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# RELATIONSHIP OF RICE MARKETING TO RICE PRODUCTION IN THE PHILIPPINES

by

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# CHAPTER III

## Rice Production in the Philippines*

### I. Introduction

The problems of rice marketing interrelate closely with the characteristics and institutions of rice production. A clear understanding of these characteristics and institutions is essential if agencies related to marketing are to be efficient and if the Government is to have the information necessary to make effective marketing policy.

The marketing organization required depends inherently upon the quantities of total national and regional production and the relationship of this production to consumption.[1/] For example, countries with surplus production such as Thailand must have a market organization relating both to exports and internal distribution. Deficit countries such as Indonesia are primarily concerned

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1/ Consumption characteristics and their relationships to production are discussed in detail in Chapter IV.

with the marketing of imports along with internal production. The Philippines in 1971, with production balancing near the self-sufficiency level, primarily requires a marketing organization for internal distribution but must be prepared to import or export as the situation demands.

Both inland and sea transport facilities are essential for the efficient movement of rice to and from foreign markets and between internal surplus and deficit areas. Warehousing problems arise both for storage and distribution terminals and between seasons, given that production is seasonal and consumption uniform throughout the year. This gives rise to the need for financing at all stages of marketing.

Organization of the agencies that collect and process palay from the farmers is influenced by the size and location of the farm units. This raises particular problems in a country like the Philippines where the average production unit is much smaller than in countries like the United States. With a multiplicity of varietal variations in the Philippines, both marketing and milling problems tend to be multiplied, and with the increased use of new technological inputs, a similar set of problems arises for their efficient distribution to the widely dispersed production units.

These production characteristics are discussed in this chapter under the following general groups: 1) Total production, 2) Inter-spatial and inter-temporal characteristics, and 3) Rice cultivation setting and practices.

## II. Total Production

1. Production forecasts and estimates. Marketing agencies in the Philippines have available two primary sets of production information on which to plan their activities, both prepared by the Bureau of Agricultural Economics (BAE) of the Department of Agriculture and Natural Resources (DANR).[2/] Regional production is forecast of the probable production area, yield and total production.[3/] These forecasts provide the earliest predictions for planning purposes. After the end of the year, and based on findings from the Crop and Livestock Survey (CLS) taken late in the crop year, final regional estimates are prepared of area harvested, yields and total production.

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2/ Prior to obtaining Bureau status in 1963 (R.A. 3627), these forecasts, as well as production estimates, were assembled by the Agricultural Economics Division (itself created in 1953 by G.A.O. #10), and prior to 1953 by the Statistics Section of the Bureau of Agricultural Extension and other agencies.

3/ See Appendix VI for list of BAE regions and the provinces included in each.

Palay production estimates are calculated as the product of the harvested area and yield estimates. An approximation of the planted area can be obtained by adding to the final harvested area [illegible] the CLS estimates of area affected by crop disease, pests, drought, floods and typhoons. Production forecasts and estimates are provided in terms of palay (rough rice).[4/]

Reliability of these production statistics has frequently been subject to question,[5/] but they compare reasonably with similar statistics developed by other developing countries in Asia.[6/] In recent years methodology has continuously improved.[7/] These continuing improvements

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4/ These forecasts and estimates are in terms of cavans of 44 kg. of rough rice of approximately 14 percent moisture content, which when milled can be converted to cavans of 56 kg. of milled rice, an average recovery in terms of volume varying in recent years between 51 and 53 percent. See Chapter IV, page , for further discussion of this conversion factor.

5/ See, for example, "A Report of the Rice Situation in the Philippines for the Period from July 1, 1967 to June 30, 1968," (mimeo) by the Committee formed by the then Secretary Rafael Salas in November 1967 "to produce a more realistic picture of the rice situation in the country".

6/ See, for example, Emanuel Levy, Review of Economic Statistics in the Philippines, World Bank Resident Mission, May, 1964.

7/ The methods used in collecting these statistics are discussed in Appendix Ia.

inject a degree of non-comparability over time. Based on analysis of the estimate of national rice production for 1962, Belarmino calculated the probable error (coefficient of variation) to be around 3.4 percent while for regional estimates the figure was reported by Levy to be something less than 10 percent.[8/] Thus an additional degree of unreliability.

These estimates of probable error may have been conservative if one compares the annual BAE production estimates with those developed from the periodic Agricultural Censuses by the Bureau of the Census and Statistics (BCS), as shown in Table III-1.

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8/ Levy, op. cit., p. 37 and Isagani C. Belarmino, "The Statistical Anatomy of our Perennial Rice Problem," The Philippine Statistician (June-September, 1963), p. 67. Using the preliminary 1962/63 production estimate, Belarmino explained that such an error meant that the confidence interval (at 95 percent probability level or 2 standard errors) would be from 85.0 to 97.4 million cavans of palay.

TABLE III-1

Palay Area Planted,[1] Yields and Production in the Philippines as Estimated by the BCS and the BAE

| | Area Planted | | Total Production | | Yield | |
|---|---|---|---|---|---|---|
| | BCS[2] | BAE[2] | BCS | BAE | BCS | BAE |
| | (in 000 ha.) | | (in 000 cavans of palay) | | (cavans of palay/ha.) | |
| 1917-18 | 1,059 | 1,368 | 40,595 | 35,795 | 38.3 | 26.2 |
| 1938-39 | 1,830 | 1,965 | 41,489 | 52,193 | 22.7 | 26.6 |
| 1947-48 | 1,834 | 2,026 | 43,864 | 50,928 | 23.9 | 25.1 |
| 1959-60 | 2,730 | 3,306 | 73,991 | 84,989 | 27.1 | 25.7 |

1/ Area harvested for DANR estimate of 1959/60.

2/ BCS = Bureau of the Census and Statistics (census)
BAE = Bureau of Agricultural Economics or antecedent organizations (sample).

Source: See Appendix I.

In 1959-60 the BAE estimate of harvested area was approximately 21 percent higher than the planted area estimate of BCS. The BAE crop production estimate was almost 15 percent above that of BCS.[9/]

It is evident that official statistics of area, yield and production have some degree of unreliability. They are probably more useful to traders and other decision makers in comparing changes over time than for determining absolutes for a given period. There is apt to be even larger error when comparing one region of the country with another. For areaswithin a region, such as provinces, the BAE does not currently provide estimates considering the probable error to be so large as to reduce their usefulness. In spite of these shortcomings, official statistics have generally been used in this study.

2. Production, area and yield. Since the beginning of the century, trends in area planted or harvested in palay, production and yields have followed quite different paths, as shown in Chart III-1 (absolute quantities are

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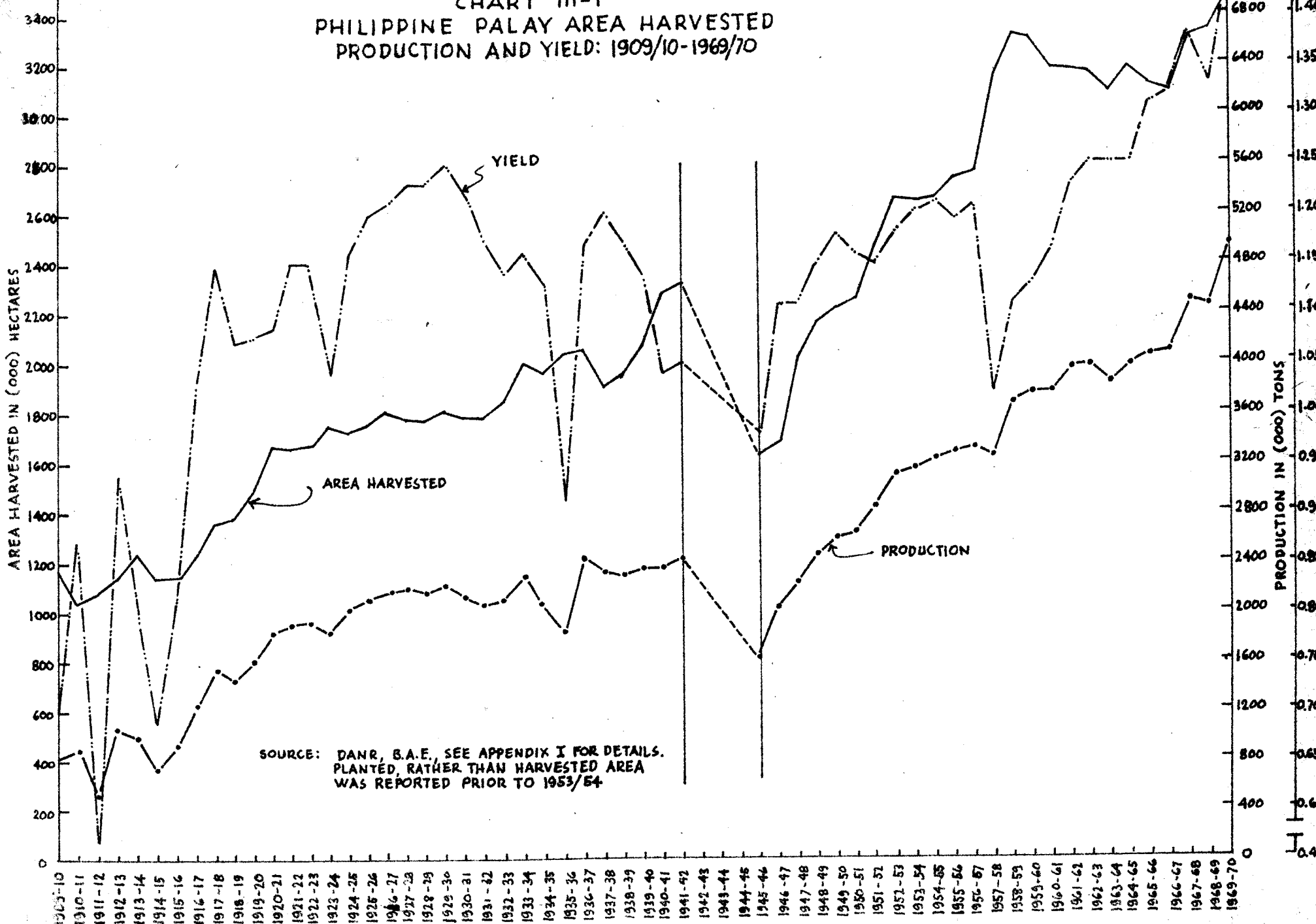
9/ For the crop year 1970/71, BAE is conducting crop-cutting experiments in Nueva Ecija Province which should provide an indication of the reliability of the present yield estimates as reported by farmers from memory.

CHART III-1

# PHILIPPINE PALAY AREA HARVESTED PRODUCTION AND YIELD: 1909/10-1969/70



detailed in Appendix I). Comparisons of annual rates of growth of these parameters, as shown in Table III-2, illustrate this variability. Over the 50-year period from 1918/20 to 1968/70, production grew at an annual growth rate of 2.2 percent accounted for by rates of 1.8 percent in area and only 0.5 percent in yields. More specifically, the increase in production was accounted for almost entirely by increased area until approximately 1965. During that 44-year period, area increased from slightly over 1.4 million to over 3 million hectares while yields increased from 1.1 to only 1.25 tons of palay per hectare. Since 1965, with almost a 50 percent increase in irrigated area,[10/] increased used of fertilizer and improved cultivation practices particularly associated with the availability of high-yielding seed varieties after 1966, the rate of yield increase has tended to approach the rate of area increase.

Area harvested actually declined after 1959 and this trend was not reversed until 1967/68 when profitable possibilities of high-yielding seed along with large increases in irrigated area induced increased plantings. These changes are evident by reference to Table III-3 where it

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10/ See Appendix Id for annual estimates of palay area under irrigation.

TABLE III-2

Comparison of Average Annual Rates of Growth of Palay Area, Production and Yield in the Philippines
(in percent figured cumulatively)

| | 50-Year Period[1/] 1917/18-1919/20 to 1967/68-1969/70 | 8-Year Period[1/] 1952/53-1954/55 to 1960/61-1962/63 | 15-Year Period[1/] 1952/53-1954/55 to 1967/68-1969/70 |
|---|---|---|---|
| Area[2/] | 1.8 | 2.3 | 1.7 |
| Production | 2.2 | 2.5 | 2.6 |
| Yield | 0.5 | 0.2 | 0.9 |

1/ Average of area, production or yield taken for each 3-year period.

2/ Area planted for earlier period and harvested for later period.

Source: 15 and 50-year period, Bureau of Agricultural Economics (mimeo). 8-year period from Ernesto C. Venegas and V. W. Ruttan, "An Analysis of Rice Production in the Philippines," Economic Research Journal (December, 1964), p. 160.

TABLE III-3

Average Annual Rates of Change of Production, Harvested Area and Yield of Palay for Regions in the Philippines for Selected Periods 1952/3-1969/70
(in percent figured cumulatively)

| Region | 1952/53-1954/55 [1] to 1960/61-1962/63 | 1960/61-1962/63 to 1967/68-1969/70 | 1952/53-1954/55 to 1967/68-1969/70 |
|---|---|---|---|
| **Production** | | | |
| PHILIPPINES | 2.5 | 2.7 | 2.6 |
| ILOCOS | 2.3 | 9.5 | 5.6 |
| CAGAYAN | 4.4 | -0.6 | 2.0 |
| CENTRAL LUZON | .3 | 3.7 | 1.9 |
| SOUTHERN TAGALOG | 2.1 | 5.6 | 3.7 |
| BICOL | 5.6 | 4.0 | 4.9 |
| EASTERN VISAYAS | 0.6 | 2.5 | 1.5 |
| WESTERN VISAYAS | 0.7 | 1.7 | 1.2 |
| N. & E. MINDANAO | -2.3 | 3.3 | *[2] |
| S. & W. MINDANAO | 10.1 | - .9 | 4.8 |
| **Harvested Area [1]** | | | |
| PHILIPPINES | 2.3 | 0.9 | 1.7 |
| ILOCOS | *[2] | 3.2 | 1.4 |
| CAGAYAN | 6.6 | -3.2 | 1.6 |
| CENTRAL LUZON | -2.1 | 2.2 | -0.3 |
| SOUTHERN TAGALOG | 2.3 | 4.8 | 3.5 |
| BICOL | 2.3 | *[2] | 1.2 |
| EASTERN VISAYAS | 1.2 | 2.6 | 1.8 |
| WESTERN VISAYAS | -1.0 | -0.6 | - .7 |
| N. & E. MINDANAO | 3.5 | 1.0 | 2.3 |
| S. & W. MINDANAO | 13.6 | -0.9 | 6.6 |
| **Yield** | | | |
| PHILIPPINES | .2 | 1.9 | .9 |
| ILOCOS | 2.4 | 6.2 | 4.6 |
| CAGAYAN | -1.8 | 3.4 | .4 |
| CENTRAL LUZON | 2.9 | 1.5 | 2.2 |
| SOUTHERN TAGALOG | - .2 | 0.6 | 0.2 |
| BICOL | 3.2 | 4.1 | 3.6 |
| EASTERN VISAYAS | - .6 | *[2] | -0.3 |
| WESTERN VISAYAS | 1.7 | 2.3 | 2.0 |
| N. & E. MINDANAO | -4.2 | 2.1 | -1.7 |
| S. & W. MINDANAO | -2.6 | *[2] | -1.4 |

1/ Prior to 1953-54, DANR data is based on area planted. Starting in 1953-54, area harvested has been reported.

2/ Less than 1%.

Sources: For 1967/68-1969/70, Bureau of Agricultural Economics, DANR, (mimeo), see Appendix I.

For 1952/53-1962/63, Ernesto C. Venegas and V. W. Ruttan, "An Analysis of Rice Production in the Philippines," Economic Research Journal (December, 1964), p. 160.

degree to which the existing and newly irrigated land can be saturated with the non-photoperiod sensitive high-yielding seed varieties, which in turn will depend on handling of the price support and infrastructure policies.[13/]

The potential for further increases in yields is readily apparent. Examination of Table III-4 of world-wide yields suggests that average yields in the Philippines continue to be among the lowest of major rice producing countries. Average yields of palay in the Philippines in 1969/70 (1.43 tons/ha.) were still only approximately one-third of those obtained in the neighboring country of Taiwan (4.02 tons/ha.). There, the high average yields are strongly influenced by the fact that approximately 90 percent of rice land is fully irrigated and water level is controlled for two crops. These are important condition for realizing the benefits from the high-yielding ponlai varieties (crosses of indica and japonica varieties), ones which unfortunately did not prove suitable to the Philippine situation.[14/] Japan's

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13/ This will involve both 2nd generation (infrastructure) questions and 3rd generation questions of income distribution. These are discussed in detail in Chapters 5 to 8.

14/ See S. C. Hsieh and V. W. Ruttan, "Environmental, Technological and Institutional Factors in the Growth of Rice Production: Philippines, Thailand and Taiwan," Food Research Institute Studies, Vol. 7 (1967), pp. 307-341.

TABLE III-4

Average Yields of Rough Rice (palay) in Selected Countries, 1967
(in tons/ha)

| | |
|---|---|
| Australia | 7.19 |
| Spain | 6.10 |
| Japan | 5.75 |
| United States | 5.10 |
| United Arab Republic | 4.99 |
| Taiwan | 4.02 |
| U. S. S. R. | 3.19 |
| Indonesian | 1.85 |
| Thailand | 1.71 |
| Burma | 1.61 |
| Philippines | 1.38 (1.43 in 1969/70) |

Source: FAO Rice Report 1969 (Rome, 1969), pp. 27-36.

high yields rely heavily on its japonica varieties, which also were not suitable to the Philippine environment.

With the development of dwarf and semi-dwarf high-yielding indica varieties, yield potentials similar to those obtained in Japan and Formosa are now within reach in the Philippines. A 1967 survey of IR-8 variety planted on irrigated paddies in Laguna province showed average yields of paddy of 4.2 tons/ha. compared with only 2.4 tons/ha. the prior year with traditional local varieties.[15/] Potential exists for expanding the use of these new high-yielding varieties on existing irrigated lands, for rehabilitating and expanding existing irrigation along with more intensive use of fertilizer and other technological inputs where high-yielding varieties are used.

It is reported that irrigated land was increased by over 300,000 hectares between 1966 and 1970 both by new facilities and rehabilitation of old. From 1971 to 1974 it is planned to rehabilitate systems covering 42,000 hectares and provide new irrigation facilities for an additional 288,000 hectares.[16/] In 1968/69 only 51 percent of the lowland

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15/ R. Barker and E. U. Quintana, "Studies of Returns and Costs for Local and High-Yielding Rice Varieties," The Philippine Economic Journal (Second Semester, 1968), p. 155.

16/ See Government of the Philippines, Four Year Development Plan, FY 1971-74 (Manila, 1970), pp. 94-95.

palay area was irrigated, while 87 percent of palay crops were planted on lowland areas.[17] But the area in new varieties was estimated at only approximately 1 million hectares compared to the over 1.4 million hectares of paddies reportedly irrigated.[18] Judging from average yields in regions where irrigation was extensive, use of fertilizer and other technological inputs was still far below economic optimums. For example, in the Southern Tagalog region, where approximately 50 percent of the paddy land is reportedly irrigated, the average yield of rough rice in 1969/70 was still only 1.13 tons/ha.

Thus, technological advance has opened the way to high-yield potentials and increased irrigated area provides another of the essentials required in attaining the higher yields. However, evidence from the Taiwan experiences indicates that there are other essentials if average yields are to be raised to levels approaching those now realized in Taiwan. There, realization of the full yield potentials inherent in the new seed varieties also required the

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17/ BAE, See Appendix Id. The BAE defines irrigated area as area artificially watered by irrigation pumps or by dams and canals.

18/ Randolph Barker, "Green Revolution," Current Affairs Bulletin (January 26, 1970), p. 71.

stimulation from organization of the farmers into effective farm credit, supply and marketing cooperatives along with successful implementation of land reform to provide additional incentive. Price policies for inputs and outputs induced high level fertilizer inputs, and with high levels of fertilizer, increased applications of insecticides became essential to protect the large investment.[19/] Hsieh and Ruttan conclude that full realization of the yield potential in the Philippines also will require commitment of substantial increases in trained manpower to the tasks of management related to these direct investments and to educational work associated with rapid achievement of production potentials.

3. Imports and exports. The growth of production represents only one side of the coin. From the marketing viewpoint, it is the comparison of production with effective demand that is important.[20/] From 1953/55 to 1968/70, the annual rate of production increase of 2.6 percent appears to have exceeded the rate of growth of effective demand

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19/ S. C. Hsieh and V. W. Ruttan, op. cit., pp. 333-339.

20/ And effective demand in the short term is a function primarily of population, income and price of rice and important substitutes.

enough to reach self-sufficiency, to balance supply with effective demand. But in per capita terms this gain was very slight as the average import in the 3-year period 1953-1955 averaged only 35,000 tons a year or 1.7 percent of average total production. This gain of supply over demand of 35,000 tons amounts to only 1.2 percent of average production (or approximately 1 percent of total consumption) in the 1968/70 period.

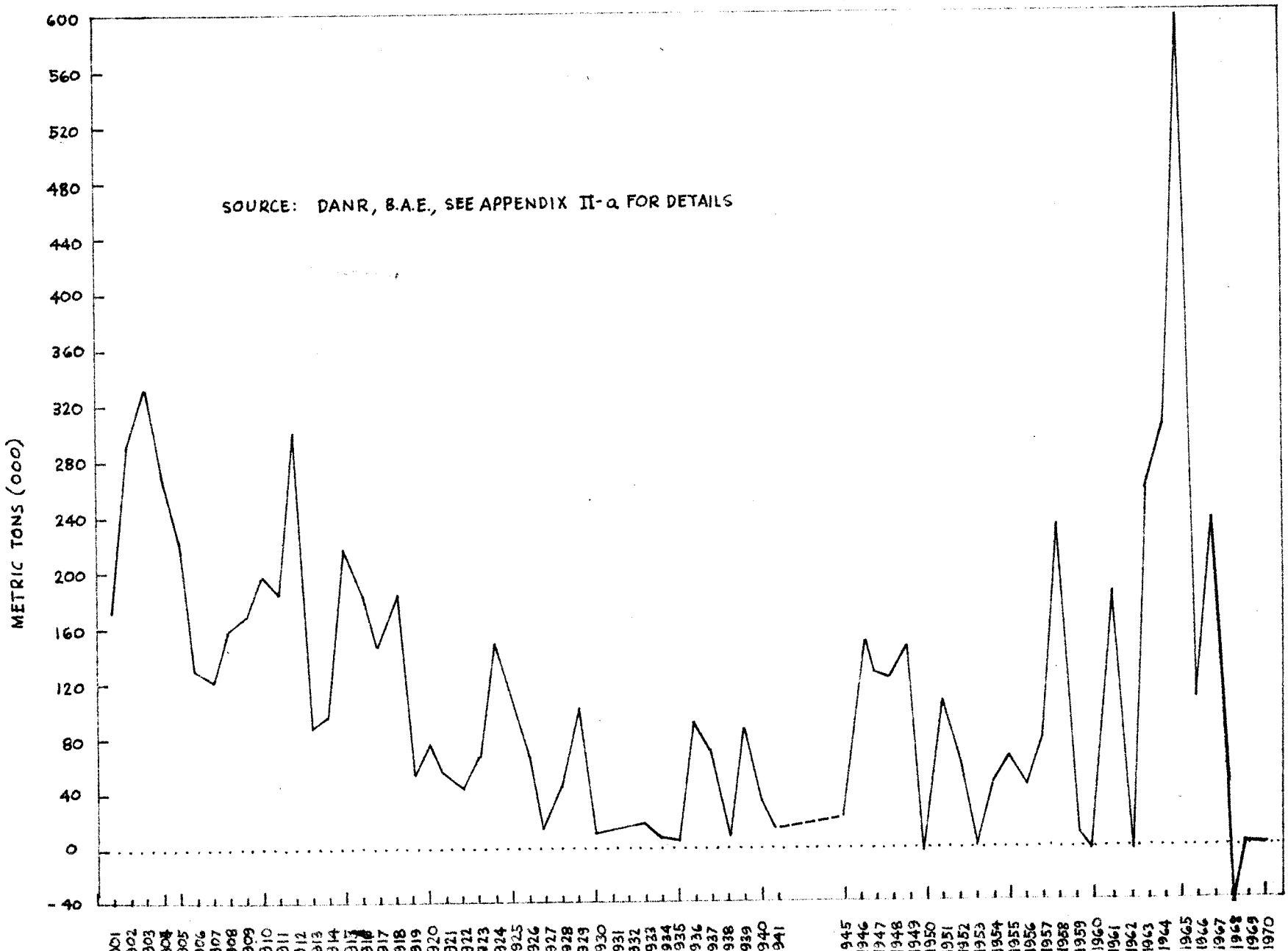
This relatively small change, together with the expectation that production will continue to increase at a more rapid rate than effective demand, creates an entirely new set of problems from the marketing point of view. In the past, the country's concern has been focused on importing sufficient rice to balance supply with demand at reasonable prices. Now, marketing must be concerned with the possibility and associated problems of either exporting or importing or both.

As shown on Chart III-2, imports in the past have varied widely, depending not only upon weather and crop damage which affected the crop size but also on political urgencies. For example, from years of no imports, such as 1953, 1960 and 1962, net imports reached as high as 11 percent of production in 1958, 21 percent in 1961 and as high as 9 percent in as recent a year as 1967. With this variability,

CHART III-2

PHILIPPINE NET IMPORTS OR EXPORTS (-) OF MILLED RICE, 1909-1970

(IN TONS 000)



and without large buffer stocks or excessive domestic price instability, marketing organizations must be prepared to handle imports in low production years and exports in surplus years. Or, as is now being seriously considered, annual exports can be made of high quality rice with imports or average quality to balance demand, any difference of export receipts over import costs adding to the country's foreign exchange supply.[21/]

But entry into the export market requires an entirely different marketing orientation from importing. To compete in the world market requires meeting world standards, involving new high quality mills in the Philippines, an efficient distribution including storage so commitments can be met as agreed upon and improved handling thoughout the entire distribution system. Moreover, export markets must be established in the face of large world surpluses and long term payment arrangements by both the U.S. and Japan. This will involve serious rice price policy considerations within the Philippines.[22/]

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21/ See, for example, Agricultural Plans and Program Office, BAECON, DANR in cooperation with RCPCC, "Philippine Rice Exports in 1970," p. 4 (mimeo).

22/ These problems are discussed in detail in Chapters VI and VIII.

Sources of imports in recent years are shown in Table III-5. While the largest source has been Burma, imports from Thailand predominated in 1966 and 1967 as Burma's production declined. Export possibilities for high quality rice are Hongkong and Singapore, both of which represent highly competitive markets. Other deficit areas in Asia usually import lower qualities except where special concessionary arrangements are made with the United States, Japan or mainland China.

Both exports and imports involve questions of transportation and storage. It is here where planning is important. Transshipment within the Philippines can be minimized if imports are shipped directly to deficit regions and exports shipped directly from surplus regions. By planning imports and exports in this fashion, it should be possible to minimize inter-island shipments and help reduce seasonal peak storage requirements in surplus areas.

Present legislation and implementing resolutions specify that all imports (except Government to Government) must be made through private parties for the sale within the Philippines by RCA.[23/] Such imports for the RCA are free of duties and taxes. Authority to import or export can be

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23/ R.A. 4643, March 8, 1966.

TABLE III-5

Sources of Philippine Imports of Rice Since 1963
(in tons of milled rice)

| Country | Tons Imported |
|---|---|
| Burma | 590,030 |
| Thailand | 466,461 |
| United States | 205,544 |
| Cambodia | 85,049 |
| Vietnam | 67,000 |
| Egypt | 53,506 |
| Venezuela | 31,192 |
| United Arab Republic | 16,781 |
| Taiwan | 10,000 |

Source: RCA, Quezon City.

granted only by RCA.[24/] Exports, like imports, are executed only through the private sector.

Rigid procedures must be followed before RCA can grant authority for import or export. In brief, this involves first the determination of the rice position of the country by the Rice Export Committee.[25/] Recommendation by the Committee for quantities of export or import must then be certified to by the NEC. For imports, the NEC must also verify "an existing or imminent shortage of such gravity as to constitute a national emergency." The private trader then given authority to export or import must be a Filipino citizen and must satisfy rigid credit and technical standards. These strict requirements have been imposed for exports to help create an image in the world for Philippine rice exports of quality and reliability.

III. Inter-spatial and Inter-temporal Characteristics.

Table III-6 shows the lack of uniformity in planting seasons thoughout the Philippines. The seasonal differences,

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24/ RCA Resolution No. 781, June 30, 1970.

25/ This Committee includes the heads of RCA, RICOB, NFAC, ACA, BAE and NEC plus one member each representing the rice millers, rice producers and rice consumers.

TABLE III-6

Philippine Rice Planting and Harvesting Calendar

| Regions and Provinces | First Crop | | | | Second Crop | | | |
|---|---|---|---|---|---|---|---|---|
| | Irrigated | | Unirrigated | | Irrigated | | Unirrigated | |
| | Planting | Harvesting | Planting | Harvesting | Planting | Harvesting | Planting | Harvesting |
| Philippines | | | | | | | | |
| Ilocos | | | | | | | | |
| Abra | June-Aug. | Oct.-Jan. | May-July | Oct.-Dec. | Jan.-Feb. | May-June | - | - |
| Batanes | - | - | - | - | - | - | May-June | |
| Benguet | - | - | June-July | | - | - | - | - |
| Bontoc(Mt. Prov.) | - | - | June-July | | - | - | - | - |
| Ilocos Norte | - | - | May-Sept. | | - | - | Nov.-Feb. | |
| Ilocos Sur | June-Sept. | Oct.-Jan. | June-Sept. | Oct.-Jan. | Dec.-Feb. | March-May | - | - |
| La Union | June-Sept. | Oct.-Jan. | May-Sept. | Sept.-Dec. | Dec.-Feb. | April-June | - | - |
| Cagayan Valley | | | | | | | | |
| Cagayan | July-Dec. | Nov.-April | July-Nov. | Dec.-April | Jan.-June | May-Oct. | - | - |
| Isabela | Sept.Oct. | Dec.-March | Aug.-Oct. | Nov.-Feb. | March-May | July-Aug. | - | - |
| Apayao-Kalinga | - | - | July-Dec. | | Feb.-June | | - | - |
| Ifugao | - | - | June-July | | - | - | - | - |
| Nueva Vizcaya | July-Oct. | Dec.-Feb. | July-Aug. | Dec.-Jan. | March-May | July-Sept. | - | - |
| Central Luzon | | | | | | | | |
| Bataan | June-Aug. | Oct.-Dec. | July-Aug. | Oct.-Nov. | Jan.-Feb. | May-June | - | - |
| Bulacan | July-Dec. | Nov.-April | July-Sept. | Nov.-Dec. | Oct.-Dec. | March-May | - | - |
| Nueva Ecija | July-Oct. | Nov.-Jan. | July-Oct. | Nov.-Jan. | Nov.-April | Feb.-Aug. | - | - |
| Pampanga | July-Aug. | Dec.-Jan. | July-Aug. | Dec.-Jan. | Jan.-Feb. | May-June | - | - |
| Pangasinan | June-Aug. | Sept.-Jan. | May-Aug. | Sept.-Jan. | Nov.-March | March-July | - | - |
| Tarlac | July-Sept. | Nov.-Feb. | June-Aug. | Sept.-Nov. | Dec.-Feb. | April-June | - | - |
| Zambales | June-July | Oct.-Dec. | June-Aug. | Oct-Dec. | Jan.-March | April-May | - | - |
| Southern Tagalog | | | | | | | | |
| Batangas | June-Sept. | Nov.-Dec. | June-Aug. | Sept.-Nov. | March-June | June-July | Dec.-Feb. | March-May |
| Cavite | June-Oct. | Oct.-Feb. | July-Sept. | Nov.-Dec. | Nov.-May | April-Nov. | - | - |
| Laguna | not distinct | | May-June | Oct.-Nov. | not distinct | | - | - |
| Marinduque | June-Aug. | Oct.-Dec. | June-Aug. | Oct.-Dec. | Nov.-Jan. | March-May | Nov.-Jan | March-May |
| Mindoro Occidental | July-Dec. | Sept.-Dec. | July-Aug. | Nov.-Dec. | Dec.-Jan. | April-June | - | - |
| Mindoro Oriental | July-Dec. | Sept.-Dec. | July-Aug. | Nov.-Dec. | Dec.-Jan. | April-June | - | - |
| Palawan | June-Aug. | Sept.-Nov. | July-Aug. | Oct.-Nov. | Oct.-Dec. | Jan.-March | - | - |

## Philippine Rice Planting and Harvesting Calendar

| Regions and Provinces | First Crop | | | | Second Crop | | | |
|---|---|---|---|---|---|---|---|---|
| | Irrigated | | Unirrigated | | Irrigated | | Unirrigated | |
| | Planting | Harvesting | Planting | Harvesting | Planting | Harvesting | Planting | Harvesting |
| Quezon | June-Sept. | Oct.-Jan. | June-Sept. | Oct.-Jan. | Nov.-March | March-June | Nov.-Jan. | March-May |
| Rizal | July-Sept. | Nov.-Jan. | July-Sept. | Nov.-Jan. | Feb.-March | May-June | - | - |
| **Bicol** | | | | | | | | |
| Albay | May-July | Oct.-Dec. | May-July | Oct.-Nov. | Dec.-Feb. | March-May | Dec.-Jan. | March-Apri |
| Camarines Norte | Nov.-Jan. | Feb.-April | Nov.-Jan. | Feb.-April | May-July | Aug.-Nov. | June-July | Sept.-Nov. |
| Camarines Sur | Jan.-July | Oct.-Dec. | June-July | Nov.-Dec. | Nov.-Jan. | April-June | Dec.-Jan. | May-June |
| Catanduanes | May-July | Nov.-Dec. | May-July | Nov.-Dec. | Jan.-Feb. | April-May | Jan.-Feb. | April-May |
| Masbate | June-July | Oct.-Nov. | May-June | Sept.-Oct. | Dec.-Jan. | April-May | - | - |
| Sorsogon | June-July | Oct.-Nov. | - | - | Dec.-Feb. | - | - | - |
| **Eastern Visayas** | | | | | | | | |
| Bohol | May-June | Oct.-Nov. | May-June | Oct.-Nov. | Nov.-Jan. | March-May | Nov.-Jan. | March-May |
| Cebu | - | - | June-Aug. | | - | - | Nov.-Dec. | |
| Leyte | July-Dec. | Oct.-Nov. | July-Dec. | Oct.-Nov. | June-July | Sept.-Oct. | - | - |
| Southern Leyte | June-July | Oct.-Nov. | June-July | Oct.-Nov. | Dec.-Jan. | March-April | Dec.-Jan. | March-Apri |
| Northern Samar | - | - | Nov.-Dec. | | - | - | June-July | |
| Eastern Samar | - | - | Nov.-Dec. | | - | - | June-July | |
| Western Samar | June-July | Oct.-Nov. | June-July | Oct.-Nov. | Dec.-Jan. | April-May | Dec.-Jan. | April-May |
| **Western Visayas** | | | | | | | | |
| Aklan | April-Aug. | Aug.-Oct. | June-Aug. | Sept.-Oct. | Sept.-Jan. | Jan.-April | Sept.-Jan. | Jan.-April |
| Antique | May-June | Aug.-Oct. | May-June | Aug.-Set. | Aug.-Oct. | Dec.-Jan. | Aug.-Oct. | Dec.-Jan. |
| Capiz | April-June | Aug.-Nov. | May-Aug. | Sept.-Dec. | - | - | - | - |
| Iloilo | Jan.-Aug. | Aug.-Dec. | Jan.-Aug. | Sept.-Dec. | Sept.-Dec. | Dec.-March | Aug.-Oct. | Dec.-March |
| Negros Occidental | June-Aug. | Oct.-Dec. | - | - | Nov.-Dec. | April-May | - | - |
| Negros Oriental | May-Oct. | Oct.-Feb. | July-Oct. | Sept.-Jan. | Nov.-March | Feb.-Aug. | - | - |
| Romblon | - | - | June-July | | - | - | Nov.-Dec. | |
| **Northern & Eastern Mindanao** | | | | | | | | |
| Agusan | July-Aug. | Dec.-Jan. | July-Aug. | Dec.-Jan. | Oct.-Dec. | March-April | Oct.-Dec. | March-Apri |
| Bukidnon | July-Oct. | Oct.-Jan. | July-Oct. | Oct.-Jan. | Nov.-March | Feb.-May | - | - |
| Camiguin | - | - | - | - | - | - | - | - |
| Lanao del Norte | June-Aug. | Oct.-Dec. | Dec.-Jan. | April-May | June-Aug. | Oct.-Dec. | Dec.-Jan. | April-May |

TABLE III-6
page 3

Philippine Rice Planting and Harvesting Calendar

| Regions and Provinces | First Crop | | | | Second Crop | | | |
|---|---|---|---|---|---|---|---|---|
| | Irrigated | | Unirrigated | | Irrigated | | Unirrigated | |
| | Planting | Harvesting | Planting | Harvesting | Planting | Harvesting | Planting | Harvesting |
| Misamis Occidental | May-June | Oct.-Nov. | - | - | Oct.-Dec. | March-April | - | - |
| Misamis Oriental | June-Oct. | Oct.-Nov. | - | - | Dec.-April | April-May | - | - |
| Surigao del Norte | Nov.-Jan. | March-May | Nov.-Jan. | March-May | June-July | Oct.-Nov. | - | - |
| Surigao del Sur | Oct.-Jan. | Feb.-May | Oct.-Jan. | March-May | July-Aug. | Sept.-Oct. | | |
| Southern & Western Mindanao | | | | | | | Dec.-Feb. | April-J |
| Northern Cotabato | April-June | Aug.-Dec. | May-Aug. | Sept.-Dec. | Dec.-Feb. | April-June | Dec.-Feb. | April-J |
| Southern Cotabato | April-June | Aug.-Dec. | May-Aug. | Sept.-Dec. | Dec.-Feb. | April-June | Jan.-Feb. | May-Jun |
| Davao del Norte | June-July | Nov.-Dec. | June-July | Nov.-Dec. | Jan.-Feb. | May-June | - | - |
| Davao del Sur | June-July | Oct.-Nov. | May-June | Sept.-Nov. | Dec.-Jan. | March-April | Dec.-Feb. | March-A |
| Davao Oriental | June-Aug. | Sept.-Dec. | June-Aug. | Sept.-Dec. | Dec.-Feb. | March-May | - | - |
| Sulu | - | - | April-Aug. | | - | - | Nov.-Dec. | Feb.-M |
| Zamboanga del Norte | June-July | Oct.-Nov. | June-July | Oct.-Nov. | Nov.-Dec. | Feb.-March | Dec.-Jan. | |
| Zamboanga del Sur | - | - | June-Aug. | | - | - | | |

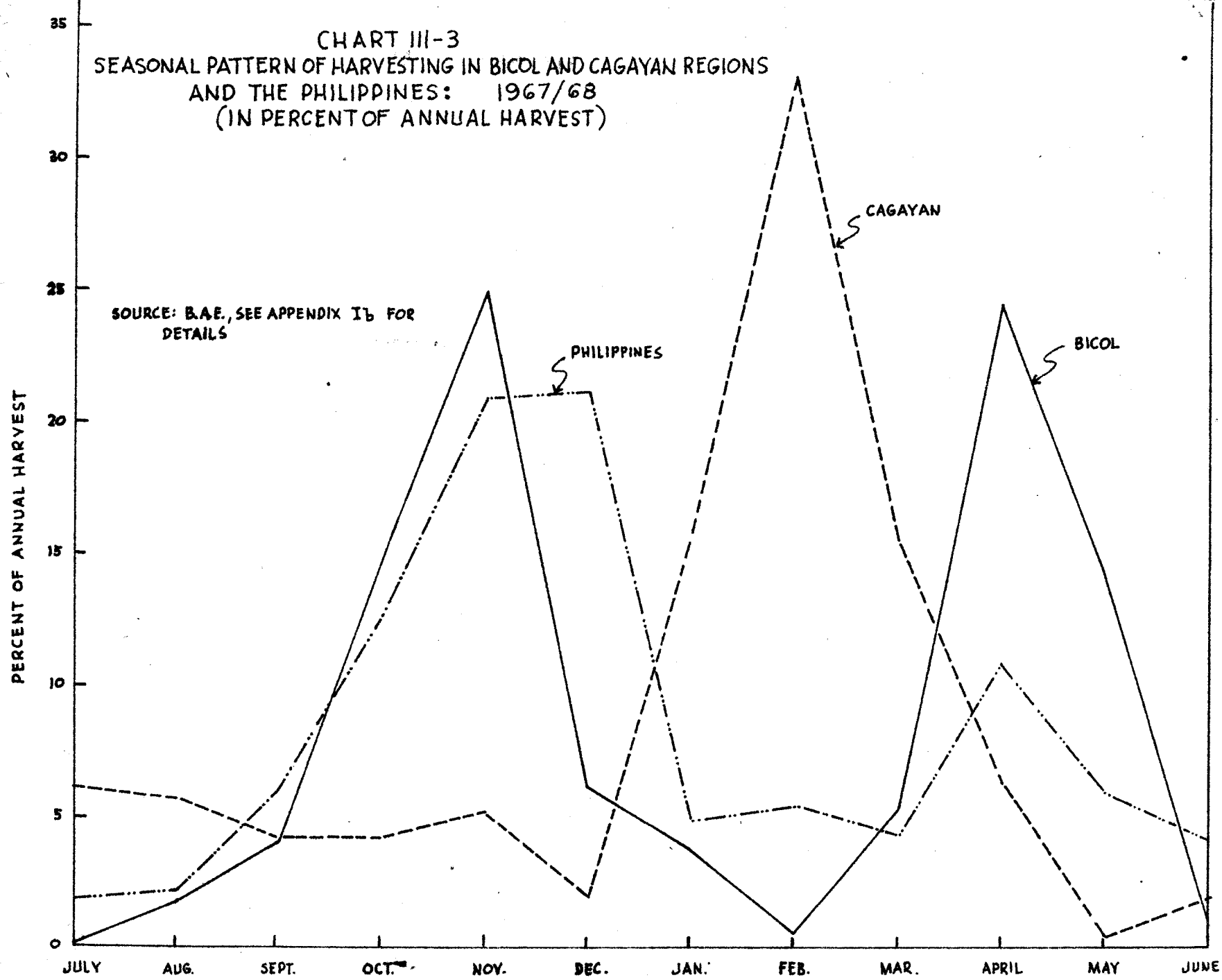
Source: NFAC, 1970 (mimeo).

with resulting periods of surplus and deficit that vary over time between areas, force the trader to consider the trade-off between inter-seasonal storage and inter-regional shipments to balance supply with demand seasonally. The differences in planting periods have arisen as farmers took advantage of the variations throughout the country in the arrival, duration, distribution and intensity of rain and also of the solar radiation available during the growing period. The variations in rainfall periods depend upon the degree of shielding given by the mountain ranges to the Northwest monsoon (November to February), the Southwest monsoon (July to September) and the trades which occur during the balance of the year or when the monsoons are weak.

The effect of these different planting periods on seasonal harvest patterns is illustrated by the contrasting situations shown in Chart III-3 for Bicol and Cagayan Valley regions and for the country as a whole. The Bicol region in general experiences no dry season and thus can raise two rain-fed or upland crops timed to limit harvesting during the period of maximum rainfall in December and January. On the other hand, Cagayan Valley experiences less total rainfall and is relatively dry from November to April.

CHART III-3

SEASONAL PATTERN OF HARVESTING IN BICOL AND CAGAYAN REGIONS AND THE PHILIPPINES: 1967/68 (IN PERCENT OF ANNUAL HARVEST)



With less than half the palay area irrigated, a majority of production must be timed to fit in with the rainy season. The overall harvest pattern for the Philippines reflects the seasonal variations in Cagayan and Bicol regions plus the patterns elsewhere with their particular climatic and water supply conditions. For the Philippines, seasonal peaks and troughs are less severe than for individual regions.

Marketing tactics must be revised from year to year as regions change in relative importance as rice producers. These changes between 1952/53 and 1969/70 are illustrated on Chart III-4.[26/] Central Luzon has always been considered as the "rice bowl" of the Philippines. But in the early 1960s its relative contribution to total production declined from the 30 percent to the 25 percent level as migrants to Cagayan Valley and Mindanao faced increased production possibilities with the rapid expansion of irrigated rice lands. This change in relative regional production was reinforced by the absolute reduction in rice area in Central Luzon as marginal rice lands were shifted to sugar and other uses.[27/]

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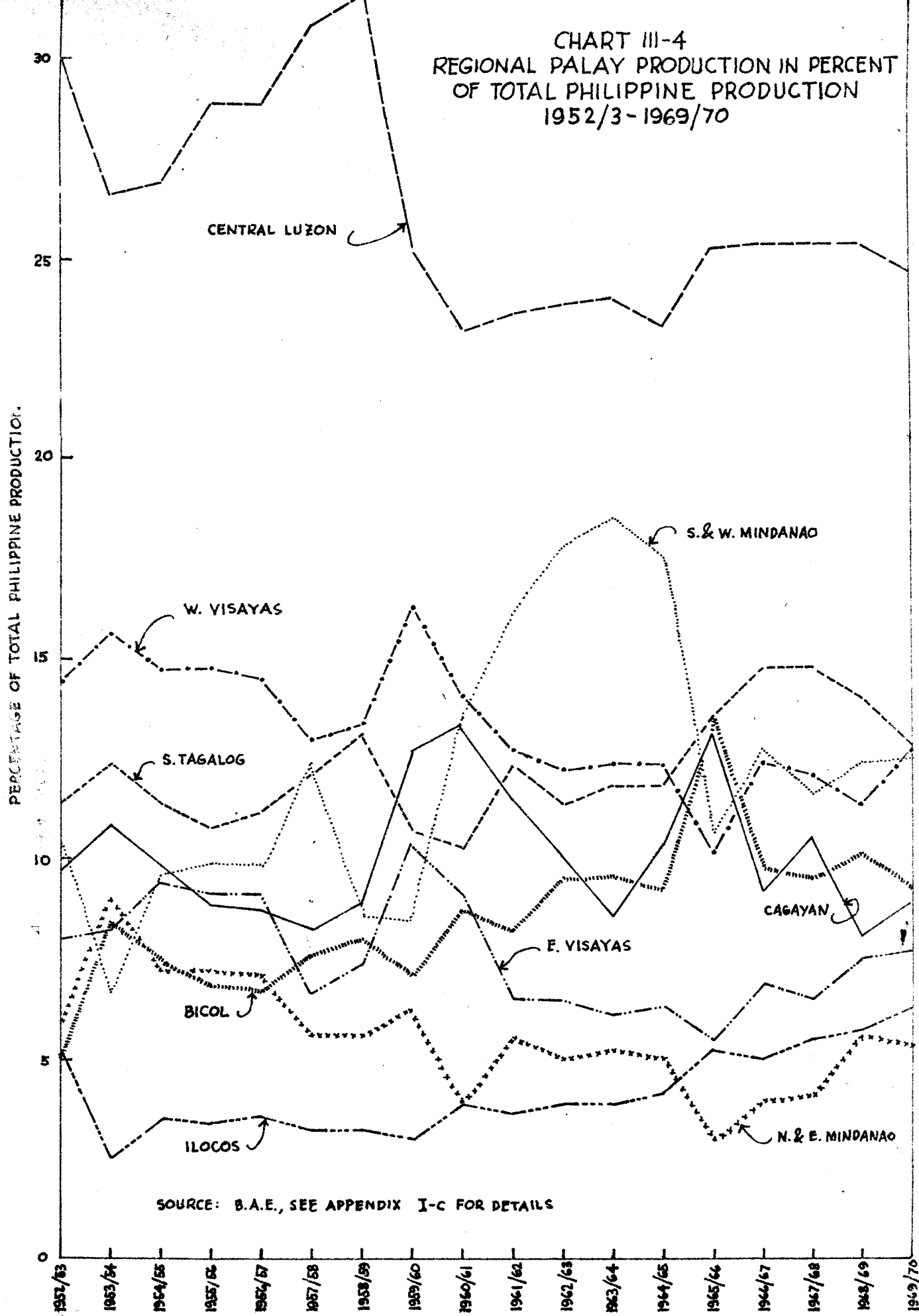
26/ Regional production relative to regional demand is discussed in Chapter IV.

27/ S. C. Hsieh and V. W. Ruttan, op. cit., p. 327.

# CHART III-4
## REGIONAL PALAY PRODUCTION IN PERCENT OF TOTAL PHILIPPINE PRODUCTION 1952/3 - 1969/70




SOURCE: B.A.E., SEE APPENDIX I-C FOR DETAILS

As described by Venegas and Ruttan,[28] explanation of longer run changes in relative production requires analysis of change in the type of area planted (irrigated, rain-fed and upland) and water use.[29] Area reductions can involve a relative shift from rain-fed and upland areas to irrigated cultivation with total production increasing as average yield rises. This was the situation in Central Luzon from 1952/53 to 1962/63 where area declined at an annual rate of 2.1 percent while yields increased annually by 2.9 percent, giving a net rate of production increase of 0.3 percent. (See Table III-3).

During the more recent period from 1960/61 to 1969/70, as shown in Table III-3, average yields have increased in all regions although insufficient to compensate for area reductions in both Cagayan Valley and South and West Mindanao. Areas where the rate of irrigation increase has been most rapid generally have shown the fastest rate of production increase as they were able to take greater advantage of the high-yielding seed varieties. This includes regions such as Ilocos, Southern Tagalog and North and East Mindanao. Regions already fortunate enough to have a high percentage of the rice lands irrigated by 1960/61 had a

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28/ Ernesto C. Venegas and V. W. Ruttan, "An Analysis of Rice Production in the Philippines," Economic Research Journal (December, 1964), pp. 159-179.

29/ Short run fluctuations can result from weather and pest variations.

double advantage during this period with the introduction of new seed varieties whose yield potential considerably exceeded that of older improved varieties. Examples are Central Luzon and Bicol, both with almost half of their rice area irrigated in 1960/61. Bicol had the third highest rate of production increase even though the rate of irrigation increase was relatively low and total harvested area remained practically constant. Eastern Visayas, with little if any increase in either irrigated area or average yields, still managed to show a 2.5 percent rate of production increase attributable mainly to increase in total area harvested. Total production declined in the South and West Mindanao region where area harvested declined with insufficient compensating increase in yields (or irrigated area).[30/]

With changes in relative proportions of irrigated, non-irrigated and upland rice areas, seasonal harvesting patterns are changing and forcing traders to keep alert if their tactics are to bring continued profits. This is

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30/ It is interesting to note that the relationship found by Venegas and Ruttan, where changes in yields from 1952/54 to 1960/62 were inversely proportional to those of area, does not seem to be valid for the period after 1960/62. (See op. cit., p. 165). During the latter period, it was only the Cagayan Valley and Western Visayas regions where this inverse relationship continued to hold. It would appear that the availability of new high-yielding seeds plus the rapid increase in irrigated area have added important new parameters.

illustrated dramatically by reference to Chart III-5. In the North and East Mindanao region, with the proportion of irrigated area increasing from only 6 percent in 1955/56 to 20 percent in 1967/68, the second crop in April has become important. Practically none existed previously. In the Bicol region, with the proportion of irrigated area increasing from 18 percent to 43percent over the same 15-year period, the second crop from March to May now equals the first crop from October to December. In 1955/56, with rather uniform rainfall over the year and with little irrigation, the harvest was much more evenly dispersed throughout the year. As shown in Chart III-6, for the country as a whole the second crop has increased in importance since 1955/56. Such changes are apt to be of increasing importance after 1967/68 with the rapid expansion of non-photoperiod sensitive high-yielding seed on old and new irrigated areas.[31/]

As suggested above, for the years immediately following 1958/59, rice hectarage declined appreciably as marginal rice land was transferred to sugar. The shift was stimulated

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31/ For details as to where new or rehabilitated irrigation is planned, see Four Year Development Plan 1971/74, op. cit., pp. 94-106. For a broad view of irrigation potential to 1990, see Frank H. Golay and Marvin E. Goldstein, Rice and People in 1990, US AID (Manila, 1967), pp. 74-97.

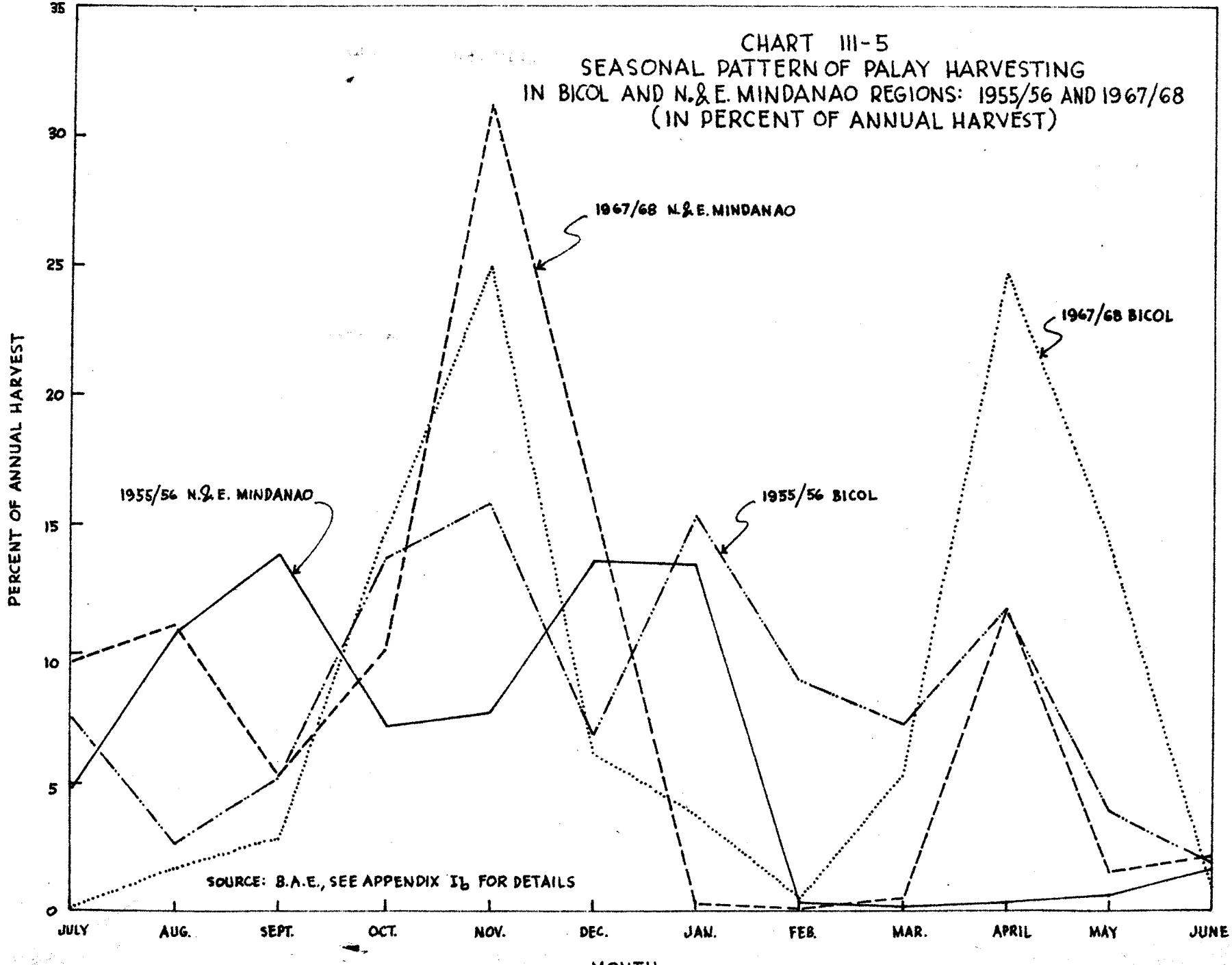
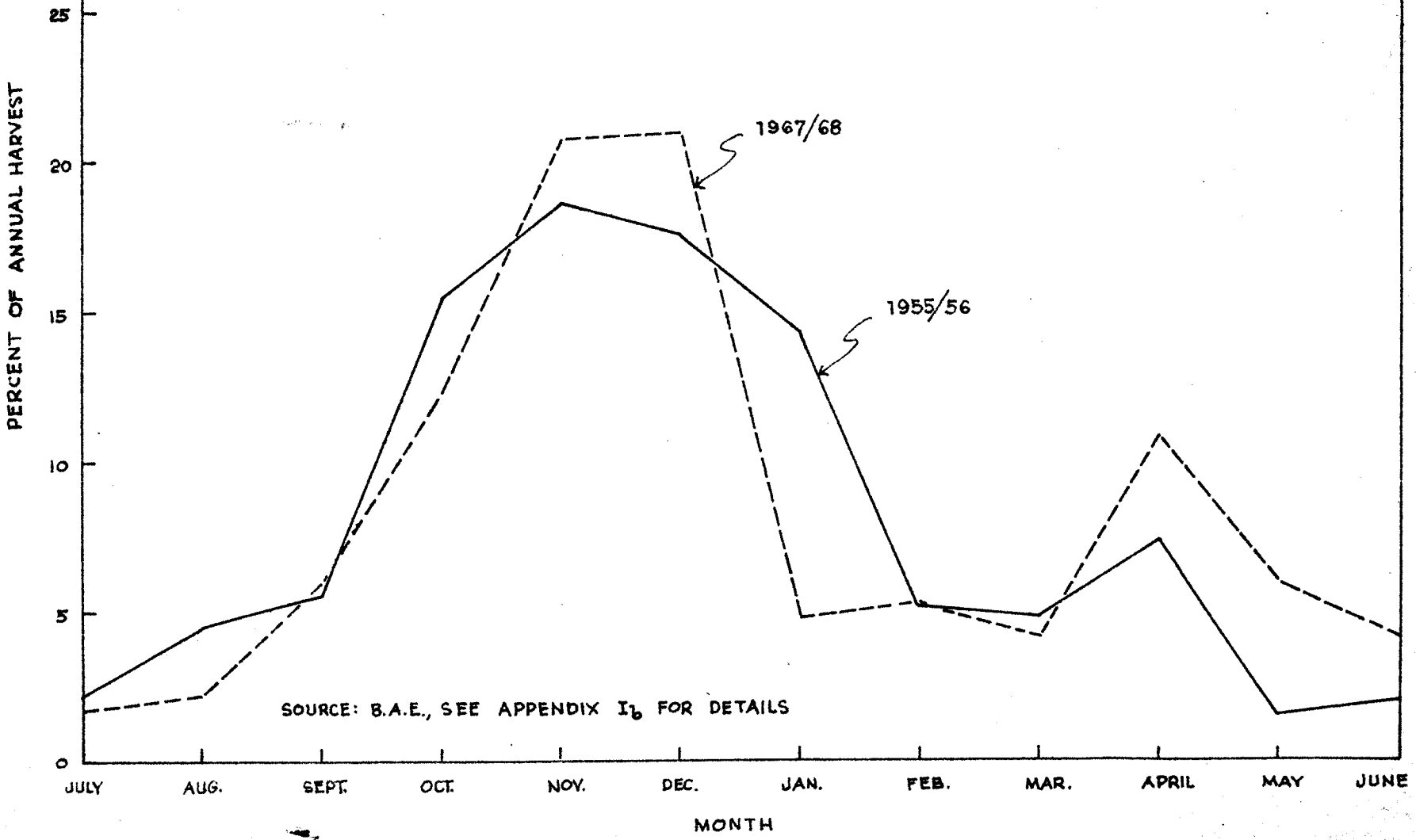


CHART III-5
SEASONAL PATTERN OF PALAY HARVESTING
IN BICOL AND N.& E. MINDANAO REGIONS: 1955/56 AND 1967/68
(IN PERCENT OF ANNUAL HARVEST)
PERCENT OF ANNUAL HARVEST
35
30
25
20
15
10
5
0
1967/68 N.& E. MINDANAO
1967/68 BICOL
1955/56 N.& E. MINDANAO
1955/56 BICOL
SOURCE: B.A.E., SEE APPENDIX Ib FOR DETAILS
JULY
AUG.
SEPT.
OCT.
NOV.
DEC.
JAN.
FEB.
MAR.
APRIL
MAY
JUNE
MONTH

CHART III-6
SEASONAL PATTERN OF PALAY HARVESTING IN THE PHILIPPINES
1955/56 AND 1967/68
(IN PERCENT OF ANNUAL HARVEST)




SOURCE: B.A.E., SEE APPENDIX $I_b$ FOR DETAILS

by the relative increase in the sugar price. This price elasticity of rice hectarage has been tested empirically by Mangahas for the period 1953/54-1963/64.[32/] Findings were in general agreement with those from other Asian countries that rice farmers are reasonably responsive to changes in the price of rice relative to corn, sugar, coconuts and probably also to other commodities.[33/] Estimated short-run price elasticities (with prices lagged one year) are shown in Table III-7.

Mangahas found that corn is the crop competing most directly with rice in the regions of Ilocos, Tagalog, Eastern Visayas, Western Visayas and South and West Mindanao. Sugar cane was competitive with rice in Central Luzon and Western Visayas. Coconuts were competitive only in Bicol region. Marketed surplus elasticities were estimated assuming that the price elasticity of hectarage was the

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32/ M. Mangahas, A. E. Recto and V. W. Ruttan, "Market Relationships for Rice and Corn in the Philippines," The Philippine Economic Journal (First Semester, 1966), pp. 1-27.

33/ For similar studies in India, Pakistan and Indonesia, see Raj Krishna, "Farm Supply Response in India-Pakistan: A Case Study of the Punjab Region," Economic Journal (September, 1963), pp. 477-87, and Mubyarto and Lehman B. Fletcher, The Marketable Surplus of Rice in Indonesia: A Study in Java-Madura, Monograph No. 4, International Studies in Economics, Department of Economics, Iowa State University Press (October, 1966)

TABLE III-7

Estimated Short-run Price Elasticities of Rice Hectarage and Marketed Surplus in the Philippines 1953/54-1963/64[1/]

| Region | Price Elasticity of Hectarage | Price Elasticity of Marketed Surplus (low estimates) |
|---|---|---|
| ILOCOS | .11 to .23 | .30 to .62 |
| CAGAYAN VALLEY | negative | negative |
| CENTRAL LUZON | .13 to .55 | .20 to .85 |
| SOUTHERN TAGALOG | .19 to .64 | .38 to 1.28 |
| BICOL | .38 to .41 | .78 to .84 |
| EASTERN VISAYAS | .15 to .35 | .34 to .81 |
| WESTERN VISAYAS | .09 to .91 | .18 to 1.78 |
| N. & E. MINDANAO | .21 to .22 | .39 to .41 |
| S. & W. MINDANAO | .25 to .34 | .57 to .77 |

1/ Elasticities are with respect to expected relative prices (prices in time t-1).

Source: M. Mangahas, A. E. Recto and V. W. Ruttan, "Market Relationships for Rice and Corn in the Philippines," The Philippine Economic Journal (First Semester, 1966), p. 21.

lower limit to the price elasticity of production.[34] As estimated from elasticities show in Table III-7, the marketed surplus elasticities (with marketed proportions of total production ranging from 37 to 65 percent) ranged from around 1.5 to 2.5.[35] It is this market surplus elasticity that is important to the trader to help him interpret expected increases in hectarage in terms of expected changes in quantities of palay to be marketed.

Unfortunately, the study of elasticities covered a period before the introduction of high-yielding high-fertilizer-responsive rice varieties. For that period, Mangahas concluded that no measurable yield response to price was obtained.[36] With the rapid acceptance since 1967 of the new varieties on irrigated areas, it would now be expected that a positive yield response to price would be found. This would involve inclusion in the analysis of a technology variable relating prices of rice and fertilizer,

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34/ This assumed a price elasticity of yield as non-negative, Ibid., p. 20.

35/ Mangahas, after allowing for some positive yield response and some negative home consumption response, concluded "it may well be that in several of the regions the elasticity of the marketed surplus of rice with respect to expected price is at least unity." Ibid., pp. 22-23.

36/ Ibid., p. 26.

a variable not included in the prior study.[37/]

IV. Rice Cultivation, Setting and Practices

In the preceding portions of this chapter, numerous relationships have been discussed between rice production and marketing. There remain others of sufficient importance to be emphasized here.

Marketing problems increase where farm sizes are small. This requires many small traders to collect miniscule surpluses from individual farms and accumulate them for sale to other middlemen or to rice mills. Such a situation also increases the possibility that the farmer will have only one potential buyer for his crop and thus little chance to obtain a competitive market price. Credits for modern inputs are difficult to obtain unless supplied by a landlord, a cooperative or Government financing program.

Many rice farms in the Philippines fall in the small size category, as shown in Table III-8. While less than 10 percent of the rice farms are smaller than 1 hectare in size, three-quarters of the remaining are of only 5 hectares or less. Compared to Indonesia, where the average rice farm

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37/ In Indonesia, the relative prices of fertilizer and rice have been found to be of major importance in the price elasticity of output. See Leon Mears, "A Rational Rice Price Policy," Discussion Paper No. 7018, U.P. School of Economics (August 20, 1970) (mimeo).

TABLE III-8

Distribution of Farm Size in the Philippines
May, 1960

| Hectares | All farms No. (000) | % | Rice farms No. (000) | % |
|---|---|---|---|---|
| Under 0.5 | 89 | 4.1 | 26 | 2.5 |
| 0.5 to under 1 | 161 | 7.5 | 69 | 6.6 |
| 1 to under 2 | 642 | 29.6 | 331 | 31.8 |
| 2 to under 3 | 459 | 21.2 | 249 | 23.9 |
| 3 to under 5 | 405 | 18.7 | 207 | 19.9 |
| 5 to under 10 | 290 | 13.4 | 121 | 11.6 |
| 10 to under 20 | 100 | 4.6 | 34 | 3.2 |
| 20 to under 50 | 16 | 0.7 | 4 | 0.4 |
| 60 & above | 5 | 0.2 | 1 | 0.1 |
| Total | 2,167 | 100.0 | 1,042 | 100.0 |

Source: Bureau of the Census and Statistics, Census of the Philippines, 1960, Agriculture (Manila, 1965), p. 17.

on Java is below 0.4 hectare in size, the average Filipino farmer is very well off.[38] But the average Philippine rice farm is still relatively small in the sense that its market sales and input purchases are small. There are over 600,000 rice farms under 3 hectares in size scattered throughout the Philippines. Their marketing problems differ only in degree from those of the Javanese farmer.

The small-scale Filipino farmer often must sell his crop immediately after harvest to satisfy creditors. Many are unable to retain sufficient palay to last them until the following harvest and so must repurchase at higher prices later in the year. Such purchases add to the total rice marketing picture.

Methods used in harvesting, drying and accumulating the palay can also affect milling recovery and quality. Sun-drying or field drying, with alternating moisture desorption in the daytime and absorption at night, results in moisture cracking of the grain that reduces milling recovery and increases the percentage of broken milled rice. Localized fermentative heating during field drying, resulting from inadequate ventilation in the stacks of palay, will cause

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38/ Agricultural Extension Service, Department of Agriculture, Pasar Minggu, West Java (mimeo).

sweating and mold damage resulting in grain yellowing and quality loss for the market.[39]

The transition to more rapidly maturing high-yielding varieties together with the change from single annual to multiple-cropping can necessitate harvesting during periods of rainy weather. This raises many problems for farmers, traders and millers. Palay that cannot be dried on the farm may have to be sold with moisture content as high as 20 to 26 percent. This involves development of a special pricing system based on dry grain equivalent. But, traditional methods of determining degree of dryness, such as biting the grain or compressing it in the palm, are unsuitable at high levels of moisture. Moisture meters will be essential for this purpose if the buyer and seller are to have the facts necessary for negotiation. With drying shifted to large traders or millers, mechanical dryers become essential. However, it is improbable that economic sized dryers can handle the large quantities of palay that are likely to be for sale before fermentative heating begins. This leads to the need for special storage facilities for storing wet grain until it can be mechanically dried.

Marketing agencies and millers also face difficulties

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39/ Much of this discussion regarding palay harvesting, drying and milling is the result of information supplied by the FAO. Technical Advisor to RCA, John Rawnsley.

from palay originating from different seed varieties. Farmers are increasingly concentrating production on the few recommended Seedboard varieties, but their market sales of these may become mixed with traditional varieties produced for their own consumption or with different Seedboard varieties that are mixed together by traders in the accumulation process. And even Seedboard varieties are of differing grain length and size and so require individual milling adjustments if total recovery and grain breakage are not to suffer. For example, the IR-20 and BPI-76 are medium length grain while C4-63 and IR-22 are long grain varieties. Also, mixture of different qualities for market sale results in foregoing the higher market price of the preferred quality. For example, BPI-76 is considered a special quality while IR-5 and 8 are considered only as ordinary. If the two become mixed, market price for the entire mixture drops to that of the cheaper ordinary variety.

## V. Summary

Rice marketing is affected by the nature of rice production. Estimates and forecasts of this production have improved over the years to provide a basis for trading decisions although statistical precision still leaves something to be desired. Major production relationships affecting marketing are:

1. Production has increased during the past 15 years so that self-sufficiency appears to have been realized in an average weather year and under price policies that have been in effect. This raises new problem in marketing, storage and milling of a critical nature, especially considering possibilities for either rice import or export or both.

2. These production gains have resulted from a complex relationship involving the nature of cropland utilized, irrigation, new high-yielding seed varieties, increased use of technological inputs and prices of rice and close substitutes and their production inputs. Further production gains will depend upon price policies affecting rice and substitutes as well as on the ability to provide additional irrigation and to effect more intensive use of high-yielding varieties and modern inputs on all irrigated ricelands.

3. The seasonal nature of production, which may be evening out slightly with added year-round irrigation and new non-photoperiod sensitive varieties, adds to the traders difficulties in supplying a non-seasonal demand without undesired price fluctuations.

4. The large number of small farms, with their small marketable surpluses, add to the cost of accumulating

market stocks and to the problem of insuring a competitive price for the farmer.

5. Marketing problems increase because of the number of varieties of rice produced as well as by the manner in which the palay of each variety is dried and marketed.

6. With a positive price elasticity of hectarage along with input and area responsiveness to the ratio of modern input prices to palay prices, there is definite evidence that price policy can be used as a major policy instrument in guiding production toward national goals.

APPENDIX .Ia

## Agricultural Statistics*

Since 1954, the principal official source of agricultural statistics on forecasts of rice area, production and yield, on crop forecasting, rice stocks and related information has been the Bureau of Agricultural Economics (BAE) of the Department of Agriculture and Natural Resources primarily through its annual Crop and Livestock Surveys (CLS) and its periodic crop forecasts (since 1968, the CLS and forecasts are combined within the quarterly Integrated Agricultural Surveys - IAS). Estimates are also furnished approximately every 10 years by the Bureau of the Census and Statistics (BCS) through the Census of Agriculture.

Prior to 1954, except for census years, statistics on palay were largely judgment estimates from field reporting services. Responsibility for these estimates changed hands over the years increasing the probability of lack of reliability in making comparisons between years.[1/] For example, in 1919 the

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* Material assistance in preparing this Appendix was provided by the Bureau of Agricultural Economics.

1/ This historical section relies heavily on J. V. Castillo, "Philippine Agricultural Data Collection: The Systems and Methods Used," Philippine Agricultural Situation Agricultural Economics Division, DANR (September, 1961), Vol. III No. 3, pp. 29-40.

Division of Farm Economics of the Bureau of Agriculture was responsible. This was shifted to the Bureau of Plant Industries (BPI) and in 1933 to the Division of Statistics in the Department of Agriculture and Commerce. This latter Division was fused in 1940 with the Bureau of the Census and Statistics, with estimates based on information supplied by field personnel of the Provincial Agricultural Extension Service. These field personnel usually relied on their own judgment estimates aided by historical records. In 1952 the Statistical Section of the Bureau of Agricultural Extension took over the task. And finally, the personnel of this Statistical Section were transferred to the Agricultural Economics Division (which was later raised to Bureau Status, BAE) of DANR.

Crop and Livestock Survey

The new Agricultural Economics Division instituted sampling procedures when the first Crop and Livestock Survey was conducted in 1954. These surveys have been conducted during the last quarter of the crop year when most of the crops have already been harvested and its results are finalized and released at about the end of the first quarter of the following crop year. A major emphasis of the survey is centered on palay and corn, more particularly, region by region information on hectarage, yield, production and such other

items as household stocks and their disposal at the farm level, covering all provinces in the Philippines except Batanes, Palawan and Sulu.

The sampling design has modified four times since 1954, with more reliable estimates hoped for with each change. According to BAE, these changes in sample design still permit a relative comparability of yearly estimates.

A two-stage sampling design has been used since 1958. The barrio is the primary sampling unit and the farming household the secondary sampling unit. All barrios within each province are first stratified according to cropping pattern, i.e., palay barrios, palay and corn, palay and others, etc. These groups of barrios are in turn grouped to form sub-strata of the same sizes in terms of total farming or palay area. Sample barrios are then chosen by simple random sampling without replacement.

A farm is defined as any parcel of land with a total area of 1,000 square meters or more, cultivated to crops and agricultural products, or any land regardless of area used for the raising of at least 20 head of livestock or 100 poultry. 2/

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2/ National Economic Council, Office of Statistical Coordination and Standards, "Methodology of Agricultural Sector Accounts and Related Statistics of the Philippines," (July, 1963) (mimeo).

A household is a group of persons living together in the same dwelling unit with a common arrangement in the preparation and consumption of food. A farming household is one which derives its income from operating a farm as defined above. Farm households are selected by random sampling with every fifteenth household selected being interviewed.[3/] In recent years, the survey size has generally slightly exceeded 2,300 sample barrios and 10,000 farm households.

Palay area harvested, yield and production is reported by type of crop, by lowland irrigated and unirrigated and by upland crop, by region, and since 1968 by traditional and high-yielding seeds varieties. Disposition of palay from the farm has been reported in most recent years. In addition, since 1968 information has been collected on such things as input use, irrigation type, marketing activities, credit practices and production cost. Similar data but generally in less detail are collected for corn and other crops as well.

As indicated in the text, these statistics have varying degrees of precision although improvements in methodology have been instituted on many occasions over the years. Criticism

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3/ "Crop and Livestock Survey Operations Manual," prepared by the Agricultural Estimates and Statistics Branch (Bureau of Agricultural Economics, Department of Agriculture and Natural Resources, 1968), pp. 1-2 (mimeo).

has been given to the fact that yield estimates are solicited ex-post from the farmers and precision depends on recall and willingness to report. Careful training of enumerators in handling interviews and cross-checking is expected to elicit some improvement in accuracy. Given the situation where few farmers keep records, this procedure is probably all that is economically warranted. The method of reporting production by cavans (in sacks or other equivalent units) can also be a source of error. All cavans are finally tabulated as if in mill-dry (approximately 14 percent moisture) condition. Thus, if the farmer's report is for palay of greater moisture content, it is expected that his sacks are of weights above 44 kg. to compensate.[4/] Net areas harvested are not actually measured and thus will involve some degree of error. To minimize this error, enumerators now obtain area estimates to the 1/100th of a hectare.

Crop Forecasting

In 1964 crop forecasting during the year was begun. Since 1968, these have been conducted on a sampling basis

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4/ In 1970, crop-cutting is being tried on an experimental basis in Nueva Ecija Province. If improved reporting warrants, it is expected to expand this picture nationwide as soon as budgets permit and men can be trained.

covering a sub-sample of ¼th the IAS sample (final round barrios) and enumerating all sample households in the sub-sample barrios to forecast the area, yields and production of the current crop year. These surveys are made in October, January and April and provide policy makers and marketing agencies with advance forecasts upon which to base their short run activities. Current surveys obtain information on the current year on area harvested and to be harvested, area damaged, yield and comparative data on the past year with explanation of any changed expectations.

This new survey procedure is expected to bring improved precision compared to the prior procedure where subjective evaluations obtained by the field statistician for each municipality of a province were the only primary source of information for forecasts. Such subjective estimates by the field technician included an estimate of percentage change in area and yield based on actual observation of the crop, weather conditions and availability of fertilizer, farm chemicals, irrigation and high-yielding varieties. The field statistician often supplemented his own observations with interviews of farmers, barrio officials, thresher operators and other Government officials.[5/]

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5/ DANR, BAE, "The Present BAECO Crop Forecasting System," (Diliman, Quezon City, 1968), p. 2.

The base data for provincial forecasts consist of estimates of area, production and yield during the previous year for each municipality, updated based on results of the 1960 Census of Agriculture and are limited to weighting purposes. The weighting factors for the different municipalities for each crop are their corresponding percentage contribution to the total area planted to the same crop in the entire province. Provincial forecasts are forwarded to regional and then national offices for further evaluation and consolidation.[6/]

These forecasts are subject to all the usual hazards of predictions with increased precision expected with each succeeding quarterly forecast. With the added factual informating since 1968 from the farm household surveys, present forecasts should have an added degree of reliability.

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6/ Ibid., p. 3.