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INTENSIFICATION OF FOOD CROP
PRODUCTION IN INDONESIA*

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*BIMAS: A PACKAGE PROGRAM FOR INTENSIFICATION
OF FOOD CROP PRODUCTION IN INDONESIA*

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This is a revised version of a paper presented by Dr. Birowo at the Indonesia Panel seminar on "Food and Nutrition in Indonesia," held at Gadjah Mada University, Yogyakarta, Indonesia, April 28-30, 1975.

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INTRODUCTION

The objective of this paper is to describe various aspects of the BIMAS program in increasing food production in Indonesia. The paper begins with an historical description of the intensification scheme, provides highlights of the program during PELITA-I (1969-74) and PELITA-II (1974-79), and concludes with a discussion of policy perspectives.¹

The programs considered here are distinct or identifiable and officially sanctioned rice production intensification efforts undertaken by the national government. These programs consist of three major activities but differ in the manner in which they are carried out. They involve: (a) agricultural extension to encourage farmers to adopt better varieties, application of fertilizer, plant protection measures, and modern agricultural practices including water management; (b) steps to distribute properly supplies to ensure physical availability of the requisite production items; and (c) provision of credit to enable farmers to secure farm supplies and pay for them after harvest. While irrigation rehabilitation and development is a major factor affecting the country's capacity to increase production, this in itself is not a distinct program.

The impact of two other policy measures and activities on production growth is difficult to dissociate from the effects of the programs. They are: (a) fertilizer price subsidy to encourage greater use of fertilizer by farmers; (b) rice price stabilization to encourage farmers further to adopt improved technology and to increase production at the same time that consumers benefit by reasonable prices.

Three programs were carried out prior to 1965 but were of such limited hectarage that they could not have had any substantial impact on total production. These were: (a) Padi Centra initiated in 1959; (b) Action Research carried out in 1963-64; and (c) DEMAS (mass demonstration) carried out in 1964-65. The major nationwide programs initiated were: (a) BIMAS (mass guidance), 1965-66; (b) INMAS (mass intensification), 1967-68; (c) BIMAS Gotong Rojong (cooperative BIMAS), 1968-69; (d) Improved BIMAS, 1969-70 to date.

1. PELITA is the Indonesian acronym for Five Year Development Plan.

HISTORICAL BACKGROUND

The measures taken to increase production prior to the 1960s, indicate that the approaches used in contemporary programs are not new to Indonesia. These measures also suggest that the main problem lies not so much in the approach used but in implementation. The demonstration approach, used as early as the pre-World War II period, attempted to show to farmers how improved techniques increase production. It was hoped that the multiplier effect of such demonstrations would cover an ever widening area. Progress was reported to be too slow and the system invariably suffered from lack of funds.

In 1959, the Padi Centra program was started in an attempt to reach self-sufficiency in a period of three years. Ten padi centers were initially set up in Central and East Java in 1958-59. The target was to establish 250 such centers to cover 1.5 million hectares by 1961-62. The strategy called for an integration of services at the padi center level. Hence, farmers were supplied farm inputs on credit and had to repay these in kind after harvest. Extension activities were also intensified. From the very start, the program ran into problems of funding. Problems of logistics also arose and there was lack of adequately trained and experienced personnel to handle the multifarious activities of this new institution.

Available information indicates that the system produced increases in yields compared to nonprogram areas, but in spite of this, repayment was a problem. By the end of 1959 collection ranged from sixty-three to eighty-two percent. In the wet season of 1959-60 the repayment rate in West Java was the lowest at fifty-six percent. Terms of repayment and interest rates were then revised, but to no avail. This was an early manifestation of the problem of farmers' low repayment capacity. The failure of the program may, therefore, be attributed to problems of logistics, credit availability, collection, and lack of trained manpower. The Padi Centra experience suggests, moreover, that in programs involving credit to farmers, a thorough pre-loan analysis of repayment capacity must be made. Credit terms must be in line with this capacity. If any subsidy is necessary, it should be clearly spelled out and not silently tolerated as a high nonrepayment rate which escapes control.

The forerunner of the BIMAS program was an Action Research project conceived by the Institute of Agriculture in Bogor and carried out in the wet season of 1963-64. Twelve students were employed in the experiment. They were assigned in pairs to live with farmers in the villages and promote the five principles of rice growing. The experiment was successful, since reported yields of a program area of about one-hundred hectares were fifty percent higher than on neighboring farms. The success of the project may be attributed to the fact that students lived in the village and had direct contact with farmers, working with only a

limited number of them. The students were effective in spite of the fact that they were neither technically skilled nor experienced extension agents.

The Action Research project was then expanded during the wet season of 1964-65 and called DEMAS. A total of 440 students from nine colleges of agriculture were sent to 220 villages. The administration of the program was handled by the Department of Agriculture in cooperation with the Department of Education. An area of almost 10,000 hectares was covered by the program. The reported average program yield was 7.3 metric tons of stalk padi, as compared to the national average of 2.3 metric tons. The success of the program may be attributed to the same factors as the Action Research project. The ratio of students to farmers was somewhat diluted but still remained relatively narrow. Again, the same problem of logistics was experienced as the program grew in size. Nonetheless, the program proved to be extremely successful and gave rise to a nationwide effort to increase production.

This nationwide program, called BIMAS, was initiated during the wet season of 1965-66 using the pattern of the DEMAS program. It has since been rapidly expanded and was recently modified substantially. There are no reports of the number and characteristics of farmers selected for assistance under BIMAS. However, program areas were selected on the basis of the following criteria: (a) availability of irrigation; (b) adequacy of road network; (c) high prevailing rice prices. These areas were heavily concentrated in the island of Java.

The predominant feature of the BIMAS program was its group credit approach. Farmers received credit accommodations through their village cooperative. This appears to have been a very loose credit arrangement between the cooperative and the farmers. Credit was easy to obtain as long as farmers were located in a BIMAS area. While many of the cooperatives used as channels for loans were registered, they were loosely organized associations which did not meet cooperative standards of education, organization, and financial management.

Farmers received loans in kind from the cooperative in the form of slips or release orders which were presented to the P.N. Pertani kiosk for the delivery of the farm supplies indicated therein. The seeds were obtained from the agricultural service. During the first season of implementation (1965-66), farmers obtained insecticide free of charge from the agricultural service. They received a portion of the loan in cash for living expenditures except during certain periods of the program.

During the wet season of 1965-66, Bank Rakyat Indonesia (BRI, then called Bank Koperasi Tani dan Nelayan) was the source of loans. The loans were extended mostly through the cooperative and at times through the *lurah* (village head). The following dry season (1966), Badan Urusan

Logistik (BULOG, then called KOLOGNAS) was the source of financing for three provinces -- West and East Java and North Sumatra. The governor of the province obtained funds which were filtered down to the *lurah*. Farm supplies were made available in the usual manner and the cash portion was disbursed by the *lurah*. The other provinces were served by BRI although the amount of credit involved was very limited. In the 1966-67 wet season, financing also came from BULOG and the same procedures were used. While funds were routed through the agricultural service, the *lurah* handled actual loan disbursement. In the 1967 dry season, financing came from P.N. Pertani. This agency supplied only fertilizer and insecticide on credit, mostly through village cooperatives. The hectareage during this period was very small. By 1967-68, financing of the program was returned to BRI (then called BNI Unit II) and program hectareage for the wet season was maintained at the same level as the previous year. The same procedures were used except insecticides had to be paid for.

An Army Agricultural Intensification Project (Army BIMAS) was started in the dry season of 1969. BRI records indicate that for the wet season of 1969-70, a total of Rp 992 million was loaned out for the Army BIMAS program. This program was reported to be a joint arrangement between the project authority and the farmers. The former provided farm supplies, equipment for plant protection, funds for land preparation and cost of living, and technical assistance; the latter, land and labor. The harvest was divided between the two parties depending on the contractual agreement, although the project authority was to receive a minimum of two tons of stalk padi per hectare. Unfortunately, there are no records of the progress of this program.

The size of BIMAS loans varied from time to time. Loan packages significantly increased in size beginning in 1968. They consisted of farm supplies and cost of living allowance. Table 1 shows the composition of these packages in 1968.

TABLE 1. COMPOSITION OF 1968 BIMAS LOAN PACKAGE PER HECTARE

Contents	Improved National Wet Season 1967-1968		PB Varieties Dry Season 1968	
	Quantity	Value (Rp)	Quantity	Value (Rp)
Seed	-	-	25 kg	1,000
Fertilizer:				
Urea	75 kg	1,350	150 kg	4,125
TSP	50 kg	787.5	80 kg	1,950
Insecticide & Spraying	n.a.	864	n.a.	1,500
Cost of Living	-	500	-	1,050
Transport Cost	-	31.5	-	-
		<u>3,533</u>		<u>9,625</u>

Source: Bank Rakyat Indonesia

Collateral was not required for loans. It was entirely up to the cooperative to make collections. To some extent, effort in selection and collection may have been exerted. It may have been BRI's practice to allow the cooperatives loans equal to the previous season's level of collection. Loans financed by BRI were to be paid in cash; those financed by BULOG were collected in kind, although cash settlement was allowed. P.N. Pertani loans were collected in the same manner.

It seems that technical supervision was not closely tied with credit extension. Farmers obtained loans whether or not they were subjected to technical supervision. The students were still the primary contact with farmers. The *mantris* (agricultural officers) were primarily engaged in other activities such as arranging deliveries, preparing reports, crop cutting, and group meetings. Their contact with farmers was very limited.

Primary responsibility for implementing the program rested with the Department of Agriculture through its personnel at the provincial level. At the village level, however, the local government played the predominant role. In the beginning of the BIMAS program, the KOTOE (Supreme Command on Economic Operation) coordinated the national program. In 1966, coordination was transferred to the Directorate of Agriculture. At the provincial level, the governor acted as the coordinator. From 1967 to 1969, coordination was taken over by the Minister of Agriculture and day-to-day affairs handled by the Director General of Agriculture. By 1970, BIMAS coordinating body (B.P. BIMAS) had been established. There were counterpart coordinating bodies at the provincial *kabupaten*, *kecamatan*, and village levels, each headed by the corresponding local government official.

The INMAS program was started in 1967-68. Its underlying assumption was that those who had been assisted under the BIMAS program would have increased their production and income substantially. Hence, they would no longer need credit and would only be provided with technical advice. This strategy called for a well established extension service. It assumed that farmers could actually stand on their own after a few years of BIMAS support. In reporting program coverage, previous assistance from BIMAS was not a criterion for inclusion in the program. Any farmer who financed his own farm supplies was considered an INMAS farmer. The minimum requirements in the beginning of the program were planting of an improved variety and fertilizer use. During later years, it is doubted whether even these requirements were met in reporting program coverage. Also, the reported hectareage does not imply that the change in technology actually occurred during the year being reported on. Thus, identification of the INMAS program area is hardly based on any clear criterion, and all reported data must be viewed with this qualification.

There seems to be no evidence that extension activities were signifi-

cantly accelerated in response to the objectives of this program. In all likelihood, only routine extension work was provided which does not necessarily mean direct farmer contact. This is not to deny that even routine extension work makes some contribution to production. However, the reports on the INMAS program to some extent may have merely served the purpose of filling the gap between target and accomplishment in BIMAS.

The years 1965 to 1967 were plagued by unfavorable weather. The BIMAS Gotong Rojong program, planned in 1967, resulted partly from a decision to undertake a large-scale operation designed to create a dramatic impact on production. In addition, doubts seem to have arisen about the capability of P.N. Pertani to continue serving as a channel for the distribution of farm supplies. Finally, inflation had not yet been contained and the foreign exchange position of the country was not favorable. Hence, the major reason put forward for the introduction of this program in 1968-69 was the fact that the country was running out of foreign exchange for the importation of needed production inputs. However, the effect of the program was more far-reaching than the reason for initiating it would indicate.

The government entered into contract with seven foreign companies, mostly manufacturers, for the supply of fertilizer, pesticides, and some equipment on a one year deferred payment basis. These foreign companies were to be paid a fixed price for every hectare they supplied with production inputs. BULOG opened letters of credit in favor of these companies which were paid by the Bank of Indonesia on maturity. Repayments collected from farmers were to accrue to BULOG. Coordination of the entire program was undertaken by the same bodies charged with coordinating the BIMAS program.

Reported coverage of the program was large even during the first year of implementation (Table 2). During the second year, coverage

TABLE 2. REPORTED BIMAS GOTONG ROJONG PROGRAM COVERAGE

(Thousands of hectares)

Year	Wet Season	Dry Season	Total
1969	298	493	791
1970	778	191	969

Source: B.P. BIMAS

reached almost one million hectares. Because of various problems encountered, the program was terminated after two years. There are no

estimates of the number of farmers who benefited by the program. The group approach was used and it is extremely difficult to trace the number of actual farmer-recipients. The primary criterion for selection was the availability of irrigation, but there were isolated instances when the area covered by a contract did not have reliable irrigation. In cases where aerial spraying was employed, the terrain was also considered in site selection. A large proportion of program hectareage was located on the island of Java (Table 3).

TABLE 3. LOCATION OF REPORTED BIMAS GOTONG ROJONG PROGRAM COVERAGE

(Thousands of hectares)

Year	J a v a			Out- side Java	Total	Java as Percent of Total
	West	Central	East			
1969	343	206	198	44	791	94
1970	318	239	374	38	969	96

Source: B.P. BIMAS

The provincial agricultural service and provincial government assisted the foreign contractors in carrying out the program. The provincial governor was the coordinator in his area of jurisdiction. The provincial agricultural service selected the areas and arranged the necessary contacts with lower level local government officials. The contractors were entirely responsible for the delivery of farm supplies to the village level. This was primarily subcontracted to private firms. In addition, contractors provided farmers with technical advice and other facilities such as sprayers, vehicles, and light traps. The program provided a cash portion for farmers' living expenses. This was supplied by BRI. During the first year of implementation, additional fertilizer allocations for those growing high yielding varieties were supplied by BULOG through P.N. Pertani under the usual credit arrangements. Seeds were supplied by the provincial agricultural service and paid from loan proceeds.

The size of credit packages was generally larger in 1969 than 1970. These packages consisted primarily of seeds, fertilizer, and pesticides. Other items such as spraying cost, transportation, and technical assistance were also included and had to be paid for by farmers. In 1969, the administrative cost of the program was included as a portion of the loan. In 1970, this item was excluded and shouldered entirely by the government. Typical loan packages in 1970 are presented in Table 4.

TABLE 4. TYPICAL SIZE OF BIMAS GOTONG ROJONG
PACKAGES PER HECTARE IN 1970

(Rupiah)		
Contents	PB Variety	Non-PB Variety
Seeds	1,000	-
Fertilizer:		
Urea	5,320	2,660
TSP	1,197	931
Insecticide	3,600	3,600
Rat Poison	40	40
Rat Bait	100	100
Spraying Cost	700	700
Transportation	110	100
Technical Assistance	<u>597</u>	<u>295</u>
	12,664	8,426

Remark: The amount of fertilizer was 200 kg urea and 45 kg TSP for PB and 100 kg urea and 35 kg TSP for non-PB. The amount of pesticides was 2 liters insecticide and 100 grams of rat poison.

Sources: B.P. BIMAS

These materials and funds were channeled at the village level by the *lurah*. The assumption was that all farmers in the village would participate in the program, grow a high yielding variety, and apply the required dosages of fertilizer and pesticides. The *lurah* received the total allocation for the village and he was responsible for distributing it as well as for collecting loans.

The program made it easy for the farmer to obtain farm supplies and funds on credit. As a matter of fact, it was mandatory that he accept the package. In return, he was to deliver one-sixth of his harvest as payment. It was estimated that this amount would be sufficient to cover the cost of the package plus the cost of administrative services of the program. By the second year of implementation, the terms of repayment were changed to a fixed value excluding the cost of administration. Repayment was to be made in cash or in kind.

Reported yields during the first year of implementation were below expectation (Table 5). This may have been partly due to underreporting by farmers to evade full repayment. But it is believed that yields may, in fact, have been somewhat low. By the second year of implementation, yields had recovered.

TABLE 5. REPORTED AVERAGE BIMAS GOTONG ROJONG YIELDS

(m.t. stalk padi)				
Year/Season	National Average	BGR Non-Baru	BGR Baru	Weighted BGR Average
1969	2.5			4.0
Wet Season		3.7	4.7	3.9
Dry Season		3.4	4.8	4.0
1970	2.7			4.4
Wet Season		3.9	5.3	4.4
Dry Season		4.3	5.0	4.5

Source: B.P. BIMAS

The BIMAS Gotong Rojong program is perhaps one of the most expensive carried out in Southeast Asia. By the end of the two-year program, some U.S.\$68 million had been spent (Table 6). In addition, BRI provided the

TABLE 6. CONTRACT VALUES UNDER THE BIMAS GOTONG ROJONG PROGRAM

Year/Season	Value in U.S.\$ Millions
1968/69	12.1
1969	28.1
1969/70	20.0
1970	8.0
Total	68.5

Source: Bank Indonesia, Posisi Kredit BIMAS Gotong Rojong per 31 December 1971, 3 February 1971.

cost of living portion of loans (Rp 506 million) in 1970. The government also incurred expenditures to cover administrative costs. A total reported credit volume of Rp 31.5 billion was made available during the program period from the above mentioned sources. A significant portion of this was not used by farmers and remained as inventory. The volume actually used was estimated at Rp 20.9 billion. However, this could not be verified as recent figures were not made available.

The program met with innumerable problems. Indeed, the practicality of the entire approach may be questioned. If it is true that all possibilities for obtaining farm supplies on credit from foreign sources were exhausted, then the financing feature of the program which allowed for a deferred payment of only one year could be justified. However, if there were other foreign sources which could have provided softer term loans in the same manner that all imported fertilizer is now financed, then the financial justification of the program may be questioned. It should be noted that fertilizer imports of the P.N. Pertani (and the food sector) in 1968, the year prior to the BIMAS Gotong Rojong program, was the largest for the period 1964-70. The fertilizer brought into the country under BIMAS Gotong Rojong amounted to only thirty-seven percent of the total imports of the food sector in 1969. P.N. Pertani pesticide imports in 1968 were the largest in its history. The fear of the lack of foreign exchange which prompted the decision to be made in favor of the program proved to be unfounded as events turned out. There were other means of financing the importation of farm supplies by the time the program was being carried out.

If the supply distribution system in the country had broken down beyond immediate repair, then the logistics aspect of the program would have been justified. But, as it was, the institutional arrangements then existing were critically affected with the introduction of the BIMAS Gotong Rojong program. The original BIMAS program seemed to have been affected. P.N. Pertani was almost eased out of the picture, adding to the already difficult situation it faced. The normal growth of the extension service may have been abated. BRI lending activities were likewise curtailed. And when the program was finally discontinued, a void was created.

The BIMAS Gotong Rojong program ran counter to commonly held basic extension principles. It should have been realized that technical change on the part of the farmer cannot be made mandatory. Farmers can only be encouraged to change. It was a shaky assumption to presume that it was possible to make them all accept change at the same time. As might be expected, there were numerous irregularities. The entire system was open to abuse -- from the pricing of materials, quantity delivered or distributed, quality of materials, and collection of loans to the remittance of collection proceeds. A black market developed where supplies obtained from the program were sold at discounted prices. Either the *lurah* sold some of the allocations of his village or farmers accepted the package and then sold part of what they had received.

As a credit operation, the program was a failure. The repayment rate was far below any acceptable collection figure (Table 7). Farmer attitudes toward government credit must have worsened. Well planned and systematic collection procedures were not employed. Safeguards were not properly instituted to ensure that proceeds of loan collections

TABLE 7. REPORTED REPAYMENT RATES OF BIMAS GOTONG ROJONG
LOANS AS OF DECEMBER 1970

Year/Season	Estimated Credit Released	Repayment Rate
(million Rp)		
1969		
Wet Season	4,390	30
Dry Season	7,671	20
1970		
Wet Season	6,968	12
Dry Season	<u>1,828</u>	<u>7</u>
	20,857	18

Sources: 1. Bank Indonesia, *Op. cit.*
2. BRI, *Op. cit.*

would be transmitted by the *lurah* in full. Moreover, contractors were not involved at all and payment to them was not based on the level of collection.

It would have been possible to carry out the program strategy successfully. However, the strict and intensive requirement of education, training, supervision, and collection did not lend itself to so rapid and substantial a hectare expansion. As it turned out, the government did not allow the program a period for organic growth. It is also difficult to conceive how a new program, set up outside of the normal institutional arrangements, could be properly established to serve an area of 791,000 hectares during its first year of operation. The poor performance of the program during that time and its recovery during the second year bear this out. The impact of the program seems to have been felt during the second year since farm supplies which may have been intended for the first year were actually used during the second.

However, the BIMAS Gotong Rojong program made definite contributions to Indonesia's agriculture. Farm supplies were, in fact, widely available in the countryside. While some of them may have been used on non-rice crops, a large proportion were used for rice. The program definitely contributed to an improvement in technology. It would perhaps have taken a longer time to attain the current level of technological development in Indonesia had the program not been carried out. But the high cost

primarily in terms of credit nonrepayment and wastage of farm supplies raises serious questions as to net benefits, alternative investment opportunities, and program procedures. Because the precarious situation which led to the initiation of the program no longer existed, the program was discontinued at the end of 1970.

In an attempt to find solutions primarily to the problems of credit, the Improved BIMAS program was developed. The group approach to credit was finally discarded and loans are now extended to farms individually. In addition to credit, serious consideration has been given to providing farmers with other services. The program was started as a pilot project in Jogjakarta in 1969-70. Because of the success of this initial experience, it is now being carried out on a nationwide scale. To a large extent, the sudden expansion of the program was prompted by the termination of the BIMAS Gotong Rojong program. The same tendency to overexpand the program has been noted.

Under the Improved BIMAS program, farmers receive loans individually from "village units" organized and maintained by BRI. A village unit located in a center village covers 600 to 1,000 hectares farmed by 1,800 to 3,000 farmers living in about five adjoining villages. The unit is composed of three persons -- a *mantri*, a bookkeeper, and a cashier. Farmers individually file loan applications which are corroborated by the *lurah*. Loans are released in the form of slips or release orders for the farm supply portion, the balance being paid in cash. An added feature of the village unit is a marketing scheme in which BRI finances the construction of godowns and equips them with the necessary facilities. It is hoped that the federation of village cooperatives will eventually manage the operation of these facilities. Storage or commodity loans to farmers are also anticipated to allow them greater leeway in deciding the date of sale of their produce.

In addition to village units, "mobile units" operate from BRI branch offices located at the *kabupaten* level. The composition and operation of these teams are similar to those of the village units, although they are not stationed in any one village. Mobile units seem to be a transitional form between the group credit and individualized credit approaches: their lending procedures still resemble those of the latter in that loan documentation is carried out with farmers as a group; however, loans are actually released to farmers individually.

INTENSIFICATION SCHEME DURING PELITA I, 1969-74

During PELITA I the intensification scheme included the Improved BIMAS and INMAS programs which may involve the use of local seed varieties as well as high yielding strains. The practical difference between the two programs today involves the provision of credit. Principally, INMAS is BIMAS without credit provision in the package scheme.

Table 8 indicates that in 1973 rice production reached 14,702 million tons. Of this, 64.4 percent was produced through the

TABLE 8. TOTAL OUTPUT, AREA, AND YIELD OF RICE IN 1969-73

No.	Item	Unit	1969	1973	Average Annual Increase	Annual Increase (percent)
1.	Total Rice Output	thousand tons	12,249	14,702	13,424	4.7
	From Intensification		3,783	9,462	6,132	26.9
	Percent of Total Output		30.9	64.4	45.7	
2.	Padi Total Area	ha thousands	8,014	8,388	8,169	1.2
	From Intensification		2,005	3,986	2,797	18.5
	Percent of Total Area		25.0	47.5	34.2	
3.	Average Yield Level	kg hundreds	15.28	17.52	16.42	3.5
	From Intensification		123.4	135.4	131.0	

Source: Department of Agriculture

intensification scheme, an increase of 33.5 percent over the comparable 1969 proportion. During this period the amount of rice produced as a result of intensification increased at an annual rate of 26.9 percent. Total riceland area covered by the program was 47.5 percent. During PELITA I (1969-73) this area increased at an annual rate of 18.5 percent.

The growth of total rice output under the intensification scheme resulted not only from the enlarged area, but especially from increased yields. During the first year of PELITA I, the yield level in the intensification area was 1.886 tons of rice per hectare. By 1973, it rose to 2.373 tons, or an annual increase of 5.7 percent. These figures indicate that the intensification program has been very instrumental indeed in increasing the total supply of food in Indonesia. Table 9 indicates

TABLE 9. ROLE OF RICE IN FOOD CONSUMPTION, 1969-73

No.	Item	Unit	1969	1973	Average 1969-73	Annual Increase 1969-73 (percent)
1.	Total Population (mid-year)	thousands	116,642	126,088	121,123	2.0
2.	Rice Consumption					
	2.1 Total	thousand tons	12,992	14,976	13,767	3.6
	2.2 Per Capita/ Year	kg	111.4	118.7	114.8	3.9
3.	Target Rice Demand					
	3.1 Total	thousand tons	14,445	15,193	14,595	2.0
	3.2 Per Capita/ Year	kg	120.5	120.5	120.5	-
4.	Rice Output from Intensification	thousand tons	3,783	9,462	6,132	26.9
	4.1 Per Capita/ Year	kg	32.4	75.0	50.2	23.3
	4.2 Percentage 4.1 to 2.2	percent	29.1	63.2	43.5	
	4.3 Percentage 4.1 to 3.2	percent	26.9	62.2	41.7	
5.	Total Rice Output	thousand tons	12,249	14,702	13,424	4.7
	5.1 Per Capita/ Year	kg	105.0	116.6	110.8	2.7
	5.2 Percentage 5.2 to 2.2	percent	94.2	98.2	96.5	
	5.3 Percentage 5.2 to 3.2	percent	87.1	81.5	88.9	

Source: Bruce M. Nicol, "Food and Nutrition in the Agricultural Development Plan of Indonesia," FAO Planning Team Preliminary Report, 1974.

that the role of intensification in terms of increasing per capita food consumption has also been important. As a result of the program, total per capita production rose from 32.4 kg to 75.0 kg, or an average annual increase of 23.3 percent.

The farm economics of new rice technology varies in accordance with the level of fertilizer application and the types of pesticide used. Under the BIMAS Gotong Rojong program, the value of the package for PB varieties per hectare ranged from Rp 10,000 to Rp 20,000 for the whole package, and Rp 9,000 to Rp 13,000 for fertilizer and pesticide alone. Amounts were also allocated for rat poison and bait, seeds, spraying cost, transportation, technical assistance, and cost of living. The most common dosage of fertilizer was 200 kilograms Urea and 45 to 100 kilograms TSP per hectare. Thus, a farmer will have to increase his production per hectare by approximately one or more tons of stalk padi exclusive of the additional labor cost to cover these input costs. For the BIMAS program, the value of the package ranged from Rp 10,000 to Rp 16,000 for PB varieties. The package consisted of 200 kilograms of Urea and 45 kilograms of TSP, which is equivalent in value to about one ton of stalk padi.

In practice, however, farmers use less than the standard amounts. Data obtained from three villages in West Java studied by the Agro-Economic Survey through two seasons in 1970 indicate that expenditures for farm inputs of farmers growing PB ranged from Rp 5,400 per hectare in one village to about Rp 10,000 in another. The former included only 56 kilograms of nutrient (N and P205) plus 1.4 liters of pesticide per hectare. The latter used 119 kilograms of nutrient plus 3.5 liters of chemicals. Yields per hectare were 3.0 and 4.6 metric tons of stalk padi per hectare, respectively. However, with the limited data available, a correlation between expenditures for farm inputs, on the one hand, and yields, on the other, could not be firmly established.

In view of the fact that the available cost of production data did not allow refined calculations of costs and benefits, a model was constructed to approximate the situation. Data used for the model were based primarily on fertilizer response data from CRIA, deflated and adjusted to approximate field conditions. Based on this model, the practical rates of input application and the corresponding returns were calculated (Table 10). Additional research is needed to obtain statistically sound information on the costs and returns of new technology. However, the data in Table 10 were judged to have a sufficient degree of probability and, therefore, would allow the following observations: (a) The practical levels of expenditure on new technology primarily depend on the variety, season, location, and the farmers themselves. (b) As conditions become more favorable, higher levels of expenditures are justified by higher returns.

As previously defined, a "program" consists of extension activities, distribution of farm supplies, and provision of farm credit. Estimation of the cost of programs was therefore made on the basis of these activities. The estimates did not include such activities as irrigation and

TABLE 10. EMPIRICAL CALCULATIONS OF ADDITIONAL EXPENDITURES AND RETURNS FROM TECHNOLOGICAL IMPROVEMENT

Category	Estimated Practical Level of N	Average Additional Expenditure ^a	Average Additional Returns	Marginal Benefit/Cost Ratio
	(kg)	(Rp)	(Rp)	
Improved National Variety	30-50	4,448	7,551	1.7
PB Variety, Wet Season Less Responsive Area	50-70	7,022	13,345	1.9
PB Variety, Wet Season More Responsive Areas	70-90	11,246	29,132	2.6
PB Variety, Dry Season	90-120	14,784	40,827	2.8

^a Including estimated pesticide and additional labor cost for harvesting.

rice price stabilization, although these are part and parcel of the total government effort at increasing rice production. There are, however, two items which will be included in the cost estimates since their effects are difficult to dissociate from the major activities of the program. These are the fertilizer price subsidy and rice research. Provincial governments shared in the expenditures of the programs but complete records are not available. Costs to the government would include the operating expenditures of agencies associated with the program, losses incurred in loan nonrepayment, and subsidy expenditures. The last item consists of income foregone rather than actual budgetary expenditures. In addition to the government's cost, farm costs were determined on the basis of loan volumes. The estimated cost of programs underwent a sudden increase in 1969 and remained at about the same level in 1970. This increase was due primarily to the BIMAS Gotong Rojong program. It should be noted that during this period costs due to nonrepayment comprised about sixty percent of total government costs. The nonrepayment figures for BIMAS Gotong Rojong are based only on early estimates, as the latest figures have not been made available.

Based on the estimated net contribution of programs to production and on estimated costs, the benefit/cost relationship was determined

(Table 11). The estimated returns to investment were limited. The estimated B/C ratio for 1969 was about even. In 1970, the benefit/cost relationship had improved considerably and aggregate program contribution was highest.

TABLE 11. ESTIMATED BENEFIT/COST RELATIONSHIP OF PROGRAMS, 1967-70

Item	Year			
	1967	1968	1969	1970
Estimated Contribution of Program to Production (thousand m.t. milled rice)	410	588	554	1,082
Estimated Value of Program Contribution (million Rp)	14,760	21,168	19,944	38,916
Estimated Net Cost to Economy (million Rp)	2,134	4,373	21,697	19,404
Benefit/Cost Ratio	6.92	4.84	0.92	2.01

Remark: Value of milled rice at Rp 36 per kilogram.

The yearly costs of producing one ton of milled rice contributed by the program, based on the foregoing estimates, are presented in Table 12. It should be noted that not all the costs associated with additional domestic production, such as payment for land and labor, were considered. On the basis of these estimates, it would cost less to buy commercial rice from Thailand at a landed cost of U.S. \$95 per m.t. in 1969 than to increase domestic production. In 1970, however, there was a significant margin between the net cost to the economy and the foreign price.

There are other social costs which have to be taken into account. Expenditures for irrigation development amounted to Rp 20.8 billion in 1970. It is estimated by BULOG that the loss per kilogram of rice purchased locally is about Rp 3. This would amount to about Rp 1.34 billion in 1970, representing the cost of maintaining the floor price. Some expenditures of the programs were made in the form of foreign exchange or domestic bank credits. The programs caused a drain of U.S. \$41.2 million in foreign exchange for the importation of fertilizer (\$12.1 million) and payment of BIMAS Gotong Rojong contracts (U.S. \$29.1 million). By comparison, total country foreign exchange disbursements

TABLE 12. ESTIMATED COST OF PRODUCING ONE TON OF MILLED RICE
CONTRIBUTED BY THE PROGRAM, 1967-70

Item	Year			
	1967	1968	1969	1970
In Rupees				
Government Cost:				
Operating	3,031	3,595	9,968	5,262
Losses	959	1,274	18,783	8,888
Subsidies	539	952	7,234	3,860
Subtotal	4,529	5,821	35,985	18,010
Additional Farm Cost:	1,634	2,889	21,962	8,811
Total	6,163	8,710	57,947	26,821
Less: Transfers Within Economy:	958	1,273	18,783	8,888
Net Cost to Economy	5,205	7,437	39,164	17,933
In US Dollars				
Government Cost:				
Operating	8.02	9.51	16.37	13.02
Losses	2.53	3.37	49.69	23.51
Subsidies	1.43	2.52	19.14	10.21
Subtotal	11.98	15.40	95.20	47.64
Additional Farm Cost:	4.32	7.64	58.10	23.31
Total	16.30	23.04	153.30	70.95
Less: Transfers Within Economy:	2.53	3.37	49.69	23.51
Net Cost to Economy	13.77	19.67	103.61	47.44
Remark: Exchange rate of Rp 378 to U.S. \$1.				

during the same year were U.S. \$893 million. Bank credits used to finance farmers were Rp 11.2 billion, representing almost six percent of central bank credits or three percent of total domestic credits. Additional bank credits were used to finance farm supply distribution activities. These costs were larger for 1969 and significantly lower for the preceding years. Production would have increased at the rate of less than four percent per annum without the various programs carried out. This compares with an actual rate of 5.2 percent during 1965-70. However, it should be noted that the program started to have a significant effect on increasing production only in 1970. Absence of the program would, therefore, have had more far-reaching effects on the future of the rice sector than what the contribution of past programs to production would indicate.

INTENSIFICATION SCHEME DURING PELITA II, 1974-79

As Table 13 indicates rice production is projected to increase from 15,032 million tons to 18,183 tons in 1978. The share of

TABLE 13. PROJECTION OF RICE OUTPUT AND DEMAND, 1973-78

No.	Item	Unit	1974	1978	Average 1974-75	Annual Increase 1974-78 (percent)
1.	Total Population ^a	thousands	129,082	141,578	135,260	2.3
2.	Rice Consumption Demand ^b					
2.1	Total	thousand tons	14,810	17,180	15,938	3.8
2.2	Per Capita/ Year	kg	114.7	121.3	118.2	1.4
3.	Total Rice Output ^c	thousand tons	15,032	18,183	16,493	4.8
3.1	Per Capita	kg/year	116.4	128.4	121.9	2.5
3.2	Percent from Consumption Demand		101.5	105.8	103.1	
4.	Rice Output from Intensification ^c	thousand tons	10,466	15,027	12,684	9.5
4.1	Per Capita/ Year	kg	81.0	106.1	93.7	3.1
4.2	Percent from Consumption Demand		70.6	87.4	79.3	

(a) B.P.S., Proyeksi Penduduk, 1971-81.

(b) P.F. Van der Goot and H.R. Russel Shaw, "Medium Term New Land and Irrigation Requirement," FAO Planning Team, 1974.

(c) Departemen Penerangan, Buku Repelita II.

output resulting from the intensification scheme is projected to increase from 70.6 percent in 1974 to 87.4 percent in 1978. The total rice output from the intensification scheme during PELITA II is projected

to grow by 9.5 percent annually. Compared with the growth in PELITA I, this is a slower rate. The growth curve is leveling off as the total share is getting larger. The intensification area will increase from 4.3 to 6.082 million hectares. Yield level will increase from 2.38 to 2.55 tons of rice per hectare. Intensification will also be implemented for corn, sorghum, cassava, soybean, peanut, and mungbean. As a result of the scheme, during PELITA II production of corn will increase from 2.6 to 4.15 million tons, sorghum from 55,000 to 240,000 tons, cassava from 9.9 to 1.275 million tons, soybean from 495,000 to 670,000 tons, and peanuts from 275,000 to 355,000 tons.

Diversification policy in food production is stressed more during PELITA II. During PELITA I (1969-74), calorie intake per capita per year increased from 1,947 to 1,974. The role of cereals in these calorie compositions remained constant. There was a slight shift from less root crops and fish towards more pulses and meat, as indicated in Table 14.

TABLE 14. CALORIE CONSUMPTION IN INDONESIA PER CAPITA PER DAY, 1969-72

No.	Item	Composition of Calories Consumed				Change Percent
		1969		1972		
		Calories	Percent	Calories	Percent	
1.	Cereals: Rice	1,030	52.9	1,040	52.9	-
	Other	251	12.9	253	12.8	0.1
2.	Rootcrops	251	12.9	226	11.4	- 1.5
3.	Pulses	105	5.4	114	5.7	0.3
4.	Meat	19	1.0	23	1.2	0.2
5.	Fish	23	1.2	21	1.1	- 0.1
6.	Milk	3	0.15	5	0.25	0.1
7.	Eggs	1	0.05	3	0.15	0.1
8.	Fruits & Vegetables	47	2.4	65	3.2	0.8
9.	Sugar	116	5.9	123	6.2	0.3
10.	Fats & Oil	99	5.1	99	5.0	- 0.1
11.	Beverages	2	0.1	2	0.1	-
Total		1,947	100.0	1,974	100.0	-

Source: Food Supply Analysis, 1969, B.P.S.

The protein intake per capita per year during PELITA I (1969-74) increased from 41.0 to 41.6 grams, as seen in Table 15. More than three-

TABLE 15. PROTEIN CONSUMPTION IN INDONESIA
PER CAPITA PER DAY, 1969-72

No.	Item	1969		1972		Percent Change
		Grams	Percent	Grams	Percent	
1.	Cereals: Rice	19.5	47.6	19.8	47.5	- 0.1
	Other	6.8	16.6	6.4	15.6	1.0
2.	Rootcrops	2.0	4.8	1.9	4.6	- 0.2
3.	Pulses	6.0	14.6	6.6	15.9	1.3
4.	Meat	1.2	2.9	1.1	2.7	- 0.2
5.	Fish	3.5	8.5	3.3	7.9	- 0.6
6.	Milk	0.1	0.2	0.2	0.5	0.3
7.	Eggs	0.1	0.2	0.2	0.5	0.3
8.	Fruits & Vegetables	1.6	3.9	1.8	4.3	0.4
9.	Fats & Oil	-	-	-	-	-
10.	Sugar	-	-	-	-	-
11.	Beverages	0.2	0.5	0.2	0.5	0
Total		41.0	100.0	41.6	100.0	-

Food Supply Analysis, BPS 1969, 1972.

fifths of the protein was from cereals. Actually, during PELITA I there was no pronounced nutrition policy to guide the food production plan. The figures in Table 14 and 15 reflect this deficiency.

POLICY PERSPECTIVES

During PELITA II more attention is given to the nutrition aspects of food production. A special unit on Food and Nutrition Policy is established in the Department of Agriculture. This unit is assigned the task of formulating production plans to support a sound nutrition objective in the national development plan. Another emphasis in PELITA II is on strengthening marketing institutions for farmers. As more and more stress will be given to secondary crops, vegetables, fruits, fish, and small livestock, farmers should be equipped with better marketing capabilities. Such produce should reach the final consumers through an efficient marketing system.

As the food economy becomes more complex, decentralization and regionalization of development management is emphasized in PELITA II. A more active role is expected from regional authorities to formulate and manage regional development projects. Research stations and agricultural development centers are to be instituted in the various regions of the country to support the data base for a sound regional development plan. As a more diversified peasant farming is stimulated, a more integrated research and development program is required. During PELITA II, a new agency is to be created in the Department of Agriculture to coordinate all research and development programs. A new type of extension with polyvalent capabilities is prepared to meet the increasing multi-disciplinary extension demand of farmers. Hopefully, with such approaches a diversified production plan can be implemented to support a sound nutrition policy.

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