A STUDY OF THE MASAGANA 99 RICE PRODUCTION PROGRAM IN THE PHILIPPINES

by

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D E C L A R A T I O N

Except where otherwise indicated, this dissertation is my own work.

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ABSTRACT

The multiple objectives of boosting food production, generating employment, raising incomes and improving welfare could naturally be achieved by small farmers in the Philippines if all the resources required - including manpower, material and capital - were made available to them. In practice, unlimited support for the agricultural sector is not available from the government, so effective agricultural production programs need to be devised.

This thesis reviews some agricultural credit schemes in developing countries - including the Philippines - that have been introduced to promote agricultural development, particularly increased production and improved welfare. This study then attempts to evaluate the Masagana 99 Rice Production Program in the Philippines and examines some of the problems that have affected program implementation.

The results indicate that the Masagana 99 Rice Production Program did have some positive effects on production and has been moderately successful. It is still rather early to draw firm conclusions at this stage, but it appears that the M-99 program not only contributed to increased production but also generated employment thus improving small farmers' income in general.

ABBREVIATIONS

ACA	=	Agricultural Credit Administration
ACAR	=	Associacao de Credito Y Assistencia (Brazil)
ACCAFA	=	Agricultural Credit and Cooperative Financing Administration
ACCI	=	Agricultural Credit and Cooperative Institute
AGF	=	Agricultural Guarantee Fund
AGLF	=	Agricultural Guarantee and Loan Fund
APIP	=	Agricultural Pesticides Institute of the Philippines
BAE	=	Bureau of Agricultural Economics
BAEx	=	Bureau of Agricultural Extension
BC	=	Burea of Cooperatives
BCS	=	Bureau of Census and Statistics
BIMAS	=	Mass Guidance (Indonesia)
BPI	=	Bureau of Plant Industry
BS	=	Bureau of Soils
CB	=	Central Bank of the Philippines
CY	=	Crop Year
COMILLA	=	Comilla Rural Development Projects (Bangladesh)
DAR	=	Department of Agrarian Reform
DLGCD	=	Department of Local Government and Community Development
FACOMA	=	Farmers Cooperative and Marketing Association
FIA	=	Fertilizer Industry Authority
FY	=	Fiscal Year
HYVs	=	High Yielding Varieties
HYVP	=	High Yielding Varieties Program (India)

IRRI	=	International Rice Research Institute
LB	=	Land Bank of the Philippines
LDCs	=	Less Developed Countries
MAT	=	Municipal Action Team
MIS	=	Management Information System
M-99	=	Masagana 99
NACS	=	New Agricultural Credit Scheme (Sri Lanka)
NEDA	=	National Economic and Development Authority
NFAC	=	National Food and Agricultural Council
NGA	=	National Grains Authority
NIA	=	National Irrigation Administration
NMC	=	National Management Committee
NMPC	=	National Media Production Center
PAC	=	Provincial Action Committee
PC	=	Philippine Constabulary
PCAR	=	Philippine Council for Agricultural Research
PNB	=	Philippine National Bank
PPOs	=	Provincial Program Officers
PTs	=	Production Technicians
₱	=	Pesos
RBs	=	Rural Banks
Re	=	Rupees
RBAP	=	Rural Banks Associations of the Philippines
STDs	=	Special Time Deposits
UPLB	=	University of the Philippines at Los Banos
USAID	=	United States Agency for International Development
TBAC	=	Technical Board for Agricultural Credit

WEIGHTS AND MEASURES

1 hectare (Ha.)	=	2.47 acres
1 metric ton	=	1,000 kilograms (Kg)
	=	2,205 pounds
1 cavan	=	44 kilograms

The Exchange Rate used is the official selling rate used in 1976

1 peso (₱)	=	$A0.125
	=	$US0.134

PHILIPPINE CROP YEAR (CY) AND FISCAL YEAR (FY)

July 1st - June 30th

DEFINITIONS

Paddy	=	Rough rice or Palay
Samahang Nayon	=	barrio associations
Selda	=	joint-liability groups

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CHAPTER 1

THE IMPORTANCE OF AGRICULTURE IN THE PHILIPPINE ECONOMY

1.1 Brief Scope of Agriculture

Agriculture plays a significant role in the Philippine economy. It accounts for about one-third of Gross Domestic Product (GDP) and one-half of total employment in the country (Tables 1.1 and 1.2). At present, two-thirds of export earnings are derived from agriculture (Table 1.3). As such, it is essential that the agricultural sector should stimulate other sectors of the economy, especially in areas which could raise the present levels of total production and export earnings, so that more employment could be generated. To achieve this, there is an urgent need to "revolutionize" the agricultural sector through a substantial amount of assistance from the government in the form of extension services, marketing, credit, infrastructure projects such as water resources, transportation, power and electrification, and other related projects.

1.2 The Precious Grain Called "Rice"

Rice, the staple food, has long occupied an important position in the agricultural sector.

In 1972, the total population of the Philippines was about 38 million,[1] which was the sixth largest population in Asian countries

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1 In 1975, the total population was reported to be 4.15 million with a rate of growth of 2.8 per cent (World Bank Country Economic Report, 1976).

TABLE 1.1

GROSS NATIONAL PRODUCT, NATIONAL INCOME AND NET DOMESTIC PRODUCT, BY INDUSTRIAL ORIGIN, CY 1972-1974

(at current prices)

Industry/ Item	1972 Value in M. Pesos	%	1973 Value in M. Pesos	%	1974 Value in M. Pesos	%
1. Agriculture, Fishery & Forestry	16531	35.9	20004	35.3	28477	36.0
2. Mining and Quarrying	1051	2.3	1693	3.0	2154	2.7
3. Manufacturing	8979	19.5	12260	21.6	10564	24.8
4. Construction	1262	2.7	1411	2.5	1891	2.4
5. Transportation, Communication, Storage and Utilities	1651	3.6	1955	3.4	2574	3.3
6. Commerce	6823	14.8	8266	14.6	11124	14.1
7. Services	9731	21.1	11124	19.6	13229	16.7
8. NET DOMESTIC PRODUCT at factor cost	46028	100.0	56713	100.0	79013	100.0
Net factor income from abroad	(865)		(450)		(553)	
9. NET NATIONAL PRODUCT or National Income	45163	80.8	56263	80.3	79566	80.4
10. Indirect Taxes net of Subsidies	4350	7.8	6179	8.8	8818	8.9
11. Capital Consumption Allowance	6349	11.4	7583	10.8	10560	10.7
12. GROSS NATIONAL PRODUCT or GROSS DOMESTIC PRODUCT (GDP)	55862	100.0	70025	100.0	98944	100.0

Source: NEDA, The National Income Accounts, 1972 to 1974, Manila, 1975.

TABLE 1.2

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

Employed	1966		1967		1968	
	'000	%	'000	%	'000	%
Agricultural	6275	56.9	6361	57.4	6366	57.1
Non-Agricultural	4757	43.1	4728	42.6	4780	42.9
Total Employed	11032	100.0	11089	100.0	11146	100.0

a The labour force refers to the population, 10 years old and over, who are either employed or seeking employment.

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

TABLE 1.3

VALUE OF AGRICULTURAL EXPORTS AND SHARE OF TOTAL EXPORTS[a]

Item	1960		1965		1970	
	Value	%	Value	%	Value	%
Products						
Coconut	179	31.9	270	35.2	209	19.7
Forest	102	18.2	195	25.4	295	27.8
Sugar	143	25.5	147	19.1	196	18.4
Others	54	9.6	45	5.8	44	4.1
Total Agriculture	478	85.2	657	85.5	744	70.0
Mineral Exports	61	10.8	77	10.0	224	21.1
Total Agriculture & Mineral Exports	539	96.0	734	95.5	968	91.1
Other Exports	21	4.0	34	4.5	94	8.9
All Exports	560	100.0	768	100.0	1062	100.0

a Total value in million dollars F.O.B.

Source: Sicat, New Economic Directions in the Philippines, National Economic and Development Authority, Manila, 1974.

and fifteenth largest in the world (Sicat, 1974). Of this 38 million, 76.8 per cent were classified as "rice eaters" (Mears and others, 1974). The rice industry is a direct source of livelihood for about a quarter of the population (BSC, 1965). Canlas (1973) has pointed out that the rice industry has increased its output by about 3.5 times from 1910 to 1960, but this period has been characterized by relatively low national average yields and a slowly evolving technology. Productivity in the rice industry is low and yields lag far behind those in most other Asian countries such as Burma, Republic of Korea, China, Indonesia and Thailand, notwithstanding some success stories in "miracle" rice varieties (Table 1.4).

TABLE 1.4

AVERAGE ANNUAL YIELDS OF ROUGH RICE (PADDY) IN SELECTED COUNTRIES, IN METRIC TONS PER HECTARE

Country	1961-65	1966-70	1971-73
Burma	1.64	1.64	1.70
Korea, Republic of	4.11	4.31	4.68
China, People's Republic of	2.78	2.93	3.14
Indonesia	1.76	1.91	2.30
Thailand	1.78	1.82	1.90
Philippines	1.26	1.51	1.53
All-Asia Average	2.05	2.17	2.32

Source: Food and Agriculture Organization, Production Yearbook, 1972 and 1973 (Rome: FAO).

1.3 Rice Production Programs

The Philippine government, in line with its policy of attaining self-sufficiency in food production, particularly rice, has long been exerting efforts to formulate and implement a successful rice production program. In 1968, the country seemed to be rewarded when rice production was sufficient to meet consumption requirements and imports were not needed. This "sufficiency" however, was shortlived. During the crop years 1971, 1972, and 1973, Philippine rice crops were severely damaged by diseases and poor weather. The 1971-72 rice crop was affected by Tungro, a virus disease spread by the Green Leafhopper, resulting in about 4 per cent less production than the year before (Table 1.5). A catastrophic flood hit Central Luzon during July, August, and September of 1972 which severely affected the crop in Central Luzon, the rice bowl of the Philippines. This was followed by a drought preventing the recouping of the earlier losses. The 1972-73 crop was 13 per cent lower than the crop of the year before.

The crucial question therefore is: "How can the Philippines offset these losses and boost rice production to meet its needs?" There seem to be two alternatives. Firstly, the Philippine government could concentrate its efforts in opening up new lands for rice cultivation.[1] However, bringing this land into use entails a large capital outlay and a pioneering spirit notwithstanding the probability

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1 In 1974, the Philippine government launched "Palayan ng Bayan", a program designed to locate and open up virgin lands and put them into cultivation. This program also supports the M-99 program activities and the other food production programs.

TABLE 1.5

AREA HARVESTED, PRODUCTION AND YIELD PER HECTARE OF ROUGH RICE (PADDY), PHILIPPINES, CY 1967-68 TO CY 1975-76

Crop Year	Area (Mil. Hectares)	Production (Mil. Cavans of 44 kgs)	Yield per Hectare	
			Cavans	m.t.
1967-68	3.30	103.7	31.4	1.38
1968-69	3.33	101.0	30.3	1.33
1969-70	3.11	118.9	38.2	1.68
1970-71	3.11	121.4	39.0	1.72
1971-72	3.25	115.9	35.7	1.57
1972-73	3.11	100.3	32.2	1.32
1973-74	3.44	127.1	37.0	1.63
1974-75	3.54	128.6	36.4	1.60
1975-76	3.58	140.0	39.1	1.72

Source: Bureau of Agricultural Economics, Quezon City, 1975 and 1976.

of reaching the limit in expanding land area. According to Encarnacion and others (1976) it is getting clearer that further expansion of land area cannot be counted on as a substantial source of future growth in food production. The second alternative is that of increasing production through more and better irrigation facilities, adoption of high yielding rice varieties (HYVS), improved credit, wider use of fertilizer and chemicals, improved marketing facilities and effective extension services - all of which seem promising for attaining increased yields per unit area. In fact, irrigation and multiple cropping are considered the most important means of shifting from land-extensive to land-intensive cultivation.

In 1969 to 1973 the National Food and Agriculture Council (NFAC)[1] implemented several food production programs which included rice, whitecorn, feedgrains, livestock, poultry, fruit, vegetables, and nutrition. Several crash programs have also been implemented to suit the needs of circumstances. For rice alone, two short programs were launched - "Operation Rice Bowl" in Central Luzon, and "Operation Palagad" in nine provinces in September 1972 and January 1973, respectively. The main objective of these was to recoup losses caused by successive calamities. For various reasons not much success was achieved and so the Philippine government launched the Masagana 99 Rice Production Program in May 1973. This program aims to increase production to achieve rice self-sufficiency through a non-collateral supervised credit scheme coupled with transfer of technology (from experimentation to extension, mass media and coordinated government management). The Masagana 99 approach is, in effect, consistent with the previously mentioned second option of increasing rice production and requires concentrated efforts for effective implementation to occur. A thorough discussion of the Masagana 99 program will be found in Chapter 4. Though it is still rather early, an evaluation of the M-99 program can to some extent cast light on what has already been attained and the factors which have constrained the effective implementation of the scheme.

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1 National Food and Agriculture Council (NFAC) is an agency in charge of coordinating the different government and private agencies related to food and agriculture by virtue of Executive Order No. 183, May 1969.

1.4 Objectives of the Study

The general objective of this study is to evaluate the impact of the Masagana 99 program and its contribution to agricultural production. Specifically, an attempt will be made to throw light on the following questions:

(1) To what extent can share of increases in rice production be attributed to the program? and,

(2) What are the issues and the problems that affect the implementation of the M-99 program?

1.5 Organization of the Study

This study is divided into seven chapters. Chapter 1 gives a brief overview of agriculture and the staple food, rice. Chapter 2 presents a survey of agricultural credit programs in some developing countries. This leads us to a discussion of agricultural credit in the Philippines in Chapter 3, suggesting a supervised credit scheme as a possible solution to small farmers' credit problems. The Masagana 99 Rice Production Program is focused on in Chapter 4. Chapter 5 presents the coverage and achievements of the Masagana 99 program along with some of the problems associated with its implementation. Chapter 6 summarizes the results in analyzing the impact of the Masagana 99 program. Finally, the summary and conclusions arising from the study are presented in Chapter 7.

CHAPTER 2

SURVEY OF AGRICULTURAL CREDIT PROGRAMS

The purpose of this chapter is to examine and evaluate some agricultural credit programs which have operated in some countries other than the Philippines. The objectives, experiences, and the lessons of these programs will be considered in order to better understand and evaluate the agricultural credit program of the Philippines. Countries like Brazil, Bangladesh, India, Indonesia and Sri Lanka are chosen because they are developing countries and, like the Philippines, are dominated by the agricultural sector. More importantly, the agricultural credit programs[1] in these countries have had significant results and have evolved into successful programs over the period of implementation.

Most, if not all, agricultural credit programs in LDCs are intended to achieve multifarious goals such as the promotion of economic development in a broad sense, but more particularly to increase agricultural output and improve the income of farmers. In practice, however,

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1 The credit programs covered in this chapter are shown below:

Abbreviation	Name	Country	Date Started
ACAR	Associacao de Credito Y Assistencia	Brazil	1948
BIMAS	Mass Guidance	Indonesia	1963
COMILLA	Comilla Rural Development Projects	Bangladesh	1959
HYVP	High Yielding Varieties Program	India	1965
NACS	New Agricultural Credit Scheme	Sri Lanka	1967

it is quite clear that the main objectives of all of the countries cited above are to increase agricultural output in order to attain self-sufficiency in food production and, at the same time, to improve the income of the rural population. For our purposes therefore, we will consider these particular objectives since these are more apparent than the general objectives.[1]

2.1 The Objectives

As mentioned earlier, the main objectives of agricultural credit programs are usually (a) increased agricultural output to attain self-sufficiency in food production, and (b) improved income of the rural population. All of the countries cited above aimed to achieve the first objective. However, Sri Lanka and India differed in their second objective. Their governments specified that the second objective of their program was to relieve the farmers of their chronic indebtedness to non-bank sources of credit such as professional money lenders, traders, landlords, relatives, and friends.

The governments of most less developed countries, and developed countries, too, have programs for making loans available to small farmers. The rationale behind these programs often is that the interest rates charged by money lenders and other sources of non-bank credit are exploitive and a barrier to development (Long, M., 1968).

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1 In 1971, Hayami and Ruttan had similarly included the above objectives in four "perspectives" with emphasis on credit as one instrument of agricultural development. Their four perspectives are (1) Shumpeterian development; (2) market reform; (3) adoption of modern inputs; and (4) income transfer. For a detailed explanation see Hayami and Ruttan, 1971.

The first objective, that of increasing agricultural output, can be achieved by either expanding the area for cultivation, or by increasing productivity (for instance by technical improvements), or by a combination of both. For productivity and hence production to increase, appropriate technological improvements such as new HYVs, fertilizers, pesticides, herbicides, new cultural practices, and so on must be introduced and be adopted by the farmers concerned, particularly by the small and marginal farmers.

In all of the countries surveyed here, both expanding the area for cultivation and increasing productivity were the means for increased agricultural output. However, in Sri Lanka, relative emphasis was given to technological change. Between 1960 and 1968, an increase of 20.6 million bushels of paddy occurred, of which 56.3 per cent was attributed to the use of modern inputs (Gunatilleke, et al., 1972, p. 144). This does not mean however, that increases in output due to the expansion of area were not important, we must bear in mind here the idea of a "land frontier", at which the expansion of land area might reach its limit. This example suggests that, as a general principle, information about increases in production cannot be interpreted properly unless increases are specified as due to expanded area or improved techniques.

Increases in productivity, which appear to have accompanied the introduction of most credit programs mentioned above (except for ACAR program in Brazil), could not have been achieved if the credit programs had not provided the farming community with the capital required for increased input usage.

That the second objective of improved welfare through improved income distribution is often important is well illustrated by the ACAR program in Brazil. These was a substantial impact on the standard of living as found by Mosher in his 1957 evaluation and later in 1971. However, Mosher concluded that although ACAR was outstanding in terms of welfare impact, it had not yet exerted a measurable impact on agricultural production.

2.2 The Experiences

Continued attempts are being made by the governments of developing countries to increase agricultural production through a fuller use of existing resources and the provision of additional credit to support the use of modern inputs. At first, credit programs were usually i-plemented as pilot projects. Of course, success seemed likely judging by the experiences of ACAR, COMILLA and BIMAS programs. In these cases, however, success was due mainly to the availability of credit, modern inputs like new HYVs, fertilizers and pesticides, and supervision from technicians - all of which were amply provided. Since "success" seemed common, this inspired the governments of other countries committed to developing the agricultural sector to expand the areas under credit programs, sometimes to the national level. The immediate expansion in the coverage of the program often led to various problems in the provision of credit and in ensuring the availability of inputs and appropriate technical supervision for the farmers "to the right place at the right time".

A large range of literature on types of credit available to small farmers exists, most of which assumed that non-bank sources or

informal credit sources were exploitive and therefore undesirable. These studies often advocated the formation of organized cooperative credit societies under government supervision but managed by farmers.

In Indonesia the BIMAS program ran into difficulties in providing credit because all agricultural loans (including BIMAS loans) were given out through the branches of the Bank Rakyat Indonesia (BRI) (Rachman, 1973). Since its branches were limited in number it was difficult for the BRI to distribute BIMAS loans effectively to village farmers. In the first BIMAS program,[1] agricultural cooperatives were established and BRI distributed loans through them. In 1968 they recognized that there was a need to establish rural banks called "village units" to provide loans at the village level. In Sri Lanka, Bangladesh, and India, where cooperative societies are well organized, loans under government agricultural credit schemes were channelled to farmers through cooperative societies of which the farmers were members. The cooperative societies obtained their loans from government banks and relent them to the farmers in accordance with the approved credit schemes.

This was not, however, the case for the ACAR in Brazil. ACAR is a rural development program organized by the American International Association (AIA)[2] for economic and social development. Funds

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1 This program started in 1963 as a pilot project. In 1964-65 the program became Mass Demonstration (Demonstrasi Massal), then became Mass Guidance (Bimbingan Massal) in 1965-66 and finally became BIMAS programs from 1966-68. Various names, such as BIMAS, Baru, BIMAS Ciba and BIMAS Gotong Rojong were used to explain the various BIMAS-type programs.

2 AIA is a non-profit cooperative which was founded in 1946 by Mr Nelson A. Rochefeller. It plans, organizes and operates self-help programs in underdeveloped countries.

were provided by contributions from both the AIA and the state government of Minas Gerais in Brazil.

In all of the programs surveyed, credit was linked with extension programs and with cooperative societies and tied to farmers' production plans. In the COMILLA program in Bangladesh, no credit was made available unless the farmer became a member of a cooperative society and made regular deposits. The same was true in India. The farmer-borrower, to be able to avail himself of credit, was required to be a member of a cooperative and to contribute to the share capital of the society concerned. In the case of old or continuing members, one requirement was that the intending borrowers must not have defaults. These rules were applicable to all farmers, large and small. In reality, however, problems usually developed which reduced the amount of credit that a small farmer obtained. Where a farmer was not a cooperative member, he had to raise money to purchase a share and become a member. The share to credit ratio in general, was 1:8 or 1:10. If the per acre credit requirement of a farmer was Re. 400 and if he operated 4 acres, his total credit need would be Re. 1600. Thus, to obtain a credit of Re. 1600, he had to raise Re. 160 with which to purchase shares of the society and to become a member. In short, the inability to purchase enough shares prevented a great flow of credit to small farmers. The All-India Rural Debt and Investment Survey (1961-62) concluded that per acre credit received by large farmers having assets of over 20,000 Rupees or holdings of over 25 acres was twice that received by farmers with holdings of 5 acres or so (Sen, B., 1973). Further, the Survey suggested that the factors contributing to a greater proportion of cooperative credit going to the larger farmers were that (1) cooperative

leadership and management were in the hands of the larger farmers, (2) land ownership was used as the sole basis for extending credit to the members, and (3) technical expertise, operational efficiency and coordination were lacking within and between agencies in charge of cooperative credit and agricultural input supplies. As a consequence, small farmers often turned to the money lenders who gave credit at exhorbitant interest rates.

In general, in most countries surveyed loans were extended to farmers provided they had security or collateral to offer. This could be in the form of land titles or, alternatively, farm machinery and other tangible assets. Normally, peasant farmers who could not offer acceptable collateral were not considered credit worthy. For example, in Sri Lanka loans given to the cooperative societies were based on bonds signed by the chairman and secretary of the society. However, assets such as land, buildings and vehicles were acceptable to cooperative societies as collateral. This is particularly true in the New Agricultural Credit Scheme (NACS) of Sri Lanka. Similarly, the cooperative societies in Bangladesh asked for a mortgage deed in favour of the society with full ownership of the property mortgaged as collateral. Farmers' shares and savings served as additional securities in Bangladesh.

In a recent survey of experiences in a number of countries, Gordon (1976) mentioned that security arrangements for protecting lenders from loss are, of course, tactical elements. He explained that in some situations the requirement that one or more persons must, along with borrower, sign a document that involves them in repayment

obligations may provide a very effective way of minimizing defaults. In other cases, a more tangible form of security seems advisable: it is appreciated that collateral in land is not very appropriate for small farmer loans, and a portion of the borrower's crop ought to be more suitable as a form of collateral. If land is used as collateral the lending agency has the right to claim the land in case of a default. In contrast, if a trader assigns some portion of his goods as collateral, the bank can if necessary take hold of the goods and sell them, without trouble, to another merchant in the same business. Further, financial assets like notes or bonds are suitable as bank assets. But there is some question as to whether agricultural land is equally valuable to a bank. Typically, there is not an active market for agricultural land in developing countries, so banks may find themselves in possession of pieces of land that they cannot easily dispose of and may have to hold for some time. Thus, land may well be a poor asset for a bank, especially when the small parcels of land are located in remote areas without connecting roads.

Default is not only a major bottleneck to any credit program, but is essentially unjust. In effect, the government and the successful or honest farmers are subsidizing the minority of defaulters. In practice, there are various factors that contribute to non-repayment. In some countries such as Bangladesh and Sri Lanka, it was the large farmers who created the principal default problem (Spring Review of Small Farmer Credit, 1973). The large farmers, because of their (often considerable) economic and political power, were frequently able to make arrangements to prevent being prosecuted for defaulting. Another factor was crop failure caused by natural calamities such as droughts,

floods, typhoons, and sometimes pest infestation. In Bangladesh and India, natural calamities were usually mentioned as the cause of high default rates. Other reasons mentioned were low incomes, unwillingness to repay, and indifference to the credit program. In particular, some farmers were unwilling to repay both because they believed that the government writes off loans that were given to them, and because they considered themselves justified on the grounds that the government had usually promised much more than had ever been delivered. This was said to be true in Bangladesh and in Sri Lanka. In Indonesia, however, low recovery of debts was reportedly due to the negligence of village leaders in collecting the loans and the misuse of loans, often by local village leaders.[1]

Several recommendations for dealing with these problems have been put forward, and some have been implemented. In the sense that the government usually bears the brunt of default, the view has been clearly expressed by many observers that past loans should not be waived. Since agricultural credit resources are mostly dependent upon government allocation of funds which are limited in most developing countries, a substantial portion of loans provided should be recovered to enable continued provision of credit to farmers. If the government decided to waive the past loans, the funds would not revolve and the credit program would be more likely to fail in its objectives of increased production and improved welfare. In the case of credit provided by private sources, a low recovery may induce creditors to shift to more profitable alternative investments.

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1 According to Fisk (1961) in developing countries, problems of this sort are not uncommon.

In general, if loans are not repaid on time, farmers are not necessarily freed of the responsibility for repaying the loans. Instead the repayment would be expected in the following period. Efforts can be made to collect debts by denying the farmer-borrowers the right to any further credit until their debts are paid. According to this view, default may be an index of the non-creditworthiness of a farmer. As such, a farmer should no longer be provided with credit until he has repaid the loan. During the period of delayed repayment interest charges augmented by penalty rates or fines may be applied. On the other hand, a personal approach could be undertaken in one of several ways, a friendly and sympathetic approach or alternatively an increasingly forceful manner could be tried (Gordon, 1976).

Experience in a number of countries suggests that a scheme of crop insurance properly implemented might reduce the incidence of default in bona fide cases. Ray (1967) observed that insurance gives farmers greater confidence in venturing upon the adoption of new and improved farming practices and in making greater investment in agriculture for improving crop yields and increasing agricultural production.

An agricultural crop insurance scheme has something to offer an institutional credit program. Even at times of crop failure it may enable the credit institution to recover its loans and be sufficiently liquid for further credit operations. The insurance itself could be offered as collateral for loans. It could also encourage better utilization of land and irrigation water. In the absence of the insurance, farmers who depend on irrigation water may postpone cultivation till water levels rise to unnecessarily high levels that waste water by evaporation and seepage. Where a scheme of agricultural

insurance is present, farmers may be more easily persuaded to stagger their cultivation cycle and thus make better use of labour, farm machinery, and draft animals.

In 1958, a crop insurance scheme was introduced in Ceylon (now Sri Lanka). This experiment is of particular value in evaluating the practicability of crop insurance for peasant agriculture and in suggesting modifications necessary for effective implementation. Sri Lanka's experience has already highlighted the difficulties inherent in reconciling low premium rates within paying capacity of the peasant farmers, with an adequate level of coverage. It has not yet found a way to achieve such reconciliation without the risk of inadequate coverage because premiums based on averaging are inequitable. Thus, such programs place heavy subsidy burdens on the government if they are to be made more equitable. A guideline for the introduction of an agricultural insurance scheme based on Sri Lanka's experience has been published (Sanderatne, 1974).

Another way of reducing defaults or increasing repayments may be the introduction of group or corporate responsibility. One of the advantages of a joint system is that it relies on the group, rather than on the individual farmer, to meet the provisions of the loan and to make certain that it is repaid. The group decides who is credit-worthy and what form of collateral is required. The internal cohesion and solidarity of the group then determines the degree of social pressure among members for proper implementation and repayment. If the credit society is newly formed, the availability of group loans and the need to develop group practices and responsibility for handling credit

may itself gradually contribute to solidarity. Such group or corporate responsibility for credit operates well in Bangladesh, although the provisions for lending have been quite different. The credit cooperatives in COMILLA operate on a uniform system that allows any farmer who deposits some savings in his local cooperative society to borrow up to five times the amount of his combined share and savings deposits, with his plot of land as collateral. Group solidarity is reinforced by weekly meetings, and by the practice of extending more credit to those who attend more meetings. Also, the local group is held accountable for loan defaults; this is enforced by withholding funds from defaulting societies. In this way, the loan structure develops or reinforces group solidarity and responsibility (Myers, 1973).

In contrast, however, credit groups in India often had not been able to mobilize such group solidarity. In India, the requirements for pledging land as collateral had favoured the wealtheir farmers and reinforced the unequal land tenure pattern. Little group cohesion had developed because the cooperatives were imposed by the government on a highly stratified and often factional village structure (Abraham, 1973).

It appears that for group sanctions to produce good results, they require not only solidarity within the group but also suitable attitudes on the part of group members and their leaders that support the purposes and operations of other credit projects which might be tried in future. Experience suggests that group sanctions will work better when members have some equity in a credit program and their own money is at risk along with outside loan funds. When members are required to deposit some savings as part of the working capital they

feel the responsibility for the success of the entire group venture and tend to be more careful in the use of funds. We cannot, however, regard this group responsibility as a panacea for default and delinquency problems.

One generalization that could be inferred from the Spring Review country experiences is that credit and marketing functions should be tied together for the successful functioning of farmers' credit groups. When the association through which the credit is channelled also has control over marketing, the collection of repayments becomes much easier. On the other hand, if secure marketing channels are not available, the whole purpose of small farmer credit may be defeated. In Bangladesh, small farmer groups with access to credit failed because they could not get access to market outlets (Spring Review of Small Farmer Credit, Analytical Papers, 1973).

Some experts have pointed to the idea of combining credit with input supplies as well as crop marketing schemes. This idea might be implemented through cooperative bulk purchasing and retail distribution systems. One great advantage seems to be to facilitate the granting of credit in kind rather than in cash, a practice which many experts have endorsed. The most permanently effective interaction of credit and market functions can be observed in multi-purpose cooperatives reportedly present in Israel, Yugoslavia, Mexico and Brazil (Gordon, 1976).

If the objective of credit policies is the transformation of traditional farming into modern agriculture, then the establishment of modern institutions adequately staffed to supervise the implementation

of agricultural policies is essential. Credit becomes relevant in supporting the overall needs of institutions like multi-purpose cooperatives for research, development, processing, packing equipment, etc., and to finance the production expenses of individual farmer-members once the scheme is under way.

Capital and credit markets in developing countries are imperfect in varying degrees. As a result, interest rates often do not allocate resources among competing uses effectively. The rates of interest affect the demands for and the supplies of goods, assets and factors of production over time, and in this way influence the rate of growth of the economy, price stability and the distribution of income. Inappropriate interest rate policies distort capital markets and reduce their contribution to economic development.

Ideally, interest rates in agriculture should cover the costs of capital and the costs of associated services such as operational, administrative and supervisory costs as well as the losses because of defaults. Credit programs are costly and in a successful program the value of the benefits (which includes the increases in production attributable to the program, income from loan interest, and other social benefits) must exceed the costs (administrative, supervisory, default, alternative opportunity costs on the funds invested, and other social costs) (Long, 1974). In practice, however, this is often not realized, and as a consequence costs often exceed benefits. In other words, credit programs are often subsidized by the government because the costs are higher than the income derived from loan interest.

In the countries surveyed, interest rates were usually well below market rates and real rates were sometimes negative, partly because of high inflation rates and partly because governments are often lenient creditors (Table 2.1).

TABLE 2.1

INTEREST RATES CHARGED BY AGRICULTURAL CREDIT INSTITUTIONS

(per cent per year)

Country	Nominal Rates[a]	Real Rates[b]	Rate of Inflation
Bangladesh	12	9	3
Brazil	15	-7	22
India	9	-1	10
Indonesia	12	6	6
Sri Lanka	12	6	6

a Nominal rates are averages of the reported rates charged on various types of agricultural loans by one or more institutions in given countries. Generally, the rates in private banks are higher.

b Real rates were obtained by subtracting from nominal rates the average annual rate of increase in the consumer price index over 1967-70, the period for which most nominal rates were reported.

The interest "subsidy" rate was important in the success of ACAR in Brazil. The interest rate charged on ACAR loans ranged from 6 to 8 per cent per year in 1949 to 1963 and there was a legal ceiling on loans of 12 per cent per year. Since Brazil had a chronic inflation rate of about 15 to 25 per cent per year for the same period (reaching a peak of 120 per cent in 1964), these rates constituted a significant subsidy. Further, these very low nominal interest rates of 6 to 8 per

cent charged on loans made it impossible for ACAR's loan portfolio to maintain its real value. One justification for this low interest rate is that farmers are close to subsistence levels of living, so the subsidy encouraged them to increase their production throug the use of credit and new technology. Wharton, in 1969, pointed out that one interesting observation of ACAR was the exclusion of small farmers from the normal banking system, whose rates of 8 per cent per year were equally negative in real terms and whose loans were consequently monopolized by larger farmers. There was evidence that prior to the ACAR program, the larger farmers were securing their loan funds through organized formal money markets, while the small farmers were securing their credit from informal and unorganized sources at rates that were 10 to 28 per cent higher. Wharton concluded that the provision of loans to ACAR farmers, therefore, had some merit in providing them with a "share of the pie" also at subsidy rates.

In LDCs the introduction of the new high-yielding rice varieties necessitated increased application of inputs such as fertilizer, agro-chemicals, etc., and more sophisticated management practices - all of which required farmers to mobilize more working capital resources than they did previously. The farmers' capacity to increase their yields and benefits from advances in technology depended on the ready availability of credit. The new HYVs proved to be very responsive to fertilizer application, hence recommendations about increased applications along with other modern inputs become mandatory to encourage farmers to raise the yield per unit area. Most of the developing countries do not produce fertilizer and if they do, they produce only at minimal levels. Governments must usually augment supplies by

importing fertilizers from abroad to meet requirements. Since fertilizer is an oil-based input, it entails high costs that farmers cannot easily afford. Governments have therefore often decided to subsidize fertilizer to make it available to farmers. The problem with fertilizer is not only adequate supplies, but also distribution within the country. To increase yields, fertilizers should arrive when needed. In reality, however, these inputs are not always available on time.

This is not uncommon in the case of pesticides and other modern inputs as well. Suffice it to say that efforts should be directed to make these modern inputs physically available in sufficient amounts at the place and time needed by farmers.

2.3 Lessons for the Philippines

It would be tedious to relate the details of all of the credit programs surveyed. However, the results are interesting and worthwhile discussing briefly. The "successes and failures" depend on how the programs are evaluated and who does the evaluation. The ACAR, COMILLA, and BIMAS credit programs all started as pilot projects which were implemented in limited areas, and they succeeded as predicted. However, when the area under the program was expanded, various problems were generated, such as credit failures, the restricted availability of modern inputs, and the lack of technical supervision.

Some of the features that contributed to relative success and failure were discussed earlier, and others will be discussed below. What is more important here is for us to understand how and why those problems occurred, what were the effects, and how the governments tried to curb or check the generated problems.

The BIMAS program in Indonesia is reported to have succeeded in increasing output and to have made a great contribution to agricultural development and the attitudes of farmers regarding use of inputs (Rachman, 1973). The BRI realized that it could not carry out such a program on its own, and that it was necessary to coordinate rural credit institutions such as the village units.

The implementation of the BIMAS program in Indonesia was rendered difficult due to rigidity in the distribution of inputs to its peasant-borrowers. In this case, there was a definite bias against deferring to the judgement of the farmers in the amount and kind of inputs necessary for optimum growth. Thus the market mechanism, which would likely permit the farmers to choose the appropriate combination of inputs, was avoided in preference for the planning mechanism, which vested the power of choice in the hands of bureaucracy. In practice, the Government of Indonesia prescribed the kind and amount of fertilizer and pesticides, and distributed these inputs in the form of a "packet". Critics agreed that BIMAS during its operation between 1964 and 1968 failed to spread the use of fertilizer and pesticides and problems of distribution and use were encountered (Hansen, 1973). In 1969, they highlighted the distribution of IR varieties, the "miracle" varieties developed by IRRI in the Philippines in 1966, which were found quite vulnerable to certain pests in Indonesia. In addition, the IR rice varieties were not liked by consumers because of their poor eating quality and hence, the price was lower than the non-IR rice. As an answer to this, the Indonesian government promoted research into development of high yielding rice varieties more adopted to consumer tastes and the production conditions of the country.

A different example was the CIBA[1]-BIMAS contract with Indonesia for aerial spraying and other inputs. At that time, the BIMAS program was encountering various problems in a HYV rice program it was sponsoring. Farmers did not see the reason for using pesticides and if they did, they did not see how they could maintain sprayers. There was faulty delivery of inputs which led to an accumulation of problems. Although the aerial spraying program was well intentioned - the plan was to solve the pest problem in one stroke - there was strong resistance to the CIBA-BIMAS program on the part of farmers so the aerial spraying contract was terminated in 1970 after a two-year trial.

The result of the aerial spraying program is remarkable in that it reveals major policy changes in midstream as a result of feed-back from the program. It stands out as a case of sequential learning and action. In the end, the BIMAS program is an excellent paradigm of the impact that political factors can have. It is striking to note that the program involved the peasant population so widely that widespread dissatisfaction provoked a response from the Government of Indonesia.

The ACAR program in Brazil had been acclaimed as the most outstanding agricultural credit scheme in Latin America. As mentioned earlier, it had exerted a welfare impact on the levels of living, but this was partly due to the very low real interest rates charged to farmers. However, a very substantial income transfer was accomplished

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1 CIBA is a Switzerland pesticide company. Other foreign companies which undertook similar projects were Hoechst from West Germany, Coopa from Italy and Mitsubishi from Japan.

through the credit markets. There were other critical issues about the ACAR program such as program costs and the program impact. Until 1963-64 ACAR was getting a grant from abroad to the amount of $US80,000 per year (Penny, 1968) to cover administrative costs and was able to get much of its capital funds from overseas at 2 per cent interest. Also, in 1968 apparently only 5 per cent of farmers in the state of Minas Gerais received credit from ACAR (Ribeiro and Wharton, 1966). However, major accomplishments are equally important to mention. These were (1) the ACAR introduced ingredients of experimentation, adoption and flexibility into Brazil's agricultural development thinking, (2) the program acquired a notable administrative and financial continuity with insulation from the political process, (3) ACAR trained a large number of Brazilian technicians, and (4) ACAR's experience was used to evolve a nationwide program of extension and credit. Furthermore, although ACAR operated with federal and state government funds, it was viewed as a private entity and experienced little political interference. This led to growing confidence in the organization among officials and particularly among farmers. Some of the changes that evolved were due to the lessons learned along the way and the willingness of the organization to make such changes. This capacity for change in response to the lessons learned and to changing needs may well be the most significant feature of successful institutionalized programs of change - change agencies must be willing and able to make themselves.

In Bangladesh, India, and Sri Lanka, quite similar features occurred in relation to their cooperative credit societies. The provision of technical and input resources was often insufficient and was not always on time; credit provided was on the basis of guarantors

and, sometimes, on pledgeable assets; and small farmers were asked first to form and join cooperative societies before they were entitled to receive credit facilities. It was difficult for some small farmers to purchase shares in the societies to become members. This prevented a great flow of credit to small farmers and it seems that the credit programs are not yet successful in reaching many of the small farmers and tenants.

As often mentioned, defects in the system of loan recovery have also been attributed to the system of cooperatives. Very often too, the leaders of cooperatives were incompetent and were appointed mainly for political reasons. The result, of course, was that there were deficiencies, mismanagement, incapability to recover or collect loans and a low repayment and high default rates.

In Bangladesh, a particular problem was that a small unit of local government called a "thana" could not become easily viable, especially in the handling of credit operations such as those in the COMILLA projects. In 1967-68, the Thana Irrigation Program was opened up and made possible better winter cultivation for new crops. Fertilizer, better seeds, pest control, training and extension services with irrigation increased production possibilities. Together, these increased the demand for credit. However, COMILLA played a major role in the "compulsion" of irrigation agriculture. Many of COMILLA projects' cooperative associations were organized around the acquisition and operation of tubewells or hydraulic irrigation pumps. Each pump or well supported 30-50 family farms. The availability of the well at the time of COMILLA and the subsidization of the acquisition costs by the

Government of Bangladesh was a powerful organizing incentive for families with compact farms. In short, the technology of the inputs mobilized social and political forces conducive to participation and forced a form of organization and self-government. Although this sometimes resulted in unequal distribution of water due to political problems of water management,[1] the COMILLA had shown that irrigation provided a setting in which such group formation is more likely to be achieved. The efforts of the Bangladesh government to duplicate this successful project throughout the country fell short in cases where pump or tubewell irrigation was wanting and was not a part of the credit program. It is therefore possible that in Bangladesh no substitute can be found for the compulsory role that was played by the irrigation technology in the formation of COMILLA projects.

There were other interesting features of credit programs, but for our purposes the factors mentioned above provide a sufficient background to study and understand the credit program in the Philippines, particularly the Masagana 99 Supervised Credit Program.

Following this survey of credit programs, questions arise as to why, despite the many "deficiencies" or "failures", credit programs are still being advocated and pursued vigorously in less developed countries. Penny (1968) listed four reasons, namely (1) the governments, and apparently many economists, are unaware of the attitudes of farmers to debt and credit, and that farmers are not willing to use credit at the earlier stage of development, (2) the governments see

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1 For example, the bigger farmers obtained more water per farm than the smaller ones.

credit programs as an easy way to increase the flow of capital: however, real capital is not created merely by increasing the supply of money, nor can capital be used for development purposes if farmers are permitted to use their borrowings for consumption, (3) governments in many low-income countries seem to feel that modern financial institutions to serve farmers can be created at a stroke of a pen, but it is not realized that the growth of such institutions is as much a result as a cause of development, and (4) the governments fail to realize that there are some powerful reasons for the high nominal rates of interest charged in the so-called unorganized money-markets. Loanable funds are in short supply in low-income countries, and at first glance, it is not surprising to find that interest rates are higher than they are in high-income countries.

Based on the above review, it seems that the governments of the countries surveyed have strong beliefs that agricultural credit programs can effectively improve the welfare of the majority of the people.

On the whole, the review suggests that problems arising from the implementation of agricultural credit programs were complicated in nature, i.e. political, economic and institutional. In Chapters 3 and 5 of this paper, the problems that affected the previous agricultural credit programs and the M-99 program will be discussed. We will see later that Philippine credit problems were similar to the problems discussed here, but did not necessarily reflect actual local experiences. Hence, the solutions/actions undertaken cannot just be copied from the countries surveyed.

CHAPTER 3

AGRICULTURAL CREDIT IN THE PHILIPPINES

3.1 Capital as an Accelerator of Agricultural Development

Like most developing countries, the Philippine economy is basically agricultural and a large proportion of the total populace derives its livelihood from agriculture. Increased output and improved welfare therefore depend largely upon how effectively agricultural development can be carried out. Lack of capital is considered to be one of the bottlenecks to the successful development of agriculture and the economy as a whole. The availability of capital will help harness human and natural resources so as to overcome basic food shortages, continuously increase production and provide a sound foundation for industrial growth.

It is said that agricultural development, or any development effort for that matter, cannot be carried on, expanded or even sustained without adequate funds for the maintenance, replacement and improvement of capital goods and for meeting the operating costs of agricultural production (Tablante, 1965). The farmer needs capital both to purchase various production inputs and to meet his consumption needs. In detail, he needs capital to finance his current farm expenses, to purchase draft animals and implements, to undertake farm improvements, sometimes to acquire land, and even to finance family living expenses including various forms of social and ceremonial expenditures. Further, he needs capital to promote the fuller utilization and increased efficiency of labour, to improve technology in agricultural production and other

operations like processing and marketing, and to maintain basic consumption levels.

In the process of agricultural development large amounts of capital are required. Most of the farmers in the Philippines, however, do not have enough capital of their own due to many inter-related factors such as the small size of farms, unfair tenancy practices, idle farm labour, primitive methods of production, limited land use, and one-crop systems of farming. To agument their capital resources, by force of circumstances, farmers will have to borrow from others. Whether borrowed from credit institutions or from conventional/informal sources such as private money lenders, agricultural credit plays a significant role in agricultural development.

With the introduction of modern technology and the accompanying package of purchased inputs, credit assumes a very important role. However, Mosher has pointed out that agricultural credit cannot be seen as the prime mover, but rather as a complementary input in "getting agriculture moving". He mentioned five "essentials" for agricultural development, namely (1) markets for farm products, (2) constantly changing technology, (3) local availability of inputs, (4) adequate incentives for farmers, and (5) transport. Similarly, he listed five "accelerators" of agricultural development. These are education for development, production credit, group action by farmers, improving and expanding agricultural land, and national planning for agricultural development. Each of the latter is important but not indispensable, unlike the "essentials" (Mosher, 1969).

3.2 Agricultural Credit in Retrospect (1903-1963)

For more than seven decades, governments of the Philippines have made repeated attempts to promote the development and expansion of rural credit facilities (Appendix A). These efforts have taken various forms and have been subjected to numerous changes to conform to prevailing conditions. While these measures have not all been successful in achieving their stated objectives, especially in terms of improving the productive and earning capacity of the small farmers, the cumulative history of their successes and failures offers a useful study of mistakes that must be avoided. It also serves as a guide in the formulation of new programs pertaining to agricultural credit in the Philippines.

Not much is known with respect to the amount of agricultural credit available for financing production inputs and farm development. However, it is generally believed that the amount has not been adequate and that the dearth of credit on reasonable terms has limited the growth in agricultural production. Institutional sources have probably provided around one-third of the total credit for agriculture, but for almost ten years there had been no real growth in the amount granted (World Bank Report, 1976). To this alarming trend one exception has been the supervised credit programs for rice and corn introduced in 1973 and 1974 respectively.

3.3 Sources of Agricultural Credit

In principle, the purchase of inputs can be financed by a combination of internal financing (personal savings of farmers) and

external financing (both from institutional credit sources and from informal loans provided by relatives, friends, landlords and other individuals). Until recently, the latter remained an important source of credit for farmers, particularly the small and marginal ones. For this reason, the following discussion will deal with the lending institutions for agriculture. This is not meant to imply, however, that the informal sources of credit are not important. Non-institutional sources of credit will also be discussed briefly in this chapter.

3.4 Access to Institutional Credit

One of the critical issues in credit policy is the extent to which the supply of institutional credit for agriculture can be expanded. It is striking to note that the share of credit going to agriculture in the Philippines declined steadily from 40 per cent in the early 1950s to 18 per cent in the early 1960s and 7 per cent in 1973 (World Bank Country Economic Report, 1976, p. 359). Part of the reason is that there has been little attempt to expand the network of financial institutions serving the rural areas. This has become a constraint to increased lending. Moreover, the institutions' requirement of collateral for their loans has excluded a large number of small farmers.

The Philippine government is aware of this problem and in recent years has been vigorously promoting the rural banking system. In the same vein, the Central Bank has already directed that at least 25 per cent of all loanable funds from commercial banks should be for agricultural credit; not less than 10 per cent for agrarian reform; and the other 15 per cent for agricultural credit in general.

3.5 Agricultural Lending Institutions

In line with the national programs designed to attain food self-sufficiency (particularly in rice), the Philippine government has allocated resources for agricultural credit through different lending institutions both private and public, in attempting to meet the needs of small farmers.

The total loans outstanding for agricultural production by lending institutions are summarized for the period 1965 to 1974 (Table 3.1). These was a drop in total loans granted in 1971 due to

TABLE 3.1

LOANS OUTSTANDING FOR AGRICULTURE BY INSTITUTION

(in million pesos)

Year	AGLF	ACA	RBs	PNB	DBs	CBs	Total	Deflated Total 1967 Prices
1965	-	87	167	569	293	458	1574	1760
1966	-	88	199	630	317	448	1682	1777
1967	n.a.	96	259	752	380	450	1936	1933
1968	15	106	302	857	438	612	2330	2208
1969	16	106	325	923	485	687	2542	2273
1970	17	119	391	973	500	741	2741	2139
1971	24	127	261	902	498	877	2689	1835
1972	65	127	508	855	740	919	3214	2010
1973	58	109	825	1283	820	961	4056	2225
1974	80	110	1334	1429[a]	877	1278[a]	5108	2098

\- - zero or negligible
n.a. - not available
a - as of June 30, 1974
AGLF - Agricultural Guarantee and Loan Fund
ACA - Agricultural Credit Administration
RBs - Rural Banks
PNB - Philippine National Bank
DBs - Development Banks
CBs - Commercial Banks

Source: Institutional Credit Reports, Central Bank of the Philippines, 1974. (Adapted from World Bank Country Economic Report, 1976.)

credit restraints being tightened and priorities being changed. The Philippine National Bank, Development Bank of the Philippines and rural banks withdrew somewhat from the credit market, placing a greater reliance on commercial banks. It can be seen, however, that from 1971 onwards there was an increasing volume of total loans granted to the agricultural sector in absolute terms. The Philippine National Bank and Commercial Banks comprised the first and second largest share of the total, about 30 per cent and 27 per cent, respectively. In real terms there was not a distinct trend from 1968 but an increase in real growth is expected to be achieved from 1973 due to recent credit policies.

3.5.1 Development Bank of the Philippines (DBP)[1]

The Development Bank of the Philippines, established in 1958, is now one of the major government-owned financing institutions in the Philippines. The previous emphasis on rehabilitation and reconstruction in its early stages of operation has been shifted to development programs. The DBP has been the major source of medium and long-term finance for off-farm marketing and processing facilities and was expanded materially in the 1960s to finance the Filipinization of the rice-milling industry (Mears, 1974).

Because small farmers lack bankable securities they are precluded from using the loaning facilities of the bank and therefore "DBP is in no way a small farmers' bank" as Sacay has put it (Sacay, 1973).

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1 More complete details of the present rice and corn financing schemes operated by the main institutions discussed below are given in Appendices B to E.

3.5.2 The Philippine National Bank (PNB)

With a total of 162 branches and agencies, PNB grants short and long-term loans to agriculture and industry. Agricultural credit programs organized by the PNB include loans for production of various crops such as rice, corn, sorghum, etc.; as well as fisheries and forestry. As of June 30, 1974, the PNB's financing of agricultural crops, fisheries and forestry totalled ₱1629 million (Soliven, 1974).

Except for paddy and maize, all agricultural loans are based on the traditional lending scheme of the bank which calls for collateral. In 1973, the PNB went full scale into the Government's Masagana 99 Rice Program and later into the Masaganang Maisan (corn program) aimed at food self-sufficiency and adopted a supervised credit scheme patterned after the Central Bank-Rural Banks system.

The PNB provided loans to 508,000 rice farmers and 99,000 corn farmers during the period May 1973 to July 1974 (PNB Progress Report, 1974). This implies that PNB had begun to be a small farmers' bank.

3.5.3 Agricultural Credit Administration (ACA)

There are presently 49 branches and agencies of ACA throughout the country.[1] The ACA is the credit arm of the government for the Agrarian Reform Program.[2] Funds are continuously provided by direct

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1 Previously known as the Agricultural Credit and Cooperative Financing Administration (ACCFA).

2 With the proclamation of the entire country as a land reform area (Presidential Decree No. 2, September 1972) the Department of Agrarian Reform implements the Agrarian Reform Program designed to "transfer ownership of the land to the tillers of the soil".

appropriations from the government. The ACA extends production loans to small farmers on a non-collateral basis. By reason of its long experience in extending production loans to small farmers, it was designated by the National Food and Agriculture Council in 1973 as one of the institutions to service the credit needs of the Masagana 99 program.

Although ACA loaned out about ₱50 million to 50,600 rice and corn borrowers between May 1973 and July 1974, this was still small compared with other government institutions. This is probably due to the fact that ACA deos not enjoy rediscounting privileges with the Central Bank which serves as the clearing house for all the activities of different financial intermediaries.

3.5.4 Rural Banks (RBs)

The rural banking system supplies the main bulk of credit to small farmers. Although privately-owned, rural banks draw heavy financial support from the Central Bank in addition to assistance they receive in the training of their officers and employees. The rediscounting window of the Central Bank is open to rural banks at preferred rates of interest. The system has expanded throughout the country from merely 18 rural banks in 1953 to 679 units in 1975.

In 1973, more than 90 per cent of the loans extended by these banks were channelled to agriculture averaging ₱1218 per loan. Of this, more than 95 per cent were short-term loans for production (21st Annual Report, Rural Banks System, 1973).

3.5.5 Commercial Banks (CBs)

Private commercial banks, with 440 branches and agencies at the end of 1970, are the largest institutional suppliers of credit averaging a total of approximately ₱50 million a year. The banks provide financial assistance to ventures on large scale rice and corn farms and loans are generally limited to post-harvest activities and relatively stable agro-industrial enterprises (Mears, 1974, p. 273). But loans to agriculture only make up a part of the minor part of their operations, representing only about 6 per cent of the total credit granted by them (Geonzon, 1972, p. 16).

3.6 Non-Institutional Sources of Credit

While various formal credit institutions have made significant contributions towards meeting the long-term, medium-term and short-term credit needs of farmers, they are still inadequate to cope with the capital requirements of a large segment of the farming population. This is particularly true with respect to short-term credit. A considerable amount of the short-term credit available - more than half of the production credit and about 95 per cent of the non-production credit (World Bank Country Economic Report, 1976) has come from traditional sources.

A study conducted in 1957 by the College of Agriculture in Laguna, showed that of 2411 short-term production loans, 88 per cent came from private individuals (42 per cent), landlords (39 per cent), friends and relatives of borrowers (6 per cent) and merchants (1 per cent). These lenders charged interest rates ranging from about

20 to 300 per cent per year, or an average of 55 per cent (Von Oppenfeld, 1957, p. 20).

The unregistered private money lenders, landlords and other individuals continue to supply the bulk of agricultural credit in the Philippines because the modern credit institutions are rather remote from the type of socio-economic organizations existing in the rural areas "where relationships are more personal and traditional rather than business-like, where written records are rarely kept, where transactions are generally sealed by oral promise based on trust and honour rather than by the sophisticated or elaborate legal documentation and where the hard shell of custom and attitudes makes farmers resistent to change, new ideas, new techniques and new institions". Tablante (1965) further observed that despite the "abuses" and "malpractices" associated with loans obtained from private money lenders, this source of credit performs a service which cannot be provided by registered credit institutions.

The impact of institutional and non-institutional credit in the rural areas may best be exemplified by the average interest rates farmers paid. A study in 1957/58 in Nueva Ecija showed that the interest paid by the farming households averaged 52 per cent per year. Only 9 per cent of loans were obtained from institutional sources, the rest were served by landlords, private individuals, merchants and relatives. In 1969/70 another study in the same area showed that the average interest paid by farmers had declined to 22 per cent. About 27 per cent of households obtained credit from institutional sources. The interest charged by unregistered sources had also substantially

decreased indicating that the expanded availability of institutional credit had reduced the profits which these unregistered sources used to enjoy (Table 3.2).

Results from BAE Indebtedness Survey in 1971-72 showed that the proportion of loans to farmers from informal sources was reported to be more than 70 per cent (Appendix F). Although landlords have declined in importance as a credit source due to the land reform program, private money lenders remain major creditors. However, several studies such as the Philippine Statistics Survey of Households in 1960/61 and BAE Integrated Agricultural Surveys 1971/72 have indicated that the trend over a ten-year period shows an increasing share of the total value of loans coming from institutional sources. From 1960/61 to 1971/72, institutional credit increased from 38 per cent to 46 per cent respectively of total loans in cash and in kind (Table 3.3).

Despite the expansion of institutional credit, the credit needs of the farmers in most developing countries are still being met through non-institutional sources because of the problems associated with institutional credit such as low agricultural loans, high administrative and maintenance costs, complicated loan procedures, collateral requirements and other "red tape" in loan seeking. Credit coming from these private sources has relatively high interest rates not only because of limited supplies of institutional credit but also because of the costs mentioned above in providing credit. This is supported by Long's conclusion that interest rates on agricultural loans are often high - primarily because capital is scarce, farm loans are costly to administer, the uncertainties of agriculture result in considerable loss through default, and the demand for credit is seasonal (Long, 1968).

TABLE 3.2

SHORT-TERM LOANS AND AVERAGE INTEREST RATE PER YEAR BY SOURCE OF LOAN[a]

Source of Loan	1957/58		1969/70	
	Number of Loans	Average Interest/ Year[b]	Number of Loans	Average Interest Rate/ Year
Informal Source				
Landlord	125	69.2	261	26.2
Other Landlords[c]	35	119.7	-	-
Private Individual Money Lenders	20	75.8	64	30.0
Friends/Relatives	18	89.6	228	25.4
Merchants	6	81.5	17	15.0
Others	-	-	13	28.3
Sub-Total	204	87.1[d]	583	25.9
Formal/Institutional				
ACA/FACOMA	9	18.3	100	11.3
Rural Banks	10	14.0[e]	75	11.2
Other Banks	1	-	45	10.2
Sub-Total	20	16.1[d]	220	11.0
GRAND TOTAL	224	52.0	803	21.8

a Only fully repaid laons included.

b Computed according to Gapud's formula:

$$\frac{\text{Actual Amount Charged for Interest}}{\text{Actual Amount Released}} \times \frac{12}{\text{Loan Paid}} \times 100 = \text{Interest Rate/Year}$$

c Landlords other than the tenants.

d Not available, hence, computed by taking the average of the average.

Source: (1) Jose P. Gapud, "Financing Lowland Rice Farming in Selected Barrios of Nueva Ecija, Crop Year 1957-58", Undergraduate Thesis, UPCA, Laguna, September 1959, p. 79.

(2) Institute of Philippine Culture - Bureau of Agricultural Economics, "Socio-Economic Study of Nueva Ecija Rice Farms, Crop Year 1969-70".

TABLE 3.3

SOURCES OF FARM CREDIT:
PER CENT OF TOTAL VALUE OF LOANS[a]

Survey and Year	Institutional	Informal[b]	Total
1. PSSH All Farms, 1960/61	38.0	62.0	100.0
2. FACOMA Members, Luzon Rice Farmers, 1965/66	57.0	43.9	100.0
3. BAE Integrated Agricultural Survey Rice Farms, 1967/68	33.6	66.4	100.0
1968/69	42.1	57.9	100.0
4. BAE Integrated Agricultural Survey All Farms, 1970/71	53.0	47.0	100.0
1971/72	45.8	54.2	100.0

a Total loans in cash and in kind.
b Includes some reports of no source.

Sources: (1) Philippine Statistics Survey of Households, May 1961.

(2) Rodolfo Matienzo, "A Study of Membership of Fourteen Active Rice Farmers Cooperative Marketing Associations, FACOMA in Central Luzon, Philippines", unpublished Masters Thesis, Oregon State University, June 1969, p. 46.

(3) Bureau of Agricultural Economics Integrated Agricultural Surveys 1967/68, 1968/69, 1970/71 and 1971/72.

(Adapted from Gelia T. Castillo's All in a Grain of Rice, SEARCA, 1975).

Interest charges for institutional credit for rice production in the Philippines ranged from 7-14 per cent per annum (Mears, 1974). These rates are significantly lower than those charged by traditional sources. Some loans from all categories of the latter sources were found

with effective rates exceeding 200 per cent. Most of these farm loans were small and without security, involving natural risks and administrative costs which called for higher interest rates unless loans had been subsidized.

The rural banks have been subsidized at two levels by the Central Bank of the Philippines. Firstly, they are provided with a preferential rate on their rediscounting of loan paper. If these financial subsidies were withdrawn, the effect undoubtedly would be to raise the cost of operations of rural banks. It was found by an Inter-Agency Committee on interest rates in 1971 that the effective rates of interest exceed nominal rates by the additional service fees and charges collected. In this regard, it was proposed that the maximum interest rate ceiling should take these hidden charges into account, so that nominal rates will be the same as effective rates. This involved setting ceilings higher than those proposed. To this effect, the Inter-Agency Committee recommended that the government should establish minimum nominal rates of 17-18 per cent per annum on bank lending. A higher real interest rate will tend to remove the present bias in the Philippine economy toward capital-intensive techniques. Since medium-scale and small-scale enterprises tend to be more labour-intensive, giving them access to the institutional credit system will expand both output and employment opportunities in the economy. Hence, the goals set forth by the government will be achieved.

3.7 Supervised Credit Scheme - "A Possible Solution"

One of the ways to help solve the problems of agricultural productivity and low incomes of rural families in many countries is

through the provision of "supervised credit". Supervised credit refers to a system of lending which combines production with technical services to the farmer-borrower to make sure that the loan is being used to adopt recommended practices to increase yields. An agent or technician helps the farmer-borrower to prepare a production plan and budget, credit is provided to the farmer, either in cash or in kind, or both. Regular visits are made by the credit agents to help the farmers use the supplies and equipment financed by the loan. Such programs must meet particular requirements if they are to be effective in increasing rice production. If credit is to be effective in encouraging higher production, it must be extended to farmers at the right time and in the appropriate amount to purchase the optimum levels of inputs.

The experiences of the United States and a few Latin American countries in the practical application of supervised farming credit should prove valuable to the Philippines and other developing countries. However, it is not a wise policy to copy directly ideas and information from one country to another as differences in cultural, social, political, and economic conditions prevail. Recognizing the differences, it was decided in the early sixties to first test the workability of supervised credit in Philippine conditions through pilot projects.

The first pilot project was undertaken by the Development Bank of the Philippines in collaboration with the Agricultural Credit and Cooperative Institute of the University of the Philippines in Cabanatuan City in 1961. A second scheme was tried in Legaspi City in 1963. Preliminary results were encouraging so the projects were expanded with the support of 23 agricultural field supervisors

(Tablante, 1964, p. 568). The Department of Rural Banks and a few rural banks followed by initiating supervised credit programs in some areas.

In 1966, the Development Bank of the Philippines and the rural banking system in the country launched the Supervised Credit Scheme with the establishment of the Agricultural Guarantee and Loan Fund to integrate the provision of credit with intensive supervision by trained credit technicians. Despite the availability of funds and the guarantee feature, initial results were not entirely satisfactory due to the unwillingness or hesitance of rural bankers to participate actively in the program. This was apparently due to the unreliability of government technicians assigned to supervise loans from rural banks. Hesitance in granting high-risk loans may also be expected of these privately-owned rural banks.

After five years of AGLF implementation, expansion difficulties were encountered. It accounted for hardly 3 per cent of the total volume of agricultural loans granted (Sacay, 1973, p. 6). By the end of 1971, the AGLF was replaced by the Agricultural Guarantee Fund (AGF) program which had the objective of encouraging rural bankers to expand loan volumes and hire their own technicians. This new program made funds available to rural banks in the form of special time deposits (STDs) for three years bearing an interest rate of 3 per cent instead of the usual 6 per cent per year. A rebate of one-half of this 3 per cent payment was given to rural banks who hired their own technicians.

A unique feature of the rural banks' supervised credit program as it now exists is the granting of loans to liability groups. Loans are granted without collateral to groups of farmers who agree to guarantee each others' loans.

In 1972, the Agricultural Loan Fund (ALF) was established to finance an accelerated rice production program in response to the severe floods that affected Central Luzon in that year. The ALF took over the functions of AGLF, administered by the Central Bank.

All these agricultural guarantee funds are administered by the Land Bank of the Philippines. The same bank also administers the funds provided under the Masagana 99 (M-99) and Masaganang Maisan programs. The M-99 program commenced in May 1973 to aid further recovery from damage to the rice crop which occurred in 1972-73. At the start of the M-99 program the government took measures to strengthen the agricultural credit system. Firstly, the AGF raised its guarantee on losses from 70 to 85 per cent. Secondly, additional funds were channelled to the ALF as special time deposits in rural banks and thirdly, the rediscounting system was overhauled. Fourthly, regional departments were established within the Central Bank which administered the Agricultural Loan Fund to expedite rediscounting. Although the AGF guarantee overlapped with that of the Agricultural Guarantee and Loan Fund, it provided a more liberal guarantee scheme (World Bank Report, 1976).

The implementation of the supervised credit program in rural bank operations has helped in easing one of the problems faced by small farmers: lack of credit assistance (Pacquing, 1969).

A study of the effect of supervised credit on selected farmer-borrowers in Nueva Ecija indicated that supervised credit has a positive effect on land, labour, resource use, farm output, and crop yield (Gapud, 1969). Hence, the possibility of increasing farm production and farm income through such schemes in the Philippines appears to be substantial. The M-99 program has become the most important supervised credit scheme operating in the Philippines and so it is through this program that, hopefully, the substantial potential for increased production and farm income that clearly exists will be realized.

CHAPTER 4

MASAGANA 99 RICE PRODUCTION PROGRAM

During the years 1971-73, the Philippine rice harvests were severely affected by disasters including flooding of the main crops in the major rice area of Central Luzon in 1972 and drought in some parts of Visayas and Mindanao. To recoup the losses in rice production, the Philippine Government launched the Masagana 99 Rice Production Program on May 21, 1973. Masagana 99 (M-99) is the most massive and intensive rice production program ever attempted and implemented by the Government in the Philippines' history.[1]

4.1 Objectives of the Masagana 99 Rice Production Program

Three specific objectives of the program were set out: first, to boost rice production by encouraging farmers in the target provinces to adopt a modern package of technology; second, to improve agricultural extension programs in the target provinces with support from extension workers, local leaders and farmers; third, to establish applied research projects on rainfed rice culture land that would serve both as demonstration plots and as a basis for recommended practices.[2]

These objectives were to be facilitated by the provision of credit (for the purchase of inputs such as fertilizers and agricultural chemicals) through rural banks and other credit institutions.

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1 "Masagana" means "bountiful" and 99 is the target of 99 cavans (about 4.4 tons) of paddy per hectare on 1.76 tons per acre.

2 Masagana 99 Rice Production Program: Implementing Guidelines NFAC, Quezon City, 1973-74.

The Masagana 99 Rice Program utliized a package of technology evolved from applied research conducted in five municipalities of Bulacan and Nueva Ecija provinces in 1971 by the International Rice Research Institute (IRRI) in cooperation with the Bureau of Agricultural Extension (BAEx) and the National Food and Agriculture Council (NFAC). The same package was tried in 1972 in the irrigated and rainfed areas supported by the supervised credit scheme described in Chapter 3. The results were very promising with an average production of 90 cavans per hectare (1.6 tons per acre) being achieved. In addition to this, the program utilized the experiences of the BAEx-NFAC Special Projects and of "Operation Palagad 1973"[1] in the Central Luzon provinces. These programs also suggested that by adopting the recommended package of technology coupled with supervised credit, rice production could be increased tremendously.

Out of the 66 provinces[2] around the country, 43 were selected for inclusion in the first phase of the M-99 program, i.e. from May to October, 1973 (Appendix G).

After the implementation of the first year of the program, an additional 12 provinces and 2 cities were included. The inclusion of 9 associate provinces[3] is still under consideration (Appendix G). A map showing the different target provinces is shown in Figure 4.1 below.

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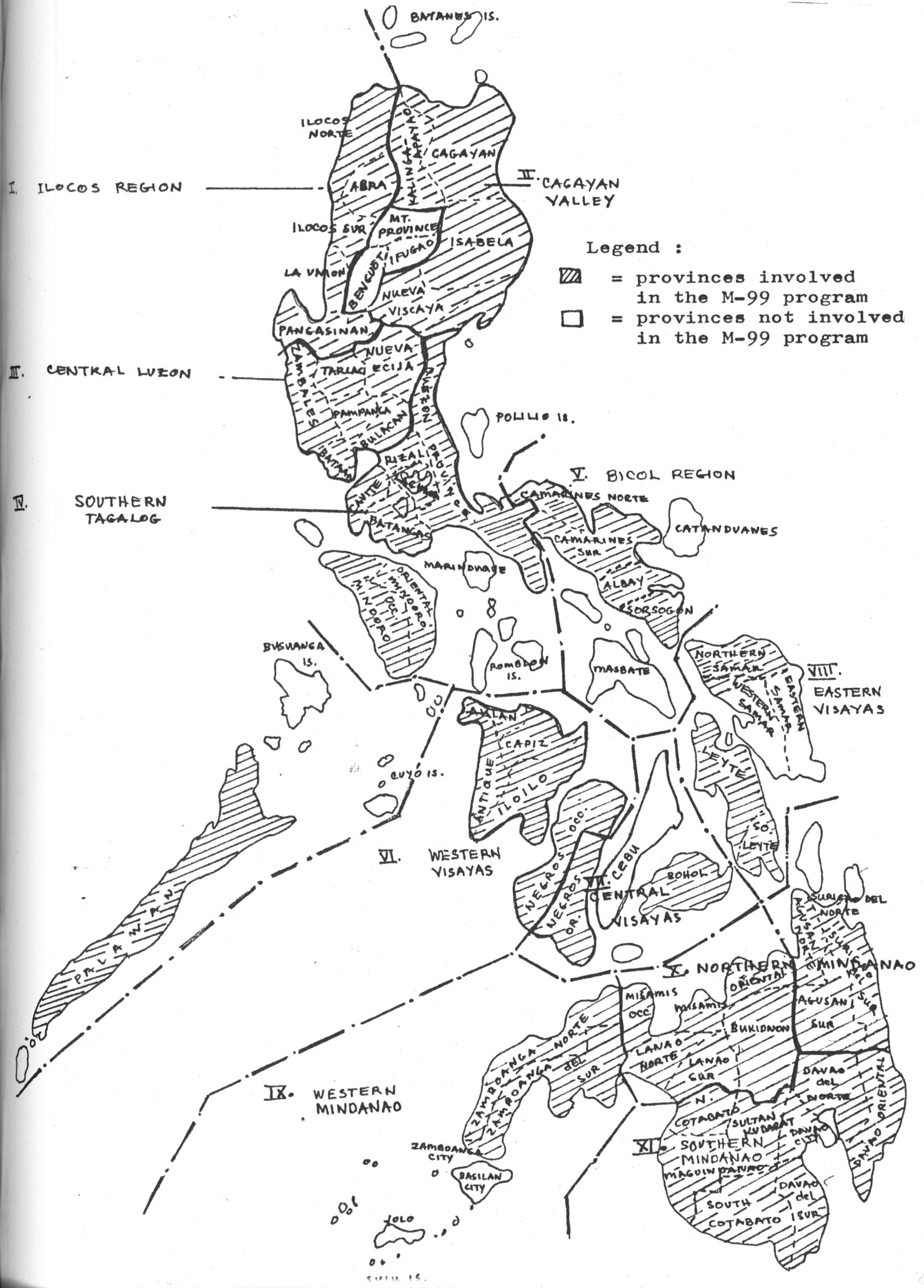
1 Operation Palagad 1973 was a rice production program implemented in the dry season of 1973 in Central Luzon provinces and the Southern provinces (Laguna and Rizal).

2 Lately, more provinces have been named as a result of the reorganization under the New Society of the Philippines and some of the new provinces are included in the M-99 program.

3 Associate provinces are those provinces willing to join the program but which lack some of the resources like manpower, credit, irrigation and other input facilities. However, they are still allowed to adopt modern technology with some technical supervision.

MAP OF THE PHILIPPINES SHOWING MASAGANA 99

PROGRAM TARGET PROVINCES



The initial goal of the program in its first year of operation was to service about 1.0 million hectares of irrigated and rainfed areas (about one-third of the total rice area in the Philippines) in the 43 priority provinces. As the program progressed from Phase I (May - October 1973) to Phase VI (November 1975 - April 1976), areas targeted to be planted with high-yielding varieties (HYVs) expanded and additional provinces were included.[1]

4.2 Organization and Management

The organization of the Masagana 99 Rice Production Program is depicted in chart form in Figure 4.2.

At the national level, Masagana 99 is run through a very broadly based National Management Committee (NMC) which represents numerous government and private entities. This Committee is responsible for designing operational strategies and formulates guidelines to solve problems in the process of program implementation (Appendix H).

Working side by side with the NMC are technical committees which determine and recommend the rice varieties and inputs that are used in the Program. Two important technical committees are the Fertilizer Technical Committee and the Pesticides Technical Committee.[2]

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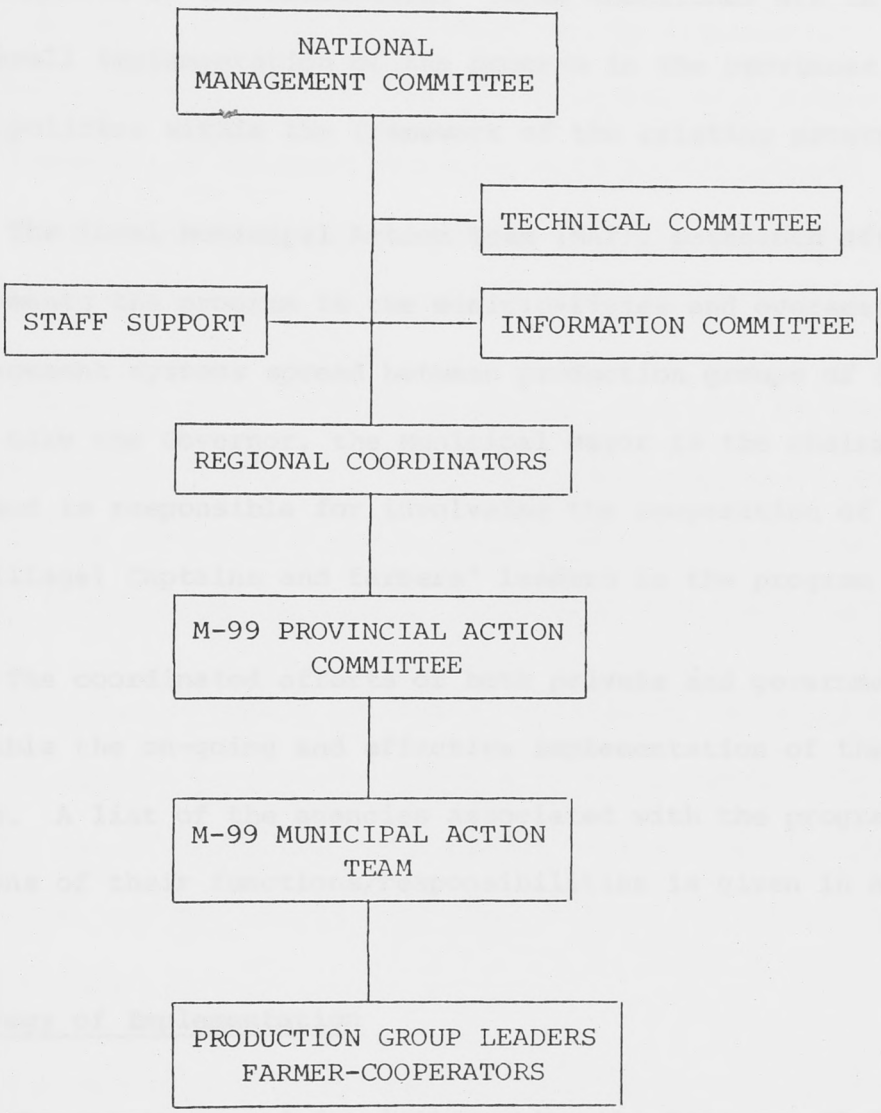
1 One phase is equivalent to one cropping season or six months. Regularly, May to October is the rainy or wet season while November to April is the dry or "palagad" season.

2 The Fertilizer and Pesticides Technical Committees are composed of representatives from Bureau of Plant Industry, Bureau of Agricultural Extension, UPLB College of Agriculture, IRRI, Bureau of Soils, Fertilizer Industry Authority, Agricultural Pesticides Institute of the Philippines and National Food and Agriculture Council.

FIGURE 4.2

FUNCTIONAL CHART OF THE
MASAGANA 99 RICE PRODUCTION PROGRAM



The National Information Committee promotes the information campaign of the program and is composed of various agencies, the most important of which are the Department of Agriculture, Bureau of Agricultural Extension, and Department of Agricultural Communication in Los Baños, Laguna.

At the provincial level, Masagana 99 is managed through Provincial Action Committees (PAC) headed by the Provincial Governor designated as chairman although the actual responsibility of running the program lies with the Provincial Program Officers (PPO) who are the vice chairmen of the Committees. These Committees are in charge of the overall implementation of the program in the provinces and formulate policies within the framework of the existing program.[1]

The local Municipal Action Team (MAT), patterned after the PAC, implements the program in the minicipalities and oversees the local management systems spread between production groups of 5-10 farmers. Like the Governor, the Municipal Mayor is the chairman of the Team and is responsible for involveing the cooperation of the Barrio (village) Captains and farmers' leaders in the program activities.[2]

The coordinated efforts of both private and government agencies make possible the on-going and effective implementation of the Masagana 99 program. A list of the agencies associated with the program and brief descriptions of their functions/responsibilities is given in Appendix I.

4.3 Strategy of Implementation

The strategy used for implementing the Masagana 99 Rice Production Program is multi-pronged involving supervised credit, a

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1 Other members of the PAC are representatives from the Philippine Constabulary, Bureau of Plant Industry, Bureau of Agricultural Extension, Credit Supervisors of PNB, ACA, and RBs and Farm Rural Broadcasters and Federation of Farmers Association.

2 The Team is composed of the Mayor, production technicians, credit agents, Barrio Captains and production group leaders.

package of technology, technical information and price support - all offered in a "package" form. The package is supported with integrated projects related to making necessary inputs available through a co-ordinated effect of the participating agencies.

The main thrust of the program is the dissemination of credit with low rates of interest and with no collateral requirements. Thus most rice farmers are eligible to participate in the program. Supervision is provided to help farmers use the inputs efficiently as well as to ensure that the loans are used for productive purposes.

The loans given to farmers consist of a cash portion (covering the cost of land preparation, pulling and transplanting of seedlings and other labour activities) and an input portion (with chits covering the cost of fertilizers, chemicals, irrigation feed, and seeds).

Masagana 99 uses a package of technology which has been proven effective in various experiment stations in the country. The package includes the use of HYVs, the right amount of fertilizers, pesticides and herbicides, and the adoption of other cultural practices beneficial to increased rice output.

The supervision of farmers by production technicians is an important component of M-99 package. This supervision starts from the formation of a "selda" (joint-liability group) and is provided until the farmers repay their loans. Along with effective extension, continuous training and hiring of specialists is undertaken every year to strengthen technical and management skills in rice production. Moreover, technicians are supplied with motorcycles through a Special Vehicle Loan Fund so that they can supervise a wider range of farmers.

An information and educational campaign sustained at the national, provincial and field levels through the established media is designed to strengthen local extension-information programs and encourage new farmers to support the local governments. Under this campaign, radio spots, mini dramas, jingles, press releases and leaflets are produced and distributed to the Provincial Program Officers, production technicians, and farm broadcasters for further dissemination to farmers.

The availability of water in certain areas is being certified by the National Irrigation Administration particularly for the purpose of loan approval to prospective farmer-cooperators. For rainfed areas, the production technicians certify the water availability during the critical rice growing period. In collaboration with the technicians and rural broadcasters, the NIA agents schedule radio announcements on water use and management and schedule of water releases.

The allocation and distribution of fertilizers by grades at subsidized prices in programmed areas is undertaken by the Fertilizer Industry Authority (FIA). Distribution is carried out through a chit system whereby bags of fertilizer are distributed to farmers. A coupon system has been developed and is followed in the case of self-financed farmers.

In the same fashion a massive seed production program is being implemented by the Bureau of Plant Industry (BPI). The International Rice Research Institute and UP College of Agriculture are taking responsibility for the production of "foundation seeds". Foundation seeds are distributed to selected seed producers throughout

the country for the production of "registered seeds" on a commercial scale. These registered seeds are then sold to seed grower cooperators for the production of "certified seeds" to supply the requirements of the area covered by the program.

The registered seeds are purchased by the BPI at a price higher than the price of certified seeds and then stored in BPI warehouses for distribution when the need arises. The Seed Inspector (deployed by the BPI) provides the technical supervision and is held responsible on matters pertaining to seed production, certification, procurement, and disbursement.

The Bureau of Plant Industry and Bureau of Agricultural Extension coordinate the pest and disease surveillance network at the provincial level. A system of visits is carried out by the production technicians at the field level. Where infestation reaches unacceptable levels the Provincial Action Committee mobilizes all the resources, agencies and civic groups in the campaign against pests and diseases.

Finally, a price support program is undertaken by the National Grains Authority (NGA). At the farm level a price support of ₱0.70 per kilogram of paddy (₱35 per cavan of 50 kilograms with 14 per cent moisture content) was enforced in 1973-74.[1,2] When the

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1 At the same time, a ceiling price is enforced for milled rice to protect the consumers. This will not be discussed in detail here since some controversy prevails about this aspect of the program, and in any case it is not directly related to the Masagana 99 program.

2 In CY 1974-75 the price support for paddy was increased to ₱0.80 per kilo then ₱1.00 per kilogram (or ₱50 per cavan of 50 kilos) in CY 1975-76. This needs to be further increased for farmers to have incentives to increase production.

prevailing price falls below the price support, the NGA procures the paddy either directly or through a link-up system with authorized traders and millers. Further, the NGA provides adequate storage facilities for farmers' produce, especially in strategic production areas.

There are other inter-related activities of the program such as farm-to-market road improvements, artificial rain-making operations, flood control, etc., undertaken in conjunction with the Masagana 99 program, but the factors mentioned earlier are the major aspects of the scheme.

CHAPTER 5

MASAGANA 99 PROGRAM COVERAGE, ACCOMPLISHMENTS AND ASSOCIATED PROBLEMS

This chapter discusses the coverage, accomplishments and some problems associated with the implementation of the Masagana 99 Rice Production Program covering the period from May 1973 to April 1976. The data used in this chapter are taken primarily from the reports of the Management Information System (MIS)[1], from the Bureau of Agricultural Economics (BAE) and from the lending institutions (PNB, RBs, ACA). Other information is drawn from both published and unpublished sources.

Since data on Masagana 99 are gathered by the production technicians (PTs) and the financial institutions in the participating provinces and then summarized and transmitted to either NFAC or BAE where final processing and analysis is done, the estimates were not always exact measurements and some problems were encountered during data processing. Despite this shortcoming, these data are the best available at hand.

5.1 Alternatives to Increase Food Production

Before discussing the coverage and accomplishments of the M-99 program in detail, the alternatives available to the Philippine

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1 The Management Information System (MIS) is a reporting system undertaken by BAE, NFAC, and USAID to assist the Masagana 99 Program with systematic recording, reporting, and analysis of selected data for program management purposes (Smith, 1975).

government to increase food production is worth considering at this point. In principle, in contemplating a program to increase food production, a government has one of many choices. Three of these choices are: (1) provision of price support for the farmers' output leaving the inputs to private markets, (2) no provision of price support but giving input subsidies, and (3) a mixture of price support for output and subsidies for inputs. Like all the governments in the region, the Philippine government has decided to adopt programs to increase production by giving incentives on both the input and output sides. These incentives are in the form of price support for farmers, ceiling prices for consumers and a lower price of fertilizers for food crop producers relative to export crop producers.[1] In 1975, the price support for paddy was set at ₱50 per cavan of 50 kilos and the ceiling price of milled rice was set at ₱1.90 per kilogram. The public cost of this subsidy was reported to be about $US20 million in both FY 1974 and FY 1975. In the case of the fertilizer subsidy, the public cost rose from $US12 million for 1970-73 to about $US84 million in 1974.[2]

The basic question therefore that the Government of the Philippines must ask itself is "Is the government revenue being spent in the best way, given the specific objectives?".

With the data presently available, it will not be possible to give a clear-cut answer to this question. It is still too early to

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1 The Government of the Philippines, through the Fertilizer Industry Authority, adopted a two-tier price system, charging essentially the world market price for fertilizers used to grow export crops (sugar, bananas, pineapples) and a lower, subsidized price to producers of food grains (rice, corn, feedgrains).

2 These cost figures are taken from World Bank Country Report, 1976.

judge how successful the M-99 program has been. However, the preliminary results shown below indicate that the M-99 program has been moderately successful so far.

5.2 Area Planted and Harvested in Relation to Target Area

One of the major aims of the M-99 program is to plant a greater area with HYVs of rice with the present available technology and input resources available in the target provinces. Target areas[1] are set in each phase to serve as guides to managers and implementers of the program in order to give an indication as to what and how many inputs are required and what the potential yields are.

After one year of implementation (May 1973 - April 1974), some Governors in the provinces left out of the program urgently requested the inclusion of their provinces and so the original 43 priority provinces were increased to 55 provinces and 2 cities, and some 9 associate provinces.

The M-99 program had six implementation phases during the period being analyzed. In Phases I to IV the target areas were overachieved because the program was given "national priority" and the full attention of both government and private entities was concentrated on it. On the face of it, a slight reduction in the area planted

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1 The Provincial Program Officers (PPOs) set their own provincial targets. Since each province differs in size, conditions and capacity to respond, it is expected that there will be wide variation. Although politically each province is important in its own right, for management purposes it is necessary to discern between those provinces that are major contributors and those provinces with token involvement.

occurred in Phases V and VI compared with Phases III and IV (Table 5.1). In reality, however, this did not actually occur. In phase III, the M-99 program was strengthened through the implementation of a new "Direct Seeding Program" which was designed to maximize the use of land by planting another crop of paddy.[1] Thus, a big jump in area planted under the M-99 program occurred in Phases III and IV. Unfortunately, in some provinces the area planted in Phase III was hard hit by typhoons in August and October 1974, while drought occurred in other areas. A total of 95 thousand hectares was affected in 26 priority provinces. This accounted for 12 per cent of the outstanding area in the affected provinces (Appendix J). This caused a wider discrepancy between the area planted and the area harvested in Phase III (Table 5.2). To offset the probable losses incurred due to the calamities, a "recovery program" was included in Phase IV increasing the target areas to 579 thousand hectares from original of about 400 thousand hectares. In effect, there was more or less the same coverage in Phases III and IV and Phases V and VI.

5.3 Production and Yield per Hectare

As mentioned earlier, the M-99 yield and production data were gathered by numerous production technicians all over the country. These sets of data were summarized and submitted to the Provincial Program Officers for submission to the National Food and Agriculture Council/ Bureau of Agricultural Economics. In turn, the NFAC/BAEcon finalized

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1 Direct Seeding - planting of short-maturing varieties like IR 1561 by direct seeding or broadcast methods on areas with sufficient and early rainfall that normally starts in April and May.

TABLE 5.1

MASAGANA 99 PLANTING PERFORMANCE, AREA TARGETTED AND PLANTED IN THOUSAND HECTARES

Planting Period	Target		Planted		% Accom.[a]
	WS	DS	WS	DS	
Phase I (May 73 - Oct. 74	574.8	-	748.4	-	130
Phase II (Nov. 73 - April 74)	-	425.2	-	452.6	106
Phase III (May 74 - Oct. 74)	901.6	-	1160.3	-	129
Phase IV (Nov. 74 - April 75)	-	579.3	-	686.8	119
Phase V (May 75 - Oct. 75)	1140.1	-	1084.8	-	95
Phase VI (Nov. 75 - April 76)	-	646.3	-	660.4	102

WS - Wet season regularly from May to October (Phases I, III and V).
DS - Dry season regularly from November to April (Phases II, IV and VI).
a - % Accomplishment = Area Planted/Target

Source: Management Information System (MIS) Reports, NFAC.

TABLE 5.2

MASAGANA 99 AREA HARVESTED AS PERCENT OF AREA PLANTED IN THOUSAND HECTARES

Phase	Area Planted	Area Harvested	%
I	748.4	1111.6	92.5
II	452.6		
III	1160.3	1203.2	87.5
IV	686.8		
V	1084.8	1021.0	94.1
VI	660.4	645.0	

Source: Management Information System (MIS) Reports and NFAC Annual Reports, 1973-74.

the summary and analysis of the M-99 program, and estimates were not always exact measurements especially if no systematic sampling was employed. The task of collection and compiling production figures is a formidable one, and reduces the production technicians' effectiveness. Also, since production technicians were paid incentives on the basis of their performances the overstatement of reports is more likely to occur. As the later residual analysis will show, the data reported by production technicians are clearly in error. Therefore, in interpreting these results, care must be taken.

Rice production in the Philippines has been reported to have been affected by institutional factors (i.e. tenancy problems and lack of credit to meet farmers' needs), environmental factors (i.e. rainfall, solar energy and the occurrence of typhoons and drought); and lack and inefficient usage of production inputs such as improved seeds, fertilizers, chemicals and irrigation. To tackle these problems a package of technology was developed and complemented with credit and the supervision of farmers. With the advent of Masagana 99 Rice Production Program a substantial increase in rice production was achieved in Crop Year 1973-74. Production increased from a low of 100 million cavans in CY 1972-73[1] to a high of 127 million cavans in CY 1973-74. This was the highest production achieved to that date, higher by 5 per cent than the previous high of 121 million cavans in CY 1970-71, and 7 per cent higher than the average for the three years

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1 However, it is noteworthy that the production of 100 million cavans for CY 1972-73 was artificially low due to the typhoons and drought that hit the country in that year. An analysis of production will follow in the chapter.

1969, 1970, and 1971 of 119 million cavans (Appendix K). Production increased further to 128.6 million and 140 million cavans in CY 1974-75 and CY 1975-76, respectively.

Increased production resulted not only from increased yield per hectare but also from increased area sown. The area covered by the M-99 program increased from one-third to almost half of the total rice area harvested (3.58 million hectares) between Crop Year 1973-74 and CY 1975-76 (Table 5.3). Considering the yield potential attached

TABLE 5.3

MASAGANA 99 PROGRAM AREA AND PRODUCTION IN RELATION TO TOTAL RICE AREA AND PRODUCTION, CY 1973-74 TO CY 1975-76[a]

Crop Year	Total Rice		Masagana 99		% M-99	
	Area	Prod.	Area	Prod.	Area	Prod.
1973-74	3.44	127.1	1.11	85.5	32.3	67.3
1974-75	3.54	128.6	1.20	83.4	33.9	64.8
1975-76	3.58	140.0	1.67	116.4	46.6	83.1

a - The area is in million hectares while production is in million cavans of 44 kilograms.

Source: MIS and BAE reports.

to HYVs of rice, the proportion of the area already covered by the M-99 program, it is expected that production under the program will have a great bearing on national rice output. The expectation was realized, as indicated in Table 5.3. The contribution made by the area under M-99 ranged from two-thirds to four-fifths of total rice production between CY 1973-74 and CY 1975-76.

Recently a report was presented that suggested that after only three years of M-99 operation, from May 1973 to April 1976, self-sufficiency in rice was attained and a buffer stock had been built up.[1]

The availability of water is critical practically at all stages of rice growing. It is widely known that the high yielding rice varieties are highly responsive when irrigation is available. As such, to achieve the best results, it is desirable that M-99 package program is aimed mostly at irrigated areas. However, the availability of water in certain areas, particularly during wet or rainy season (as certified by the production technicians), made the M-99 program available to both irrigated and rainfed areas. The M-99 planting performance classified into irrigated and rainfed areas for Phases I to VI is summarized in Table 5.4. It can be seen that a large proportion of the M-99 program areas is under irrigation, ranging from 68 per cent to 86 per cent of the M-99 total area planted in Phases I to VI. Rainfed areas ranged from 14 to 32 per cent, the highest of which occurred during the rainy season.

If we look at the total area harvested, shown in Table 5.5, we can see that the rainfed areas are substantially higher than the irrigated areas. This suggests that more efforts must be exerted to increase and improve the irrigation facilities through the country. A brief discussion on irrigation will follow in the last section of this chapter.

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1 Quisumbing and others, "An Evaluation of Masagana 99 Program", paper presented at the Conference of Strategic Factors in Rural Development in East and Southeast Asia, Manila, sponsored by the Council for Asian Manpower Studies, December 18-23, 1976.

TABLE 5.4

MASAGANA 99 PLANTING PERFORMANCE IN IRRIGATED AND RAINFED AREAS

Phase	'000 Hectares			Per Cent	
	IRR	RF	Total	IRR	RF
I II	859	252	1111	77	23
III	794	366	1160	68	32
IV	592	95	687	86	14
V	740	345	1085	68	32
VI	545	114	660	82	18

Source: MIS Reports, NFAC, Quezon City.

TABLE 5.5

TOTAL AREA HARVESTED: IRRIGATED AND RAINFED CROPS, CY 1969-70 TO CY 1974-75

Crop Year	'000 Hectares			Per Cent	
	IRR	RF	Total	IRR	RF
1969-70	1346	1767	3133	43	57
1970-71	1471	1642	3133	47	53
1971-72	758	987	1745	43	57
1972-73	1241	1871	3112	40	60
1973-74	1494	1943	3437	43	57
1974-75	1412	2127	3539	40	60

IRR - Irrigated
RF - Rainfed
a - Only in 15 priority provinces.

Source: Bureau of Agricultural Economics Reports, Q.C..

The average yield per hectare of paddy in irrigated and rainfed areas for both the Masagana 99 and the total rice areas are shown in Table 5.6. It was reported that the total average yield per hectare attained under irrigated crops increased from an average of 1.95 metric tons for the Crop Years 1970-73 to 2.25 metric tons in CY 1975-76. A closer examination of the figures in the Table revealed that the overall yield per hectare of 1.72 metric tons in CY 1975-76 had already been attained in CY 1970-71. In CY 1970-71, the increase in yield was attributed to HYVs, increased irrigation rates, and favourable weather. However, the yield declined substantially in the following crop year to 1.64 metric tons per hectare due to 21 typhoons, the Muslim-Christian conflict in Cotabato which severely reduced the production of rice and corn in the main producing areas of Mindanao, lack of agricultural credit, inability of the Rice and Corn Administration (now National Grains Authority) to guarantee a floor price, and damage brought about by Tungro disease.[1] A series of typhoons hit the country again in July to September of 1973 strongly affecting the rice crops of 1972-73 and 1973-74. This brought about a reduction of 13 per cent from the production of the previous year.

With the implementation of the M-99 program the overall yield rose from an average of 1.59 metric tons for the three years of 1970-73 to 1.72 metric tons in CY 1975-76. The M-99 average yield increased to 3.39, 3.04, and 3.08 metric tons in CYs 1973-74, 1974-75, and 1975-76, respectively. The yield achieved in irrigated areas under M-99

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1 See A.R. Tanco, Jr., "Harvests Way Below Targets", Manilla Times, pp. 1 and 8, August 20-21, 1971.

TABLE 5.6

AVERAGE YIELD[a] PER HECTARE OF PADDY IN IRRIGATED AND RAINFED AREAS UNDER MASAGANA 99 AND TOTAL RICE AREA, CY 1970-71 TO CY 1975-76

Crop Year	Total Averages			M-99 Average Yield		
	IRR	RF	Overall	IRR	RF	Overall
1970-71	1.99	1.47	1.72			
1971-72	1.98	1.38	1.64			
1972-73	1.89	1.11	1.42			
1973-74	2.02	1.33	1.63	n.a.	n.a.	3.39
1974-75	2.15	1.24	1.60	3.93	2.90	3.04
1975-76	2.25	1.34	1.72	4.25	2.95	3.08

a - Figures in metric tons.

Source: MIS and BAE reports.

averaged 3.93 metric tons in CY 1974-75 and 4.25 metric tons in CY 1975-76 while under rainfed areas the yield averaged 2.90 metric tons and 2.95 metric tons over the same period. These are all substantially higher than the total yield averages. The reduction in M-99 yield in its second year of implementation reduced the overall yield from 1.63 to 1.60 metric tons. The reduction was ascribed to 22 typhoons reported to have occurred in August and October of 1974.

As stated earlier, the proportion of the irrigated area under the M-99 program was high compared with the rainfed areas. It is unlikely that the overall M-99 yield would be closer to the rainfed yield than the yield under irrigated area. Although it was widely observed from

Phases I to VI, that the bigger the production and area being reported the smaller the yield obtained, this does not seem to be the actual cause of the discrepancy of the overall M-99 yield and M-99 irrigated yield.

This may reflect the fact that the data reported in the MIS had some discrepancies and therefore need to be improved.

Taking all these into consideration, can the 8 per cent increase in yield from an average of 1.59 metric tons for the last three years of 1970-1973 to 1.72 metric tons in CY 1975-76 be considered substantial?[1] This needs a closer examination but the data available suggest that it is still rather early to be sure of the reasons for the increases in yields since the disappointing years of 1971, 1972, and 1973.

5.4 Volume of Loans, Area Financed, Farmers Served and Loan Repayments

The target areas to be financed are submitted to the rural banks, Philippine National Bank, and Agricultural Credit Administration for allocation of agricultural loan funds from their portfolio. The arrangement was for the PNB to provide 50 per cent of the total loans required by the program with 45 per cent coming from rural banks, and the rest from ACA.

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1 It should be noted that the calamities brought about much destruction of properties and loss of lives in the affected provinces. In particular, infrastructures like roads, bridges, irrigation facilities and others were heavily affected - all of which needed to be rehabilitated, entailing considerable time and cost.

The total loans granted to farmers amounted to 2.7 billion pesos for Phases I to VI (Table 5.7). This was more or less consistent with the target proportion of loans assigned to the three lending agencies.

TABLE 5.7

MASAGANA 99 TOTAL LOANS GRANTED BY INSTITUTION, CY 1973-74 TO CY 1975-76

Institution	Loans Granted (Billion Pesos)	% Share
Philippine National Bank	1342.7	49
Rural Banks	1269.6	47
Agricultural Credit Administration	101.9	4
Total	2714.2	100

Source: Reports from PNB, RBs and ACA as of December 1, 1976.

The total loans granted by phase shown in Table 5.8 indicate a falling trend. At first, loans increased from Phases I and II to Phases III and IV, respectively, However, a significant reduction occurred in Phases V and VI. This is true for both the total number of farmer-borrowers and the area financed. Table 5.9 shows the total area financed in relation to the area planted. It can be seen clearly that there is here also a falling trend.

This can probably be attributed to two factors. One is that farmers are probably moving towards self-financing and need less external financing. Secondly, due to non-repayment of loans, some farmers are no

longer provided with credit and this has tended to bring about a reduction in the total area financed and in total loans granted. Which of the two factors has been most important is not as yet known, but further analysis in the next chapter will cast some additional light on the subject.

TABLE 5.8

MASAGANA 99 LOANS GRANTED, AREA FINANCED AND FARMER-BORROWERS, BY PHASE[a]

Phase	Loans Granted (Million ₱)		Area Financed ('000 ha.)		Farmers[b] ('000s)	
	WS	DS	WS	DS	WS	DS
I	369.5	-	574.0	-	376.9	-
II	-	230.7	-	340.3	-	235.9
III	716.2	-	854.7	-	527.9	-
IV	-	572.3	-	469.3	-	305.0
V	572.9	-	551.4	-	315.9	-
VI	-	252.7	-	254.8	-	150.7

a - Reported by lending institutions as of December 1976.
b - As reported by MIS.

TABLE 5.9

MASAGANA 99 TOTAL AREA FINANCED AS PERCENTAGE OF AREA PLANTED, PHASES I-VI

Phase	Area Financed		Area Planted		%
	WS	DS	WS	DS	
I	574.0	-	748.4	-	76.7
II	-	340.3	-	452.6	75.2
III	854.7	-	1160.3	-	73.7
IV	-	469.3	-	686.8	68.3
V	551.4	-	1084.8	-	50.8
VI	-	254.8	-	643.4	39.6

Source: MIS and lending institutions' reports.

It should be noted, however, that starting in Phase V, the target area to be financed was reduced as a result of low loan collection and overloading of production technicians. Strict compliance was enforced by the lending institutions on the maximum of 200 farmers to be supervised by each individual technician (PNB Memorandum No. 67, August 1975).

The loans granted mature within six months of release with an interest of one per cent a month. Out of total loans due of 2.71 billion pesos, a total of 2.14 billion pesos had been repaid to the end of Phase VI. This is about 79 per cent of the total loans due. During the first two phases there was a good repayment rate as indicated in Table 5.10. However, as the program progressed, the loan repayment rate declined.

TABLE 5.10

MASAGANA 99 LOAN REPAYMENTS AS PERCENTAGE OF LOANS DUE, BY PHASE[a]

Phase	Loans Due (Million ₱)		Loans Repaid (Million ₱)		% Repayment	
	WS	DS	WS	DS	WS	DS
I	369.4	-	345.2	-	93.4	-
II	-	230.7	-	213.6	-	92.6
III	716.2	-	585.4	-	81.7	-
IV	-	572.3	-	443.9	-	77.6
V	572.9	-	381.9	-	66.6	-
VI	-	252.7	-	164.4	-	65.1
Total	1658.5	1055.7	1312.5	821.9	79.1	76.4

a - Reports as of December 1976 by lending institutions (PNB, RBs, ACA).

Problems started in Phase III when the area harvested dropped substantially due to the typhoons and drought mentioned earlier. These problems continued into latter phases because farmers were unable to recover immediately from the catastrophes. As a result, farmers had difficulty in paying back their loans. Accordingly, the repayment problems became more severe in spite of the good harvests claimed to have been attained in the latter phases.

This poses a difficult problem for implementors of the M-99 program, particularly for the lending agencies. A credit program is a failure as a banking activity if it cannot recover the funds it lends to farmers. As a development activity, however, a subsidy might be justified on "infant industry" arguments. On the other hand, even if banking and development criteria do not justify a subsidy, the objective of improved welfare (which is usually one important aim of an agricultural credit program) might justify a subsidy particularly in the case of a national disaster.

Several studies were undertaken to find out the real causes of non-repayment. One of these is an analysis of agricultural credit (short-term) non-repayment problems in the Philippines for CY 1973-74, jointly undertaken by BAE and PCAR.[1] The results showed that the major cause for non-repayment was crop failure (76 per cent). This was followed by low production due to misapplication of loans (10 per cent),

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1 Philippine Council for Agricultural Research-Bureau of Agricultural Economics Project No. 122, "An Analysis of the Agricultural Credit (Short-Term) Non-Repayment Problems in the Philippines, CY 1973-74", BAE, Quezon City, 1976.

borrowers not being accustomed to re-paying loans (8 per cent), and the attitude that loans are a government dole-out (2 per cent). Another survey of debt repayment capacity of paddy farmers in Central Luzon was undertaken by Opelanio and others (1976). The results were similar to those of the PCAR-BAE joint study. Specifically, the reasons put forward were low production due to calamities, money being used for consumption, and loans not yet being matured. The same study pointed out that during the early stages of an inflationary period, farm prices tended to increase more rapidly than costs. Later, costs increased more rapidly than farm prices. This could have explained, at least in part, higher repayments in Phases I and II than in the latter phases of the M-99 program.

Due to the alarming problem of default a similar study was conducted by the Technical Board for Agricultural Credit,[1] to examine rigorously the causes of this problem. The major findings contributed more specific and significant causes of low repayments. Aside from low production observed by the above studies, other reasons cited were waiting for better prices, the burden of debts other than M-99 loans, the selda (joint-liability group) concept, M-99 loans being used for other crops, farmers using the M-99 loan for the succeeding planting season, the poor quality of some technicians, non-acceptance of partial payments by banks, the dole-out mentality, and a host of other related factors.

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1 See Preliminary Report of the Technical Board for Agricultural Credit (TBAC), "Survey of the Causes of High Arrearages of Central Luzon Farmers in Phases IV and V of the M-99 Program", TBAC, Presidential Committee on Agricultural Credit, Manila, 1976.

A study of some of the causes for increasing non-repayments suggests, among other things, that (1) whereas banking institutions took an aggressive approach in extending loans, they did not exercise sufficient effort in assessing credit worthiness, in keeping in contact with farmers during the cropping season, and especially in collecting loans at harvest time; (2) placing the Pts in the role of loan collectors is not consistent with their jobs of educating farmers; and (3) because the total loan was relatively small, some farmers might have assumed that they would not be forced to re-pay - in effect testing the non-collateral system. Although the interest rate of 12 per cent is relatively low, the rediscounting of loans at the Central Bank by 1 per cent suggests that M-99 loans should be profitable and that banks should be able to acquire capable staffs to make, supervise and collect loans (Quisumbing, et al., 1976).

These studies have pointed out that causes of non-repayment are related to economic, psychological, institutional and sociological factors - all of which are varied and interconnected in nature. There is no clear-cut solution to the above problems. However, several steps were undertaken and others are being tried to isolate and solve them. These steps included increasing the number of production technicians and agricultural credit supervisors and increasing incentives provided to them, restructuring of loans for borrowers who were unable to repay due to crop failure, reorganization and strengthening of the "selda" joint-liability groups, loan extension on a highly selective basis, and maintenance of existing loan ceilings per hectare. Further, a system of identifying farmers was developed.

In cases where farmers refused to repay, the military authorities helped in the collection of loans.[1] While the resort to authority may be regrettable in principle, in reality it was effective because some farmers were made to realize that it is imperative to repay the loans so that both they and other farmers can borrow again in the future. In very extreme cases such as where farmers were found to be "fake" farmers or non-existent, court trials were held to prosecute those responsible for the fraud. This was done to give farmers a warning and to encourage fraudulent farmers to repay the loans immediately. Figures for loan repayment can be expected to improve somewhat as some defaulters will eventually pay the loans.

5.5 Average Loan per Hectare and per Farmer-Borrower

An official loan per hectare figure which is expected to cover all expenses involved in adopting the package of technology is regularly set by the National Management Committee (NMC) (Appendix L). In Phases I and II, a loan ceiling of ₱700 was available per hectare. This was increased to ₱900 in Phases III and IV and ₱1200 for the latter phases.[2] These increases were made to accommodate price increases of inputs (fertilizers, chemicals, etc.) as a result of devaluation and spiralling of oil prices after 1974.

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1 The Philippine Constabulary (PC) became a member of the National Management Committee when problems of this sort occurred in the early phases of the M-99 program (see Appendix H).

2 On a case to case basis, a total of ₱1600 per hectare would be available upon recommendation of the Provincial Action Committee (PAC) and approved by the NMC.

The average loan per hectare ranged from ₱643 in Phase I to ₱992 in Phase VI (Table 5.11). Bearing in mind the amount of loans required and available to them, it seems clear that, in general, farmers did not borrow the total loan per hectare which was made available to them. However, it is also possible that farmers did not want to avail themselves of the cash portion of the loan allocated for labour expenses as they relied on their own labour and that of the family members which were supplied without cash outlay.

TABLE 5.11

AVERAGE LOAN PER HECTARE AND PER FARMER-BORROWER, BY PHASE

Phase	Average Loan in Pesos (₱)	
	Per Hectare	Per Borrower
I	643	980
II	678	978
III	838	1357
IV	1119	1876
V	1039	1813
VI	992	1677

Source: MIS Reports.

5.6 Production Technicians and Numbers of Supervised Farmers

The designation "Production Technician", or PT, was applied to any technician assigned to assist farmers in relation to the M-99 production program. Most people assigned were from the Bureau of Plant Industry (BPI) or the Bureau of Agricultural Extension (BAEx). The PT's role in supervising farmers is vital in the successful implementation of the M-99 program.

It must be pointed out here that the farmers supervised by the PTs can either be with or without credit. Table 5.12 summarizes the total number of farmers with or without credit. The farmers supervised increased from Phases I and II to Phases III and IV, respectively, and remained more or less the same in Phases V and VI.

TABLE 5.12

NUMBER OF PRODUCTION TECHNICIANS AND FARMERS SUPERVISED, BY PHASE

Phase	No. of PTs	No. of Farmers Supervised			Farmers per Technician[a]	
		W/Credit	W/O Credit	Total	Range	Average
I	3133	376.9 (65)	199.7 (35)	576.6 (100)	46-619	184
II	3095	235.9 (63)	139.0 (37)	374.9 (100)	10-320	121
III	3480	527.9 (69)	240.7 (31)	768.6 (100)	38-434	221
IV	3711	305.0 (63)	179.9 (37)	484.9 (100)	9-431	131
V	4413	315.9 (45)	390.9 (55)	706.8 (100)	53-392	160
VI	4104	150.7 (30)	343.4 (70)	494.1 (100)	27-575	120

a - Taken from Quisumbing and others (1976), An Evaluation of M-99 Program. All the other figures were taken from MIS reports.

A closer look at the figures indicates a reverse trend; that is, farmers with credit decreased from Phases III and IV to Phases V and VI, respectively, while farmers who did not avail themselves of official credit supplies increased from a low of 200 thousand farmers

in Phase I to a high of 343 thousand farmers in Phase VI. This seems to be consistent with the hypothesis that many farmers have become ineligible for loans because they did not repay earlier debts. However, it is quite consistent also with the probability that farmers are becoming self-financed in latter phases. An in-depth analysis needs to be done to see the real cause of the decline in loans granted. Figures in brackets show the percentages of farmers supervised with and without credit by phase.

The increase in farmers supervised resulted from an increase in the number of production technicians assigned from Phases I to VI. The ideal coverage of one production technician has been recommended to be about 150 farmers. But in Phases I to III, the load averaged 184 and 221, respectively, and the range was wide in all phases. This suggests that some technicians had had a near impossible load to handle (Table 5.12). Hence, the number of technicians was increased to attain the appropriate coverage while maintaining the same number of farmers being supervised. No doubt, the high average loads of Phases I and III has affected the supervision provided by the PTs. Although the policy is to cover as many farmers as possible, under the M-99 program the farmers supervised stayed more or less the same for Phases III and IV to Phases V and VI, respectively. One of the reasons was the lack of trained graduates in agriculture to be hired to help implement M-99 program, not to mention the lack of government funds. Furthermore, several production technicians experienced difficulty in contacting farmers because of the lack of transport facilities. This problem was alleviated through a vehicle loan program designed to assist technicians in acquiring motorcycles at cost.

It was observed that experiences in some countries like the Republic of China, Korea and Japan indicated that success in increasing productivity depended in part on the rate of adoption of innovations among farmers. This, in turn, influenced the quality of the agricultural extension services and the role of farmer organizations (World Bank Country Economic Report, 1976). In the Philippines, this potential for promoting more rapid adoption has not been fully exploited. The role of extension workers (mostly called production technicians), their relation with farmers and farmer organizations, and the interrelationships among the latter all deserve close attention. Therefore, the need is to upgrade the quality of the existing extension services rather than just to expand them.

5.7 Problems Related to Fertilizers, Pesticides and Irrigation

While the problems of low repayments, lack of technicians and others have already been treated in the preceeding sections, the problems associated with fertilizers, chemicals and irrigation have not been discussed. It would therefore be worthwhile discussing these problems in brief to get a clearer view of the subject matter.

One of the important factors that brought about increased rice production during the late 1960s and early 1970s was increased usage of fertilizers (Hsieh and Ruttan, 1967; Abad, 1974). This seems to be supported by the increasing volume of fertilizer consumed from 1969-74 as summarized in Table 5.13. The volume of fertilizer increased from 324.8 thousand metric tons in 1969 to 655.5 thousand metric tons in 1974, an indication that the agricultural sector had become increasingly aware of the use and benefits of inorganic fertilizers.

TABLE 5.13

VOLUME OF FERTILIZER CONSUMPTION, 1969-1974

Year	'000 m.t.	Ratio of Fertilizer-Rice Price[a]
1969	324.8	1.22
1970	434.0	1.56
1971	473.0	1.18
1972	563.0	1.13
1973	677.2[b]	0.80
1974	655.5[b]	2.50

a - Ratio of Urea fertilizer price to price of paddy (rough rice).
b - Excludes imports of direct users and traders.

Sources: (1) Data from 1969-73, National Economid and Development Authority.

(2) 1973 data from Fertilizer Industry Authority.

(3) World Bank "Agricultural Sector Survey: Philippines", May 2, 1973.

However, the current World Bank reports stated that, despite the government's efforts to expand fertilizer usage, the application rate remains low (in 1973 only about 400 thousand metric tons were consumed) because of inadequacy of institutional credit to finance fertilizer purchases and an uneven distribution network which does not serve the more remote areas. Although detailed data are not available, this report expressed the feeling that a sharp drop in the use of fertilizers in rice areas occurred in CY 1974-75 as a result of a much less favourable fertilizer-rice price ratio (Table 5.11).

In order to realize the objective of rice production discussed earlier, it is necessary to improve the fertilizer distribution system

and adjust the relationship between the price support for paddy and fertilizer prices. This will provide sufficient incentive for farmers to adopt modern technology.

As with fertilizers, the problems associated with insecticides are supply, high prices, and distribution system. During the early stages of the M-99 program farmers claimed that there were some shortages of approved insecticides.[1] In CY 1974-75 occurrencesof insect pests and rats were not uncommon. In the provinces of Laguna and Davao the rice crops were affected by "Hopper Burn".[2] These sorts of problems were treated properly by mobilizing manpower and input resources at the local level to control these pests.

In any study of rice production, the aspect of irrigation deserves to be discussed even briefly because irrigation is considered one of the most important factors in increasing yields of paddy. As reported by the Bureau of Agricultural Economics, figures from 1970-71 to 1975-76 showed that the yield of paddy in the irrigated area is much higher than that of the rainfed area (refer to Table 5.6). This is so because there is greater control of water supply when irrigation facilities are available significantly allowing for more intensive cultivation of land. The uneven distribution of rainfall in different areas at different times, often causes substantial reductions in yields of paddy. Presently there is a dearth of adequate irrigation facilities

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1 A Committee on Pesticides created by the National Food and Agriculture Council tests and approves different insecticides for the M-99 program.

2 Hopper Burn is damage to rice crops caused by brown planthoppers.

in most rice growing areas rendering production in the dry season limited. If irrigation water is made available, rice can be grown twice or thrice a year increasing production and hence leading to better incomes.

The Philippine Government has given high priority to the expansion and improvement of irrigation systems together with the provision of adequate credit and other inputs. Increased investments are necessary in the construction, rehabilitation, and maintenance of irrigation facilities - all of which are critical to the boosting of rice production and the promotion of agricultural development.

Under the Masagana 99 Rice Production Program, one of the requirements embodied in the package is the availability of water, particularly during the critical rice growing period. The National Irrigation Administration in collaboration with other government agencies is exerting all-out support for the expansion and improvement of irrigation works to intensify land utilization.

CHAPTER 6

IMPACT OF THE MASAGANA 99 RICE PRODUCTION PROGRAM

6.1 Trends in Production, Area and Yield

The most important part of this study is covered in this chapter where the importance of the Masagana 99 Rice Production Program is delineated in the context of increased production.

Several previous studies have examined the trends in the Philippine rice production, hectarage and yield. Venegas and Ruttan (1964) observed that the long-run trend in rice production from BY 1902-03 to CY 1962-63 could be divided into four distinct periods. From the early 1900s to the mid 1920s the trend was characterized by rapid increases, and then from 1926-27 to 1941-42 a period of stability occurred. There was a rapid decline and then a recovery between 1941-42 and 1952-53, and finally a period of slow growth from 1952-53 to the early 1960s. Towards the end of the period studied an increase in total production and average yield was achieved while there was an actual reduction in the area devoted to rice (Appendix M).

In separate studies Mangahas, et al. (1967) and Lawas (1968) both concluded that between the periods 1920-49 and 1949-60, the increases in rice production were largely tracable to area expansion rather than the average yield. Lawas further observed that there was even a decline in average yield per hectare from 26.16 cavans in 1949 to 25.7 cavans in 1960.

A study by Pamatmat (1973) on the economics of production and pricing of rice from 1961 to 1970 indicated that within that period the hectarage devoted to rice decreased by approximately 3 per cent while production and average yield increased by 41 per cent and 45 per cent, respectively. Pamatmat pointed out that the increase in production was not constant over the years but that much of the increase occurred in 1968 and 1970. Interestingly, in the year 1970, increase in production was ascribed to a substantial increase in yield due to increased hectarage being devoted to HYVs, increased usage of fertilizer and good weather (see Figures 6.1, 6.2 and 6.3). However, based on Figure 6.3 we can not easily say that yields increased from 1961 to 1970. Neither can we say that there is a distinct upward trend over the entire period with a short "green revolution" effect. It is rather difficult to conclude on this basis.

This chapter hopes to add to these previous studies by reviewing the pattern of rice production, area and yields for CY 1970-71 to CY 1975-76. In doing this, it is hoped that the contribution of the Masagana 99 Rice Production Program implemented in May 1973 can be isolated.

The production, hectarage, and yield per hectare of paddy for the period 1961 to 1976 are shown in Figures 6.1 to 6.3.[1] As indicated, high production was attained in CY 1973-74 to CY 1975-76. On the other hand, production declined in CY 1971-72 and CY 1972-73 due

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1 It was decided to join the trends between 1961-70 and 1971-76 for the purposes of clarity and continuity. Also, note that whenever rice production data is discussed CY 1970-71 is the same as 1971 or vice versa unless specified.

FIGURE 6.1

TOTAL PRODUCTION OF PADDY (ROUGH RICE), PHILIPPINES,
1961-1976

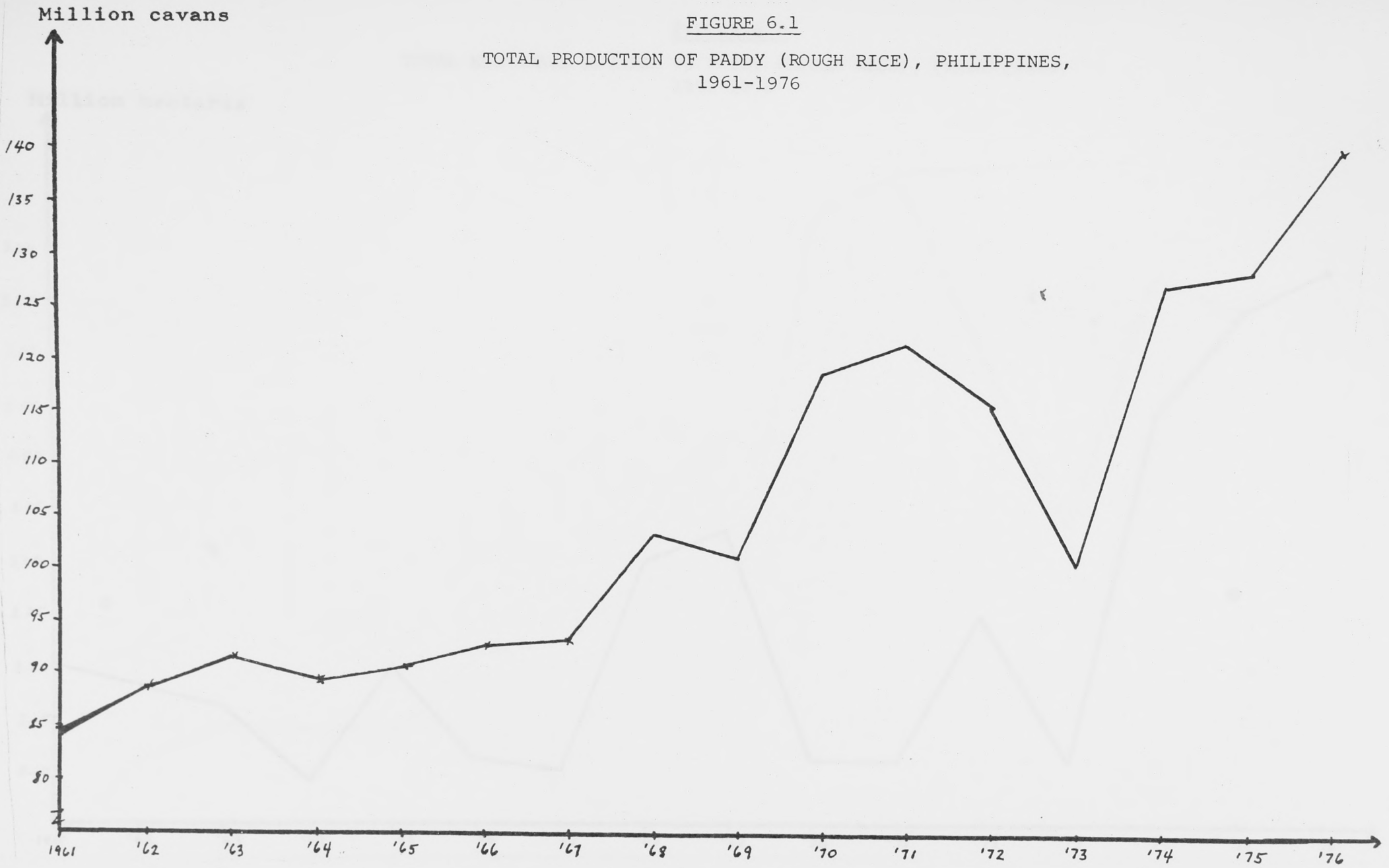


FIGURE 6.2

TOTAL HECTARAGE DEVOTED TO PADDY (ROUGH RICE), PHILIPPINES, 1961-1976

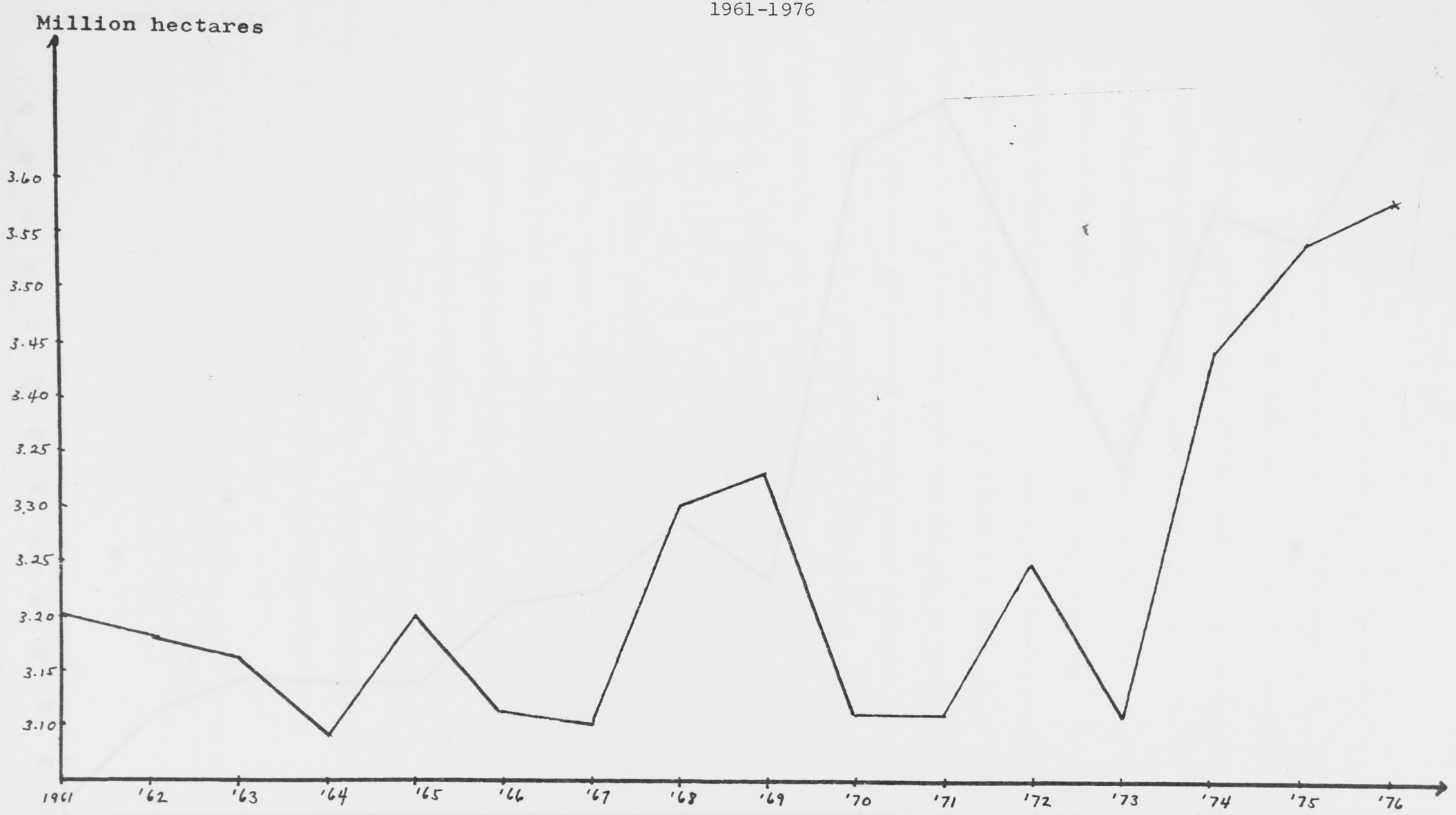
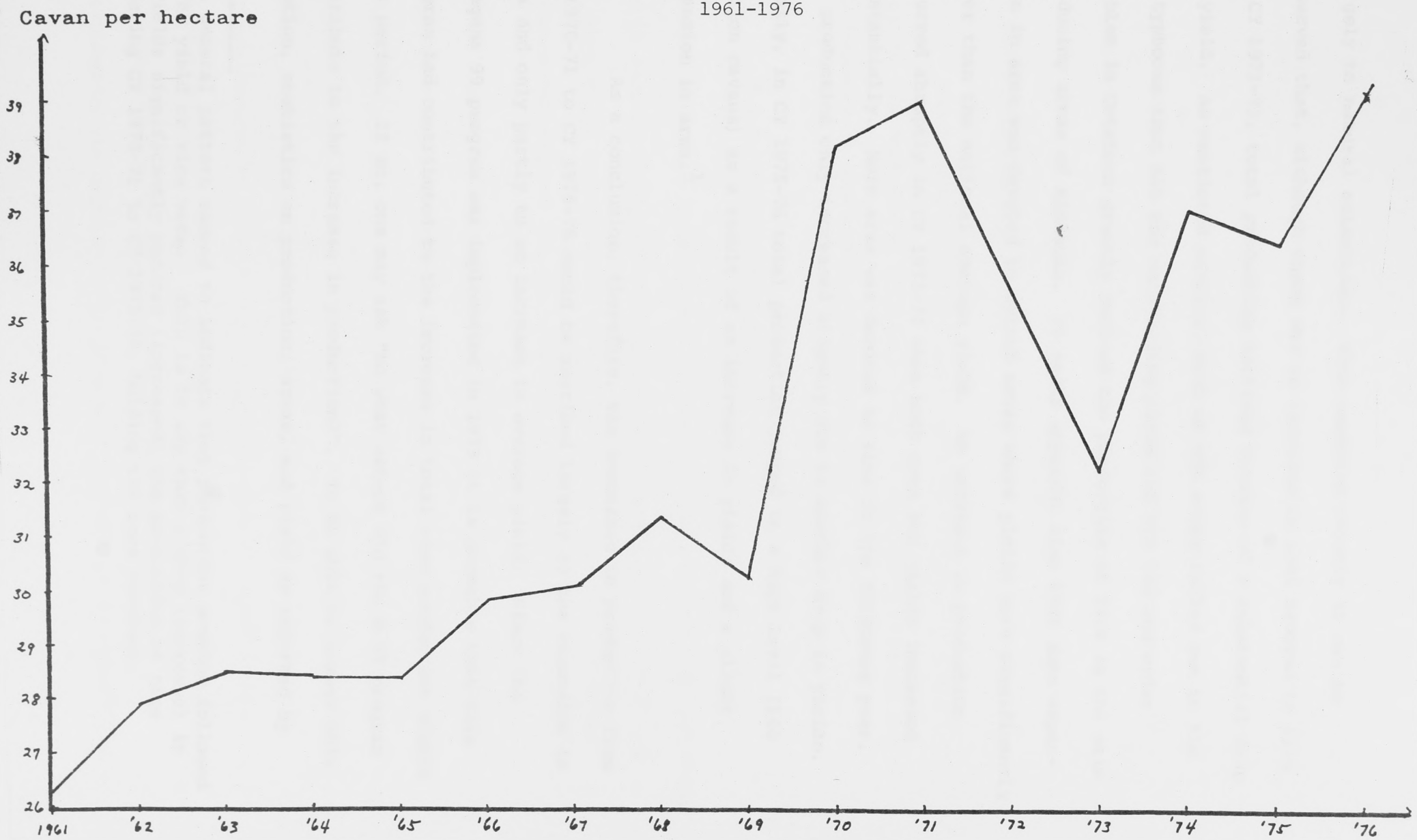


FIGURE 6.3

NATIONAL YIELD PER HECTARE OF PADDY (ROUGH RICE), PHILIPPINES, 1961-1976



largely to natural calamities. When examined closely it can be observed that, although there was an increase in area devoted to rice in CY 1971-72, total production declined because of a substantial drop in yield. As mentioned earlier, most of the crops failed due to the 21 typhoons that hit the outstanding areas and the law and order problem in Cotabato greatly reduced the production of rice in the main producing areas of Mindanao. It seems apparent also that some expansion in area was devoted to upland areas where yields were significantly lower than the national average yield. An increase in production occurred abruptly in CY 1973-74 when both area and yields increased substantially. More area was devoted to rice in the following year, but production only increased slightly due to another drop in yields. Finally, in CY 1975-76 total production jumped to a high level (140 million cavans) as a result of an increase in yields and a slight expansion in area.[1]

As a conclusion, therefore, the increases in production from CY 1970-71 to CY 1975-76 could be ascribed largely to the expansion in area and only partly to an increase in average yield. Since the Masagana 99 program was implemented in 1973 it is possible that this program had contributed to the increase in total rice production within that period. If so, one may ask "to what extent did the M-99 program contribute to the increase in production?". To be able to answer this question, statistics on production, areas, and yield as reported by

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1 A general pattern seemed to indicate that production somehow followed the yield or vice versa. This is to say that a drop (increase) in yields significantly reduced (increased) the production of rice during CY 1970-71 to CY 1975-76, holding the area constant.

various government agencies, particularly the Bureau of Agricultural Economics (BAE) and Management Information System (MIS) were examined. There were some problems of accuracy and consistency of data so the results of the analysis were verified by using other sources, such as research studies already conducted in assessing the performance of Masagana 99.

6.2 Method of Analysis

Two methods of analysis were used in attempts to measure the impact of the Masagana 99 program. First, a residual method was tried and, secondly, a regression analysis was used.

6.2.1 Residual Analysis

Using the residual method, the difference between two different sets of figures (total rice hectarage and production on one hand, and the Masagana 99 hectarage and production on the other) was taken to represent the figures for the remaining non-program area.

Based on the reported M-99 production and area, yields of the program were determined. These production and area figures were then subtracted from the national total rice production and area (reported by BAE), in order to arrive at a residual that could represent the production and area of the non-program area, that is, the area not covered by M-99 program. Based on these residual values (non-program production and area) the non-program yield was estimated. The difference between the program and non-program yield was then multiplied by the reported program area to determine the contribution

from CY 1973-74 to CY 1975-76. The summary of the residual results is shown in Table 6.1.

TABLE 6.1

SUMMARY OF RESULTS USING RESIDUAL ANALYSIS

Item	Crop Year		
	1973-74	1974-75	1975-76
TOTAL (Philippines)			
Area Harvested (Million Hectares)	3.44	3.54	3.58
Production[a] (Million m.t.)	5.59	5.66	6.16
Yield (m.t.)	1.63	1.60	1.72
MASAGANA 99			
Area Harvested (Million Hectares)	1.11	1.20	1.67
Production[a] (Million m.t.)	3.76	3.67	5.12
Yield (m.t.)	3.39	3.04	3.08
NON-PROGRAM			
Area Harvested (Million Hectares)	2.33	2.34	1.91
Production[a] (Million m.t.)	1.83	1.99	1.04
Yield (m.t.)	0.79	0.85	0.54
Yield Differential[b]	2.59	2.19	2.54
Contribution from area under M-99[c]	2.87	2.63	4.24
% of Total Production	51	46	69

a - Converted from cavan of 44 kilograms.
b - Total yield - Masagana 99 yield.
c - M-99 area × yield differential to represent the contribution from area under M-99 (in million metric tons)

In CY 1973-74 the M-99 program average yield recorded a high of 3.39 metric tons (77 cavans of 44 kilos). A reduction of 11 per cent occurred in CY 1974-75 due to natural calamities that plagued the country in August and October of 1974. As a result, the national yield declined as well. In CY 1975-76 a considerable proportion of increased production seemed to have been contributed by M-99 area when the coverage increased to almost half of total rice area in that year plus an increase in yield, i.e. from 3.04 metric tons to 3.08 metric tons. This helped in increasing the national yield of 1.60 m.t. in CY 1974-75 to 1.72 m.t. in CY 1975-76.

With regard to the residual values derived for CY 1973-74 and 1974-75 the increase in non-program area and yield brought also an increase in non-program production. This can partly be explained by the so-called "fall-out" of the M-99 program where, because of the information campaign, some farmers adopted some of the rice cultural practices. However, due to the priority given to the M-99 participants, inputs were not readily available to non-Masagana farmers, hence yield did not reach the expected level.

In CY 1975-76 the non-program production, area and yields decreased. This prevented the national yield and total production from increasing by a larger amount.

The results of the residual method[1] showed that a significant proportion of the total rice production was contributed by the area under the M-99 program. In terms of output, this ranged from 2.87

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1 The author has some reservations on this result as there is a strong feeling that an overstatement of the figures was derived.

million m.t. to 4.24 million m.t. or between 46 per cent and 69 per cent of total production in the three years between CY 1973-74 and CY 1975-76.

In the last chapter, it was mentioned that under the Masagana 99 Rice Production Program a large proportion was concentrated in irrigated area, i.e. from 68 to 86 per cent of the total M-99 area planted. To be able to make a realistic comparison between the M-99 and the non-Masagana 99 areas, the figures that should have been used are those for the irrigated area. However, the lack of a complete series of data for M-99 classified into irrigated and rainfed for Phases I to VI prevented this sort of analisys from being done and therefore the aggregate figures (irrigated and rainfed) were used.

In interpreting the results of residual analysis it must be recognized that the upland rice area (about 15 per cent of the total rice area) has a substantially lower yield (average of 0.8 m.t.) than the rainfed area (average of 1.2 m.t.) and that the rainfed yield is also lower than the national - all reflected under the total area. Mention must be made also that under the residual method employed, the effect of better land resources and other inputs (made available mostly for M-99 area) were counted under "program contribution". For these reasons, any errors in the statistics of the residual method would be magnified.

It is still too early to give a firm conclusion as to how much of the increased production can be attributed to the area under the M-99 program. However, there are reasons for being optimistic and the situation will become clearer after further years of the program.

Some studies from the Philippines give grounds to believe that there are significant increases in production and yields. These studies will be taken in order to verify the results derived by using the residual method. A summary of three national surveys is presented in Table 6.2. These surveys conducted in 1974, 1975, and 1976, covered

TABLE 6.2

AVERAGE YIELD PER HECTARE OF M-99 PARTICIPANTS AND NON-PARTICIPANTS, CAVANS OF 50 KILOGRAMS[a]

Crop Year (Phase)	Participants			Non-Participants			Differential[b] Yield	
	WS	DS	Ave.	WS	DS	Ave.	in cav.	in m.t.
1973-74 (I & II)	54.1	54.7	54.3	47.7	45.0	46.8	7.5	0.375
1974-75 (III & IV)	63.2	73.5	67.4	51.4	54.8	52.8	14.6	0.730
1975-76 (V & VI)	66.2	63.5	65.2	53.5	49.6	51.7	13.5	0.675

a - These data are largely drawn from:

(1) Mariano, E.P., "Masagana 99: Phases I and II", Special Studies Division, Department of Agriculture, L 74-6, Restricted, October, 1974 (1422 farms).

(2) Carlos, I.P., "Masagana 99: Phases III and IV", Special Studies Division, Department of Agriculture, L 75-27, Restricted, September, 1975 (1476 farms).

(3) Carlos, I.P. and W.C. Vera Cruz, "Masagana 99: Phases V and VI", SSD, D.A. L 76-35, Restricted, September, 1976 (1499 farms).

b - Average Yield of Participants - Average Yield of Non-Participants (average for two sesons) on a per hectare basis.

1422, 1476 and 1499 farms.[1] The main aim of these surveys was to examine the performance of the M-99 Production Program. The results indicated that between M-99 participants and non-participants big differences in yields were achieved from CY 1973-74 to CY 1975-76. These ranged from 7.5 cavans to 13.5 cavans or 0.675 metric tons per hectare within that period.

From these figures the M-99 area contribution was estimated. Table 6.3 summarizes the results indicating that M-99 contributed about 8 per cent of the total rice production in the same period. In terms of output these ranged from 0.42 million metric ton to 1.13 million metric tons. In contrast, the first residual method gave a range of 46 per cent to 69 per cent contribution.

The results of the residual analysis showed that the official M-99 figures were overstated, most probably due to the aforementioned discrepancy of reports from the production technicians' level to the national level. It is quite unbelievable that the non-program yields could have been that low (from 0.54 metric ton to 0.85 m.t. between these periods).

Table 6.2 presents more realistic results since a systematic sampling procedure was employed.[2] Even then, a selection bias might

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1 These survey samples included both Masagana 99 participants and non-Masagana participants.

2 A predetermined sample was proportionally allocated to different regions based on NFAC and BAEcon reports of the cumulative number of hectares planted under the Masagana 99 program, Phases III and IV. This was done mainly to provide the proper statistical weights to all major rice areas. The major producing areas in each region were selected for the interviews. For each area, the sample farmers were selected as follows: 1/5 were randomly selected from the northern portion of the area; 1/5 from the southern; 1/5 from the eastern; 1/5 from the western and 1/5 from the centre. The centre was allocated more samples in cases where the number of samples was not divisible by 5.

TABLE 6.3

NET RESULTS USING YIELD FROM THREE NATIONAL SURVEYS - 1974, 1975 AND 1976

Item	Crop Year		
	1973-74	1974-75	1975-76
TOTAL (Philippines)			
Area Harvested (Million Hectares)	3.44	3.54	3.58
Production (Million m.t.)	5.59	5.66	6.16
Yield (m.t.)	1.63	1.60	1.72
M-99 PARTICIPANTS			
Area Harvested (Million Hectares)	1.11	1.20	1.67
Production (Million m.t.)	3.01	4.04	5.44
Yield (m.t.)	2.71	3.37	3.26
Yield Differential[a] (m.t.)	0.375	0.730	0.675
Contribution from area under M-99 (Mil. m.t.)	0.42	0.88	1.13
% of Total Production	7.5	15.5	18.3

a - Taken from Table 6.2 between M-99 participants and non-M-99 participants.

still be present. A more accurate result can be achieved by comparing respondents from M-99 area, barrios or municipalities with respondents from barrios or municipalities with no M-99 program at all. However, it may not be possible to do this as almost all provinces are now involved in the Masagana 99 program which is of high national priority.

Even when these estimates of M-99 area contribution are reasonable, we must be cautious in accepting these results as they cannot represent the net benefits from the M-99 Rice Production Program. A study of the economic implications of Masagana Programs by Agabin (1975) approximated that costs incurred during Phases I, II and III revealed an overall direct cost averaging ₱185 per hectare (Appendix O). When the indirect costs were included, i.e. the net earnings foregone by the fertilizer industry and the opportunity cost of funds, the program costs per hectare totalled ₱311. These costs however, were believed to be grossly understated due to unavailability of other cost factors which should have been included in the computation. Since costs of fertilizer subsidies, extension services, and others entail tremendous cost to the government, there is an urgent need to compensate these costs by increasing the benefits via increased yields.

However, even when the two results differed substantially from each other they both indicated an increasing trend suggesting that given more years of operation the M-99 impact will be felt more. It is rather early to judge at this stage, but the residual results showed some evidence of M-99 importance.

6.2.2 Regression Analysis

Before going to the regression analysis it might be worthwhile to discuss briefly the statistical assumptions of the Least Squares Model.

When using OLS approach three important statistical assumptions are considered, namely: (1) homoskedasticity, (2) non-autoregression,

and (3) non-multicollinearity, in order to get an estimate which is unbiased and of minimum variance. The first two will no longer be discussed but the third assumption, namely that none of the explanatory variables is too highly correlated with any other explanatory variable, is highly important in this section. If this assumption is violated, there exists multicollinearity. On the contrary, whenever all explanatory variables are not correlated with each other, there is an absence of multicollinearity. The cases in between are described by various degrees of multicollinearity. Therefore, the multicollinearity assumption is a question of degree and not of kind. Thus, we do not test for multicollinearity, but measure its degree in any particular sample, if possible.

When we encountered multicollinearity, the estimated coefficients may probably be unreliable; variances may be large and the acceptance region for the hypothesis, that a given regression coefficient is zero, will be wide. This in turn, provides a weak, and hence not very useful, test for discriminating between true and false hypotheses (Kmenta, 1971, p. 391). The respective regression coefficients may lack significance even when the R^2 is extremely high. In this case the equation may be used for predictive purposes, but the contribution of the changes in independent variables to the changes in the dependent variable cannot be explained. In our purpose, it is always useful to examine the simple correlation between the explanatory variables to see whether or not multicollinearity is a problem. In circumventing this problem, a regression can be carried out, having the equation re-specified by omitting one of the highly correlated variables.

A regression analysis using Ordinary Least Squares Method (OLS)[1] was carried out to find out if correlation exists between a dependent variable, rice production; and independent variables, time, area (total rice area harvested), dummy variable for HYV adoption, and another dummy variable for participation under the M-99 program. Observations on these variables were made over time, that is, with the use of time series data.

Equation (6.1) expressed the general linear relationship between the dependent variable Y_j and the m explanatory variables $X_1, X_2, \ldots X_m$.

$$Y_j = A_0 + \sum_{i=1}^{m} B_i X_{ij} + E_j \qquad (6.1)$$

where

Y_j = output in time j

X_{ij} = amount of variable i used in time j

B_i = coefficients associated with variable X_i

A_0 = overall intercept (constant term)

E_j = error term in time j

Because of the few years of observation for both HYVs and the Masagana 99[2] they are not easily comparable with majority of the observed years from CY 1909-10 to CY 1975-76, thus, the dummy variables

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1 The principle behind the least squares estimation involves minimizing the sum of squared deviations of the observed values from their mean (Kmenta, 1971).

2 Adoption of HYVs started in 1966, while the M-99 program was implemented only in May 1973 (CY 1973-74).

that were used will take into account the qualitative factors present in the adoption of HYVs and participation under the M-99 program. So the actual equation becomes the equation expressed in (6.2) which we will call Model One.

$$Y_j = A_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + E_j \qquad (6.2)$$

where

Y_j = rice production in million cavans per year j

X_1 = time variable in crop years

X_2 = area variable in million hectares

X_3 = dummy variable for HYV adoption (which takes a value of one, zero otherwise)

X_4 = dummy variable for M-99 program adoption (which takes a value of one, zero otherwise)

B_1 to B_4 - coefficients of X_1 to X_4 variables at different magnitudes

A_0 = intercept (constant term)

E_j = error term or the least squares residuals.

Here, the error term E_j may be composed of the measurement error in different variables used and the error due to the omission of other variables in the equation. In other words, E_j may represent the effects of variables other than time or year of production, area harvested, dummy variable for HYV adoption and dummy variable for M-99 program participation.

To test for the goodness of fit of the regression equation, it has become conventional in the literature of applied econometrics to use R^2 as a measure of association between independent variables X's and dependent variable Y.

An overall test of significance of the fitted regression Model One can be carried out by calculating the F ratio, regression mean square divided by error mean square.[1] The F ratio is distributed approximately as the F distribution with degrees of freedom k and N-k-1, i.e. $F_{k, N-k-1}$, where k is the number of variables and N the number of observations. This ratio provides a test of the null hypothesis that $R^2 = 0$. If we reject this null hypothesis (F value larger than the tabulated F value at the desired probability level) then we can say that R^2 is statistically significant.

On the other hand, if we wish to test for a specific regression coefficient the T statistic using Student's t distribution with N-2 degrees of freedom is used. If we reject the null hypothesis that the coefficients are equal to zero then we can say that they are statistically significant.

In this study, partial correlation coefficients between independent and dependent variables were derived using the SPSS routines.[2] The correlation coefficients between independent variables are used as an indicator of the possible presence of linear or near linear relations among these variables. These coefficients are presented in Table 6.4. If the correlation coefficients are relatively

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1 The formula for $F = \frac{SSreg/k}{SSres/N-k-1} = \frac{R^2/k}{(1-R^2)(N-k-1)}$

where, SSreg is the sum of squares explained by the entire regression equation, SSres is the residual (unexplained) sum of squares, k is the number of independent variables in the equation, and N is the sample number (Nie, N.H., et al., 1975).

2 Statistical Package for the Social Sciences (Nie, N.H., et al., 1975).

high, one of the highly correlated variables should be dropped from the regression equation. However, which variable to omit and which to retain should be decided on the basis of the logic (physical, biological and economic) relevant to the production process being studied. In Model One, the highest correlation coefficients among independent variables are present in area (0.949) and time (0.939). It can therefore be concluded at this stage that high multicollinearity is present in Model One. To help circumvent this problem of multi-collinearity, the model can be re-specified by omitting one of the highly correlated variables. The independent variable area was found to have the highest correlation coefficient and was therefore dropped in the next equation (Model Two).

TABLE 6.4

CORRELATION (R) MATRIX FOR REGRESSION EQUATION OF PRODUCTION, PHILIPPINES, CY 1909-10 TO CY 1975-76

Variable	Y	X_1	X_2	X_3	X_4
Production	1.000				
Time	0.939	1.000			
Area	0.949	0.965	1.000		
HYV Dummy	0.762	0.646	0.612	1.000	
M-99 Dummy	0.511	0.359	0.371	0.486	1.000

The results of the regression analysis in Model One are summarized in Table 6.5. On the basis of F test, the entire regression explained 96 per cent of the observed variation in total rice production as indicated by the coefficient of multiple determination

corrected for degrees of freedom ($\bar{R}^2$). [1] The whole regression was significant at the one per cent level of probability. The area, HYV dummy and the M-99 dummy had positive coefficients significantly different from zero at the 0.5 per cent probability level. However, the coefficient associated with time variable was significant only at the 10 per cent level of probability.

TABLE 6.5

RESULTS OF REGRESSION ANALYSIS ON RICE PRODUCTION

Independent Variable	Xs	Bi Regression Coefficient	Beta	SBi Std. Error of Estimate	F	T
Time	X_1	0.222	0.146	0.146	2.299	1.52*
Area	X_2	24.917	0.625	3.728	44.660	6.68****
HYV Dummy	X_3	18.286	0.230	2.725	45.010	6.71****
M-99 Dummy	X_4	16.310	0.115	3.993	16.680	4.08****
Constant	A_0	-5.042				

R^2 = 0.97 Std. Error = 5.836

$\bar{R}^2$ = 0.96 $F_{4,59}$ = 408.426***

* = significant at the 10 per cent level
** = significant at the 5 per cent level
*** = significant at the 1 per cent level
**** = significant at the .5 per cent level

1 Adjusted $\bar{R}^2$ is an R^2 statistic adjusted for the number of independent variables in the regression equation and the number of cases (Nie, N.H., et al., 1975).

A closer examination of the specific regression coefficients for each of the independent variables showed that the highest contribution was made by the land area followed by the adoption of HYVs, M-99 program participation and the time variable. In terms of production this means that an additional 24.9 cavans per hectare, i.e. 24.9 million cavans per million hectares, was contributed by the land area. While all these variables were positive, the constant term had a negative coefficient indicating that the initial production of paddy is below zero (05.042). Since we know that this is not true, the entire regression model is unacceptable on this basis.

The standarized regression coefficient referred to as beta, shown in Table 6.4, is more convenient to use in our analysis. Working with these beta weights enables us to simplify the linear regression equation since the constant term A_0 (the Y intercept) is always equal to zero and therefore can be omitted. Furthermore, when there are two or more independent variables measured in different units (such as time in years and area in million hectares), standardized coefficients provide the only sensible way of comparing the relative effect or importance of each independent variable on the dependent variable. On this basis, we can say that, of the four variables used in the regression, area is the most important independent variable in explaining production. This is followed by HYV dummy, time and the M-99 dummy. We can probably say at this point, that despite the short period of implementing the Masagana 99 program, quite an importance (11.5 per cent) is attached to it in estimating production.

It might be well to mention that the data for the war years (CY 1942-43 to CY 1944-45) were not included in the series of data used in the regression analysis and therefore do not reflect the abnormality of wars, depressions, etc.

To improve the regression model a similar procedure was carried out (Model Two) regressing yield on independent variables time, HYV dummy and M-99 dummy. Due to a very high correlation (0.949) found to exist between area and production (and since production over area is equivalent to yield) dropping the area variable from the equation could equally substitute yield for the previous dependent variable production.[1] The linear relationship is expressed in equation (6.3) as follows:

$$Y_j = A_0 + B_1X_1 + B_2X_2 + B_3X_3 + E_j \qquad (6.3)$$

where

Y_j = yield per hectare in cavans in time j

X_1 = time variable in years

X_2 = dummy variable for HYV adoption (which take a value of one, zero otherwise)

X_3 = dummy variable for the M-99 program (which take a value of one, zero otherwise)

B_1 to B_3 = coefficients of X_1 to X_3 at different magnitudes

A_0 = intercept (constant term)

E_j = error term or the least squares residual

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1 There were other independent variables included in the regression equation like M-99 loan, total area planted under the M-99 program, and number of years of M-99 program but all these variables were finally dropped as they were found to be highly correlated with one another. Thus, the dummy for M-99 program can substitute for all these variables.

Table 6.6 presents the intercorrelated between yield and independent variables time, HYV dummy and M-99 dummy. All independent variables were positively correlated with yield. The highest correlation was between yield and time (0.748) and the least correlation was between yield and M-99 (0.475).

TABLE 6.6

CORRELATION (R) MATRIX FOR REGRESSION EQUATION OF YIELD, PHILIPPINES, CY 1909-10 TO CY 1975-76

Variable	Y	X_1	X_2	X_3
Yield	1.000			
Time	0.748	1.000		
HYV Dummy	0.708	0.645	1.000	
M-99 Dummy	0.475	0.359	0.487	1.000

The whole regression explained 64 per cent of the observed variation in yield as indicated by the coefficient of multiple determination corrected for degrees of freedom, $\bar{R}^2$ (Table 6.7). The regression in its entirety was significant at the 0.5 per cent probability level. Although $\bar{R}^2$ is relatively low, the results are probably better as indicated by the regression coefficients. Perhaps when other more important variables are present in the equation, the entire regression could explain more of the observed variation in yield.

The regression coefficients of time and HYV dummy were positively significant at the 0.5 per cent level of probability while

the M-99 dummy was positively significant at the 5 per cent level. The constant term A_0 had 21.31 regression coefficient. In terms of yield, this indicates that the basic yield was 21.31 cavans per hectare. This result is more reasonable than the previous model although much lower than the average yield per hectare prior to the introduction of HYVs (about 28 cavans per hectare). Given time, yield increased at 0.13 cavan per hectare per year. When HYV adoption was introduced into the equation, an additional yield of 4.38 cavans was attained. When the M-99 program was introduced it contributed 3.43 cavans per hectare. Taken altogether, the post HYV yield totalled 25.82, while the post M-99 yield totalled 29.25 cavans per hectare. The 3.43 cavans contributed by the M-99 participation is far below the differential yield between M-99 participants and non-participants (Table 6.2) which ranged from 7.5 cavans to 14.6 cavans in the same period (CY 1973-74 to CY 1975-76).

TABLE 6.7

RESULTS OF REGRESSION ANALYSIS ON YIELD

Independent Variable	Xs	Coefficient	Beta	SBi Std. Error of Estimate	F	T
Time	X_1	0.126	0.488	0.025	24.598	5.04****
HYV Dummy	X_2	4.385	0.323	1.427	9.437	3.08****
M-99 Dummy	X_3	3.431	0.142	2.084	2.708	1.65**
Constant	A_0	21.311				

R^2 = 0.66 Standard Error = 3.07

$\bar{R}^2$ = 0.64 $F_{3,60}$ = 39.168****

* = significant at the 10 per cent level
** = significant at the 5 per cent level
*** = significant at the 1 per cent level
**** = significant at the 0.5 per cent level

Between HYV adoption and the M-99 program, the results showed that the HYV adoption exerted more impact in increasing yield of rice (4.38 cavans per hectare). In the light of this, it is worthwhile mentioning again that HYV adoption is part and parcel of the M-99 program package and, therefore, it is hard to isolate the effect of HYV adoption from the M-99 program. It is possible that the effect of the HYV adoption embodied in the M-99 program had already been counted in the HYV adoption per se. On the other hand, it is also possible that HYV adoption by itself is actually more important in increasing yield than the M-99 program. It is still too early to draw firmer conclusions at this stage and we need to have more observations of the M-99 program to be definite in our conclusion. Nevertheless, it can be concluded that, based on the regression analysis (Model Two), evidence showed that the M-99 program had exerted an impact in increasing yield per hectare directly and indirectly boosting the total production of rice in the Philippines in CY 1973-74 to CY 1976.

The above findings suggest that policy makers should continue looking into the possibility of attaining higher rice productivity through improvement of the Masagana 99 Rice Production Program with support services like extension, credit, irrigation and marketing facilities in addition to a continuous research and development of new high yielding varieties of rice.

Another regression was carried out pooling cross-sectional and time series data to form a covariance model (Kmenta, 1971). The principle behind the covariance model is a supposition that each cross-sectional unit and each time period are characterized by their own special intercept.

It is known that yield of paddy differs considerably from time to time and from one location to another. Therefore this covariance model could be a more efficient way of estimating or predicting yield based on different independent varaibles and set of region and time dummies.

Eleven regions and eight years (cross-section and time series, respectively) were pooled together to arrive at our model. Independent variables such as % area irrigated, % area devoted to HYVs, volume of fertilizer used and area financed under the M-99 program were used in regressing yield. In addition, dummy variables were used to account for regional and time differences (Appendix N).

The general linear relationship is expressed in equation (6.4) as follows:

$$Y_{it} = A + B_1 X_{it} + \ldots + B_K X_{it}, + \gamma_2 Z_{2t} + \gamma_3 Z_{3t} + \ldots + \gamma_N Z_{Nt}, + \lambda_2 W_{i2} + \lambda_3 W_{i3} + \ldots + \lambda_T W_{iT}, + E_{it} \qquad (6.4)$$

where

Z_{it} = 1 for the i'th cross-section data,
= 0 otherwise (i = 2,3 ... N)

W_{it} = 1 for the t'th time period,
= 0 otherwise (t = 2,3 ... T)

Since we are introducing a bonafide constant into the model and because we are using a computer program that gives an intercept, it is essential that one dummy variable be dropped from each set of dummies. Otherwise, a linear dependency will be produced (Johnston, 1972).

For our covariance model, the actual regression equation will be the following:

$$Y_{it} = A + B_1X_1 + B_2X_2 + B_3X_3 + \sum_{i=2}^{11}\sum_{t=2}^{8} \gamma_i Z_{it} + \sum_{i=2}^{11}\sum_{t=2}^{8} \lambda_t W_{it} + E_{it} \quad (6.5)$$

where

Y_{it} = yield in cavans per hectare in region i and time t

X_1 = % irrigated area in region i and time t

X_2 = % area devoted to HYVs in region i and time t

X_3 = % M-99 area financed in region i and time t

Z_i = dummy variables for region, where R = 2,3,... 11

W_t = dummy variables for time, where T = 2,3, ... 8

B_{it} = coefficients associated with variables X_1, X_2 and X_3

γ_i = coefficients associated with dummy variables Z_2, Z_3, ... Z_{11}

λ_t = coefficients associated with dummy variables W_2, W_3, ... W_8

A = constant term or intercept

E_{it} = error term

The intercorrelations between the variables is indicated by the zero-order correlation coefficients in Table 6.8. Independent variables % irrigated area, % area devoted to HYVs, and % area financed under the M-99 program were positively correlated with yield. The highest correlation between yield and these variables was with % irrigated area (0.634). Four of the region dummies (RD7, RD8, RD10 and RD11) and two of the time dummies (TD2 and TD6) were negatively

TABLE 6.8

MATRIX OF SIMPLE CORRELATION COEFFICIENTS AMONG VARIABLES

USED IN REGRESSION ANALYSIS OF YIELD BY REGION, PHILIPPINES, CY 1967-86 TO CY 1974-75

Variables	Y	X_1	X_2	X_3	Z_2	Z_3	Z_4	Z_5	Z_6	Z_7	Z_8
Yield	1.000										
% IRR	0.634	1.000									
% HYV	0.265	0.174	1.000								
% M-99 Area Financed	0.248	0.094	1.000								
RD_2	0.177	0.348	-0.114	-0.007	1.000						
RD_3	0.510	0.376	0.095	0.230	-0.100	1.000					
RD_4	0.011	0.078	-0.008	0.013	-0.100	-0.100	1.000				
RD_5	0.071	0.215	0.228	-0.044	-0.100	-0.100	-0.100	1.000			
RD_6	0.018	-0.390	0.011	-0.036	-0.100	-0.100	-0.100	-0.100	1.000		
RD_7	-0.361	-0.352	-0.073	-0.044	-0.100	-0.100	-0.100	-0.100	-0.100	1.000	
RD_8	-0.310	-0.430	-0.091	-0.059	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	1.000
RD_9	0.063	0.008	0.108	-0.025	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
RD_{10}	-0.238	-0.149	-0.131	-0.027	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
RD_{11}	-0.061	0.059	0.111	-0.025	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
TD_2	-0.232	0.026	-0.225	-0.186	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TD_3	0.153	0.011	-0.136	-0.186	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TD_4	0.155	0.161	0.046	-0.186	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TD_5	0.042	-0.005	0.156	-0.186	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TD_6	-0.127	-0.002	0.227	-0.186	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TD_7	0.113	0.025	0.309	0.451	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TD_8	0.092	-0.090	0.291	0.666	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOOD	0.086	0.099	0.161	-0.053	-0.034	0.339	-0.034	-0.034	-0.034	-0.034	-0.034

TABLE 6.8 (Contd.

Variables	Z_9	Z_{10}	Z_{11}	W_2	W_3	W_4	W_5	W_6	W_7	W_8	Z_3W_6	X_1X_2
Yield												
% IRR												
% HYV												
% M-99 Area Financed												
RD_2												
RD_3												
RD_4												
RD_5												
RD_6												
RD_7												
RD_8												
RD_9	1.000											
RD_{10}	-0.100	1.000										
RD_{11}	-0.100	-0.100	1.000									
TD_2	0.000	0.000	0.000	1.000								
TD_3	0.000	0.000	0.000	-0.143	1.000							
TD_4	0.000	0.000	0.000	-0.143	-0.143	1.000						
TD_5	0.000	0.000	0.000	-0.143	-0.143	-0.143	1.000					
TD_6	0.000	0.000	0.000	-0.143	-0.143	-0.143	-0.143	1.000				
TD_7	0.000	0.000	0.000	-0.143	-0.143	-0.143	-0.143	-0.143	1.000			
TD_8	0.000	0.000	0.000	-0.143	-0.143	-0.143	-0.143	-0.143	-0.143	1.000		
FLOOD	-0.034	-0.034	-0.034	-0.040	-0.040	-0.040	-0.040	0.284	-0.040	-0.040	1.000	
IRRHYV	0.078	-0.147	0.119	-0.121	-0.092	0.118	0.083	0.144	0.238	0.114	0.196	1.000

correlated with yield. Most of the independent variables showed a low degree of intercorrelation, the largest being 0.469 between the % area devoted to HYVs. It was mentioned in Chapter 4 that M-99 loans consisted of cash and input portions. The cash portion was allocated for seeds and labour expenses. The relatively high correlation suggests that a greater area devoted to HYVs was under the M-99 area financed. As a whole, we can say that a multicollinearity problem does not exist in this model as indicated by the relatively low correlation coefficients.

The entire regression explained 66 per cent of the observed variation in yield as indicated by the coefficient of multiple determination corrected for degrees of freedom ($\bar{R}^2$) and was significant at the 1 per cent probability level. Among the independent variables only the % irrigated area (X_1) had a regression coefficient significantly different from zero at the 1 per cent level of probability. The % area devoted to HYVs had also positive coefficient but not significantly different from zero at the desired level (Table 6.9). The % M-99 area financed had negative regression coefficient (-0.029) but also insignificant. This might be due to small number of years observed for the Masagana 99 program. Hence, this is still inconclusive.

Looking more closely at the regression coefficients of regional dummies, the RD3 representing Central Luzon was outstanding It had a positive regression coefficient of 9.759 and was significantly different from zero at the 0.5 per cent level of probability. In terms of yield per hectare, this coefficient means an additional 9.759 cavans per hectare. Explanation could largely be attributed to a greater and better rice land area; that is, irrigation rates were high, more

TABLE 6.9

RESULTS OF REGRESSION ANALYSIS ON YIELD PER HECTARE USING COVARIANCE MODEL

Variables		Bi	Beta	SBi Std. Error	F	T
% IRR	X_1	0.403	0.642	0.167	5.797	2.408***
% HYV	X_2	0.066	0.133	0.138	0.228	0.477^{ns}
% M-99 Area Financed	X_3	-0.029	-0.059	0.097	0.093	-0.305^{ns}
RD_2	Z_2	0.586	0.022	2.281	0.066	0.257^{ns}
RD_3	Z_3	9.759	0.372	2.503	15.203	3.899****
RD_4	Z_4	-0.432	-0.016	2.371	0.033	-0.182^{ns}
RD_5	Z_5	0.725	0.027	2.897	0.063	0.251^{ns}
RD_6	Z_6	4.113	0.157	3.290	1.563	1.250^{ns}
RD_7	Z_7	-5.195	-0.198	3.149	2.722	-1.650**
RD_8	Z_8	-3.288	-0.125	3.344	0.967	-0.983^{ns}
RD_9	Z_9	1.931	0.073	2.674	0.522	0.722^{ns}
RD_{10}	Z_{10}	-4.153	-0.158	2.709	2.349	-1.533*
RD_{11}	Z_{11}	-1.466	-0.056	2.638	0.309	-0.556^{ns}
TD_2	W_2	-1.085	-0.047	2.362	0.211	-0.459^{ns}
TD_3	W_3	6.786	0.297	2.531	7.186	2.681****
TD_4	W_4	6.014	0.264	2.993	1.037	2.009**
TD_5	W_5	5.325	0.233	3.212	2.748	1.658**
TD_6	W_6	2.414	0.106	3.330	0.525	0.724^{ns}
TD_7	W_7	7.889	0.346	3.655	4.659	2.158**
TD_8	W_8	8.312	0.364	4.157	3.997	1.999**
FLOOD	Z_3W_6	-2.436	-0.034	5.500	0.196	0.443^{ns}
IRRHYV	X_1X_2	-0.003	-0.381	0.003	1.010	-1.005^{ns}
Constant	Ao	15.787				

$R^2 = 0.75$

$\bar{R}^2 = 0.66$

$F_{22,65} = 8.733****$

* = significant at the 10 per cent level
** = significant at the 5 per cent level
*** = significant at the 1 per cent level
**** = significant at the .5 per cent level
ns = not significant

farmers adopted HYVs, farmers were more accessible to extension, credit and marketing facilities, and other support services that were not always readily accessible to other regions in the country. A significant but negative regional dummy was RD7 which represents Central Visayas. This implies that yield in Central Visayas was lower than the yield in other regions. In Central Visayas, the main crop is sugar. Further, their staple food is not rice but corn and most farmers tended to grow sugar and corn instead of rice. The lower yield in this region can also be partly explained by the heterogeneity in farming.

All of the time dummies had regression coefficients that were positive except for TD2 (CY 1968-69). The coefficient associated with TD2 was -1.085 but insignificant at the desired level and therefore is inconclusive. What seems to be more interesting is that, starting from TD3 (CY 1969-70) to TD8, regression coefficients all became positive. TD7 and TD8 had coefficients of 7.889 and 8.312, respectively, and were both significant at the 5 per cent probability level. The M-99 program was implemented in TD7 and TD8. There is, therefore, a clear possibility that the M-99 program implemented in these years contributed to the increase in yield of paddy. In quantitative terms, TD7 contributed about 8 cavans per hectare. The same holds true for TD8. The entire regression indicated that the most important variable that explained variation in yield was the % area irrigated. The % area devoted to HYV also explained some variation in yield. However, it was not significantly different from zero at the desired level and therefore inconclusive. The fluctuations in the coefficients of regional dummies implied that there were substantial variations in yield from one region to another.

The most important regional dummy was RD3 representing Central Luzon. It suggests that it might be worthwhile concentrating on bringing even greater areas of Central Luzon under rice production.

The regression results showed that for every one per cent change in irrigated area available there came about an increase in yield of 40.3 cavans.[1] For a 1 per cent change in area devoted to HYVs an additional 6.6 cavans was attained, and so on. The negative but insignificant coefficient for M-99 area financed implies that the program had not exerted much impact yet. However, it is still inconclusive and rather too early to draw firm conclusions especially as the year effect dummies may be taking up the true Masagana 99 effect as the program was promoted in the first two years. When more quantifiable explanatory variables are available for a longer period, more definite conclusions might be made.[2]

It was cited earlier in this section that each cross-sectional unit (regional dummies) and each time period (time dummies) were characterized by their own special intercept. To examine this characteristic, two regression analyses were carried out again. The sets of dummy variables were expected to pick up some effects from other independent variables. When the set of time dummies was dropped from the regression equation, the $\bar{R}^2$ declined to 57 per cent while the intercept became 8.86 (Table 6.10). On the other hand, when the set of region dummies

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1 This is because the units in the data set were in terms of percentages written as 48.6, 32.4, etc. rather than in decimals .486, .324, etc.

2 Fertilizer usage has been considered very important in explaining yield variation. However, due to unavailability of regional volume of fertilizer used, the fertilizer variable was not used in the regression equation, although the yearly volume of fertilizer figures for the whole country were available.

was excluded, retaining the time dummies in the equation, the $\bar{R}^2$ further reduced to 51 per cent and the intercept decreased to 1.57 (Table 6.11). Results were quite similar except for the following changes.

TABLE 6.10

RESULTS OF REGRESSION ANALYSIS ON YIELD PER HECTARE, BY REGION[a]

Variables		Bi	Beta	SBi Std. Error	F	T
% IRR	X_1	0.552	0.880	0.172	10.338	3.215****
% HYV	X_2	0.282	0.570	0.114	6.153	2.480***
% M-99 Area Financed	X_3	0.055	0.110	0.047	1.380	1.175^{ns}
RD2	Z_2	0.811	0.031	2.520	0.104	0.322^{ns}
RD3	Z_3	8.494	0.324	2.682	10.029	3.167****
RD4	Z_4	-0.678	-0.026	2.609	0.068	-0.261^{ns}
RD5	Z_5	-0.049	-0.002	2.815	0.000	0.000
RD6	Z_6	4.027	0.153	3.539	1.295	1.138^{ns}
RD7	Z_7	-4.534	-0.173	3.427	1.750	1.323*
RD8	Z_8	-2.429	-0.092	3.630	0.448	-0.669^{ns}
RD9	Z_9	1.449	0.055	2.816	0.265	0.515^{ns}
RD10	Z_{10}	-3.146	-0.120	2.977	1.116	-1.056^{ns}
RD11	Z_{11}	-1.922	-0.073	2.764	0.484	-0.696^{ns}
FLOOD	Z_3W_6	-4.397	-0.062	5.734	0.588	-0.767^{ns}
IRRHYV	X_1X_2	-0.006	-0.735	0.003	4.295	-2.072**
Constant	A_0	8.863				

$R^2 = 0.65$

$\bar{R}^2 = 0.57$

$F_{15,72} = 8.817$****

* = significant at the 10 per cent level
** = significant at the 5 per cent level
*** = significant at the 1 per cent level
**** = significant at the .5 per cent level
ns = not significant

a - The set of time dummies was dropped from the regression analysis.

TABLE 6.11

RESULTS OF REGRESSION ANALYSIS ON YIELD PER HECTARE, CY 1967-68 TO CY 1974-75[a]

Variables		Bi	Beta	SBi Std. Error	F	T
% IRR	X_1	0.750	1.196	0.150	24.753	4.975****
% HYV	X_2	0.342	0.692	0.151	5.143	2.268**
% M-99 Area Financed	X_3	0.160	0.319	0.090	3.137	1.771**
TD2	W_2	-3.024	-0.132	2.591	1.362	-1.167^{ns}
TD3	W_3	4.393	0.192	2.740	2.570	1.603*
TD4	W_4	2.637	0.115	3.056	0.745	0.863^{ns}
TD5	W_5	2.112	0.092	3.275	0.416	0.645^{ns}
TD6	W_6	-1.729	-0.076	3.391	0.260	-0.510^{ns}
TD7	W_7	-0.177	-0.008	3.939	0.002	-0.045^{ns}
TD8	W_8	-1.497	-0.065	4.502	0.111	-0.333^{ns}
FLOOD	Z_3W_6	7.306	0.102	5.762	1.607	1.268*
IRRHYV	X_1X_2	-0.008	-1.026	0.003	6.822	-2.612****
Constant	A_0	1.570				

$R^2 = 0.58$

$\bar{R}^2 = 0.51$

$F_{12,65} = 8.561$****

* = significant at the 10 per cent level
** = significant at the 5 per cent level
*** = significant at the 1 per cent level
**** = significant at the .5 per cent level
ns = not significant

a - The set of regional dummies was dropped from the regression equation.

The positive coefficient associated with % area devoted to HYVs increased tremendously from 0.066 to 0.282 when the time dummies were ignored. Interestingly, the negative coefficient associated with

% area financed became positive. However, on the basis of t statistic (1.175) it is barely significant. In quantitative terms, this would mean that for every 1 per cent increase in area financed under the M-99, the national yield increased by 5.5 cavans per hectare. In other words, when a farmer participated in the M-99 program, he would have an increase in yield of 5.5 cavans. This 5.5 cavans is not unreasonable when compared with the differential yield of 7.5 to 14.6 cavans suggested in the three national surveys reported in Table 6.2. Similarly, a 1 per cent increase in area devoted to HYVs led to a 28.2 cavans increase in yield per hectare.

The intercept term declined from 15.787 to 8.863 and, finally, to 1.57. On the basis of these characteristics, it is reasonable to say that the dummy variables which represented the regional differences gave more explanation in the observed variation in yield than the time dummies as indicated by big changes in the respective $\bar{R}^2$ and intercept.

To see the effect of some interactions between regions and time or between dummies and independent variables, interaction dummies could be created. We know for a fact that flood, typhoons and drought affected the production of rice in the Philippines. Therefore, by looking at certain regions at a certain time of year where a flood occurred, we can see how the interaction phenomenon affected the yield per hectare. For instance, an interaction dummy variable FLOOD was created to reflect the phenomenon in RD3 (Central Luzon) in TD6 (CY 1972-73). As indicated by the regression coefficient of FLOOD (Tables 6.9 and 6.10) it was associated with negative coefficient not significantly different from zero. This probably suggests that possible explanations of yield variation could be attached to FLOOD,

but this is inconclusive again. Another interaction variable, IRRHYV, i.e. % IRR x % HYV, was created to see the impact of combining the two explanatory variables. This is because it is generally assumed that water control is of vital importance to high yielding rice varieties. The result did not show this, however. A possible explanation for this is the impact of high yielding varieties in many of the best rainfed areas is in fact greater than irrigated areas. Clearly, this is a very interesting result that needs further investigation.

The three regression coefficients for IRRHYV imply that the changes in effects of interaction term were lower than the contribution of just the % IRR and just % HYV.

In conclusion, the regression analyses presented in this chapter provide some suggestive evidence that the M-99 Rice Production Program may have exerted some impact on increased production which is our main argument in this study. It is difficult to sort out the M-99 effect from the pure time effect in the data set used in the regression analysis. The result does not prove or disprove the M-99 impact. To date then, the three national surveys undertaken by the Special Studies Division of the Department of Agriculture provide the best estimates of the results of the impact of the Masagana 99 program. However, the results in this section are sufficiently informative to encourage a similar analysis when more detailed data over a longer time period become available: for example, regional breakdown of inputs - particularly fertilizer.

6.3 Other Effects of the Masagana 99 Program[1]

It must be stressed that there are other important benefits not quantified in the preceding sections. These will be discussed very briefly below.

Research in the Philippines has established that increases in employment occurred as a result of adopting modern technology such as the use of HYVs, fertilizers and chemicals (Barker, et al., 1972). Cultural practices like weeding, application of fertilizers and chemicals all required additional labour. Harvesting and threshing as a result of the increased yield attained required additional labour too. The early maturing varieties planted under the direct seeding method made it possible to grow a second crop, not necessarily rice, and this further increased the demand for labour thus increasing employment.

Moreover, when income is increased through the adoption of HYVs and other inputs, increases in incomes in other sectors of the economy are usually induced through multiplier effects. For instance, farmers would increase demand for vegetables, poultry and livestock which then provide greater scope for increasing intensity of labour utilization, raising incomes and improved welfare.

The Masagana 99 program provided a means for bridging the gap between experimental and farm levels of operation. Support services such as supervision of farmers, field demonstrations, the supply of

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1 For more details, see Meliza Agabin, "Economic Implications of Masagana Programs". Paper presented to the First Agricultural Policy Conference, UPLB College, Laguna, Philippines, April 14-16, 1975.

production technicians, and the dissemination of information through the mass media were provided as part of the Masagana 99 program. These proved effective in disseminating and diffusing technology.

Undoubtedly, the Masagana 99 Program provided some backward and forward linkages in various sectors of the entire economy. Some activities which have experienced push effects from the Masagana 99 program are seed growing, services related to the supply of inputs, marketing of output, banking services, and transport. To varying degrees, therefore, the M-99 program not only contributed increased production but has generated employment and thus helped improve rural welfare.

Similarly, no analysis has been attempted in this study as to the costs of Masagana 99. A complete evaluation of the program will necessitate not only a detailed examination of the benefits but also the real costs incurred.

CHAPTER 7

SUMMARY AND CONCLUSIONS

The agricultural sector has played, and for the foreseeable future will play, a major role in the Philippine economy. It is therefore imperative to develop this sector through a substantial amount of both government and private assistance in the form of extension services, credit, marketing arrangements, infrastructure like irrigation and flood control facilities, farm-to-market roads, and other related services.

Generally, Filipinos are rice eaters, so rice will remain the most important food crop for a long period. Further, the Government of the Philippines is concerned to win the race between food production and population growth, so agricultural development programs, particularly rice production programs, will continue to have high priority.

Governments of many developing countries like the Philippines vigorously pursued the implementation of agricultural credit programs to increase food production and improve rural welfare. The experiences of Bangladesh, Brazil, India, Indonesia, and Sri Lanka presented in Chapter 2 proved to have significant results and were important in attaining desired objectives, both directly and indirectly. There seemed to be a strong demand for agricultural credit in the countries surveyed. However, it must be stressed that care should be taken in considering credit as the vanguard of agricultural development for, while credit is often found necessary, it is only one of the instruments in promoting agricultural development.

Moreover, it is interesting to note that, despite the weaknesses of agricultural credit programs, these are still being advocated in most developing countries. Perhaps the governments of these countries have strong beliefs that credit programs can effectively improve the welfare of the majority of the people.

To refer back to the past, it is quite disappointing to learn that while various efforts have been made in the Philippines to develop, promote, and expand rural credit facilities, institutional sources of credit have not provided enough credit to the agricultural sector for more than seven decades. It is true that the volume of agricultural loans provided has increased. However, improvements in financing are needed not only in terms of size and number of loans, but more so in the modification of lending policies and procedures. Often, complicated lending procedures have precluded small farmers from loan programs in the past. Some characteristics of formal lending institutions such as interest rates and collateral requirements were pointed out both in Chapter 2 and Chapter 3. A flexible interest rate was proposed, preferably set at about 8 per cent in real terms, although in practice the real interest rate would probably rise and fall with the rate of inflation. At the present time, the inflation rate in the Philippines is about 8 per cent per annum which suggests that an interest rate of perhaps 16 per cent would be appropriate. It was also revealed in Chapter 3 that there had been no real growth in the amount granted for almost ten years before the Masagana 99 supervised credit scheme was initiated in 1973. This new supervised credit program, which was accompanied by other liberal policies (such as no collateral and joint liability groups), offered a possible solution to small

farmers' credit problems and is expected to improve the real growth of agricultural credit in the years to come. Although the available results are worthwhile examining, it will be several years before firmer conclusions can be drawn about the full effectiveness of the program.

In the late 1960s, the Philippine Government had implemented both food production programs (rice and corn production programs) and agricultural credit programs in isolation from each other. It was only in 1973 that the Government recognized that agricultural credit could not be used effectively by itself. A package composed of technology, farmer supervision, available inputs, price support and credit was therefore developed and implemented and is called Masagana 99 Rice Production Program (M-99).

The Masagana 99 program is a large, multifaceted, relatively well-conceived, organized, coordinated and implemented program. As such, its weaknesses and successes are of great importance and interest to both the Philippines, who will gain from the Masagana 99 experience, and to other developing countries who may wish to implement similar types of programs.

The objective of rice self-sufficiency has been attained in three years of operation. The increase in total production of paddy attained between CY 1973-74 and CY 1975-76 was due to both increased area and increased yield. Increases in yield appear to have been attained due to the increased usage of inputs that were made available during the M-99 implementation. The m-99 supervised credit program provided a total of 2.7 billion pesos for Phases I to VI. These loans generally flowed to those who needed them for production purposes and

were able to increase yields because of them. About 600,000 farmers, both with and without credit, were provided with supervision by about 3600 production technicians every cropping season. Undoubtedly, some farmers who did not participate under the M-99 program benefitted also from the M-99 program in the areas of information, price support, subsidies, etc. It therefore seems reasonable to say that, generally, the M-99 program reached small farmers and provided them with credit and supervision that caused them to increase their yields raising their incomes.

This all suggests that the program went well, but a close examination of loans granted, the number of farmer-borrowers and area financed revealed that there was a decreasing trend. Two hypotheses were put forward in Chapter 5 to explain the situation: (1) that farmers moved toward self-financing and needed less (or no) external financing, and (2) that some farmers were no longer provided with loans by lending institutions because they did not make prompt repayments. Both explanations appear to be consistent with the results of the analysis in the same chapter, but the latter seems a more realistic explanation because there were decreasing repayment rates in the latter phases. However, no definite conclusions can be drawn until stronger evidence is available to test the two hypotheses.

The Masagana 99 program is not without problems and to evaluate the scheme the accomplishments have to be balanced against the problems. Inclement weather, pests and diseases, availability of fertilizers and chemicals (affected by supply, distribution and high prices), lack and inefficiency of some production technicians and many related factors all

affected the smooth implementation of the program. While increased production was attained, these problems, coupled with an alarming rate of non-repayment, encumbered the M-99 program. Various efforts were undertaken to mitigate these problems and it is clear that more effort and more time will be needed to make this program work efficiently. While the program required a lot of Government funds, these can be justified on the grounds of development and improved welfare, particularly in the case of a national disaster.

To digress, the Government might consider the possibility of initiating a crop insurance scheme in order to protect rice farmers from risks of crop failures due to typhoons, droughts, pests and diseases. Whereas the expenses of farmers would necessarily be increased because of cost of premiums, the protection provided by crop insurance in terms of a reduction in uncertainties and income fluctuations would benefit the farmers. For a crop insurance scheme to work, it would need to be implemented in a manner that rural banks could operate and be administered by a central authority.

To evaluate properly any economic program, including agricultural credit programs, information on the value and distribution of the benefits and costs (both economic and social) should be available and for a program to be called a success the benefits must exceed the costs. This study has not included a cost-benefit analysis for want of sufficient information, but has tried to show the contribution made by the Masagana 99 program using residual and regression analysis.

The analysis in Chpater 6 showed that, while high production was attained from CY 1973-74 to CY 1975-76, the main reason was not

increased average yield per hectare as expected but increased area (from 3.44 to 3.58 million hectares). This, however, does not negate the substantial increase in yield achieved under the M-99 areas (the average yield was 3.39 metric tons in CY 1973-74 and 3.08 metric tons in CY 1975-76), but it appears that it will take several more years before the real impact of the M-99 program can be felt - that is, when a full recovery from the effects of previous natural hazards has already been realized.

As verified with the results of three national surveys undertaken by Special Studies Division, Department of Agriculture, the residual analysis indicated that the contribution of the area under the Masagana 99 program averaged about 14 per cent of the total rice production a year, which is promising. The regression analysis looked only at some available variables and tried to test if correlation existed or not. Using production as the dependent variable and independent variables such as time, area, dummy variable for HYV adoption and dummy variable for Masagana 99 participation, the results showed that positive correlations existed and were all significant at the desired level of probability. Interestingly, despite only three years of implementation, the M-99 program had exerted quite an important influence on yield as indicated by its beta coefficient (11.5 per cent).

Another regression was carried out using a covariance model (pooling cross-section (regions) and time series data) (CY 1967-68 to CY 1974-75). The results proved that yield differs significantly from region to region and from time to time. But, the regional differences explained more of the variation in yield than did the time differences.

The overall result is still inconclusive for the set of data was not able to prove or disprove the claimed impact of the M-99 program. Perhaps it would take more years before the actual impact of the program can be sorted out. Only then can we be firm in our conclusion.

The overall findings suggest that policy makers and implementors of development programs should exert more effort in looking at ways of increasing food production, particularly rice. This can be done through improved services such as irrigation, extension, credit, marketing, and other facilities in addition to continuous work on research and development of new technology (HYVs, fertilizer and chemicals).

It must be mentioned that there are many important factors that affect rice production other than just the quantifiable variables used in our analysis. The as yet unquantifiable variables in package may have either constrained or boosted the effects of the Masagana 99 program. Hence, no definite statement can be made until the effects of these other factors can be observed for a longer period.

The various sectors of the Philippine economy also felt the push effects of the Masagana 99 program activities, especially in services related to marketing of inputs and outputs, banking and transport. It is, therefore, reasonable to conclude that, to varying extents, the Masagana 99 Rice Production Program contributed to high production, generated employment and thus improved rural welfare.

Because the Philippine population is increasing at a rapid rate (3.0 per cent per year) there is a need not only to sustain the

present level of production but also to exert greater effort to meet food requirements and thus win the race between food production and population growth.

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APPENDIX A

A CALENDAR OF VARIOUS MEASURES ADOPTED TO ALLEVIATE AGRICULTURAL CREDIT PROBLEMS IN THE PHILIPPINES (1903-1963)

1903 - The Banco Espanol Filipino was reincorporated under a special charter. Originally chartered in 1851, it was authorized to grant loans up to 20 per cent of its paid-up capital, based on mortgaged or titled real estate.

1907 - The first official move to tackle the problem of agricultural credit was taken on the initiative of the Philippine Commission. It tried to induce private capital to invest in an agricultural bank by authorizing the Insular Government to guarantee an annual income of five per cent to individuals and corporations willing to invest. However, nobody availed himself of this Agricultural Banks Act.

1908 - The Agricultural Bank of the Philippine Islands was established with a capital of one million pesos. Limited capital, which was frozen in no time in long-term loans, lack of trained personnel, and absence of rediscounting facilities, gradually reduced the effectiveness of the Bank in meeting the needs of agricultural development. From its inception in 1908 up to 1916 when it was merged with the newly organized Philippine National Bank, the Agricultural Bank extended an aggregate of ₱5,028,560 in loans.

1915 - Act No. 2508, the Rural Credit Law, was passed authorizing the establishment of a system of agricultural credit cooperative associations to operate and function under accepted cooperative principles and practices. This Act was the culmination of a series of attempts by Filipino leaders to introduce into the Philippines a system of cooperative credit. The law was inoperative for a year, until an amendment to the Act placed it under the Bureau of Agriculture. A Rural Credit Division was formed in that Bureau to supervise the implementation of the Act. By 1939, after 23 years of operation, only 35,041 members of a total membership of 105,084 availed themselves of the facilities of the 571 associations organized in 43 provinces. Actually, in terms of operations, none of these associations are active today.

1916 - The Philippine National Bank was established with a capital of ₱20 million to supplant the Agricultural Bank of the Philippine Islands, primarily to engage in commercial banking. The Bank's charter provided for the granting of loans for agricultural, industrial and commercial purposes. Except for initial difficulties encountered between 1917 and 1922, the PNB has been a major instrument in promoting national economic development. Although the bank has attempted to serve the credit needs of farmers, it has not adequately met the problem of rural credit.

1919 - Act No. 2818 appropriated one million pesos to set up a Rice and Corn Fund for loans to farmers through the rural cooperatives organized under Act No. 2508 for the purpose of promoting and

increasing the production of rice and corn. The Fund became the principal source of funds for the agricultural credit cooperative associations. It has undergone several changes in name. In 1936, it was changed to Agricultural Cooperative Fund to include marketing cooperatives in its sphere of operations. In 1940, it was renamed the National Cooperative Fund and placed under the National Trading Corporation.

1924 - Guanco Act (Act No. 3154) was passed authorizing the establishment of agricultural banks with a minimum capital of ₱50,000. Only one bank was organized under this Act and this was the short-lived bank of Pangasinan.

1930 - A Rural Bank Commission was created to study and recommend the best way of effectively extending greater credit facilities to small farmers with the Philippine National Bank assuming the central role in this problem. According to Governor F. Davis, in his letter addressed to private banks and other institutions, "one of the main difficulties confronting the small farmer appears to be his inability to obtain adequate credit facilities without paying a very high price for them".

1931 - The Philippine National Bank was authorized by Act No. 3895 to regulate the creation and operation of rural credit associations, and by a companion measure, Act No. 3896, to organize rural banks. The Bank was clothed with superior powers to control and supervise cooperative credit societies and private rural banks. Only seven associations were organized under Act 3895, and only two rural banks under Act 3896. There are no available records of their operations as these were destroyed during the war.

1939 - The Agricultural and Industrial Bank was established under Commonwealth Act No. 459 to meet demands for long-term capital funds. With a capital of ₱150 million, the Bank, during its two and a half years of existence cut short by the last war, granted loans amounting to ₱24 million for agricultural and ₱4 million for industrial purposes. Its assets were absorbed by the Rehabilitation Finance Corporation organized after the war.

1940 - Commodity Corporations, like the National Abaca and other Fibers Corporations (NAFCO), National Coconut Corporation (NACOCO) and National Tobacco Corporation (NATOCO), were set up by the Government to deal with the particular problems of certain industries. These corporations engaged in lending operations mostly in the nature of marketing loans to stabilize commodity prices. The war reduced their operations and these government corporations have now been liquidated or their functions absorbed by other agencies.

1940 - A Special Fund of one million pesos was given to the Bureau of Labor to be loaned to farmers in Central Luzon. Small farmers could borrow from this Fund provided they organized themselves into cooperative credit associations.

1947 - The Rehabilitation Finance Corporation, established under Republic Act No. 85, with an authorized capital of ₱300 million, started operations on January 2, 1947. It was entrusted with the responsibility of providing long-term financing for the rehabilitation, development and expansion of agriculture, commerce

and industry, the reconstruction of property damaged by the war, and the diversification of the national economy. In the eleven and a half years of its existence, the RFC granted ₱407.2 million of real estate loans, ₱225.1 million of agricultural loans, and ₱347.5 million of industrial loans.

1952 - Republic Act No. 720 (Rural Banks Act) was passed, providing for the creation, organization and operation of a system of rural banks throughout the country, designed to give easy credit facilities on reasonable terms to small farmers, small merchants, small industries and cooperatives. The rural banks program was devised in such a way as to make rural banking as simple as possible and adapted to the set ways and low level of education of the rural people. Since the opening of the first rural bank on December 31, 1952 until December 31, 1963, a total of more than 660 million pesos has been loaned to about 1.2 million borrowers, by the 257 rural banks in operation in 223 municipalities and 29 chartered cities in 50 provinces throughout the country.

1952 - The Agricultural Credit and Cooperative Financing Administration (ACCFA) was established with the enactment of Republic Act No. 821, with a capital of 100 million pesos. Under its Charter, it is charged with the dual function of developing a farmer-owned and farmer-controlled marketing system and of providing credit on liberal terms and conditions to farmers' cooperative marketing associations involving a total membership of 310,731 farmers. Since the start of the program in 1952, up to mid-1963,

loans of various types released totalled ₱204.4 million out of a paid-up capital of ₱40.5 million and Central Bank borrowings of ₱148.7 million, of which ₱124.2 million has been collected. The balance of receivables stood at ₱80.2 million.

1958 - The Development Bank of the Philippines replaced the former Rehabilitation Finance Corporation, with the approval of Republic Act No. 2081 on June 14, 1958. It was established for the purpose of providing credit facilities for the development and expansion of agriculture and industry, for the diversification of the national economy, and for promoting the establishment of private development banks in provinces and cities. Its capital was increased from ₱300 million to ₱500 million. As of June 30, 1960, the combined operations of the Rehabilitation Finance Corporation for eleven and a half years and its successor, the Development Bank of the Philippines for two years, resulted in the granting of 88,900 loans totalling ₱1,225.9 million, including ₱289 million of agricultural loans, ₱448.2 million of industrial loans, and ₱412.5 million of real estate loans.

1959 - On January 20, 1959, the Development Bank of the Philippines inaugurated its 50-million-peso agricultural loans program which included small loans to farmers in amounts not exceeding 2,000 pesos payable in ten years. The objectives of the small agricultural loans program are to increase and diversify agricultural production, to encourage effective farming practices, and to improve the processing of locally grown agricultural products.

1963 - With the passage of the Agricultural Land Reform Code (R.A. No. 3844), the ACCFA was reorganized into the Agricultural Credit Administration, and given an additional appropriation of ₱150 million. Lending activities of the ACA are to be directed to stimulate the development and operation of farmers' cooperatives. (Adapted from Tablante, 1964)

From 1964 onwards, the agricultural credit policies had been geared toward liberalizing the lending procedures and channelling more fund resources to the agricultural sector, but it was only recently that funds became available to the agricultural sector and credit became accessible to the small farmers.

APPENDIX B

DBP'S FINANCING PROGRAM FOR RICE AND CORN FARMERS, 1975

Financing Program	Eligible Borrowers	Amount of Loan	Collateral	Interest Rate (per annum)	Terms of Payment
1. Cereal (Food Grains) Production	1. Farmers presently engaged or who propose to engage in rice and corn production, who want to improve operations.	1. Loan is based on actual costs of project and on debt repayment capacity of the crop financed. Loans will not exceed ₱1000 per hectare for commercial rice production and ₱700 per hectare for commercial corn production.	1. First mortgage on privately-owned titled or untitled real estate property; Chattel on farm machinery and other durable assets; Group borrowers/ farmers cooperatives are secured by a guarantee, i.e., they are jointly and severally liable for loan repayment.	12 per cent for loans above ₱5000 9 per cent for ₱5000 and below	1. Not to exceed 2 years for operation and maintenance. 2. For permanent improvements not to exceed 10 years. 3. For acquisition of draft animals - 5 years; and machinery - 7 years.
2. Certificate of Land Transfer holders (CTL)	Holders of CTL using the same collaterals for DBP's cereal production financing				

APPENDIX B (contd.)

Financing Program	Eligible Borrowers	Amount of Loan	Collateral	Interest Rate (per annum)	Terms of Payment
3. Grain Processing and Storage	1. For integrated facilities - cooperatives/ associations organized with capital stock owned by Philippine citizens. 2. For modernization and expansion programs - those on rice business with successful ongoing rice storage.	1. Based on actual needs of the project. 2. For capital assets - more than $2000 or peso equivalent.	1. Real estate property, paddy stock both existing and to be acquired.	9 per cent for loans ₱5000 and below 12 per cent for loans above ₱5000	1. Payable for 14 years including 1 period on principal 2. Payable in 10 years with one year grace period.
4. Irrigation Pump	Farmers owning agricultural lands; farmers whose real estate properties are encumbered; and leaseholders	A maximum of ₱8500 per annum.	Applicants with total cash equity equal to 10 per cent of irrigation pump costs.	12 per cent	

APPENDIX C

PNB'S FINANCING PROGRAM FOR RICE AND CORN FARMERS, 1975

Financing Program	Eligible Borrowers	Amount of Loan	Collateral	Interest Rate	Terms of Payment
Supervised Credit Schemes					
1. Paddy					
a. Masagana 99 crop loan	Rice farmers following the recommendation of supervised credit technician	Actual cost of essential items to be financed not exceeding ₱1600 per hectare.	Any of the following: a. 1st lien on real estate property or livestock or crop; b. Joint-liability group	12 per cent	180 days
b. M-99 Commodity	Rice farmers with stored crops financed by PNB crop loan	Additional amount up to 80 per cent of the value of stored crop (current market value)	Stored crops enough to cover both crop and commodity loan	9 per cent	90 days

APPENDIX C (contd.)

Financing Program	Eligible Borrowers	Amount of Loan	Collateral	Interest Rate	Terms of Payment
2. Corn					
a. Masaganang Maisan Crop Loan	Corn farmers adopting farm practices under PNB supervised credit scheme	Actual costs of essential items to be financed not to exceed ₱500 per hectare	Same as collateral for M-99 crop loan.	12 per cent	180 days
b. Masaganang Maisan Commodity Loan	Corn farmers with stored crops financed by PNB crop loan	Additional amount up to 80 per cent of the value of stored crop	Stored crops enough to cover both crop and commodity loan	9 per cent	90 days

APPENDIX D

RURAL BANKS' FINANCING PROGRAM FOR RICE AND CORN PRODUCTION, 1975

Financing Program	Eligible Borrowers	Amount of Loan	Collateral	Interest Rate (per annum)	Terms of Payment
1. Ordinary Agricultural Loan	Rice and corn farmers owning or cultivating not more than 50 hectares of land.	50 per cent of the value of established production the previous year.	No collateral.	12 per cent	Not exceeding one year.
2. Masagana 99 Program	Rice farmers who are members of "selda" or "Samahang Nayon" barrio association.	₱1600 per hectare.	-	12 per cent	6 months
3. Masaganang Maisan Program	Same as M-99.	₱500 per hectare.	-	12 per cent	6 months
4. CB:IBRD Rural Credit Project (Machinery, Equipment and Irrigation Facilities)	Farmers owning or cultivating not more than 50 hectares of land.	Loans not exceeding 70 per cent of the appraised value of real estate collateral or 50 per cent of approved value of movable property.	-	12 per cent	3-10 years payable annually or semi-annually

APPENDIX E

ACA'S FINANCING PROGRAM FOR RICE AND CORN PRODUCTION, 1975

Financing Program	Eligible Borrowers	Amount of Loan	Collateral	Interest Rate (per annum)	Terms of Payment
Production Loan	a. Organized rice farmers (compact farms or mutual assistance groups); b. Agrarian reform farmers in landed estates and settlement areas; c. land transferees and lessees in tenanted areas; d. Owner-cultivators of not more than seven hectares of land.	Actual need of farmer-borrower and the repayment capacity but not exceeding 60 per cent of the value of expected crop.	Any of the following: a. Pledge of crops financed to ACA warehouse under marketing contract; b. Real estate mortgage; c. Chattel mortgage on livestock/ equipment/ machinery. d. Two co-makers of a joint-liability group.	12 per cent	Two months after harvest

Note: For more complete details, see "Lending Agencies for Rice and Corn Farmers 1975", Philippine Council for Agricultural Research, Los Banos, Laguna, Philippines.

APPENDIX F

SOURCES OF FARM CREDIT (CASH AND KIND)

(Percentage)

Source	1954-55	1965-66	1971-72
FACOMA, ACA, ACCFA	11.0	22.0	13.2
DBP, PNB, Rural and Commercial Banks[1] and others	1.0	14.0	14.4
Total Institutional	12.0	36.0	27.6
Landlords	39.0	64.0	10.8
Relatives and Friends	6.0	-	25.4
Merchants	1.0	-	-
Private Money Lenders and others[2]	42.0	-	37.2
Total Informal	88.0	64.0	73.4
TOTAL	100.0	100.0	100.0

1 Includes credit union and other loan associations

2 Includes self-finance.

Sources: (1) L.P. de Guzman, "An Economic Analysis of the Methods of Farm Financing Used on 5,144 Farms", Philippine Agriculturist, Vol. 41, January 1958.

(2) FHDO, Farm and Home Development Office - Report 1966-67, UPCA, Los Banos, Laguna, Philippines.

(3) BAEcon, Integrated Farm Indebtedness Surveys, 1971-72.

(Adapted from Gelia T. Castillo, All in a Grain of Rice, SEARCA, 1975.)

APPENDIX G

MASAGANA 99 PROGRAM TARGET PROVINCES IN DIFFERENT REGIONS

I. ILOCOS REGION

1. Abra[1]
2. Ilocos Norte
3. Ilocos Sur
4. La Union
5. Pangasinan

II. CAGAYAN VALLEY

6. Cagayan
7. Isabela
8. Kalinga-Apayao[1]
9. Nueva Viscaya

III. CENTRAL LUZON

10. Bataan
11. Bulacan
12. Nueva Ecija
13. Pampanga
14. Tarlac
15. Zambales

IV. SOUTHERN TAGALOG

16. Batangas
17. Cavite
18. Laguna
19. Mindoro Oriental
20. Mindoro Occidental
21. Palawan[1]
22. Quezon
23. Rizal

V. BICOL REGION

24. Albay
25. Camarines Norte
26. Camarines Sur
27. Sorsogon[1]

VI. WESTERN VISAYAS

28. Aklan
29. Antique
30. Capiz
31. Iloilo
32. Negros Occidental

VII. CENTRAL VISAYAS

33. Bohol
34. Negros Oriental

VIII. EASTERN VISAYAS

35. Leyte
36. Leyte Sur
37. Northern Samar[1]

IX. WESTERN MINDANAO

38. Zamboanga City
39. Zamboanga del Sur
40. Zamboanga del Norte

X. NORTHERN MINDANAO

41. Bukidnon
42. Agusan Norte[1]
43. Agusan Sur[1]
44. Lanao Norte[1]
45. Lanao Sur
46. Misamis Oriental
47. Misamis Occidental
48. Surigao Norte[1]
49. Surigao Sur

XI. SOUTHERN MINDANAO

50. Cotabato
51. Cotabato South
52. Maguindanao[1,2]
53. Sultan Kudarat[1,2]
54. Davao Norte
55. Davao Oriental[1]
56. Davao Sur
57. Davao City[1]

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1 Additional provinces for Masagana 99 program.

2 Previously part of Cotabato.

APPENDIX H

NATIONAL MANAGEMENT COMMITTEE

Chairman: National Food and Agriculture Council

Members: Representatives from -

Bureau of Agricultural Extension

Bureau of Plant Industry

Philippine National Bank

Agricultural Credit Administration

Bureau of Agricultural Economics

Central Bank-Department of Rural Banks, Savings and Loan Associations

Land Bank

Fertilizer Industry Authority

Agricultural Pesticides Institute of the Philippines

U.S. Agency for International Development

Rural Bankers Association of the Philippines

National Grains Authority

Bureau of Cooperatives, Department of Local Government and Community Development

Department of Agrarian Reform

International Rice Research Institute

UPLB College of Agriculture

Philippine Constabulary

National Irrigation Administration

Bureau of Soils

APPENDIX I

IMPLEMENTING AGENCIES AND THEIR RESPONSIBILITIES

1. National Food and Agriculture Council (NFAC)

The National Food and Agriculture Council coordinates all agencies directly and indirectly involved in the program, deposits funds to the Central Bank of the Philippines which are utilised for Special Time Deposits (STDs) with Rural Banks and Philippine National Bank, and prepares plans and programs in cooperation with other participating agencies.

2. Bureau of Agricultural Extension (BAEx) and Bureau of Plant Industry (BPI)

These two Bureaus, under the Department of Agriculture, provide technical personnel in the provinces and municipalities. They coordinate the program planning, participate in the information drive, pest and disease regulatory and rat control programs and in applied research activities in cooperation with other agencies.

3. Central Bank of the Philippines (CB)

The Central Bank administers the funds for lending to participating rural banks under the program, provides credit personnel, and simplifies lending procedures to speed up operations of the supervised credit scheme. The CB Department of Loans and Credit rediscounts all

eligible papers under supervised credit at a rate not exceeding 1 per cent interest per year for rural banks and 3 per cent for Philippine National Bank.

4. Rural Bankers Association of the Philippines (RBAP)

The RBAP encourages more rural banks to participate in the Masagana 99 program. It assists in simplifying, expediting, and informing rural banks on the new procedures aimed at smooth operations.

5. Rural Banks (RBs)

The rural banks provide production loans to farmer-borrowers, arrange credit and marketing tie-up with the National Grains Authority (NGA) warehouse millers whenever feasible, participate in seed production programs, and collect loans with the help of the production technicians. They provide incentive allowances to production technicians supervising the M-99 program.

6. Philippine National Bank (PNB)

The Philippine National Bank provides production loans to farmer-cooperators to complement loaning operations of the rural banks, participates in the information campaign, arranges whenever feasible credit and marketing tie-up with NGA warehouse millers, and helps in the collection of loans from the farmers. It provides incentive allowances to technicians.

7. Agricultural Credit Administration (ACA)

The ACA also provides loans to rice farmers or through the existing farmers cooperatives (FCs). It performs the same functions as the PNB and the rural banks in the information campaign and collection of loans from the farmers.

8. United States Agency for International Development (USAID)

The USAID participates actively by providing the services of the Management Systems Advisors, Consultants, and Crop Production Specialists in the design, research, development, reporting and evaluation systems of the program.

9. National Irrigation Administration (NIA)

The Administration provides the list of farmers to be supplied with irrigation water during the period and provides the fieldmen to work with production technicians in the selection of farmer-cooperators. It develops new irrigation systems and distributes irrigation pumps.

10. National Grains Authority (NGA)

The National Grains Authority provides marketing support to farmer-cooperators through its price support program and procurement scheme. It also participates actively in the information drive.

11. Bureau of Agricultural Economics (BAE)

The Bureau of Agricultural Economics assists in the monitoring, compilation, and analysis of provincial reports. It helps conduct program

evaluation in collaboration with the Management Information System (MIS) unit of the National Food and Agriculture Council.

12. Fertilizer Industry Authority (FIA)

The FIA is in charge of fertilizer allocation throughout the country particularly fertilizer requirements of the M-99 program in the target provinces.

13. Agricultural Pesticides Institute of the Philippines (APIP)

The APIP supplies pesticides and herbicides through accredited dealers of pesticides companies in the municipalities and barrios at standard prices.

14. National Economic and Development Authority (NEDA)

The NEDA lays down broad plans for the agricultural sector and provides the necessary funds support for the program.

15. UPLB College of Agriculture and International Rice Research Institute (UPLB, IRRI)

Both institutions conduct training for rice specialists and technicians. They help in providing technical guidance in the application of packages of technology in the field. They put up micro-kits for demonstration to selected farmer-cooperators to serve as sources of new seed varieties.

16. Bureau of Cooperatives, Department of Local Government and Community Development (DLGCD)

The Bureau of Cooperatives furnishes all rural banks, PNB, and ACA branches lists of registered samahang nayon (barrio associations) and their farmer-members. It facilitates the formation and organization of selda (joint liability groups) in the samahang nayon (barrio associations).

17. Land Bank (LB)

The Land Bank provides the guarnatee fund for Masagana loans provided to farmers with the assistance of the Government Adjusters in the respective provinces.

18. Department of Agrarian Reform (DAR)

The Agrarian Reform Department provides additional personnel as needed in the program, assists in the information drive and in the collection of loans from farmers.

19. Philippine Constabulary (PC)

The PC assists in the distribution of inputs by providing transport trucks as situation calls for and helps in the collection of loans.

20. Bureau of Soils

The Bureau of Soils provides technical personnel and conducts soil analysis around the country.

APPENDIX J

M-99 AREA DAMAGED BY TYPHOONS AND DROUGHT IN AUGUST AND OCTOBER, 1974

('000 hectares)

Region/Province	Area Planted in Phase III	Area Damaged in Phase III	% Area Damaged
ILOCOS REGION			
1. Abra	7.0	2.7	39
2. Ilocos Norte	27.4	3.1	11
3. Ilocos Sur	29.6	24.5	83
4. La Union	23.4	3.6	15
5. Pangasinan	53.3	5.0	9
CAGAYAN VALLEY			
6. Cagayan	19.6	7.0	36
7. Kalinga-Apayao	6.7	3.0	45
8. Nueva Viscaya	16.6	0.9	6
CENTRAL LUZON			
9. Bataan	11.2	0.8	7
10. Pulacan	56.7	4.0	7
11. Nueva Ecija	125.8	19.4	15
12. Pampanga	71.9	9.8	14
13. Tarlac	67.9	5.0	7
14. Zambales	14.5	0.2	2
SOUTHERN TAGALOG			
15. Batangas	12.7	0.1	1
16. Cavite	11.5	0.09	0.8
17. Laguna	28.5	1.0	3
18. Mindoro Occidental	22.6	0.8	4
19. Rizal	7.8	0.3	3
20. Palawan	8.0	0.01	0.1
BICOL REGION			
21. Albay	21.4	0.2	1
22. Camarines Norte	8.0	0.3	4
WESTERN VISAYAS			
23. Iloilo	103.5	0.1	0.1
24. Negros Oriental	25.5	3.0	12
SOUTHERN MINDANAO			
25. Maguindanao	3.8	0.3	8
26. Sultan Kudarat	4.0	0.02	0.5
TOTAL	778.9	95.2	12.0

Source: Management Information System (MIS) reports.

APPENDIX K

PRODUCTION, AREA, AND YIELD PER HECTARE OF PADDY, PHILIPPINES, CY 1949-50 TO CY 1975-76

Crop Year	Area (Million Hectares)	Production (Million Cavans)*	Yield (Cavans per Hectare)
1949-50	2.21	59.23	26.8
1950-51	2.25	59.46	26.4
1951-52	2.47	64.33	26.1
1952-53	2.65	71.46	26.9
1953-54	2.64	72.33	27.3
1954-55	2.65	72.79	27.4
1955-56	2.74	74.39	27.1
1956-57	2.77	76.04	27.5
1957-58	3.15	72.81	23.1
1958-59	3.33	83.74	25.2
1959-60	3.30	84.99	25.7
1960-61	3.20	84.20	26.3
1961-62	3.18	88.86	27.9
1962-63	3.16	90.16	28.5
1963-64	3.09	89.30	28.4
1964-65	3.20	90.74	28.4
1965-66	3.11	92.56	29.8
1966-67	3.10	93.05	30.1
1967-68	3.30	103.65	31.4
1968-69	3.33	101.01	30.3
1969-70	3.11	118.94	38.2
1970-71	3.11	121.43	39.0
1971-72	3.25	115.91	35.7
1972-73	3.11	100.33	32.2
1973-74	3.44	127.14	37.0
1974-75	3.54	128.64	36.4
1975-76	3.58	140.00	39.1

* A cavan is equal to 44 kilograms.

Sources: (1) Data from 1949 to 1960 taken from Venegas and Ruttan, "An Analysis of Rice Production in the Philippines", International Rice Research Institute Journal Series No. 39, Published in Economic Research Journal (University of the East), Vol. XI, No. 3, December 1964.

(2) Data from 1961 to 1976 taken from Bureau of Agricultural Economics, Department of Agriculture, Quezon City, Philippines.

APPENDIX L

MASAGANA 99 LENDING RATE PER HECTARE IN PESOS[a]

Item	CY 1973-74	CY 1974-75	CY 1975-76
Cash Portion			
Land Preparation			300.00
Pulling of Seedlings			30.00
Transplanting			
Baits/Baiting Materials			
Seeds[b]			
Sub-Total	320.00	400.00	550.00
Input (Chit) Portion			
Fertilizer			
Chemicals			
Rodenticides			
Sub-Total	380.00	500.00	650.00
TOTAL	700.00	900.00	1200.00

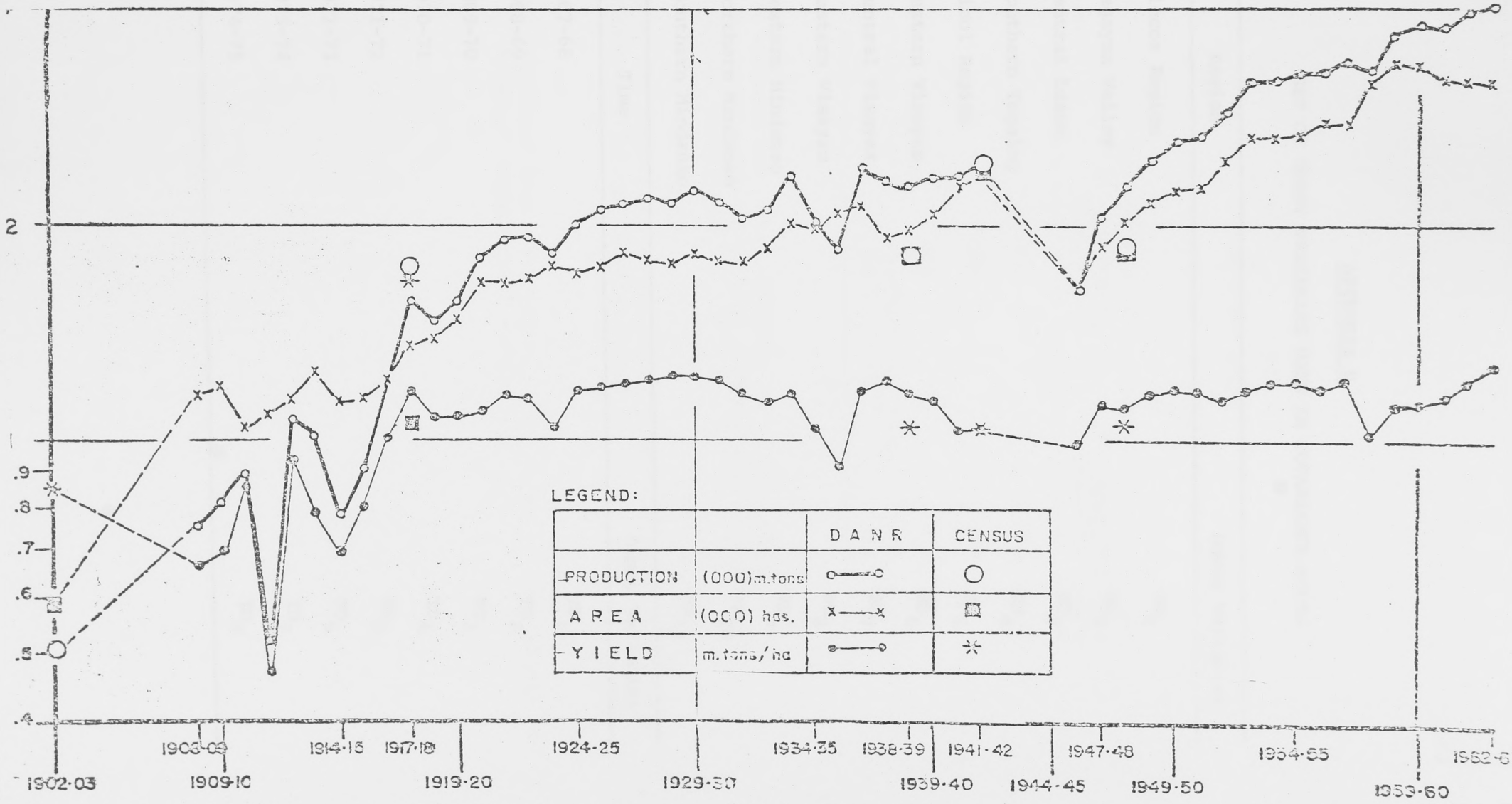
a - If the farmer is a Samahang Nayon (Barrio Associations) member, an additional 5 per cent of his total loan releases is granted by the bank to cover his contribution to the Barrio Savings Fund (BSF).

b - The amount of loan for seeds can either be included in cash or in input portion. Otherwise, the amount of seeds shall be a part of the cash portion.

APPENDIX M

LONG-TERM TREND OF RICE PRODUCTION, AREA AND YIELD IN THE PHILIPPINES

(1902-03 TO 1962-63)



Source: Venegas, E.C. and V.W. Ruttan, "An Analysis of Rice Production in the Philippines", IRRI Journal Series No. 39, published in Economic Research Journal (University of the East), Vol. XI, No. 3, December 1964.

APPENDIX N

SET OF DUMMY VARIABLES USED IN COVARIANCE MODEL

Region	Dummy Variables
1. Ilocos Region	RD_1
2. Cagayan Valley	RD_2
3. Central Luzon	RD_3
4. Southern Tagalog	RD_4
5. Bicol Region	RD_5
6. Western Visayas	RD_6
7. Central Visayas	RD_7
8. Eastern Visayas	RD_8
9. Western Mindanao	RD_9
10. Northern Mindanao	RD_{10}
11. Southern Mindanao	RD_{11}
Time	**Dummy Variables**
CY 1967-68	TD_1
CY 1968-69	TD_2
CY 1969-70	TD_3
CY 1970-71	TD_4
CY 1971-72	TD_5
CY 1972-73	TD_6
CY 1973-74	TD_7
CY 1974-75	TD_8

APPENDIX O

ESTIMATED COST OF THE MASAGANA 99 PROGRAM

PHASES I, II AND III

(in ₱ per ha.)

Point of View Phase	A. Government Direct Cost[1]	B. Whole Economy Direct & Indirect[2]
I	152	217
II	189	309
III	206	373
TOTAL	186	311

1 Cost includes only credit subsidy, fertilizer subsidy, agricultural extension service, information campaign, and management coordination.

2 All of the above plus (a) net earnings foregone by the fertilizer industry and (b) opportunity cost of funds.

Source: Extracted from - Evangeline Javier, "Cost of the Masagana 99 Program" (unpublished), March 1975.