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GUIDELINES TO AN AGRICULTURAL STRATEGY FOR INDONESIA

by

Leon A. Mears, 1907-

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I

Strategy guidelines for Indonesia must consider the short, medium and longer run and their inter-relationships when examining the kinds of agricultural and related investments that will provide quick returns while leading toward the generation of sustained upward growth in yields per hectare per year. Such a strategy should flow from past experience in Indonesian and Asian agriculture, taking into account current urgencies and medium and longer run objectives.

The general outlines of past agricultural development in Indonesia are known but recent production and trade data are incomplete and neither the medium nor the long range objective functions or production targets have been spelled out except in the most general of terms.[1/] An exception

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1/ For historical development, see for example:

D.H. Penny and J.P. Gittinger, Economics and Agricultural Development, paper presented at the Seminar on Technology and Science in Indonesian Development, at Center for Development Change, University of Kentucky, May 21-27, 1967.

L.A. Mears, Rice Marketing in the Republic of Indonesia, Pembangunan Press, Djakarta, 1961.

F.A.O., Report of F.A.O. Survey Team to Indonesia, Rome, 1967.

J.C. van Leur, Indonesian Trade and Society, W. Van Hoeve Ltd., The Hague, 1955.

G.C. Allen and A.G. Donnithorne, Western Enterprise in Indonesia and Malaya, The Macmillan Co., N.Y., 1957.

Stanislas Swianiewicz, "The Problem of Agricultural Overpopulation", Ekonomi dan Keuangan Indonesia, July 1958.

L.A. Mears, "Economic Development in Indonesia Through 1958", Ekonomi dan Keuangan Indonesia, January/February 1961, pp. 15-57.

Biro Pusat Statistik, Statistical Pocketbook of Indonesia, Djakarta, published annually from 1955 to 1963.

Nugroho, Indonesia, Facts and Figures, Djakarta, January 1967.

is the stated target of the Ministry of Agriculture for rice self-sufficiency by 1973.[2/] Thus, it is necessary to assume general objectives on which to base strategy and then to resort to sensitivity analysis to cover a possible range of output objectives. In essence, it is more the guidelines to a strategy than the strategy itself that will be developed and evaluated in this paper.

Such a strategy for Indonesian agricultural development consists in the selection of those factors that will 1) lead toward the development of a modern agriculture (including forestry and fisheries), based on the use of improved inputs (such as controlled irrigation, fertilizer, high-yielding varieties, insecticide, mechanization, etc.), 2) support the urgent need for expanded production and foreign exchange resources by their immediate effect on output, and 3) help speed the development of the supporting infrastructure and organizations that a growing agriculture will require.

II

BASIS FOR STRATEGY

Leads Toward a Modern Agriculture with Modern Inputs

Lacking any perspective plan (or even the rough dimensions of the coming 5 Year Plan), the objective of increasing output through agricultural modernization---increasingly using modern inputs---can serve as a long run

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(cont'd) [1/] A rough framework for the 5 year plan which has never receive any official recognition, was presented by Moh. Sisman of Bappenas at the Seminar on the Agricultural Five-Year Plan, held at the Gadjah Mada University at Jogjakarta in June 1967. See also, K.D. Thomas and J. Panglanykim, "Suharto Plans Again", Far Eastern Economic Review, Nov. 2, 1967, pp. 239 ff.

[2/] Internal policy papers of the Ministry of Agriculture have repeatedly mentioned this target during 1967 and 1968.

guide to strategy for sustained agriculture growth. In general during the post war years, Indonesian agriculture has been rehabilitated along lines using traditional pre-war inputs. Production of many crops such as rice, corn and small-holders' rubber surpassed pre-war levels relying heavily on additional inputs coming from the opening of new lands and more intensive use of labor. Where irrigation has been expanded, it has generally been to provide water for traditional seed cultivated by traditional methods. In a number of instances, new varieties have been developed but it is only within the past several years that new high fertilizer-responsive, high-yield varieties have been tested or were available for large-scale planting in the country.[3/] Yet, with new lands frequently marginal and at best expensive to prepare for cultivation, sustained increases in production can be expected only by the more rapid naturalization and adoption of new high-yielding varieties together with the modern inputs they require.

It is of prime importance to have the high-yielding varieties that are highly fertilizer-responsive. Preliminary trials indicate the probable adaptability to Indonesia of the new rice varieties developed in the Philippines. With the Bimas[4/] organization to help introduce this

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3/ "Metro" corn, a high-yielding hybrid, was developed and extensively planted in the early 1960s but seed stock has not been maintained. Farmer resistance developed when prices fell as export marketing institutions proved inadequate to dispose of domestic surpluses. Miracle rice from the Philippines is being planted over extended areas for the first time in 1968.

4/ For description of the Bimas program, see E.A. Roekasah and D.H. Penny, "Bimas: A New Approach to Agricultural Extension in Indonesia", Bulletin of Indonesian Economic Studies, Canberra, June 1967, pp. 60-69.

variety and assure availability of inputs, there is added reason to give strong short run priority to increasing rice production. High yielding varieties of other crops such as corn, rubber and oil palm are available and may be considered for strategic emphasis providing existing constraints can be alleviated. Where such high-yielding varieties are not available, together with an organization to stimulate effective adoption, the long run strategy should be toward required research and institutional development. In the short run, strategic priority would not be given these crops.

It is recognized that most such new high-yielding crop varieties require heavy application of fertilizer to make the high yields possible.[5/] Fertilizer generally is not fully effective unless water can be assured as needed for the growing cycle. With the large investment in inputs, risks of loss by pests must be minimized by use of insecticides.

Thus, particularly for the new high-yielding varieties, but also for greater yields with many traditional varieties, an adequate supply of fertilizer takes a high position in any agriculture strategy in Indonesia. Fertilizer is important in the longer run, but especially valuable in the short run given the quick-response of production to its use.

The addition to or the rehabilitation of existing irrigation provides more assured (and preferably controlled) water supply. This

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5/ For further discussion on this point, see L.A. Mears, "Strategy for Increasing Food Grain Production in South and Southeast Asia", Philippine Economic Journal, Second Semester, 1967.

factor stands second only to fertilizer in deserving strategic priority. The spread of high-yielding varieties and multiple cropping, even of traditional varieties, generally is limited by the extent of such irrigation. Aside from providing for completion of partially finished large scale irrigation projects, resources for irrigation could well be concentrated in the medium run on rehabilitation and pump installation where there is a minimum time-lag between investment and output.

Increased insecticide use is also of strategic importance but as yet institutional arrangements have not been found to induce large scale adoption for small-holders' crops in Indonesia. Its usefulness as a strategic factor in the short run depends on the ability to develop the organization and provide inducements to bring greater use. Given the extent of production that may be otherwise lost, amounting to as much as 30 percent in large parts of Java and Sulawesi, subsidies could be justified at least in the short run.[6/]

This strategic emphasis does not imply that the support for such factors as rural education, erosion control, watershed protection and land tenure is unimportant, or that projects with longer gestation periods are not required for ultimate progress. What is implied is that for the present the bulk of resources should be concentrated where benefit-cost ratios are

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6/ Currently, large scale mass spraying projects are being undertaken under direct arrangements with a Swiss insecticide manufacturer. This experiment, following an earlier one in South Sulawesi, may attract greater use by individual farmers or lead to new institutional methods for providing mass protection.

extremely favorable and rapid output increases can be expected.[7/]

Factors that will have immediate effect on Production and Foreign Exchange

Agriculture itself occupies a strategic role in the short run in the economic development in Indonesia because of its potential to bring rapid production increases and to both earn and save scarce foreign exchange. In the short run, this will include continued expansion from additional cultivation on new lands and better management of traditional techniques of production where their use has deteriorated. In cases where new varieties have been proven, as may shortly be the case for rice, modern technology could lead toward both short and longer run objectives. Each crop needs to be analyzed specifically so that the strategy determined will bring optimum short run relief but yet lead toward longer run objectives with a minimum of delay.

Associated with this strategic approach is the requirement that farm prices relative to input costs should provide adequate inducement for farmers to provide the necessary inputs to meet objectives most effectively. In some cases, this would mean providing inducement to cultivate new lands or to increase yields on old land by traditional methods. Elsewhere, it could mean providing inducements to adopt new techniques. It is probable

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7/ Experimental data is seldom available at present to permit refined benefit-cost analysis. For such analysis covering the use of some modern inputs for rice production under the "Bimas" program, see L.A. Mears and Saleh Afiff, "The Bimas Program and Rice Production", Bulletin of Indonesian Studies, Canberra, June 1968, and L.A. Mears, "Suggestions for a Strategy to Increase Agricultural Production and Yields in Indonesia", University of the Philippines, Quezon City, 1967 (U.P. School of Economics, Institute of Economic Development and Research Discussion Paper 67-6).

that the size of the inducement may need to be greater in the latter instances, given the high risk factor Indonesian farmers generally attach to a change in production.[8/] For example, over the longer run farmers might gradually start using large fertilizer inputs even though fertilizer prices were not subsidized. However, given the urgency of increasing output, subsidization of fertilizer prices will continue to be important. This will be especially valid where not only landlords but also tenants are to be reached by inducements. Tenants often share production unequally such that a given inducement looks less attractive to them than to the landlord.

To Speed Development of Supporting Infrastructure and Organization

A given price/cost inducement to increase production by either traditional or modern methods can be ineffective where supporting infrastructure and organization are inadequate. Added inputs require greater production credit, larger and more effective marketing organizations plus reasonable assurance that the farmer will receive a greater percentage of the price paid by the ultimate buyer.

To the extent that transportation to market is unduly expensive, the inducement to grow additional crops for market is reduced if not eliminated. Where roads do not exist reasonably near to the producer, it is highly unlikely that any crops will be grown for market. In the short

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8/ This characteristic is not uncommon in other countries as well, see John W. Mellor, The Economics of Agricultural Development, Cornell University Press, Ithaca, N.Y., 1966, pp. 291 ff.

run, production may receive greater stimulus from improvement of inter-island shipping and the removal of constraints that limit inter-regional shipments than by improvement of land transport.

Strategy in selecting priority crops in the short run must take into account the availability of adequate infrastructure and organization. In preparation for the medium run, strategic priority should be given gradually to improving the infrastructure and organizational facilities, with higher priority where changes appear to have a potential to stimulate production rapidly. For example, where the effectiveness of high-yielding corn varieties has already been proven, and where export marketing organization appears to be developing, organization for multiplication of the high-yielding corn varieties should be given high strategic priority. Or, where primary and tertiary irrigation channels remain unused because tertiary channels have not been constructed, organizational strategy is indicated.

To the extent possible, the Government should help provide inducements to enable the private sector to relieve them of furnishing marketing services. The Philippines provides a constructive example where fertilizer is increasingly marketed by fertilizer producers and new high-yielding seeds propagated and distributed extensively by private producers. Given the present limited organizational capacity, the Indonesian Government will have its hands full providing those services that the private sector is generally unable to provide. However, where other conditions indicate priority, and where the Government cannot shift organizational responsibility, strategic temporary use of expatriate specialists in positions of authority may be essential to effect rapid organizational improvement.

Forestry and Fisheries

The same strategic guidelines hold for these products but with slightly different interpretation. While high-yielding fish for inland fisheries and improved seed-stock for the forests may be a long run objective, adoption of modern deep sea fishing and logging techniques are more important for rapid production gains in the shorter run. Infrastructure and marketing organization are apt to be limiting constraints suggesting foreign know-how and capital as strategic to rapid development.

III

STRATEGY FOR PRIORITY CROPS

With the above general objectives and strategic factors in mind, the specific crop strategy can be reached after examining each crop situation in detail. This crop strategy is explained in the following section for a selected group of priority crops. Selection of this priority group has taken into account the quantitative importance of production, foreign exchange earning or saving capacity, the availability of new high-yielding varieties or improved production techniques and the readiness of supporting infrastructure and institutions.[9/]

9/ In evaluating individual crop situations and potentials, considerable reliance has been placed on discussions in Indonesia with crop experts from the Asian Development Bank, the I.B.R.D., the Netherlands Government and the F.A.O., who were conducting intensive investigations in late 1967 and mid-1968. Additional unpublished statistics and first hand description of conditions were obtained in discussions with government and private agriculturalists and related specialists in Indonesia.

Production Trends and Foreign Exchange Earnings

Net value added in production of agricultural crops selected for their potential strategic importance (including animal husbandry, forestry and fishing), is shown in Table 1 for selected years from 1960 to 1968. The 1968 figures, which have been estimated by the author (on the basis described in Table 1), provide the benchmark for estimating incremental value added by agriculture in the 5 Year Plan, 1969 to 1973. Under each agricultural sub-category, the "other" group includes those crops or products where strategic emphasis does not appear warranted now and where the "best estimate" is that their production will continue to expand according to past trends.

Four rather important farm food crops are included in this "other" category. The production of two of these, cassava and sweet potatoes, accounts for approximately 4.5% of the net domestic product (N.D.P.). They are not included as priority items as they are generally considered in Indonesia to be inferior foods relative to rice. Considering the objective of the Ministry of Agriculture to obtain self-sufficiency in rice by 1973, any successful promotion of cassava and sweet potato production could result in a surplus at existing relative prices, given the unlikelihood that exports could be expanded rapidly.

Fruits and vegetables, which account for approximately 10 percent of N.D.P. also have been included in the "other" group. Priority is not considered warranted as there are no recent developments of new high-yielding vegetable varieties and if new fruit varieties have been developed, these can be considered for strategic importance only in the

TABLE 1

Origin of Net Domestic Product at Factor Cost from Agriculture, Forestry & Fisheries

Constant 1960 Prices[1/]

Indonesia 1960 - 1968
(In billions of Rupiahs)

	a. Amount b. % of Net Domestic Product	1960		1964	1966	1968 Benchmark	
		(a)	(b)	(a)	(a)	(a)	(B)
1.	Farm Food Crops	132.0	33.4	137.5	148.6	154.5	33.9
	Rice	53.4	13.5	51.6	55.8	59.8	13.1
	Corn	7.2	1.8	10.9	9.3	8.7	1.9
	Other	71.4	18.1	75.0	83.5	86.0	18.9
2.	Small-holder Nonfood Crops	26.9	6.8	32.1	33.6	36.3	8.0
	Rubber	11.0	2.8	12.3	12.1	12.6	2.8
	Copra	7.1	1.8	6.9	7.7	7.7	1.7
	Coffee	1.2	0.3	1.1	1.3	1.6	0.3
	Other	7.6	1.9	11.8	12.0	14.4	3.2
3.	Estate Crops	11.7	3.0	12.4	10.9	10.5	2.3
	Rubber	5.0	1.3	5.3	5.2	5.0	1.1
	Tea (Processed)	1.5	0.4	1.5	1.4	1.4	0.3
	Palm Oil	1.06	0.3	1.2	1.2	1.2	0.3
	Palm Kernels	0.17	-	0.17	0.18	0.2	-
	Other	3.97	1.0	4.23	2.92	2.7	0.6
4.	Animal Husbandry	18.1	4.6	19.3	20.7	21.1	4.6
5.	Forestry & Hunting	9.0	2.3	6.8	5.0	6.2	1.4
	Timber	2.6	0.7	1.8	-	2.0	0.5
	Other	6.4	1.6	5.0	-	4.2	0.9
6.	Fishing	7.5	1.9	9.4	9.8	10.3	2.2
	Total Agriculture	205.2	52.0	217.5	228.6	238.9	52.4

TABLE 1 (cont'd)

Sources:

1960 and 1964 -- Central Bureau of Statistics, National Income of Indonesia, Djakarta, 1967.

1966 -- Central Bureau of Statistics, unpublished, with value added figure for Fishing reduced by author from Rp. 11.6 billion to Rp. 9.8 billion as increase (in sea fisheries) did not appear justified considering lack of evidence of increased inputs.

1968 -- Estimated by author, using preliminary estimates of 1968 physical output from summary of numerous recent surveys by experts in each field; including both Indonesian government officials and expatriates.

Footnote:

1/ The net value added has been obtained by applying fixed percentages (estimate by the Central Bureau of Statistics in 1960) to the estimate value of gross output in all years, with either average wholesale or factory input prices (1960) used with physical output to value annual gross output. The fixed percentage coefficients take into account an estimated 10% trade and transport margin plus estimated input costs. Using these fixed coefficients may distort the picture of year-to-year change but data for recent years is not available to permit greater refinement.

longer run. According to agricultural extension workers contracted by the author, farmers who grow vegetables and fruit commercially are generally aware of modern inputs and will use fertilizer on traditional varieties as long as it is available at economic prices. Thus, with the general strategy of providing adequate fertilizer, fruit and vegetable production should continue to increase at rates approximating the past trend.

Major agricultural exports for 1966 and 1967 are shown in Table 2. Two of the important export crops, tobacco and pepper, have not been chosen for priority attention. Before any changed production trend might be expected for pepper, severe pest and marketing problems must be solved. Increase in tobacco production also depends largely upon solution of existing marketing shortcomings.

Assuming alternative per capita income growth targets for the 5 Year Plan and individual crop strategies as described below, estimates have been made of total and incremental net value added by production. These are shown in Table 3. For these crops, annual compound rates of production growth during the 5 Year Plan are indicated in Table 4. Rates of growth over the 5 Year Plan period are compared with the rates estimated for the period 1960-1966. The 1960-1966 period is shown for comparison, as it is probably more representative of the recent trends than would be the period extending through 1968 which includes the years of rehabilitation after Sukarno.[10/]

10/ The growth rate during this period is also used as the "best estimate" of the rate of growth of the groups of products indicated in the "other" groups in Table 1.

TABLE 2

Major Agricultural Exports of Indonesia 1966-1967
(Value in Millions of U.S. Dollars)

	1966	1967
Rubber[1/]	217	190
Coffee[1/]	33	32
Palm Oil[1/]	30	27
Tobacco[1/]	24	43
Copra[1/]	15	30
Tea[2/]	14	N.A.
Pepper[1/]	13	10
Palm Kernels[1/]	7	4
Livestock Products[2/]	5	4
Forest Products[2/]	7	9
Miscellaneous Smallholder Exports[2/] (incl. corn)	26	25
Miscellaneous Estate Exports[2/]	9	30 (incl. tea)

Sources: [1/] Ministry of Plantations, unpublished.

[2/] Bank Negara Indonesia, Unit II (Central Bank), unpublished.

TABLE 3

Estimate of Contribution by Agriculture[1/] to Grow
Product Considering Strategy Suggestions and Alt
Targets, 1968-1973
(Values in billions of Rupiahs and Co

	1968 Production Benchmark				Assuming Annual 1%		
	Quantity				Total Output :	Incremental Output	
	Units		Amount	Value	Net Value :	Value :	% of Total Increment
1. Farm Food Crops				154.5	181.1	26.6	30.2
Rice[2/]	million	tons	9.8	59.8	72.0	12.2	13.9
Corn	"	"	3.0	8.7	11.1	2.4	2.7
Other				86.0	98.0	12.0	13.6
2. Small-holder Nonfood Crops				36.3	43.2	6.9	7.8
Rubber	(000)	tons	460	12.6	12.6	0	0
Copra	"	"	1,350	7.7	7.7	0	0
Coffee	"	"	100	1.6	1.9	0.3	0.3
Other				14.4	21.0	6.6	7.5
3. Estate Crops				10.5	12.13	1.63	1.9
Rubber	(000)	tons	219	5.0	5.5	0.5	0.6
Tea (Processed)	"	"	44	1.4	1.96	0.56	0.6
Palm Oil	"	"	160	1.2	1.7	0.5	0.6
Palm Kernels	"	"	38	0.2	0.27	0.07	0.1
Other				2.7	2.7	0	0
4. Animal Husbandry				21.1	23.6	2.5	2.8
5. Forest and Hunting				6.2	7.7	1.5	1.7
Timber				2.0	3.5	1.5	1.7
Other				4.2	4.2	0	0
6. Fishing				10.3	12.9	2.6	3.0
Total Agriculture				238.9	280.63	41.73	47.4
Net Domestic Product				456.0	544.2	88.2	100.0

TABLE 4

Annual Compound Rates of Growth of Major Agricultural Sectors and Priority Areas with Alternative Rates of Real Income Increase[1/]
(In Percent)

	Estimated Rate 1960-1966	1968-1973 Assuming Growth Rates of Per Capita Income of:		
		1%	2%	3%
Net Domestic Product (NDP)	2.0	3.6	4.6	5.6
Non-agricultural Sectors	2.2	4.0	5.8	7.6
Agriculture	1.8	3.3	3.45	3.6
Farm Food Crops	2.0	3.2	3.5	3.7
Rice	0.9	3.8	4.4	5.0
Corn	6.8	5.0	5.0	5.0
Small-holders, nonfood	3.8	3.5	3.5	3.5
Coffee	8.5	3.5	3.5	3.5
Estate Crops	-1.1	2.9	2.9	2.9
Rubber	0	1.9	1.9	1.9
Tea (processed)	-1.3	7.0	7.0	7.0
Palm Oil	2.5	7.2	7.2	7.2
Palm Kernels	1.5	7.2	7.2	7.2
Animal Husbandry	2.3	2.3	2.3	2.3
Forestry and Hunting	-6.3	4.7	4.7	4.7
Timber	N.A.	11.8	11.8	11.8
Fishing	4.6	4.6	4.6	4.6

Footnote: [1/] See Tables 1 and 3 for sources and footnotes.

Rice

Rice is given high priority as a focus of strategy not only because of self-sufficiency targets, but also because of the heavy foreign exchange drain as long as imports are required and because of probable adaptability of high fertilizer-responsive varieties from the Philippines. While institutional support has severe shortcomings--particularly as regards provision of credit, marketing of inputs and the extension service--a workable temporary substitute is provided by the Bimas program.

With new high-yielding seeds, there can be a reduction in the organizational problems that have kept Bimas from complete effectiveness. Assuming a 2% annual real income increase during the Five Year Plan, the Bimas program, using traditional varieties, would have had to cover approximately 2.5 million hectares to provide self-sufficiency in 1973. With expected increased yields from high-yielding seed varieties, Bimas coverage can be reduced to approximately 750 thousand hectares. All Bimas participants might not use the full package of inputs, but even so it is likely that the maximum coverage of the program could be limited to 1 million hectares.[11/]

Given these favorable conditions and strategic priority focus, and taking cognizance of the rapid adoption rate of high-yielding rice

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11/ Experience in the Philippines has shown that growers of "miracle" rice often use less than optimum levels of inputs, see 1967 Annual Report, International Rice Research Institute, Los Baños, Philippines, 1968.

varieties in both the Philippines and West Pakistan, the self-sufficiency target seems within relatively easy reach, even though the target of annual per capita income increase might be raised to 3%. In this latter case, the trend increase in production (1960-1966) of 1.8% per year would have to be doubled during the 5 Year Plan, see Table 4.

Rice production will remain below consumption requirements during the early years of the 5 Year Plan period. Use should therefore be made of Bulgur wheat and wheat flour purchased on long term P.L. 480 loans as a substitute to reduce and probably eliminate foreign exchange expenditures for food grain imports, as proved possible in 1963 to 1965 in East Pakistan.[12/] This will necessitate careful implementation of price policies and related wheat injections.

In estimating contributions of the various crops to the growth of the NDP during the Five Year Plan (Table 3), the contribution from rice is shown to increase as real income growth assumptions increase. Rice production is estimated to provide self-sufficiency under each assumption which involves increased production with increased per capita income growth. In this respect, rice differs from all other crops or products. Value added for other crops is not assumed to change with different real income assumptions, the value depending alone on estimated potential output with application of strategic factors as indicated below.

12/ For discussion of this experience, see Government of Pakistan, Outline of the Third Five-Year Plan, Government Printing Office, Karachi, 1964.

In preparation for the longer run, research should be undertaken to guide future decisions as to whether rice production should be expanded for export or limited to the self-sufficiency target. Food grain production breakthroughs now appear possible for most deficit areas in Asia, suggesting an unattractive export market by the mid-1970s, even though deficits could reappear later if population growth rates do not decline appreciably.

Corn

Indonesia is presently self-sufficient in corn for human consumption. Except as corn use for livestock feed is expanded, any appreciable incremental production must be for export if it is not to adversely affect producer prices.[13/] Human consumption of corn in Indonesia will tend to increase slightly as the population grows but it will tend to decline with growth in per capita income. Income elasticity of demand for corn has been estimated to average approximately -0.25.[14/]

On the other hand, corn production increased at an annual rate of 6.8% between 1960 and 1966. So, given high fertilizer-responsive varieties of corn adapted for Indonesian use, plus credit and Japanese marketing assistance to facilitate exports to the deficit Japanese market, an annual production increase of 5% during the 5 Year Plan seems

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13/ Indonesia has been a large net exporter of corn since 1966, during which time the corn price has remained approximately 50 percent of the rice price, a relationship of long standing.

14/ As calculated by G.T. Jones, based on Biro Pusat Statistik, National Social and Economic Survey, December 1963-January 1964, Djakarta, 1967.

well within reason. Japanese firms have developed working arrangements of a private sector "Bimas" variety both in East and West Java, exporting from these areas as much as 70,000 tons of corn to Japan in 1966.

Thus strategy should be directed to give priority to increased corn production. Additional drying and storage facilities must be provided to handle an added 500,000 tons of exports but at least part of the financing should come from the Japanese marketing counterparts. Domestically, improved institutions will be required that can multiply rapidly the necessary high-yielding hybrid seed, fertilizer and water needs to be provided as inputs, port facilities may require some improvement and price policy must be directed such that the export product remains competitive and surpluses do not build up that would tend to depress prices to producers.

Small-holders Rubber and Copra

While production of both small-holders' rubber and copra increased slightly between 1960 and 1966, it is unlikely that this trend will continue or that strategic priorities would be of much use in the short and medium run. Over 70% of the small-holders' rubber trees are over 35 years of age, with the economic age limit usually considered to be 25 years. Further, given the low quality of their production, coupled with extended marketing and reprocessing channels, the farmers receive less than one-third of the export value of the rubber.[15/]

15/ As determined by a survey (report not published) by the Ministry of Plantations, 1966.

Basic production and marketing problems might be corrected in the longer run, as new colones in Malaysia are already yielding over 2,200 kilograms per hectare dry rubber content as compared to an average of only 350 for small-holders in Indonesia.[16/] But this will take time, heavy financing, as well as the need to provide modern processing facilities closer to the farm. In the short run and considering the low world-market prices, it will be difficult to establish export pricing policies that will induce farmers even to maintain current levels of production. As experience has shown, farmers tend to intensify tapping only when returns increase.[17/]

Copra production suffers mainly from shortcomings in sea communication and marketing organization to bring it from the plantations in northern Sulawesi to the domestic or export markets. Further, there has been an increasing domestic demand for edible oils and soaps which tends to reduce the balance available for export. While fertilizer use, especially potassium, would probably increase production materially, difficulties in the way of improving the marketing suggest that priorities should be withheld until organizational solutions are more in evidence.

Small-holders Coffee

With rising prices, small-holders plantings have materially increased over the past few years providing a potential annual increase

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16/ As reported in Planters' Bulletin of the Rubber Research Institute of Malaya, January 1967.

17/ See Kenneth D. Thomas, Smallholders Rubber in Indonesia, Lembaga Penjelidikan Ekonomi dan Masjarakat, Monograph #7A, Djakarta, 1957.

in production until 1973 of at least 3½%. It is important that export and domestic price incentives be maintained if this growth is to be continued. While increasing domestic consumption will absorb a considerable portion of increased production, exports also should continue to expand. If Indonesia can continue to disregard the fact that it is subject to international coffee export quotas, exports can be increased in step with production surpluses. If not, steps should be taken to obtain a higher quota or at least permission to temporarily exceed the quota allowance.

Estate Rubber

While high-yielding colones are available in Malaysia, and should yield at least 3 times the current average of estates in Indonesia, it is likely that only a small production increase can be effected during the 5 Year Plan. This will result in part from increased replantings made after 1963. However, considering the high percentage of old trees, their slaughter tapping must also be relied upon if production is to show an increase and if exports are to even hold their own. Any appreciable replanting awaits determination of longer run potential for this crop in Indonesia.

Estate Tea

Tea production from aged but generally still viable tea plants has declined both in quality and quantity in the past decade. There are a combination of causes. Lacking foreign exchange, fertilizer use dropped to less than 50% of optimum.[18/] Management is also responsible

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18/ As reported by Ministry of Plantations.

for allowing the quality to decline and for an inability to find solutions to transport and marketing problems. All of these factors tended to reduce the offering price for Indonesian teas.

In part, reduced quality resulted from changed plucking practice with old leaves being plucked along with tender, new ones in order to compensate for reduced yield when fertilizer use declined.[19/] In 1968, the Ministry of Plantations directed that traditional plucking practices be re-established but yields will now decline unless additional fertilizer is used. The quickest solution to the marketing management problems will be to bring in expatriate experts to help in this complicated specialty. Evidence indicates that such foreign expertise has in general been lacking since the exodus of foreign estate managers in the 1950's.

These difficulties are real but appear to be ones that can be improved within several years. In the short run, even with old tea plants, this could result in at least a 10% increase in output, some increase in exports and an upgrading of quality that could increase prices by as much as 50%. Strategic priority is definitely warranted.

Estate Palm Oil and Kernels

In the short run, both production and exports can be increased by at least 7% a year if strategic emphasis is placed on increasing

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19/ Some of the decline in quality may be more apparent than real if earlier practices of certain foreign managers have been continued of downgrading invoiced quality classification to effect unofficial currency transfers.

fertilizer inputs, using modern foliar analysis to help determine precise fertilizer requirements. This is the only major estate crop where area planted with trees of economic age has increased since the pre-war period. During this time, oil yields have declined by about one-third (from approximately 3 to 2 tons per hectare), mainly as a result of low fertilizer use.[20/] This is currently reported to be only about one-third of economic requirements.[21/]

For the longer run, given the unusual suitability of Indonesian soils, increased and improved plantings are indicated. Yields on new varieties in Malaysia are approximately 5 tons per hectare, with new technology involved in planting. Some priority in providing finance will be required although existing estates generally are sufficiently profitable even at today's low yields to finance at least part of the replanting. This crop might also be extended to small-holders in the longer run by planning centrally located factories providing marketing and management services while production is supplied by the smallholders as well as estates.

Animal Husbandry and Fishing

In the short run, for somewhat different reasons, it would be overly optimistic to expect that any practical strategy would alter materially the rate of production growth in either of these areas of

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[20/] Central Bureau of Statistics.

[21/] Ministry of Plantations.

activity. Constraints restricting adoption of modern techniques generally are of a nature that cannot be eliminated rapidly. In sea fishing, for example, motorized ships with special gear need to be designed, financed, constructed, and then crews trained to man them. This will prove inadequate until cold storage facilities have been constructed (including refrigerated land and sea transport), the marketing organization rationalized and suitable credit facilities made available.[22/] Cattle raising and beef and hide exports have been declining because of serious disease problems. Modern poultry production practices of other Asian countries offer some hope (traditional production has been increasing rapidly) but are unlikely to be successfully transplanted into Indonesia until large undertakings appear with adequate technical and financial support to counter the disease and feed problems that have plagued earlier efforts.

Potential does exist for the longer run, as impediments mentioned above are gradually eliminated. This is particularly true for sea fisheries where the current annual catch from shallow Indonesian seas may be only 10% to 15% of estimated potential using modern techniques.[23/] The same holds true for poultry raising which first

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22/ For evaluation of possibilities in the fishing industry, considerable reliance has been placed on an intensive study by the FAO, "Report of FAO Survey Team to Indonesia", January-February 1967, Rome, Italy, 1967. See also, M.S. Doty and A. Soegiarto, The Development of marine resources in Indonesia, paper presented at the Seminar on Technology and Science in Indonesian Development at the Center for Development Change, University of Kentucky, May 21-27, 1967.

23/ As reported by FAO, op. cit. from K. Tiews, "On the possibilities for further developments of South East Asian Fisheries", Current Affairs Bulletin, IFPC, No. 47, Bangkok, 1966.

requires an industry to supply nutritious feed at reasonable costs and then large production operations that may require the cooperation of foreign capital and know-how.

Forestry

Increase in forest exploitation assumes extremely high priority, given the tremendous forest potential, the deficit domestic market, an increasing world deficit for lumber plus availability of modern production technology developed outside of Indonesia.[24/] Indonesia's potential is evident when it is realized that almost two-thirds of the country is still covered with forests, 90% of which are state owned.

Given the urgent need for foreign exchange and the size of the timber reserves, exploitation should be pushed even though a degree of inefficiency might be involved in the short run. The strategic factor is to attract foreign capital and know-how as modern logging methods are extremely expensive and involve many specialized techniques.[25/] For competitive production of the logs alone, heavy investment is required in surveys, logging equipment, forest camps, transport and handling equipment plus roads and port facilities. If logs are to be processed into lumber, heavy additional expense is required for sawmills.

[24/] See recent study by FAO for further discussion of increasing world deficit, "Forest and Forest Product Industries", Bangkok, June 1967. The Department of Forestry of the Indonesian Ministry of Agriculture has estimated that annual export surplus of timber will be about 100 million cubic meters of round wood equivalent, valued currently at about US $1 billion.

[25/] With inexpensive labor on Java, it has been economic to exploit the teak forests using labor-intensive methods. The situation is different on the outer islands, where most of the forest reserves are located, and competitive urgencies will require modern, mechanized, capital-intensive techniques.

By early 1968, the Indonesian Government had already negotiated four production-sharing agreements with large foreign firms who will finance and manage operations from the forest to the foreign market.[26/] Recent reports from Djakarta indicate that over ten additional proposals are in the final stages of negotiation. By giving priority to facilitating the implementation of the cooperative agreements, annual growth of forestry output should average at least 12% during the Third Plan.

For the longer run, consideration must be given to an increase in sustained-yield management and to paper, pulp, plywood and other forest product industries. It is also possible that timber extraction can be integrated with land clearing for agricultural expansion and that lower priced lumber from the outer islands could be shipped to Java to release teak for export. This latter will involve improvement of inter-island shipment to permit lower transfer costs.

IV

IMPLICATIONS OF THIS STRATEGY

Relative Contribution of Agriculture to N.D.P.

The relative patterns of growth of the agricultural sector and N.D.P. are shown in Table 5. The above strategy guidelines lead to a declining relative contribution of agriculture, from 52.4% in 1968 to

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26/ These early agreements are discussed in detail by Dahlan Thalib, "Timber Development", Bulletin of Indonesian Economic Studies, Canberra, October 1967.

For a later review of Japanese agreements, see Gregory Clark, Japanese Production Sharing Projects, 1966-1968, Bulletin of Indonesian Economic Studies, June 1968.

TABLE 5

Alternative Patterns of Agricultural Growth 1968-1973[1/]
(In Billions of Rupiahs - Constant 1960 Prices)

	1968 Benchmark	1973 Assuming Growth Rates of Per Capita Income of:		
		1%	2%	3%
Net Value Agricultural Output	238.9	280.63	282.73	285.13
Net Domestic Product (NDP)	456.0	544.20	571.00	598.80
Agriculture as % of NDP	52.4	51.6	49.5	47.2
Increment in Value Added by Agriculture as a % of Total Value Added Increment 1968-1973		47.4	38.1	32.4

[1/] See Tables 1 and 3 for sources and footnotes.

a possible low of 47.2% in 1973. There remains the necessity to stimulate growth in the other sectors to make up the balance, a gap that increases with increased real income growth assumptions.

Mining and oil exploitation are logical priority candidates to contribute increased output with some help to come from a recovering industrial sector. For industrial expansion, urea fertilizer production is a prime candidate in view of the rapidly increasing quantities required by a more modern agriculture as summarized quantitatively in the next section.[27/] At least US $40 million would be required for urea imports by 1973 and much of this foreign exchange can be saved by rapidly proceeding to tap domestic resources to produce this essential input. Insecticide use also is apt to at least triple by 1973. Now is the time to stimulate investment in formulation plants in Indonesia.

If it is found that non-agricultural sectors cannot increase their contribution to the national income as targeted here, agricultural growth may have to bear more of the burden. Some of this may come from the new and rehabilitated irrigation if it exceeds the cautious targets assumed in estimating output in this paper. Insect control also might spread faster than now appears probable. If added output does not come from these sources, the strategy outlined here could be speeded up but probably only by moving toward lower benefit/cost ratios. More

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27/ For a survey of present and possible future sources of fertilizer in Indonesia, see; Zakaria Raib, "Prasaran mengenai rentjana produksi pupuk dalam negeri", in Rapat Kerdja Pupuk, Bogor, 1965, pp. 154-164.

expatriates could be availed of to help temporarily to by-pass management bottlenecks, foreign finance might be pleaded for to help bring more rapid improvement to infrastructure and supporting facilities or extra expenditures on surveys and research may unearth potentials now not evident. These are alternatives that may require further research as plan formulation proceeds. At best, these suggested difficulties are indicative of the problems facing attempts to meet high real income targets during the coming 5 years.

Input Implications of this Strategy

Increased use of strategic inputs has been suggested for the individual priority crops. It is summarized here so consistency with other aspects of the plan can be checked.

A rough estimate of the fertilizer requirements in 1973 as suggested by this strategy is shown in Table 6. It is evident that greatly increased domestic fertilizer production can be justified.[28/]

The organization for seed multiplication, either public, private or mixed, needs overhauling if it is to be able to supply enough certified high-yielding seed by 1973 for 1 to 1½ million hectares of rice land and about 600,000 hectares of hybrid corn production.

New or rehabilitated irrigation is envisioned that will hopefully supply adequate water for at least two crops. This is a target

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28/ No large scale chemical fertilizer production takes place now in Indonesia except in Sumatra where one Government plant operates with an annual urea production capacity of 100,000 tons.

TABLE 6

Rough Estimate of Fertilizer Requirements in 1973 Suggested by Strategy[1/]
(In tons of Nutrient)

	N	P	K
Rice[2/]	102,800	31,600	12,500
Corn	60,000	5,000	
Estates[3/]	43,500	17,500	30,000
Fruits, Vegetables and Other Agriculture Crops[3/]	45,000	12,500	7,500
	251,300	66,600	50,000
Equivalent in Commercial Fertilizers: (tons)			
Urea	560,000		
Triple Super Phosphate		148,000	
Potassium CI			105,000

1/Plus nominal quantities of special fertilizers including: magnesium, patent kali, etc.

2/Estimated on the basis of 2 percent annual growth of per capita income. If growth is only 1 percent, then N = 86,500; P = 58,500 and K = 47,500. If growth is 3 percent, then N = 121,000; P = 75,000 and K = 53,000. All other requirements hold constant.

3/Estimates are a first approximation only, given incomplete records of current usage and lack of agreement as to economic requirements.

that may be considerably exceeded, given the large number of on-going irrigation projects and the extensive rehabilitation project that the World Bank has agreed to finance. However, even with new large irrigation facilities, there remains the problem of organizing the construction of tertiary channels and of coordinating technical and agronomic requirements of the system. Moreover, rehabilitation cannot improve the water flow where water storage areas have been denuded. But, on the positive side, the dredging accompanying irrigation system rehabilitation can reduce loss from floods. It has been assumed here that by 1973 approximately 20,000 hectares annually will be saved from flood damage by this effort.

Other strategic factors also are involved. For the expected tea, palm oil, corn and lumber output expansion, management assistance is considered essential. Domestic and foreign financing must be found for increased inputs and supporting investment to increase production of rice, corn, tea and palm oil. And finally, joint venture capital is counted on immediately in the lumber industry and hopefully in the longer run in poultry raising and feed preparation.

Effect of the Strategy on Foreign Exchange

By 1973, lumber exports are expected to expand 20-fold, corn 5-fold, palm oil and kernels by a third and coffee and tea slightly. Foreign exchange savings will result as rice imports can be reduced. Even before rice production reaches self-sufficiency, P.L. 480 wheat imports can probably substitute completely for rice imports. Additional

foreign exchange savings will result as domestic fertilizer plants come on the line. This relief to the balance of payments is critical even though it is limited. Longer range strategy must aim to provide further easing of the foreign exchange gap.

CONCLUSION

Strategy guidelines have been developed and quantitatively evaluated as to their effectiveness in meeting possible real income and other objectives. These guidelines have been developed prior to any formulation of a general model for perspective or five year plan guidance. Thus, these guidelines will need be checked carefully and undoubtedly revised as the body of the overall plan emerges and as sectoral plans take shape. However, from this first approximation it appears possible to meet the growth objectives that might be expected of the agricultural sector by 1973.