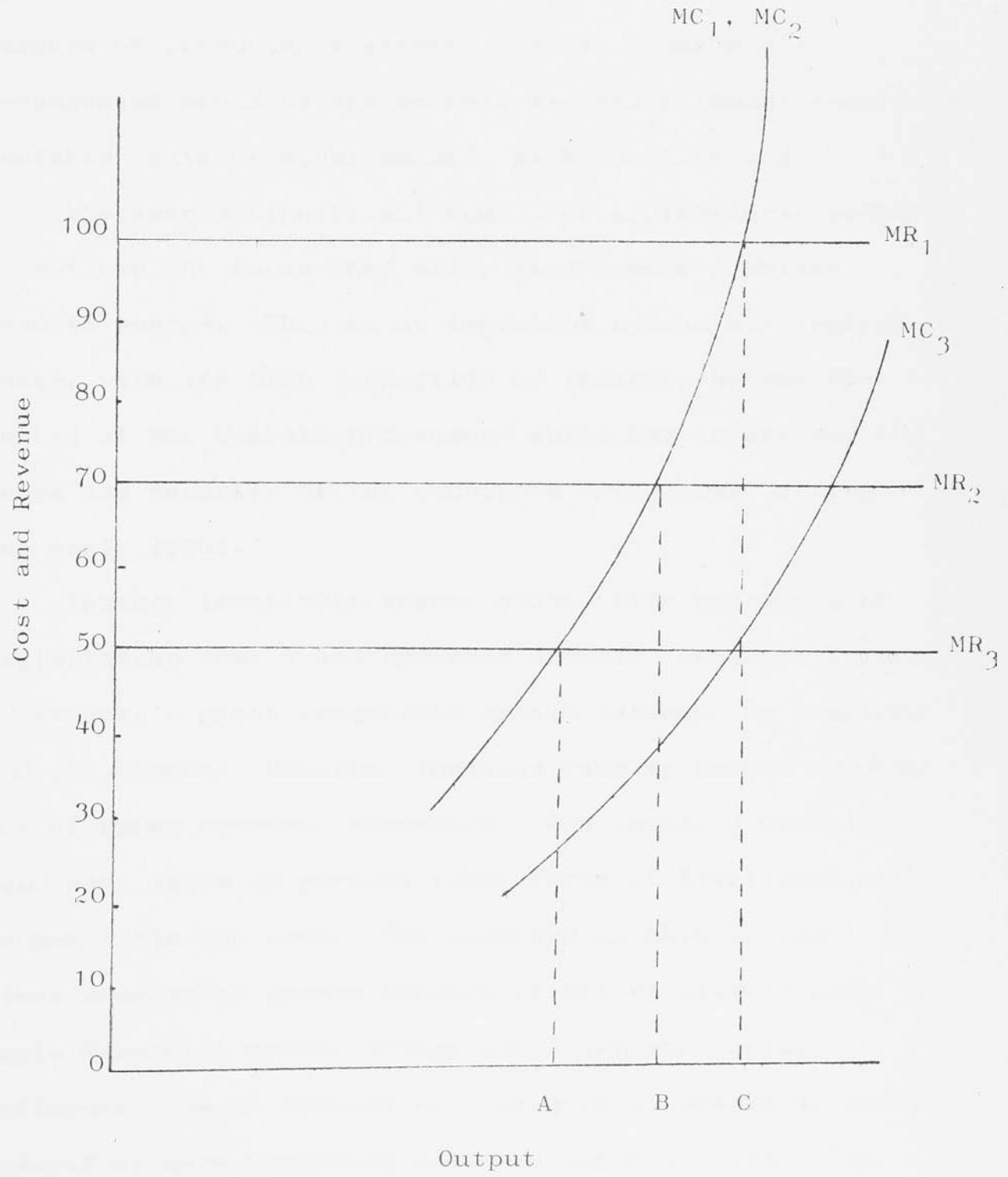
* For the basic concept, this section draws mainly on Bishop and Toussaint (1958, pp. 158-9). See also Beckford (1972, pp.168-9).

FIGURE 4

MARGINAL REVENUE AND MARGINAL COST CURVES OF FULL OWNERS, AND OPERATORS UNDER 70-30 and 50-50 CROP SHARING ARRANGEMENTS



The diagram illustrates that, in cases where the land is fully owned by the operator and where the tenant shares variable costs equally with the landlord, an optimum output is produced which is greater than the production of a tenant defraying a larger share of variable costs. This situation implies that, for the purpose of producing a greater output, a desirable arrangement would be one wherein the share tenant shoulders variable costs of equal amounts with the landlord.

Wherever a significant number of agricultural workers do not own the farms they till, land tenure problems tend to emerge. This is an important reason why Central Luzon, with its high proportion of tenancy, became the hotbed of the Hukbalahap movement which had threatened the peace and security of the country's 'rice bowl' during the early 1950s.

Tenancy invariably spawns abuse, like practices of exploitation that breed agrarian unrest. Under this form of tenure, a gross inequality exists between the landlord and the tenant. Usually, landless farmers become tenants out of sheer economic necessity. The landlord owns the land and, while he pursues other forms of livelihood, the tenant tills the land. The landlord is able to tap other sources of income because of his relatively more ample financial means, better education and social influence. He is thereby at a greater advantage to avail himself of more rewarding economic opportunities. The tenant often remains on the land, almost totally dependent upon the landlord for his subsistence and overall

economic welfare.

Montemayor (1969, p.136) writes poignantly of the pernicious effect of share tenancy on farmers and agricultural productivity in the Philippines, as follows:

> Moreover, under sharehold tenancy, the landlord actually manages the farm. Ultimately, he makes all important decisions. In actual practice, the tenant is virtually the servant of the landlord. He does what the landlord commands him to do. And since the harvest is divided between the landlord and tenant, the tenant has very little incentive to increase the harvest. Hence, the tenant's economic position sinks lower and lower, and various forms of exploitation are practised upon him such as usury, forced and unpaid services for the benefit of the landlord, short-sharing, political coercion, etc.

In an agricultural economy predominated by small landholdings, the relatively meagre returns accruing to the operator from the land are further reduced by the necessity to share the harvest with the landlord. Productivity is further inhibited by the tenant's confinement within a subsistence level. And where yields are depressingly low, the tenant invariably finds himself constantly in debt. Clearly, the incentives for higher productivity are stultified under such conditions. Means for increased output remain beyond the reach of the tenant when his goal in the short-run is to provide himself and his family with just enough to live on during the intervals between harvests. In the event of a good crop, he may earn a little more, an amount usually credited against his constantly mounting debt with the landlord and the village moneylender.

Uncertainties of Weather

Rice production in the Philippines has consistently

suffered from the adverse effects of inclement weather. Typhoons bring torrential rains over palay-producing regions and often inflict damage on standing crops through destruction by strong winds and floods. The floods that revaged Central and Northern Luzon in August 1972 were particularly severe, after continuous rainfall for more than twenty days starting in the latter part of July. All of Central Luzon was in the path of two typhoons which swept the region at 100 and 150 kilometres per hour respectively.

The losses inflicted by the floods in Central Luzon and Southern Tagalog were estimated at 6.4 million cavans (Table 33). This was equivalent to 25 per cent of the production of the whole region for the crop year ended 30 June 1971. In nearly 216,000 hectares of affected areas, yields were expected to drop by 43 per cent from the regional average of 49 cavans to only 28 cavans. Laguna and Rizal provinces suffered damage to their rice crops covering an area of 228,000 hectares (Table 33).

Over the years, typhoons have struck the country in varying degrees of intensity. Table 34 presents the production losses incurred from 1962 to 1971, as a result of typhoons and floods. The most extensive damage has been recorded during the years 1963, 1965, and the consecutive years 1968 to 1971, ranging from 1.9 million cavans in 1965 to 10.7 million cavans in 1971.

Typhoons are considered the most fearsome and awe-inspiring elements that bring rainfall to the Philippines. Immense amounts of moisture which could

TABLE 33

PALAY CROP DAMAGES: AREA AFFECTED AND PRODUCTION LOSSES DUE TO TYPHOONS AND FLOODS, BY PROVINCE AND REGION, JULY 1972

Province	Affected Area	Yield per Hectare		Net Production Losses
		Normal	Expected Reduction	
	'000 ha.	cavans	cavans	'000 cavans
Bataan	5.6	48	6.1	34
Bulacan	16.1	56	29.1	469
Nueva Ecija	39.6	49	46.2	1,831
Pampanga	31.0	48	29.8	923
Pangasinan	78.4	47	32.5	2,548
Tarlac	41.1	51	5.2	212
Zambales	3.7	45	6.0	22
Total Central Luzon	215.5	49	28.0	6,039
Laguna	9.1	53	26.2	238
Rizal	3.7	46	27.3	101
Grand Total	228.3	-	-	6,378

Source: Bureau of Agricultural Economics, Philippines.

constitute from 25 to 33 per cent of the total Philippine rainfall are carried by one storm.

The Philippine typhoon season usually lasts from July to November. However, storms may also strike during other months. If damage is wrought on newly-planted crops, fields may still be replanted and serious depletion of harvests thereby minimised. Unfortunately,

TABLE 34

ESTIMATED PALAY AREA AFFECTED AND PRODUCTION LOSSES DUE TO TYPHOONS AND FLOODS, PHILIPPINES, 1962-71

Year	Area	Number of Cavans Lost	Value
	'000 ha.	'000	m.pesos
1962	15.7	367.1	3.46
1963	118.0	2,354.1	23.21
1964	66.0	642.7	7.65
1965	256.8	1,916.3	24.92
1966	24.8	118.9	1.82
1967	256.7	1,488.6	19.32
1968	338.8	6,556.8	115.84
1969	136.5	2,176.0	31.67
1970	7.0	173.0	2.40
1971	395.5	10,685.4	190.12

Source: Bureau of Agricultural Economics, Philippines.

the typhoon season is usually the period just before the first crops are harvested. In this situation, losses inflicted by typhoons cannot be recovered on time, and an impending rice shortage would have to be averted by importation.

Catanduanes, the Bicol Peninsula, the Samar provinces and other Eastern Visayan islands are directly

in the path of typhoons that rage over the Philippines annually. Frequently, the central regions also suffer from the effects of strong winds during the storm season.

Scientists and meteorologists have undertaken studies to minimise the destruction wrought by storms. The groundwork of project 'Stormfury', an anti-typhoon program in the Western Pacific, was laid in October 1971 by the typhoon committee of the United Nations Economic Commission for Asia and the Far East (Beo, 1972, p.49). The Philippines is co-operating in this project, together with the United States, Taiwan, South Korea, Laos, Japan and Hong Kong. The scientific experiment does not seek to dissipate a storm, but only to reduce its wind force. It was reported at the ECAFE session by C.D. Hughes, of the U.S. National Oceanic and Atmospheric Agency, that the project had succeeded in reducing the power of some Atlantic hurricanes by 15 per cent.

The project may be implemented in the Philippines by the establishment of a storm warning network of storm-finder radar stations in five strategic locations. A special aircraft will be part of the equipment to be used in decelerating a typhoon's destructive power.

Droughts have also taken their toll of damage on rice production. During the last decade, the heaviest losses from droughts have been recorded for the years 1964, 1966, 1968 and 1969 (Table 35). Losses amounting to more than 9.2 million cavans were incurred in 1969. In another drought year, 1964, the country lost almost 2 million cavans of palay.

TABLE 35

ESTIMATED AREA AFFECTED AND PRODUCTION LOSSES DUE TO DROUGHTS, PHILIPPINES, 1962-72

Year	Area	Number of Cavans Lost	Value
	'000 ha.	'000	m.pesos
1962	9.0	350.8	2.79
1963	1.1	78.8	0.93
1964	96.0	1,999.2	17.49
1965	3.2	11.2	0.16
1966	17.2	300.2	4.50
1967	10.7	95.9	1.72
1968	47.2	828.8	11.69
1969	467.0	9,243.8	176.05
1970	-	-	-
1971	-	-	-
1972	12.0	72.0	2.02

Source: Bureau of Agricultural Economics, Philippines.

The most radical measure against drought, high intensity of evaporation and dry winds, which can be applied by farmers, is irrigation. In areas where irrigation is not available or cannot be undertaken, the other alternative measure is the selection of crops best suited to resist various forms of drought. These crops should be able to maintain their productive capacities under extremely dry conditions.

The Traditional Rice Farmer

The traditional rice farmer personifies the human factor in the low-yielding rice farms in the country where the pace of progress has been slow. He has been described as poor, with minimal schooling, living in a dilapidated hut made of bamboo, palm leaves or cogon grass roofing.

His small house is usually a two-room dwelling, combining within a meagre space his living room, dining room, bedroom, playroom for his children, and storage for grain.

This farmer is typically a tenant, farming some three hectares of land on a sharing system with his landlord. He considers his farming operations principally as providing the basic needs of his family, mainly food, through the production of his farm. A minor portion, usually about one-third or 34 per cent of his share of the produce, may be sold to meet his cash requirements for the year. His production efforts are confined largely on the subsistence level - to provide food for himself and about five other members of his family.

Since most of the irrigated lands belong to the big landlords, he is totally dependent on rainfall, operating his farm on a monoculture, one-crop, system for short periods during the year. His farming activities are centred on rice culture. He may tend patches of vegetables and raise some poultry and a few hogs on his farm, mainly for home consumption. Generally, however, this type of farmer has no other crops that he can sell in the market to augment his needs for cash. About 30 to 35 cavans per hectare, representing his total harvest for the year, provide for his family's food and cash requirements. Usually, as in a 50-50 sharing system, half of this quantity goes to the landlord as rent for his land and a part of the remainder is given to creditors as payment for loans that he had previously solicited during periods of urgent necessity. Occasionally, he may find off-farm

employment, doing odd, generally casual, jobs in the nearest town.

Labour utilisation is far below optimum. The farmer spends an average of 5.3 months working on the farm; 2.1 months in off-farm employment such as carpentry and barbering. The remaining 4.6 months are spent unproductively (Tablante, 1965, p.48).

The traditional rice farmer operates with limited capital investments. The landlord provides about 33 per cent of the total farm capital, consisting mostly of farm land. About 12 per cent is contributed by the farmer, accounted for by small buildings including his house, the home lot and other assets. The working capital from which the farmer draws his minimum requirements for tools, productive livestock and farm supplies generally averages less than P200, which is mostly borrowed money.

The farmer's inadequate capital severely deters him from using improved technology and better farm practices, no matter how greatly convinced he may be of their potential to increase his production.

Table 36 shows the small annual average residual incomes of lessees and share tenants of a group of crop loan borrowers in the Philippines for the year 1957-58. Sandoval (1964, p.187) observed that potential savings from the residual incomes are not invested in operating the farm business but are actually used mostly in other expenditures such as providing for the education expenses of the farm operator's children, improving living quarters and purchasing household appliances like sewing machines

and radios. Part of these amounts may be saved for the purchase of land, as in the case of owners of land whose incomes are relatively larger than those of lessees and tenants. When residual incomes are meagre, as those of the latter, the demands of other consumption requirements generally get priority over the need to invest in the farm business. Often, a part of this residual income has to be spent on instalment payments for loans. In the case of the share tenant, this necessity often arises, and is relatively more compelling.

To a certain extent, the adoption of modern technology by rice farmers could be facilitated if their level of education were adequate. Education and experience foster confidence in the feasibility and effectiveness of modern technology and enhance the farmer's ability to apply recommended innovations to his farm operations. In this respect, the traditional rice farmer is greatly restricted.

The farmer with only three or four years' schooling behind him often finds it hard to understand the technical information he receives, such as that found in brochures and other pamphlets on crop culture which are usually distributed by agricultural extension personnel. The maintenance of even a simple farm record - an important farm management tool - is, for him, a complicated and tedious task that can be more conveniently left to his memory. This type of farmer makes it difficult for researchers to collect agricultural information for various surveys in the rural areas of the country.

TABLE 36

AVERAGE CASH RECEIPTS, FARM OPERATING EXPENSES, NET CASH INCOME, FAMILY LIVING EXPENDITURES AND RESIDUAL INCOME, BY TENURE, 400 CROP LOAN BORROWERS, ACCFA,[a] 1957-58

(in pesos)

Item	Owner	Part-Owner	Lessee	Share-Tenant
Total cash receipts	1,619	1,489	1,172	928
Less farm operating expenses	258	278	245	163
Net cash income	1,361	1,211	927	765
Less family living expenses	807	804	704	701
Residual income	554	407	223	64

Note: a. Agricultural Credit and Cooperative Financing Administration, Philippines.

Source: Sacay (1961), cited in Sandoval (1964, p.186).

Field personnel of the Bureau of Agricultural Economics in the Philippines, with whom the writer has frequently associated, have cited cases of farmers who are still hampered in their farm operations by superstitions and other irrational beliefs. This unfortunate characteristic is one often observed in farmers who have spent only a few years in school. One example is the farmer who hesitates to apply fertiliser because he fears that the land would develop a 'taste for fertiliser' and would completely 'refuse' to produce any amount of crop if fertiliser were not available. Another case is the farmer who fears to take measures against disease infestation despite encouragement to the contrary by extension personnel. He believes that the infestation is a punishment imposed upon him by the Almighty for

his sins, and that he would suffer more if he resisted the Divine Will. The same state of mind is common among groups of farmers who reject family planning measures, no matter how dim their prospects may be of providing adequately for seven or eight children. The 'bahala na', or 'let things right themselves', attitude among these farmers is a significant factor impeding greater initiative and efforts for advancement.

Table 37 indicates the levels of formal education among farmers in the Philippines. Part-owners with 82.7 per cent occupy the highest proportion among farm operators who have received formal education, followed by full-owners with 79.1 per cent. Tenants account for the lowest proportion of operators with formal education at 78.7 per cent.

Farm managers, part and full owners spent the greatest number of years in school at an average of 9.5 years. Share tenants appear to have spent the least period - 3.38 years - in formal education.

Primary education appears to be the level of schooling for the majority of farmers, 59.0 per cent, the overall average number of years in school amounting to only 3.74 (Table 38). More than one-quarter completed intermediate education. A minimal proportion, 1.5 per cent, claims to have attained the college level.

Private moneylenders are the rice farmer's principal sources of credit. This is a necessity imposed upon him because he does not have mortgageable property which can be accepted as collateral for loans. He does not avail

TABLE 37

AVERAGE NUMBER OF YEARS IN SCHOOL AND PERCENTAGE OF FARM OPERATORS RECEIVING FORMAL EDUCATION, BY TENURE, PHILIPPINES, 1962

Tenure Status	Average Number of Years in School	Proportion of Total Operators Receiving Formal Education
		%
Total	3.74	79.9
Full-owner	3.85	79.1
Part-owner	3.96	82.7
Tenant (all)	3.39	78.7
Share	3.38	78.8
Cash and others	3.51	76.5
Farm Manager	9.50	100.0

Source: Bureau of Agricultural Economics, Philippines.

TABLE 38

PERCENTAGE DISTRIBUTION OF FARM OPERATORS CLASSIFIED ACCORDING TO LEVELS OF FORMAL EDUCATION, BY TENURE, PHILIPPINES, 1962

		Percentage distribution of operators who acquired formal education			
Tenure Status	Total	Primary	Intermediate	High Sch.	College
	%	%	%	%	%
Total	100	59.0	29.0	10.5	1.5
Full-owner	100	55.5	31.1	11.0	2.4
Part-owner	100	58.2	28.8	11.7	1.3
Tenant (all)	100	65.3	26.2	8.3	0.2
Share	100	65.5	26.3	8.0	0.2
Cash and others	100	60.0	24.6	15.4	-
Farm Manager	100	-	-	100.0	-

Source: Bureau of Agricultural Economics, Philippines.

himself of banking facilities, since their proper and wise use is usually unknown to him, or difficult to comprehend.

Having lived in the socio-economic organisation characteristic of his community, the operations of modern institutionalised sources of credit still confuse the farmer. His desire to avail himself of their services dampens when he realises how much paper work has to be accomplished in applying for credit. He has little patience with the slow pace in the processing and releasing of his loans. In the rural areas where the farmer lives, economic relationships are personal, rather than business-like. Since transactions are generally completed with oral promises based on mutual trust, written records are seldom kept. In many instances, he has to obtain his credit requirements from the landlord, the moneylender, or merchant who knows him well but who often charges rates of interest ranging from 20 to 300 per cent a year. The landlord and other moneylenders usually get a lien on the farmer's rice crop for cash advances extended between harvests.

Customs and traditions are significant factors governing the farmer's attitudes, and could be powerful inhibiting influences on his receptiveness to new ideas and new techniques. They tend to hamper his attempts to improve his mode of living and his efforts to provide for his needs. He regards life as a wheel of fortune, taking things as they come, believing that they spring from a predetermined plan of the Almighty, and there is nothing

much he can do about his condition. Consequently, he takes a passive stance, persevering little on a manipulating way to change his lot for the better.

Since his formal education is generally limited, his horizons for self-improvement do not extend beyond a point where deeply ingrained customs and traditions lose their absolute hold on him. This condition hampers his development into a farmer who regards his work as a partnership with nature over which he has some measure of control.

The community where the farmer lives is deeply rooted in the traditions that have shaped his value systems. His worth to the community is measured by the way he 'gets along' with the rest of the villagers. Accordingly, his marginal propensity to spend runs high. As any one of his children gets baptised, or whenever village fiestas are in season, he feels an obligation to invite all of his friends to parties which he prepares by slaughtering some hogs, a cow or a coop of chickens, most of which are purchased out of borrowed money. Often, these activities leave him with nothing to improve his farming operations such as increasing his stocks of improved seeds and other production inputs. There are many other instances, such as illness of members of his family, when the farmer has to lean on credit to defray consumption expenditures which tend to drag him deeper into debt.

The traditional farmer is thus caught in a vicious circle. His low productivity, resulting from the impact

of the various economic, social and cultural forces, severely limits his income. His meagre education, the constraints of his tenure status, and consequent inability to produce beyond a subsistence level, are significant factors hampering his capacity to adopt new technology and institute changes that could provide him with a better life.

The Slow Evolvement of Rice Technology

Improved methods of palay cultivation in the Philippines registered their impact only in the late 1950s and the early 1960s. During these periods, two new systems of rice cultivation - the Masagana and the Margate - were hailed as ideal methods for the country.

Under the old system, farmers do not select their seeds, but plant them indiscriminately. Moreover, they cannot achieve the full effect of tillering because of their practice of planting too deeply, with too many seedlings to the hill. A large proportion of healthy seedlings are also damaged by the practice of pounding the seedlings to the ground to remove excess soil.

The Masagana and Margate systems which are basically similar, encourage far more careful cultivation techniques from seed selection to harvesting. Seeds are tested for fullness, and straight row planting and regular spacing are followed. These methods reduce the number of seedlings required per field. Effective use of the soil is made possible, as well as ease in the use of simple weeding machines. Water is maintained at a greater depth and fertilisers are regularly applied.

Until now, a substantial proportion of rice in the country has been produced by upland farming. In 1972, about 270,000 hectares, or 11.4 per cent, of total harvested area of rice were devoted to upland culture. An estimated 7.2 million cavans were produced at an exceedingly low yield per hectare of only 19.5 cavans.

Two distinct forms of upland farming are still practised in the Philippines: kaingin, or shifting cultivation, and permanent field upland farming. Kaingin farming is usually undertaken on hillsides, since most of the land on gently sloping areas is already planted to permanent crops or is generally covered with cogon (tall, wild grass) which has grown after a period of kaingin cultivation. In the choice of a site for kaingin, vegetative cover is considered with care, the choice usually being of lands covered with heavy stands of forest. Kaingin farmers are well aware of the low fertility of soils covered with bamboo and wild grasses such as cogon or jungle growth. The forest is cleared and allowed to dry for a period ranging from one to four months. The cut trees and bushes are then burned, after which palay seeds are planted between the stumps of trees with the aid of a pointed stick.

Kaingin farming depends upon rainfall alone. The use of fertiliser (except for the ash of burned material) and pesticides is practically unknown. Weeding, if not omitted entirely, is haphazardly done, and the crop is only barely protected from wild animals with a crude fence.

The yields of palay in kaingin farming may amount to

about 35 cavans during the first year, but in successive years harvests tend to decline rapidly. Areas on steeply sloping land are also eroded easily, and the original fertility of the soil is substantially lost after two or three years. Often, at this stage, weeds become uncontrollable, and when the farmer believes that further planting of the area is no longer as profitable as in previous seasons, he abandons the field and searches for a new area.

The practice of kaingin farming has not only contributed to the low average yield of rice lands in the country, but it has also abetted the rapid denudation of forest areas. As well as from kaingin farming, the problem of forest denudation has arisen from indiscriminate logging. This is one of the serious problems of agriculture confronting the country today. Both shifting cultivation (kaingin) and illegal logging have laid bare some 60 per cent of the forest lands of Luzon, and it is believed that more than 50 per cent may not regenerate into high forest (Hicks and McNicoll, 1971, p.212). It is also estimated that about 40,000 hectares of forest area in Northern Luzon are lost annually through these destructive practices.

The majority of farmers operating a kaingin were previously share-tenants. Under the traditional terms of tenancy, it is difficult for a farmer to live above the lowest level of subsistence. These tenants soon realise that the only way they can alleviate their poverty is to acquire lands of their own. The unoccupied

forest areas accordingly appear to them as the fulfilment of their hopes. The attraction of the kaingin system for farmers rests basically, therefore, on the land hunger of peasants, their desire for independence, and the opportunity to earn a little more for their efforts since they do not have to share their harvests with a landlord. Theirs is a longing for freedom from the bonds of tenancy. They do not seem to realise, however, that the system shackles them to a semi-nomadic exitence, necessarily imposed by the need to shift cultivation which is characteristic of kaingin.

In upland farming which is totally dependent on rainfall, lack of ponding and the relatively slow growth of rice seedlings foster the rapid development of weeds. Even in cases where the soil has been carefully prepared, weeds may still flourish and compete successfully against rice for soil nutrients and sunlight. Lack of adequate weeding will, therefore, result in low yields. Under this type of culture, weeding demands greater time and attention than is necessary under lowland culture.

Deficiencies in the Marketing System

With the advances made in rice production in recent years, it has been observed that much remains to be accomplished towards the solution of the so-called 'second generation problems'. These problems are centred mainly on the marketing functions - drying, storage, milling and transport of rice.

The rice processing industry in the Philippines has yet to attain modernisation. From the 1950s to the

early 1960s the need for modernising rice processing facilities was the object of much concern and discussion in government circles. However, efforts towards this goal did not gain much headway because rice millers were not given adequate incentives to improve their processing facilities. The millers did not benefit from a credit program that would finance such improvements. On their own, they would not initiate such a step which would involve substantial cash outlays. When a dramatic increase in rice output was thus realised in 1968, rice processing in the country was not much different from its status during the earlier decade (Drilon, 1969, p.2-1).

Most storage facilities have been crude - a warehouse for grain is typically a barn-like structure where palay and milled rice in jute bags are piled on pallets or dunnage. The walls are usually made of flattened petrol drums. Most of these structures are not well-ventilated, nor are they free from rats and other pests.

Much of the harvested palay is wasted due to lack of drying equipment at the rice mills. Generally, rice farmers do not have mechanical dryers, using only concrete platforms and bamboo mats for sun-drying palay. Recently this situation has created a problem. With the increased adoption of rice varieties that are harvested during the rainy season, solar dryers cannot be used effectively. Even in warehouses, it may be observed that palay deteriorates to some extent, yielding lower recoveries and a proportion of yellow grains when milled.

In the Philippines palay is unhusked in three ways:

through the kiskisan mill, the cono mill, and by handpounding. The kiskisan is a rice mill with an average milling capacity of 45 cavans of palay per 12 hours. Approximately 30 per cent of the palay produced in the entire country is milled by kiskisans, where the owner is paid in kind. The average recovery rate of kiskisan mills is only about 59 per cent of clean rice.

The processing of rice by kiskisans is much greater in deficit regions or in areas which are just self-sufficient in the cereal than in surplus production regions such as Central Luzon and Western Visayas. One reason for this is attributed to the relatively larger investments of capital required by the conos. Businessmen find it more profitable to establish these larger mills in locations where rice is produced in relative abundance, as in the regions just mentioned. Usually, conos are established with warehouses capable of storing hundreds of cavans of palay.

The cono has a much higher recovery rate, about 67 per cent. The owner of this type of mill is usually a dealer and miller at the same time. The milling capacity of the cono is considerably greater than the kiskisan, averaging about 150 cavans per 12 hours, or over three times the volume of the smaller mill. Large conos can process over 1,000 cavans per day. Usually, the operator owns a fleet of trucks which collect palay from producers immediately after threshing. Approximately 50 per cent of the total rice production in the country

is processed by conos. In Central Luzon, about 80 per cent of the production is handled by these large mills.

About 20 per cent of the harvested palay in the country is still handpounded. This method of rice processing is not desirable because of its low rate of recovery, and the clean rice produced by this means cannot be kept for a long period. In almost every village in the Ilocos region, the mountain provinces, Samar, Leyte or Northern Mindanao, handpounding of palay is commonly practised.

There have been suggestions in government circles on the advisability of changing kiskisans to more efficient mills such as the cono or cylinder type, whereby milling recoveries could increase by about 2 or 3 per cent in volume. This shift, however, would require considerable credit financing. Furthermore, a reality in the rural areas that should be considered is the fact that the kiskisans, at which the owners are usually paid in kind, perform a necessary function in these places. The kiskisan is a more convenient outlet for the small rice farmer who has only a few cavans to process. Often, he can bring for quick processing only one or two cavans which he needs for home consumption. These farmers, who are usually found in deficit areas, frequently do not have ready cash to pay for the service.

Other alternatives which could be more feasible are the gradual improvement of the existing kiskisan mills in the country to approximate the efficiency of foreign manufactured mills, like the Japanese type. This mill is

reported to have a relatively high rate of recovery, apart from being portable and capable of processing up to 15 cavans per hour. The existing cono mills could also be improved, by installing more efficient components such as graders to separate immature from mature grains, a system to produce powder-free rice, a polisher to improve the appearance of the grain, and other improvements, if plant space could accommodate them.

In 1962-63 about 47 per cent of palay production in the Philippines entered commercial channels. This proportion increased in 1965 to just over 61 per cent (Table 39). The table does not include palay used for seeds during the year, which normally come from the harvest of the previous year or from outside sources, such as certified seeds from government agencies.

Figure 5 shows the physical flow of rice and rice by-products in the Philippines. Government agencies like the National Grain Authority, Farmers' Cooperative Marketing Associations, and local rice dealers perform important assembly functions. Some local buyers are agents of large wholesalers, while others are entrepreneurs undertaking business independently. They sell to large wholesalers and processors such as the owners of cono mills who perform wholesale distribution in addition to processing. Kiskisan operators serve the people principally in the rural areas.

Wholesalers are generally located in large market centres. They may deal mainly in rice, but their stocks

TABLE 39

PERCENTAGE BREAKDOWN OF PALAY DISPOSAL, PHILIPPINES, 1965

	%
Entering Commercial Channels	
Rent and landlord's share	23.4
Exchanged for services	13.1
Sold and/or paid for loans	24.8
	61.3
Household Consumption and Other Disposals	
Consumed by households of operators	17.9
Animal feeds and other uses	2.0
Probable stock at end of year	18.8
	38.7

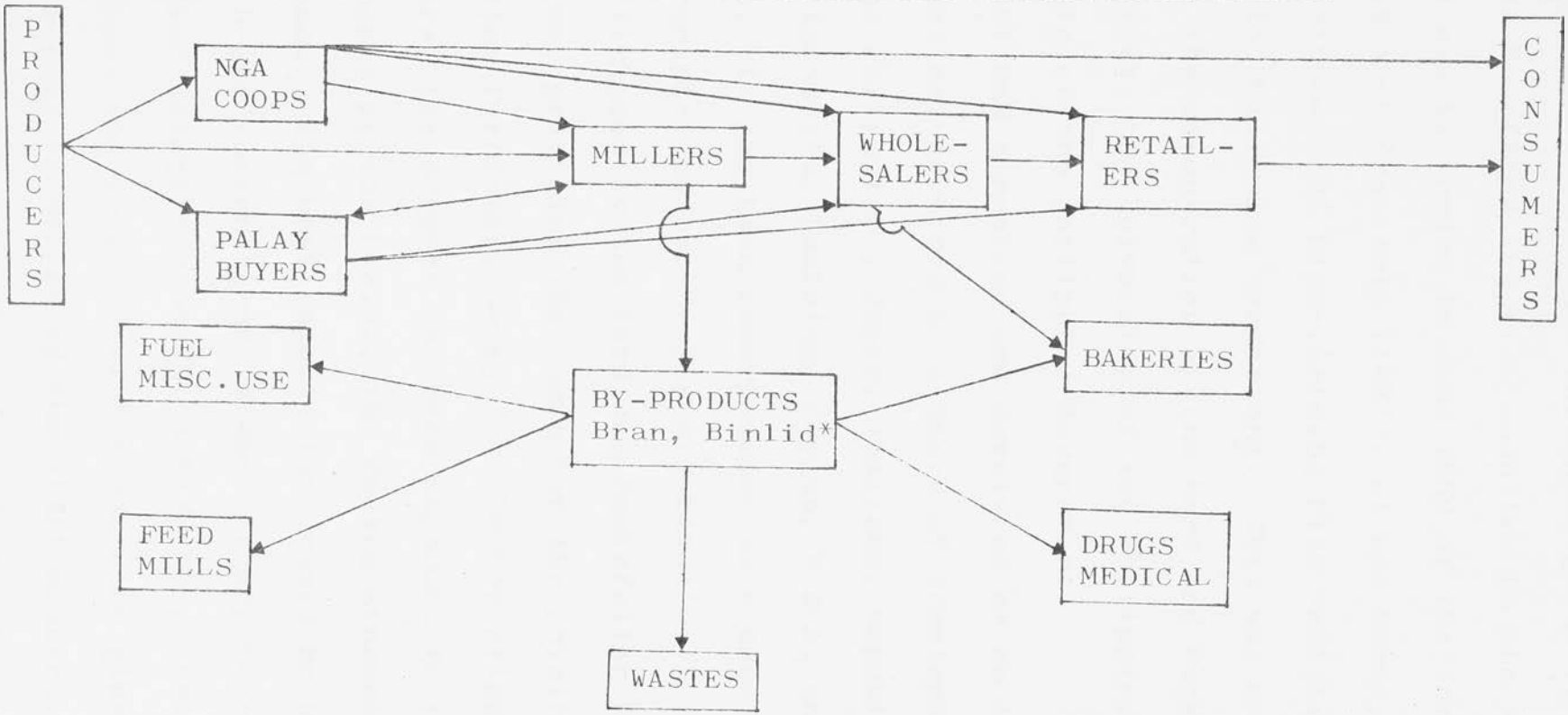
Source: Belarmino, (1965, p.15).

may also include other vegetables. Wholesalers who transact business in major agricultural areas are sometimes referred to as wholesale assemblers. In urban areas, they are appropriately called wholesale distributors. The wholesalers in the production areas may, therefore, sell to other wholesalers who operate in the towns and cities. This situation extends the marketing channels through which the product passes from the producer to the consumer.

A wide marketing margin exists between the retail price and the prices received by farmers. For the three-year period, June 1957 to June 1960, this margin was estimated to vary from P3.00 to P4.75 per cavan of palay or from P6.00 to P9.50 per cavan of rice (Gutierrez, 1965, p.212).

FIGURE 5

PHYSICAL FLOW OF RICE AND RICE BY-PRODUCTS IN THE PHILIPPINES



* Fine milled grain

Source: Gutierrez (1965).

Factors that have Fostered the Industry

Recent Advances in Technology - IRRI and its Accomplishments

Undoubtedly the most fortunate event in many decades that has benefited the rice industry in the Philippines was the establishment in June 1959 of the International Rice Research Institute (IRRI), at Los Banos, Laguna, and its development of high-yielding rice varieties particularly suited to Philippine conditions. This was made possible through the co-operation of the Ford and Rockefeller Foundations, the University of the Philippines, and officials of the Philippine Government.

IRRI was conceived and developed as an international organisation, governed by a board of trustees drawn from the Philippines, Japan, Thailand, Republic of China, India, Indonesia, Pakistan, Ceylon, U.S.A. and Latin America. It has been incorporated as a non-stock, philanthropic and non-profit organisation. Initially, it was financed by the Ford and Rockefeller Foundations, the former providing the funds for the physical plant, and the latter furnishing money for the operating costs. Over the years, its support has been expanded to include the governments of the U.S.A., the United Kingdom, Japan and Canada. The best talents that could be assembled from a broad international community may be said to form its senior scientific staff, a body representing diverse disciplines and equipped with experience gleaned from the different countries of the staff members.

Dr Robert F. Chandler, Jr., former Director of IRRI, stated in an address during its 10th anniversary celebration

in April 1972 that foremost among the Institute's early accomplishments has been the development and distribution on a massive scale of a new plant type for the tropics (Chandler, 1972, p.10).

The rice plant may be characterised as being location-specific; that is, the biological and economic environment must be suitable to the plant itself. It was, therefore, essential that the new and improved plant variety would have to be developed in the Philippines or in other areas approximating the environmental conditions of the country where the plant would be grown. IRRI was able to develop a plant type particularly suitable for the Philippines. With this type as a base, further advances were made and paved the way for the attainment of the high yield of rice that has been made possible through the use of the new plant varieties.

The new type of rice plant has a number of properties which enables it to achieve yields considerably higher than the traditional varieties. It is highly efficient in converting solar energy and plant nutrients into grain. With its short, stiff straw, its tendency to lodge (fall over) is much less. It is able to benefit from much sunlight which penetrates its upright leaves easily. Through its heavy tillering capacity, it can produce more panicles of grain per unit area of land. A stand of rice is thus able to compensate for missing hills, or, under direct seeding, for thinly-seeded areas. These properties are distinct improvements on those of the traditional rice plant which is tall, droopy-leaved, and highly

susceptible to lodging. Furthermore, the traditional plant, unlike the new variety, does not respond well to the application of fertiliser, or better environmental conditions.

The first efforts of IRRI were centred on the collection of thousands of tropical rice varieties. These were studied and evaluated carefully. Out of this intensive screening, the variety, Taichung Native 1, which had been developed in Taiwan, was found to have the desired plant characteristics, such as its short height, which IRRI had sought to develop. The scientists were able to identify those genetic factors which were easily transferable, such as the semi-dwarf character of Taichung 1 which it inherited from one of its parents, Dee-geo-woo-gen. Crosses were made between Taichung 1 and a similar variety, I-geo-tse, and thousands of progeny lines were evaluated until the first high-yielding variety, IR8, was developed and named in 1966. With the birth of IR8, new insights were also gained on the physiological base of potential yield increases, and on the appropriate cultural practices and pest control methods under which the new rice plant could grow and produce well in Philippine con'itions.

The IR8 became available for distribution to Philippine farmers in 1966. It has been aptly named 'miracle rice' which suggests its unusually high yield potential as compared with the traditional types.

A number of problems were encountered with IR8 because of its reportedly inferior milling and eating qualities and lower disease resistance than some traditional varieties

(IRRI, 1967, p.243). It also required a relatively greater amount of weeding. Through sustained experiments, IRRI was able to develop other varieties in succeeding years: the IR5 in 1967, the IR20 and IR22 in 1969; and IR24 in 1971. The other varieties have been reported to show greater resistance to disease than IR8 and to possess improved grain characteristics.

Apart from the development of the high-yielding rice varieties particularly suited to the tropics, IRRI has achieved further advances in the science of the rice plant and its culture which could be of incalculable benefit to the progress of rice production in the Philippines. When IRRI started its operations in 1962, some aspects of the science of the rice plant were not well understood, if not totally unknown. Through the efforts of its scientists during the past decade, many of these aspects have been clarified.

The rice plant has been so thoroughly and intensively studied that there is now a good understanding of the reasons why the modern rice varieties yield so much more than the traditional ones. The scientific work which had brought about this insight covered studies of leaf area, mutual shading, photosynthetic efficiency, tillering capacity, crop growth rate and other factors affecting plant performance. It is now possible to achieve yields of 5 metric tons per hectare under unfavourable conditions of the cloudy, monsoon season of the tropics; under ideal conditions in the same setting, over 10 metric tons per hectare may be produced.

Vital data have been assembled on the correlation between grain yield and the amount of solar energy received by the rice plant during the last 45 days before harvest. This information is highly useful in predicting economic returns from irrigation systems.

Through careful scientific study, the most complete information that exists in the world on the chemistry of the rice grain has been accumulated by IRRI. On the soil where the plant derives its sustenance, information of equal scope, particularly on the chemical kinetics and thermodynamics of submerged soils, has likewise been gathered and recorded. The results of this work have yeilded valuable understanding of rice soils which is a great stride achieved in this field.

Much has been done towards combatting the natural enemies of the rice plant. About a decade ago, chemicals available to farmers for spraying were either so expensive or required so much precision in mixing, that they could not feasibly be adopted by the small farmers. IRRI has established that weeds can be controlled in flooded rice paddies with one application of herbicides in granular form at less than half the cost of hand weeding.

Studies on pesticide residues in the soil have revealed that a number of important insecticides, such as lindane, diazinon and DDT, left smaller amounts of residue in flooded soils than in upland areas. This information shows that certain insecticides can be used safely without the danger of polluting flooded rice soils with harmful chemicals.

Over 14,000 rice varieties from 25 countries have been collected and screened by IRRI in order to achieve many of the recent advances in rice technology. Among the most significant information now available is the identification of certain rice varieties that are resistant to most physiological types of rice blast disease. Some rice varieties resistant to the bacterial blight disease, leaf-hoppers and plant-hoppers have also been identified, and are now being used as parents to bolster the resistant factor into the modern varieties.

Experiments at IRRI have been devoted not only to the development of improved rice varieties, but also to the uncovering of yield potentials of traditional varieties. An applied research project is being undertaken with the Agricultural Productivity Commission to test both the IR and traditional varieties under rainfed and upland conditions. Tests are being made on the responses of these varieties to the application of irrigation, fertilisers, herbicides and insecticides and different management levels. Valuable insights are being obtained from these experiments.

Machines have been developed by IRRI agricultural engineers to reduce the drudgery and increase the efficiency of the small farmers. Among these inventions are threshers, weeders, seed-cleaners, seeders, a low-lift water pump and a small power tiller. In many developing countries like the Philippines, it is possible for these machines to be manufactured locally.

The Adoption and Spread of High-Yielding Rice Varieties

The significant advances in rice production during

the late 1960s may be observed as having occurred within the same period in which the new high-yielding varieties (HYVs) developed by IRRI were adopted by farmers in the Philippines. Since the introduction of IR8 in 1966, production of improved varieties in the country has shown a continuous increase. This is indicated in Table 40 which gives the national output of these rice varieties from 1968 to 1972. An increase of almost three-quarters of the 1968 production was realised in 1969 with a corresponding expansion in area of about 93 per cent over the previous year. In 1970 and 1971, there were relatively smaller output gains. The area planted in 1970 was almost equal to that of the preceding year, while production increased by more than one-fifth of the previous year's output. In 1971, a significant expansion in area may be noted, amounting to 15.6 per cent, with a corresponding production increase of 11.4 per cent.

The steady increase in both production and area is further shown in Table 41. In 1971, over one-half of total palay area and production was accounted for by high-yielding rice varieties, compared with 21.2 per cent and 26.5 per cent, respectively, of total area and production in 1968.

The adoption of high-yielding varieties of rice in the Philippines has been receiving the full support of the government in its Rice and Corn Self-Sufficiency Program. In the effort to increase national rice output, a more co-ordinated government machinery contributed greatly to the attainment of production goals.

TABLE 40

AREA AND PRODUCTION OF HIGH-YIELDING VARIETIES OF RICE, PHILIPPINES, 1968-72

Year	Production	Percentage Increase over Preceding Year	Area	Percentage Increase over Preceding Year
	'000 cavans	%	'000 ha.	%
1968	27,552	-	702	-
1969	48,126	74.7	1,352	92.6
1970	58,326	21.2	1,354	0.2
1971	66,599	11.4	1,565	15.6
1972	67,979	2.1	1,683	7.5

Source: Bureau of Agricultural Economics, Philippines.

TABLE 41

PROPORTION OF TOTAL PRODUCTION AND AREA PLANTED TO HIGH-YIELDING VARIETIES OF RICE, PHILIPPINES, 1968-71

Year	Percentage of Total Area	Percentage of Total Production
	%	%
1968	21.2	26.5
1969	40.6	47.6
1970	43.5	49.0
1971	50.3	54.8

Source: Bureau of Agricultural Economics, Philippines.

Together with the IR series of improved seeds, varieties developed by the Bureau of Plant Industry and the College of Agriculture of the University of the Philippines were also disseminated in 1968 and 1969. Extension work, with great stress on the culture of new varieties, has been intensified. Farmers have consequently become more conscious of the appropriate varieties that they should plant in their fields - a salutary effect of demonstrations carried out by government personnel.

The provision of the technical inputs necessary for the culture of the new varieties is a vital factor in their adoption by farmers. Fertilisers, pesticides and weedicides have been made available to farmers through the establishment of over 1,000 retail outlets throughout the country, mostly in the priority provinces of the program.

Table 42 indicates the greater yields attained in the production of the HYVs compared with the traditional lowland and upland varieties. The increases in yields of HYVs have contributed significantly to the overall output of rice in the country (Table 43). It may be noted that significant yield increases were likewise achieved with the lowland and upland varieties. Apparently, the national effort to boost the output of rice in the country had a favourable impact on the yields of both the improved and traditional varieties.

TABLE 42

PALAY: YIELD PER HECTARE OF HIGH-YIELDING AND TRADITIONAL VARIETIES OF RICE, PHILIPPINES, 1968-71

(in cavans)

Year	High-Yielding Varieties	Traditional Varieties	
		Lowland	Upland
1968	39.3	31.6	18.8
1969	35.6	29.2	18.0
1970	43.1	37.9	23.3
1971	42.5	39.2	23.3

Source: Bureau of Agricultural Economics, Philippines.

TABLE 43

PALAY: PRODUCTION BY VARIETY, PHILIPPINES, 1968-71

(in million cavans)

Year	High-Yielding Varieties	Traditional Varieties		
		Lowland	Upland	Total
1968	27.55	67.09	9.01	103.65
1969	48.13	44.92	7.97	101.02
1970	58.33	51.00	9.61	118.94
1971	66.60	46.34	8.50	121.44

Source: Bureau of Agricultural Economics, Philippines.

A survey, conducted by IRRI in 1967 (IRRI, 1967, pp.243-4), revealed certain factors contributing to the adoption or non-adoption of the improved rice varieties by farmers (Tables 44 and 45).

Anticipated high yield ranked first among the factors

motivating the adoption of HYVs. The unavailability and high costs of inputs were indicated by farmers as reasons for not adopting the improved varieties. It may also be noted that, in many of the farms, the operators indicated their non-adoption as the landlords' decisions. These decisions may perhaps be explained by citing a number of problems which were encountered in the government's efforts to encourage rice farmers to change from the traditional to the new varieties.

TABLE 44

REASONS GIVEN FOR THE ADOPTION OF IMPROVED RICE VARIETIES, LAGUNA, PHILIPPINES, 1967 WET SEASON

Reason	Number of Farmers Giving Reason	Number of Farmers Indicating the Single Most Important Factor
a. Expected high yield	105	97
b. Landlord's decision	55	6
c. Follow advice of extension worker	68	0
d. Expected high price	41	1
e. Follow advice of neighbour	11	0
f. Others	21	6

Total number of adopters = 110
Total number of respondents = 110

Source: IRRI (1967, p.243).

Paulino and Trinidad (1969, p.1-7) found that the price of rice was an important influencing factor. Farmers were observed to react quickly and unfavourably to low prices. This problem was encountered with the IR8 variety.

TABLE 45

REASONS GIVEN FOR NOT PLANTING IMPROVED RICE VARIETIES, LAGUNA, PHILIPPINES, 1967 WET SEASON

Reason	Number of Farmers Giving Reason	Number of Farmers Indicating the Single Most Important Factor
a. Landlord's decision	16	14
b. Expensive	13	12
c. Lack of irrigation	7	3
d. Seed not available	4	3
e. Others	21	9
Total number of non-adopters = 45		
Total number of respondents = 41		

Source: IRRI (1967, p.244).

Although it produced high yields, it commanded a low price in the market. Millers offered low prices for this variety because of its reported poor milling and inferior eating qualities. Another factor which tended to discount the price of IR8 was its inadequately dried state when sold. This condition occurs when the variety is harvested before the end of the wet season since it matures earlier than most of the traditional varieties. Inadequate drying facilities have also been attributed to this situation.

Paulino and Trinidad further observed a problem encountered in the change to the new varieties which could have resulted in the low yields in some areas where the high-yielding varieties were used. There were farmers who, readily impressed by the successful results of variety shifts in neighbouring farms, adopted the new varieties without considering the sufficiency of resources

that could assure them of the most profitable returns. When low prices were subsequently obtained, these farmers reverted to other types, the culture of which requires the utilisation of less resources that could assure them of optimum returns.

Another study was undertaken on the diffusion of high-yielding rice varieties in Gapan, a town in the province of Nueva Ecija in Central Luzon (Huke and Duncan, 1969). The spread of the new varieties was traced since their introduction to farmers in June 1966. The town had an advantage of having three major landowners who were able to secure IR seeds in the same year because they had sufficient political and economic influence to tap the sources of the new and improved seeds.

The study covered the years 1967 to 1969 using a multiple regression analysis. The number of adopters was taken as the dependent variable while six independent variables were chosen; namely, percentage of land irrigated by barrio (village); number of original innovations in 1966 by barrio; the settlement pattern which was either continuous or non-continuous; percentage of leaseholders by barrio; cost of transportation of fertiliser from the town proper to the barrio; and the percentage of owner-operators by barrio.

A pattern of diffusion very similar to that observed by researchers in the U.S.A. and Western Europe was found in this study. The most important factors identified as having influenced the spread of the new varieties were irrigation and continuous settlements. The location and number of original innovators greatly influenced

the diffusion in 1967 and 1968. In 1969 this factor diminished in importance.

The significance of irrigation is stressed with the striking observation that barrios with irrigation had a cumulative 80 per cent adoption after only four years of contact with high-yielding varieties. For the whole town, the rate of conversion was 59 per cent at the end of four years, a rate higher than the rate of adoption of similar innovations in the U.S.A. or Western Europe.

The study further revealed that the adoption of an innovation requiring more outlays of cash or labour is faster when risks are minimised. The greatest risks in rice farming are apparently related to adequacy and availability of water.

The implications of these findings lean towards giving priority to improvement in existing irrigation facilities and their extension to more rice producing areas. Efforts by the government should also be exerted to ensure that sources for defraying cash outlays of agricultural inputs should be made available to farmers in the form of credit.

Land Reform as a Component of Agricultural Development in the Philippines

In the current efforts of the Philippines to attain agricultural development and overall economic growth, land reform has continued to be a priority project, as it has been during the last two decades. Its main objective is to contribute to increased productivity on the farms,

raise rural incomes and improve the well-being of the farm population. This goal is designed to have a favourable impact on a festering social problem of the country - the unrest that has been building up in the rural areas, exemplified by the Hukbalahap movement which started during the early post-war years.

In order to increase the productivity of the farmer, a more favourable climate of expectations must be provided for him. He must expect to gain more from his efforts to produce. Towards this end, he must be provided with land that he can call his own, or his security of tenure on the land that he tills should at least be strengthened. Not only should more land be made available to him, but he should also be equipped with capital, better technology, and persuaded to adopt more efficient farm practices. Furthermore, his production efforts must be supported by an efficient market mechanism that would assure him of the maximum returns from his products.

Cognisant of these requirements, and coupled with its concern for the social unrest arising from the agricultural sector, the Philippine government embarked on a continuing Land Reform Program over the last two decades.

During the early 1950s, the late President Ramon Magsaysay launched a "Land for the Landless" program (Cook, 1961, p.170) the central concentration of which was focused on the following six points:

1. Acquisition of large estates at fair value for

resale in small holdings to tillers of the soil. This was provided for by Republic Act No. 1400, creating the Land Tenure Administration (LTA).

2. Lowering of rental rates, providing security of tenure and otherwise placing landlord-tenant relations on a tolerable basis. Equitable division of crops between tenant and landlord was provided for by Republic Act No. 1199 and Executive Order No. 67, creating the Agricultural Tenancy Commission (ATC).

3. Provision of an adequate production credit system for small farmers. This was carried by Republic Act No. 821, creating the Agricultural Credit and Co-operative Financing Administration (ACCFA).

4. Resettling of tenants [from heavily tenanted areas of Central Luzon] to sparsely settled regions, chiefly on the islands of Mindanao and Palawan much of which was in the public domain. This was speeded up by Republic Act No.1160, creating the National Resettlement and Rehabilitation Administration (NRRA). The efforts for resettlement were supported by a project initiated with the Economic Development Corps of the Armed Forces of the Philippines (EDCOR). The project was designed to rehabilitate captured or surrendered Huks.

5. Provision of security of land titles. A project was initiated with the Bureau of Lands to overhaul procedures for land title registration, and to train personnel in the technique of

photogrammetry, as a means of speeding up cadastral surveys. These measures were to expedite the homesteading program of the Bureau of Lands.

6. Improvement in the property tax structure.

An appraisal of this program has revealed that no significant progress was achieved towards the attainment of its goals because of the following reasons:

(a) The LTA has not been able to buy as much land as it should because the better farms are not for sale, and the government cannot expropriate except where there is active unrest among tenants. Shortage of funds, difficulties in establishing fair market values in areas where there is no active land market, create serious problems.

(b) Tenants have not taken title of redistributed land because the administration has required a 10 per cent down payment and the tenant must pay the usual rent while accumulating this amount.

(c) The basis for sharing crops other than rice was not spelled out in the original law.

(d) The Agricultural Credit and Co-operative Financing Administration has been unable to furnish enough consumption credit to rid farmers of dependence on the landlord or merchant, to assume the farmer's bad debts, and to supervise farm credit so as to increase the productivity of the borrower.

(e) The National Resettlement and Rehabilitation Administration has been unable to finance its

newly settled farmers beyond the first year.

The present efforts being undertaken for land reform in the Philippines are an implementation of the Agricultural Land Reform Code which was signed into law by then President Diosdado Macapagal in August 1963.

The Agricultural Land Reform Code spells out the following as policies of the State:

(a) To establish owner-cultivatorship and the economic family-size farm as the basis of Philippine agriculture, and, as a consequence, divert landlord capital in agriculture to industrial development.

(b) To achieve a dignified existence for the small farmers, free from pernicious institutional restraints and practices.

(c) To create a truly viable social and economic structure in agriculture conducive to greater productivity and higher farm incomes.

(d) To apply all labour laws equally and without discrimination to both industrial and agricultural wage earners.

(e) To provide a more vigorous and systematic land resettlement program and public land distribution.

(f) To make small farmers more independent, self-reliant and responsible citizens.

It was hoped to accomplish land reform under the Code of 1963 in two phases: the first was primarily concerned with the conversion of share-tenants into lessees; the second with the conversion of lessees into

full owners.

Compensation for landlords whose properties are expropriated consists of 10 per cent in cash, and the balance in 6 per cent tax-free redeemable bonds. The landlords may use the bonds in the purchase of government undeveloped land in the public domain or shares of stock in government-owned or controlled corporations.

The leasehold system mitigates the gross inequality between the landlord and the tenant. As the tenant is covered by the leasehold tenancy, he becomes the sole manager of the farm, making all important decisions. The rights of the landlord are relegated and limited generally to observation and suggestion.

The tenant pays a fixed annual rental under the leasehold system. This rental, being controlled by law, cannot exceed 25 per cent of the average normal harvest during the three agricultural years immediately preceding the date the leasehold is established.

The implementation of the land reform program since the passage of the Land Reform Code in 1963 has been greatly handicapped by inadequate financing. As early as 1965, two years after the enactment of the law, a number of other problems had also been encountered, some of which were those directly surrounding the conversion of share-crop tenants to leasehold. Under a lease contract between the landowner and lessee, a fixed rental is stipulated. There were many cases of tenants who reacted negatively upon knowing that an increase in their yields would mean increased rentals under the leasehold system.

They refused to plant high-yielding varieties of rice and use modern methods of cultivation unless and until they were covered by the leasehold system. On the other hand, the law actually motivated the farmers to support the implementation of land reform in their respective areas, at the earliest possible time. The prospect of owning the lands that they tilled provided a hope for the fulfilment of their aspirations.

An opposite reaction was observed among the landlords. Many of them sought the delay of land reform implementation in their holdings for about three years. Their intention was to increase the productivity of their farms, which would have the effect of raising rentals on their lands at the time when leasehold was finally declared on them. It may be said, therefore, that the land reform programs greatly motivated the landlords to participate with enthusiasm in the rice production self-sufficiency program in recent years.

The slow pace in the conversion of lands from share-tenancy to leasehold has been attributed to a number of factors. Fear on the part of tenants to initiate a change in their relationship with their landlords has been mentioned. There are many cases where tenants are blood relatives of landowners. There is often an apprehension on the part of tenants that they might not be able to borrow needed funds for production from government lending agencies. This apprehension was generated by cases of tenants who were not provided with facilities to help them assume the responsibilities of

landownership. To prove the helplessness of some tenants, selfish landlords withdrew all types of assistance which they had previously extended to the farmers.

Since 1966, greater impetus has been given by the government to achieve the objectives of the Land Reform Code. By 1971, there had been some measure of progress. Leasehold systems were being implemented in the whole region of Central Luzon, in the provinces of Cavite, Laguna, Bohol, Samar, some in Southern Mindanao and in the Bicol Region, south of Luzon (Philippines, NEC, 1971). As at the end of the fiscal year 1971, 236 cities and municipalities were under the leasehold system covering about 315,000 farmers working an area of 788,000 hectares of palay and corn farms (Table 46). In addition, there were a number of settlement projects, agricultural landed estates and residential estates administered by the government.

It has been observed that rice production in land reform areas has increased significantly (Estrella, 1972, p.250). Pre-proclamation records registered the average yield per hectare as 39 cavans of palay. During the crop year 1968-69, average yields for the wet season crop rose to 63.1 cavans; yields for the dry season crop were recorded at 64.5 cavans with increases of 24.1 and 25.5 cavans respectively. It may be recalled that the overall national average yields in the crop years ending 1968 and 1969 were 31.4 and 30.3 cavans respectively. The high average yields in the land reform areas have apparently

TABLE 46

LAND REFORM: PROGRAM COVERAGE, BY TYPE OF FARM, PHILIPPINES, FISCAL YEAR 1970-71

Particulars	Total Scope	Total Coverage	Percentage Coverage
No. of provinces	66	20	30.30
No. of cities, municipalities and municipal districts	1,506	236	15.67
No. of palay farmers	1,061,333	292,469	27.56
No. of corn farmers	382,558	22,563	5.90
Palay farms (ha.)	3,038,502.1	718,912.5	23.66
Corn farms (ha.)	952,970.4	69,139.4	7.25
No. of palay share tenants	432,474	173,568	40.13
No. of corn share tenants	174,402	8,635	4.95
Tenanted palay farms (ha.)	942,485.8	385,252.5	40.88
Tenanted corn farms (ha.)	274,512.0	23,025.3	8.39

Source: Handbook of Philippine Agriculture and Natural Resources, Bureau of Agricultural Economics, Philippines, 1971.

contributed to the increased overall national average in the late 1960s.

In 1971, the Congress of the Philippines passed Republic Act No. 6389 which was an improvement on the Agricultural Land Reform Code of 1963. The new law created a Department of Agrarian Reform and provided for the total abolition of share tenancy by automatically converting all share tenancy relations into leasehold. In support of this drastic and total conversion, and to aid the adjustment of tenants under the new situation, landowners and local moneylenders were authorised to

extend credit to tenants who had been transformed into lessees, provided that the interest on loans shall not exceed 14 per cent per calendar year. These credit sources will aid the farmers and will supplement the services of the Agricultural Credit Administration and the rural banks.

CHAPTER VI

TOWARDS A MORE ABUNDANT FUTURE - A SUMMING UP

The advances in rice production recorded in the late 1960s have infused the whole agricultural economy with an awareness of the potentials of obtaining greater rewards from the land by applying the new and improved technology. This is the underlying strength of the 'green revolution' that is now sweeping most Asian countries, including the Philippines.

Rice has remained the chief staple food of the country for many centuries. It would be very unlikely that the grain would be supplanted by alternative cereals such as corn in the diet of the greater part of the population, since the only major corn-consuming regions in the Philippines at present are the Eastern Visayas and Northern Mindanao. Furthermore, corn has been gaining greater importance as an animal feed grain rather than as a staple food.

With the exception of certain recurring vagaries of weather, the rice industry thrives on a favourably endowed geographic base, well within the periphery of the great rice-producing and consuming region of the world. The overall climate of the Philippines, excluding destructive storm periods, is especially suited to rice culture. However, as previously discussed in Chapter IV, the vulnerability of the industry to the uncertainties of weather has been felt in recent years. At this point, one

is intrigued to note that students of the rice economy in early and recent years have invariably excluded inclement weather as a consistent cause of low national average yields per hectare in the country since the turn of the century. A plausible reason that may be mentioned is the division of the country into regions, as described in Chapter II, where individual typhoons usually reach the archipelago within specific areas in varying degrees of frequency and intensity. While Northern and Central Luzon may often be endangered by storms, Southern Mindanao, which is itself a heavy rice producer, lies in an area relatively free from these climatic hazards. In taking the overall average yield for the whole country, the effect of typhoons in previous studies had apparently been outweighed by other factors which were considered to have influenced the yields of rice farms. Nevertheless, the probability remains for typhoons and droughts to be recognised as being among the causes of fluctuations in rice supply and reasons for consequent decisions to import the cereal. It will be recalled, as discussed in Chapter IV, that the typhoons during crop year 1970-71 were among the factors that precipitated the decision to re-import rice in that year.

As also mentioned in Chapter V, research at the International Rice Research Institute has been geared to the development of rice varieties with shorter and stronger stalks and upright leaves. Even when exposed to strong winds and rain, these desired properties will alleviate a tend ncy of the plant to lodge, thereby

enabling it to resist destruction by the elements. In addition, research is being carried out to develop varieties resistant to diseases and pests. Continued financial support and encouragement of IRRI should be given by donor countries, as well as by the Philippines, to enable the Institute to accomplish more significant work in this direction.

The Philippine government may well initiate and encourage the establishment of firms providing crop insurance for rice farmers to protect them against the risks of crop losses due to weather hazards like typhoons and droughts, and destruction by pests and diseases. Although the cost of premiums would necessarily add to the operating expenses of farmers, the protection provided by the insurance coverage, in terms of a reduction in uncertainties and income fluctuations arising from these natural hazards, would certainly benefit the farmers. The firms may operate in a fashion complementary to rural banks in the country and supervised by a central authority, in the same manner as rural banks are at present administered.

IRRI has made such progress in the development of high-yielding rice varieties during the last decade that it may be said to have established a sound organisational and technological base that would facilitate and fructify its further research efforts in the science of rice production. It may be reasonable to expect that the benefits of its further work would make a favourable and continued impact on Philippine rice production.

With the solution of the technical problem of developing and nurturing a high-yeilding rice plant; and with the determined national efforts to provide the infrastructure, administrative and institutional requirements to promote rapid growth of the industry, optimism for further increases in rice production may be justified. The so-called 'breakthrough' is now supported by evidence that has enhanced its credibility, despite claims of its overplay in the various media. It is also reasonable to expect further that, if the momentum of increased growth in output were to be sustained, the long-run prevalence of low national average yields in the country's rice farms from the beginning of the twentieth century until the early 1960s (Chapter IV) may remain a thing of the past. Philippine farmers who have obtained increased yields and incomes from their rice farms may now benefit from the economic and social rewards that have long been beyond their reach.

Another encouraging observation on this aspect is worthwhile considering. In his survey of Central Luzon, Ishikawa (1970, p.25), found some evidence of economic factors that would provide a dynamic force for the sustained impact of the new technology. He mentions, in particular, the emergence of a group of commercial farmers in the region. Although most of these farmers still rent some parcels of their lands to tenants, they have adopted a changed approach in the cultivation of their farms, such as providing direct management, an expanding employment of hired labour, and an increasing application of modern inputs.

One problem affecting the use of modern inputs among the lower strata of farmers in the Philippines is that of farmers who are restrained because of inadequate funds to finance cash outlays. Since the adoption of farming innovations involves risk and uncertainty, the change occasioned by a shift to the new technology among this group of farmers becomes more difficult to attain. This situation emphasises the role that lending institutions serving the rural sector must play, at such levels of effectiveness as to contribute to the solution of the financial problems of rice farmers. In the major rice areas those with repayment potential have been observed to secure loans for the purchase of tractors to mechanise their farms. In August 1967, the Central Bank of the Philippines had noted over 1,000 tractor loans from World Bank funds (Johnson et al, 1968, p.207).

In the Four-Year Development Plan of the Philippines for the fiscal years 1972-75, the urgent need to extend credit to agriculture has been stressed. The total credit required to support the agricultural program has been estimated at P4,651 million in fiscal year 1971, increasing to P5,935 million in fiscal year 1974. Agricultural loans were heavily concentrated on rice in 1969, as shown in Table 47.

The current program intends to increase the proportion of loans for other crops, although a greater absolute amount will be channelled to the rice industry.

The extension of agricultural credit has a peculiar problem related to the high risks involved in the granting

of loans for agriculture. Lending institutions, such as the Philippine National Bank, the Development Bank of the Philippines and the rural banks, require only mortgageable property as security for loans. Their clients, therefore, are confined to owner operators who can borrow money secured by mortgages on their lands.

TABLE 47

AGRICULTURAL LOANS, PHILIPPINES, FISCAL YEAR 1969

Loans for	Amount	Share in Total
	m. pesos	%
Rice	893.0	49.0
Corn	69.8	3.8
Other feed grains	253.0	13.9
Fruit and vegetables	171.3	9.4
Fish	160.3	8.8
Livestock and poultry	276.4	15.1
Total	1,823.8	100.0

Source: Philippines, NEC (1971, p.122).

The Agricultural Credit Administration (ACA) shoulders a greater risk in granting loans, since it is bound by law to extend production credit to farmers on the basis of expected harvests. Chances of repayment are greatly affected by the uncertainties of agricultural production arising from inclement weather or other causes of crop failure.

The Development Bank and rural banks in the country have embarked on supervised credit schemes which integrate the extension of credit with intensive supervision by

technically trained personnel providing practical farm and home management guidance. Supervised credit offers most benefits to small farmers whose technical and economic limitations make them ineligible for ordinary credit requiring acceptable collateral, but who have potentials for economic advancement. The credit scheme serves as a transition for the farmer from his present inability to avail himself of ordinary credit until his acquisition of sufficient means to be eligible for such types of loans.

Together with the provision of adequate credit to finance cash outlays, the government has maintained a program to increase irrigated areas. From 1969 to 1971, about 375,400 hectares were covered by the program. For the subsequent years, 1972-75, the goal set by planners is an expansion of areas served by improved irrigation and drainage systems by about 315,000 hectares. A previous discussion has mentioned the close relationship between the availability and adequacy of irrigation facilities and the adoption and spread of improved rice varieties.

Despite the gains in the total output of rice in the country during recent years, it is very unlikely that the possibility of sustained exports of rice by the Philippines on a larger scale than the 1968 shipments will predominate national thinking on the rice economy for at least the next few years. As a result of the production increase achieved in 1968, it proved possible to export substantial quantities of the grain from the country for the first time, as noted in Chapter IV. These exports,

however, may be considered as dramatic exceptions in the history of the industry. In a review of the world market and outlook for Philippine exports of the cereal, Barker (1969, p.7-1) noted doubts expressed by some economic observers on the possibility of attaining a sustained surplus level of rice in the country. The exports of 1968 and 1969 were not duplicated during the three succeeding years. Imports of rice were resumed in 1971, and for 1972 an assessment of the periodic rice situation by the NEC Inter-Agency Committee for Rice and Corn included an estimate of imports amounting to 15.47 million cavans of palay for that year (Table 48).

The building up of annual rice surpluses in the country has to contend with a number of obstacles. The fast rate of the country's population growth, as indicated in Chapter I, creates a major problem since it generates rising levels of demand.

A United Nations study has estimated that the income elasticity of demand for rice in the Philippines is around 0.4 (Mears, 1970, p.29). Other students of the rice economy would place the income elasticity of demand lower than the U.N. study, but all indicate that it is positive. This shows that consumers have not reached a point where they are satisfied with their level of rice consumption, which is fairly low as compared with other Asian countries (Table 49). Consumers in the country would very likely increase their present purchases of rice when they are able to earn higher incomes.

TABLE 48

RICE SUPPLY AND DEMAND SITUATION, CROP YEAR ENDING 30 JUNE 1972, PHILIPPINES

(in million cavans of palay)

I.	Estimated Supply		153.00
	1. Production	123.60	
	2. Commercial stocks in government and private warehouses at 1 July 1971	4.77	
	3. Market-directed farm household stocks	9.32	
	4. Imports	15.47	
II.	Estimated Total Requirement		133.00
	1. Annual food requirement	119.00	
	a. Per capita consumption: 3.10		
	b. Population at 1 Jan 72, (million): 38.54		
	2. Allowances	14.00	
	a. For animal and poultry feeds and other purposes at 6% of household requirements except seeds and waste 7.30		
	b. Wastage at 3% production 3.10		
	c. Seeds 2.90		
	i. Seeding rate (ha.): 0.90		
	ii. Area planted (ha.): 3.159		
III.	Estimated Stock at 30 June 1972		19.80

Source: Inter-Agency Committee Report of 7 December 1971, as cited by the Rice Production Program, July-December 1972 of the National Food and Agriculture Council, Philippines, p.1.

TABLE 49

COMPARATIVE RICE CONSUMPTION AND INCOME ELASTICITY OF DEMAND FOR RICE, 1961-63

Country	Per Capita Rice Consumption (Average in kg/year)	Income Elasticity of Demand for Rice
Japan	116	-0.1
Malaysia/Singapore	120	0.2
Philippines	89	0.4
Ceylon	110	0.5
Khmer Republic	149	0.0
Thailand	123	0.2
Vietnam, Republic of	168	0.4
Indonesia	85	0.6
Pakistan	94	0.4
India	72	0.5
Burma	133	0.1

Source: ECAFE (1971, p.97).

Another aspect of rice consumption must equally be considered. The rise in prices of the cereal in relation to substitute commodities may not reduce consumption appreciably. For the rice consuming majority of the population in the Philippines, there is a greater likelihood of their substituting a lower quality rice rather than another cereal when the price rises. A similar effect, but in the opposite direction, may be expected when the price falls (Mears, 1970, pp. 43-4).

Another factor to be reckoned with is the existence

of social unrest in the country, such as civil and political disturbances, the causes of which are basically and traditionally of an agrarian nature, as the situation discussed in Chapter IV. These are particularly evident in the major rice-producing and consuming regions of Central Luzon and Southern Mindanao. A report on the status of the rice industry in 1971 cites that the civil disturbances in Cotabato province, considered to be the 'rice granary' of Southern Philippines, caused a disruption of normal production activities in the region. These events were considered among the major causes of its significant reduction in harvests in 1971 (Drilon, 1971, p.162).

On the whole, the causes of past shortages have been identified in previous discussions, as well as the conditions that generated an actual rice surplus. Both situations of shortages and surpluses, whenever they may occur in the future, would be beset by the problems of price fluctuations that the country must face. Over the years, imports of rice have provided the stop gap measures against shortages and the need to stabilise sharply rising prices. These imports included provisions for a buffer stock to fill the gap existing in the rice supply. Future surpluses could be handled against inordinately depressing prices to the detriment of producers, by siphoning the surplus into the buffer stock. Any further excess supply, if available, may then be directed into export outlets. The recently established National Grain Authority assumes a heavy responsibility in performing

this highly sensitive function.

In determining the feasibility of exporting any excess supply, the situation in the world rice market must be carefully considered. The market has been described as volatile by keen analysts like J. Norman Efferson (1972, p.127). Import-export decisions are expected to vary from year to year among countries involved in the trade. The Philippine experience has shown that long existing trends in output can be reversed within a short time. Abrupt changes may also be expected in other rice-producing and consuming countries. Within the next few years, if rice production in Asia were to increase by at least 4 per cent a year, rice imports by deficit nations would decline, together with international rice prices. Poor weather and other adverse factors may decrease the harvests of surplus-producing countries in Asia and the rate of production increase may fall by about 2 per cent a year. The decreased rice supplies would be so greatly exceeded by demand as to cause a rise in prices.

Despite these changes among countries in the rice trade, it is expected that the world import-export operations on the cereal would be maintained at around 6 to 7 million tons a year. In Asia, recurring import requirements have been observed for such countries as South Korea, Bangladesh, Indonesia, Sri Lanka, Malaysia, and for Hong Kong and Singapore.

It is essential to compare the growth rate of palay output in the Philippines with the rising level of

demand in order to determine further the feasibility of maintaining surplus stocks of rice in the country at least within the next decade.

Overall production of rice in the Philippines increased at an average of more than 5 per cent per annum between the years 1948 and 1960 (Table 50). A slower rate of growth at 4 per cent per annum was observed between 1960 and 1970. In a later period, between 1969 and 1971, however, recovery was noted as the output growth rate rose to about 6 per cent per annum. Estimates in the Development Plan of the country for fiscal years 1972 to 1975 have placed an annual increase of 6.1 per cent for the period, assuming the accomplishment of favourable production conditions such as the further spread of high-yielding varieties of rice in irrigated lands; the provision of machinery to ensure better preparation of land; the extension of supervised credit to enable the farmer to purchase fertilisers, insecticides and weedicides; and the improvement in processing and marketing facilities.

The factors influencing demand can likewise be determined. Even with the inception of family planning programs, population growth in the Philippines is expected to rise at about 3.1 per cent per annum within the next decade, taking into account the sociological and religious barriers and other problems of program implementation still prevailing in this predominantly Catholic country.

Per capita income is expected to increase by 3.4 per cent in 1972 over that of 1971 (Philippines, NEC, 1971, p.22). At the end of the program period, per capita income

TABLE 50

PALAY PRODUCTION: OVERALL AND ANNUAL RATES OF CHANGES AT DIFFERENT REFERENCE PERIODS, PHILIPPINES, 1948-71

Production (thousand cavans)

Year	Output
1948	50,928
1960	84,989
1969	101,015
1970	118,941
1971	121,430

Production Changes

	Overall %	Annual %
Between 1948 and 1960	66.9	5.6
Between 1960 and 1970	40.0	4.0
Between 1969 and 1971	18.0	6.0

Source: Bureau of Agricultural Economics, Philippines.

is estimated to increase to a relative maximum of 3.9 per cent per annum by the end of fiscal year 1975.

With the foregoing data, the rate of demand growth in the Philippines may then be computed on the following equation:

$D = P + RE$ where

D = Rate of demand growth
P = Rate of population growth
R = Rate of income growth
E = Income elasticity of demand

Taking an average increase of per capita income at 3.6 per cent per annum with the U.N. estimate of income elasticity of demand at 0.4; and assuming that population will rise at an annual rate of 3.1 per cent, the overall

yearly rate of demand growth may be computed at 4.5 per cent.

Given further technological progress in the industry supported by effective institutional and administrative measures, the growth rate of rice output may be maintained at 6.0 per cent per annum. At this rate, it would exceed the annual growth rate of demand by only 1.5 per cent. Furthermore, the uncertainties still confronting the industry, such as inclement weather and civil disturbances, should be considered, as their recurrence would further reduce this margin.

On the basis of the foregoing analysis, the situation in the industry may warrant the attainment of sufficiency levels during the next decade, but a reasonable margin of output growth on which to expect a steady flow of export surpluses apparently does not exist.

In the light of these previous discussions, two points stand out distinctly. First, the Philippines, within the next decade, cannot expect to earn a permanent place in the world export trade in rice. The apparent instability of the local supply situation would not enable the country to undertake the further risks of a volatile world trade situation. Despite the past optimism of national leaders for the capacity of the industry to maintain a steady stock of export surpluses, current efforts should still be geared to the goal of a sustained self-sufficiency in the cereal. Certain dynamic forces of growth within the industry have undoubtedly been set in motion. However, the existing factors that have slowed

the pace of progress in the past are still to be reckoned with. Social and institutional deficiencies, by their very nature, can only be rectified over a period of many years. Agrarian reform is one example that should be accomplished over a substantial length of time.

Secondly, apart from ensuring adequate supplies of rice for the country, agriculture has to meet pressing demands to provide the other items of a nutritionally adequate diet for the people if they are to enjoy a healthy and vigorous life. This goal must, of necessity, demand its own share of resources - a significant constraint in the allocation of more resources for the development of the rice industry.

Rice is more certain to remain the main crop in most farms of the country. To take advantage of the recently developed varieties that mature early, farmers may profitably attempt to diversify production to a greater degree within the next few years. Agricultural diversification, centering on rice as a principal crop, would very likely emerge as another accomplishment of the recent progress in the rice industry. Agricultural planning in the country is at present giving equal stress to the production of protective food crops that are rich in vitamins and proteins. The protein gap in the average Filipino diet is yet to be filled.

The early-maturing varieties of rice have opened up new vistas of multiple cropping where rice can be rotated with sweet potatoes, sweet corn, soybeans, sorghum and other crops of similar value and cultural requirements.

Bradfield (1966, p.7) has expressed optimism for the potentials of increasing the output of sorghum on the residual moisture left in rice soils at the end of the rainy season. Sorghum is an excellent feed grain that could significantly boost the output of the poultry and livestock industry in the country. He believes that, with a little further research on suitable varieties, fertilisation and cultural practices, comparable crops can be grown in vast areas of farmlands in the country. These opportunities may tap new sources of income to enhance the economic wellbeing of the nation's farmers.

A significant further change in the tenurial structure of Philippine agriculture which would greatly benefit the rice industry is expected to be achieved with the issue by President Ferdinand Marcos of Presidential Decree N.2 on 26 September 1972, proclaiming the entire country a land reform area (Appendix B).

This drastic action, which was made possible under the present martial law, seeks to increase the momentum of land reform, a step similar to one which produced positive results for Taiwan after her program was launched in 1951.

Another Presidential Decree (No.27 of 21 October 1972) is designed to benefit both tenants and landlords (Appendix C). Tenant farmers will be aided in the acquisition of lands by the establishment of co-operatives which will serve as guarantors for the payment of lands by tenants. Landlords will be paid reasonable prices for their lands - equivalent to two and one-half times

the average harvest of three normal crop years immediately preceding the promulgation of the Presidential Decree. The landlords will also be extended all forms of assistance, particularly credit, to enable them to shift into industries where their talents could best be utilised. Tenants will continue to receive ample technical assistance to help them increase the productivity of their farms and assume the responsibilities of land ownership.

Much enthusiasm prevails for this new development in Philippine agrarian reform which, it is hoped, will generate benefits similar to those observed in the Taiwan experience. Agricultural output in that country has, as a result, increased towards greater agricultural and industrial progress and overall economic and social stability.

The Philippines should, however, consider the need to look back on and profit from the lessons of past experience in her land reform program (Chapter V). More funds should be obtained to support the current efforts in this direction. The farmer, newly liberated from the bonds of tenancy and dependence upon his landlord, should be equipped with adequate facilities that would aid his transition into an owner-operator. In keeping with the spirit of the recent Presidential decrees, the whole agricultural economy must be further revitalised to generate effective support services, such as credit schemes that are more responsive to the growing demands of production under the new technology, crop insurance

schemes, more comprehensive agricultural extension, and the provision of infrastructure such as the expansion of irrigation facilities and more farm-to-market roads.

Only then will the farmer realise that land reform - his dream and his father's before him - will have become more meaningful and will enable him to assume the proper role that he should play in the country's agricultural development.

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APPENDIX A

PALAY-PRODUCING FARMS: PERCENTAGE DISTRIBUTION BETWEEN TENURE CLASS WITHIN REGION, PHILIPPINES, CROP YEAR 1970

Region	Total	Owned	Partly Owned	Tenanted (Share)	Leased	Managed	Other Tenure
	%	%	%	%	%	%	%
Philippines	100.0	40.7	17.6	35.9	4.8	0.2	0.8
Ilocos	100.0	41.0	34.1	24.8	0.1	-	-
Cagayan Valley	100.0	51.4	19.4	28.1	0.9	-	0.2
Central Luzon	100.0	17.6	13.9	49.4	17.3	0.2	1.6
Southern Tagalog	100.0	30.4	16.2	50.7	1.9	0.2	0.6
Bicol	100.0	35.2	22.5	40.0	1.4	0.5	0.4
Eastern Visayas	100.0	47.7	23.9	27.5	0.8	-	0.1
Western Visayas	100.0	34.0	17.9	41.2	5.1	0.2	1.6
Northern & Eastern Mindanao	100.0	61.6	13.0	23.9	1.0	-	0.5
Southern & Western Mindanao	100.0	73.0	5.3	19.0	2.0	0.2	0.5

Source: Bureau of Agricultural Economics, Philippines.

APPENDIX B

PRESIDENTIAL DECREE NO.2: PROCLAIMING THE ENTIRE COUNTRY AS A LAND REFORM AREA

'WHEREAS, there is pressing need to accelerate the Agrarian Reform Program of the Government for the early attainment of the objectives set forth in Republic Act 3844, as amended;

'WHEREAS, among such objectives is to achieve dignified existence for the small farmers free from the pernicious institutional restraints and practices which have not only retarded the agricultural development of the country but have also produced widespread discontent and unrest among farmers, one of the causes of the existing national emergency; and

'WHEREAS, it is believed that the lasting objectives of land reform may be sooner realized if the whole country is declared a land reform area;

'NOW, THEREFORE, I, FERDINAND E. MARCOS, President of the Philippines, by virtue of the powers vested in me by the Constitution as Commander-in-Chief of the Armed Forces of the Philippines, and pursuant to Proclamation No. 1081 dated September 21, 1972, and General Order No.1, dated September 22, 1972, as amended, whereby I have assumed direction of the operation of the entire Government, do hereby proclaim the whole country as land reform area.

'All agencies and offices of the Government are enjoined to extend full cooperation and assistance to the Department of Agrarian Reform to insure the successful prosecution of the Agrarian Reform Program.

'The Agrarian Reform Coordinating Council created under Executive Order No.347, series of 1971, is hereby directed to convene immediately to exercise its functions

'The Secretary of Agrarian Reform shall take the necessary steps for the prompt and effective implementation of this decree.

'Done in the City of Manila, this 20th day of September in the year of our Lord, nineteen hundred and seventy-two.'

(Sgd) FERNINAND E. MARCOS
President
Republic of the Philippines

APPENDIX C

PRESIDENTIAL DECREE NO.27: DECREEING THE EMANCIPATION OF TENANT FROM THE BONDAGE OF THE SOIL, TRANSFERRING TO THEM THE OWNERSHIP OF THE LAND THEY TILL AND PROVIDING THE INSTRUMENTS AND MECHANISM THEREFOR

'Inasmuch as the old concept of land ownership by a few has spawned valid and legitimate grievances that gave rise to violent conflict and social tension,

'The redress of such legitimate grievances being one of the fundamental objectives of the New Society,

'Since Reformation must start with the emancipation of the tiller of the soil from his bondage,

'Now, therefore, I, Ferdinand E. Marcos, President of the Philippines, by virtue of the powers in me vested by the Constitution as Commander-in-Chief of the Armed Forces of the Philippines, and pursuant to Proclamation No. 1081, dated September 21, 1972, and General Order No.1 dated September 22, 1972, as amended do hereby decree and order the emancipation of all tenant farmers as of this day, October 21, 1972;

'This shall apply to tenant farmers of private agricultural lands primarily devoted to rice and corn under a system of sharecrop or lease-tenancy, whether classified as landed estate or not;

'The tenant farmer, whether in land classified as landed estate or not, shall be deemed owner of a portion constituting a family-size farm of five (5) hectares if not irrigated and three (3) hectares if irrigated;

'In all cases, the landowner may retain an area of not more than seven (7) hectares if such landowner is cultivating such area or will now cultivate it;

'For the purposes of determining the cost of the land to be transferred to the tenant-farmer pursuant to this Decree, the value of the land shall be equivalent to two and one-half (2-1/2) times the average harvest of three normal crop years immediately preceding the promulgation of this Decree;

'The total cost of the land, including interest at the rate of six (6) percentum per annum, shall be paid by the tenant in fifteen (15) years of fifteen (15) equal annual amortizations;

'In case of default, the amortizations due shall be paid by the farmers' cooperative in which the defaulting tenant-farmer is a member, with the cooperative having a right of recourse against him;

'The government shall guaranty such amortizations with shares of stock in government-owned and government-controlled corporations;

'No title to the land owned by the tenant-farmers under this Decree shall be actually issued to a tenant-farmer unless and until the tenant-farmer has become a full-pledged member of a duly recognized farmers' cooperative;

'Title to land acquired pursuant to this Decree or the Land Reform Program of the Government shall not be transferable except by hereditary succession or to the Government in accordance with the provisions of this Decree, the Code of Agrarian Reforms and other existing laws and regulations;

'The Department of Agrarian Reform through its Secretary is hereby empowered to promulgate rules and regulations for the implementation of this Decree.

'All laws, executive orders, decrees and rules and regulations, or parts thereof, inconsistent with this Decree are hereby repealed and or modified accordingly.

'Done in the City of Manila this 21st day of October, in the year of our Lord, nineteen hundred and seventy-two.

(Sgd) FERDINAND E. MARCOS
President
Republic of the Philippines