A STUDY OF THE MASAGANA 99 CREDIT DELIVERY SYSTEM IN THE PHILIPPINES

by

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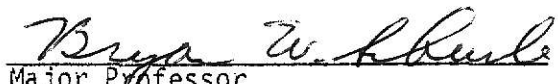

Major Professor

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CHAPTER I

INTRODUCTION

Agriculture is the major economic sector of virtually all less developed countries (LDC's). Small farms dominate the agricultural sector of these economies, at least in numbers, if not in food production. Thus, the role of agriculture, and of small producers in particular, in economic development is of major concern to policymakers and to developmental specialists. Since the small farm sector includes the largest segment of the population, the response of small farmers to economic stimuli are especially relevant for economic and social development.[1]

Agricultural credit has been viewed as an important ingredient for small farmer development programs around the world. Indeed, in some programs, credit is the major focus of such development efforts. Like in the Philippines, credit has been the facilitating input in the agricultural development efforts with the volume and allocation of credit determined according to the policy thrust of the government. Although its role is largely supportive, it is one of the instruments for accelerating the transfer of improved technologies, stimulating agricultural productivity, improving the level of farm income and developing the rural financial markets.[2] On the basis of this precept, supervised credit was made an integral component of the Masagana 99 rice production program in

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[1]Ronald L. Tinnermeier, ed., Credit for Small Farmers, Chapter VI, Small Farm Agricultural Development Problems (Colorado, 1974), p. 97.

[2]Agricultural Credit Plan CY 1977-1982, Financing Agricultural Development: The Action Program, Executive Summary, TBAC, Manila.

the Philippines thus making possible the adoption by farmers of a new rice technology which requires such costly inputs as fertilizers and pesticides.

Importance of the Study

While there are several studies and reports attesting to the fact that Philippine rice production has considerably increased since the birth of the Masagana 99 program, little effort has been made to find out what variables are related to the increase in production.

The availability of institutional credit at liberal terms, a competent extension service, an efficient marketing system and land reform are not essential to triggering a breakthrough in agriculture. However, once a breakthrough has started, failure to move ahead in any or a combination of these factors may seriously affect the rate and extent to which modern technology will spread.[3]

The foregoing statement reflects current thinking on the requisites to agricultural development.[4] This new school of thought has been developed through studies of modern advances which have proven to dramatically increase farmers' yields.

While development efforts are now centered on the wider adoption of new technology, the factors which accelerate the adoption have gained new dimensions and have cast a shadow of doubt on traditional concepts of development. As agriculture shifts from traditional to modern methods of production, greatly increased use must be made of purchase inputs that

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[3]Dr. Orlando Sacay, Credit and Small Farmer Development in the Philippines (AID Spring Review of Small Farmer Credit, March 1973).

[4]F.F. Hill and Lowell S. Hardin, Crop Production Successions and Emerging Problems in Developing Countries, Some Issues Emerging from Recent Breakthrough in Food Production (New York State College of Agriculture), p. 24.

must be financed from current income, savings or loans. Credit systems which serve agriculture effectively are a necessary part of the infrastructure of modern agriculture.

There is however, one dilemma. The precise combination of factors necessary to expand and sustain the use of modern technology beyond the initial diffisuion stage is not as yet perfectly understood. From the point of view of program cost, the question is which of these program components can be dispensed with. What is the optimum combination of these components in terms of return to public investment.

While existing programs may be studied for comparison, different programs may have been carried out under varying environmental, administrative, financial and social conditions. Experience in India has shown that an integrated approach to development in selected areas has not significantly increased agricultural production. However, contrary to it, in Rizal province in the Philippines, increase in rice production during the first season of the province-wide implementation of the program was the combined effect of varietal change, extension services, irrigation development, farm mechanization, production credit, farm supply distribution, cooperative development and marketing services. The rapid increase of Taiwan's agriculture was also the combined effect of several of these factors.[5] It may therefore be necessary to run controlled experiments to answer the aforementioned questions.

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[5]Dr. Orlando Sacay, National Policy Issues and Developing Domestic Demand, Some Issues Emerging from Recent Breakthrough in Food Production (New York State College of Agriculture), p. 452.

Objectives of the Study

This study is aimed primarily at examining the role of financial credit in small farm development vis-a-vis increased production while considering other factors influencing palay farms' productivity. Specific objectives are as follows:

1. To review available information concerning the operational procedures and implementation of the Masagana 99 credit delivery system in the Philippines.

2. To identify problems encountered in the implementation of the Masagana 99 credit scheme.

3. To suggest recommendations and/or courses of action to guide policymakers in the formulation of credit policies in the future.

4. To demonstrate the use of an analytical technique that could help in the formulation of credit policies if applied to appropriate data.

Organization of the Study

Chapter II includes a review of Philippine agriculture with emphasis on rice. A brief discussion of the Masagana 99 program, outlining its key components is presented in Chapter III.

Chapter IV contains a more detailed discussion of the Masagana 99 credit scheme.

Chapter V is concerned with a review of literature and the conceptual framework of the study.

Chapter VI contains a discussion of the methodology, the economic variables used, and a description of the data. The results are presented in Chapter VII.

Chapter VIII gives the summary and conclusions of the study.

CHAPTER II

AN OVERVIEW OF PHILIPPINE AGRICULTURE

The Philippines is predominantly an agricultural country with more than 70 percent (approximately 34 million in 1980)[6] living in rural areas. Agricultural output accounts for approximately 24 percent of the Gross National Product of the country (Table 1.1). Its largest component is the foodcrop subsector, principally rice and corn, which accounts for a third of the gross and net-value added to the agriculture-fishery-forestry sector (Table 1.2). More than half of the total labor force is engaged in agricultural activities producing about one-third of the total value of goods generated by the economy and earning about two-thirds of aggregate receipts.

With a land resource base of approximately 30 million hectares where 28 percent represents the total cultivated area, the total farm-holdings number about 2.35 million in 1971. About 60 percent of farm-holdings are owned (fully and partially); 29 percent are tenanted; 10 percent are managed while the rest are under other forms of tenure. The average farm size was 3.6 hectares for all commodities, 2.7 hectares for palay and 13.6 for sugar.[7] Small farmers dominate the rural scene with 85 percent of the farms under five hectares.

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[6]Philippine Development, Vol. VIII, No. 10, October 15, 1980, p. 11.

[7]Philippine Statistical Yearbook for 1979, National Economic and Development Authority, Manila.

Table 1.1. Gross National Product, National Income and Net Domestic Product by Industrial Origin, CY 1973-78 (in million pesos at constant 1972 prices)

SECTOR	1973	1974	1975	1976	1977	1978
1. Agriculture, Fishery and Forestry Sector	15,745	15,876	16,913	18,086	19,006	19,828
2. Industrial Sector	13,598	14,087	15,165	16,458	17,895	18,909
Mining and Quarrying	1,057	1,038	1,053	1,123	1,306	1,371
Manufacturing	10,144	10,532	10,662	10,662	11,674	12,313
Construction	2,084	2,195	3,076	4,151	4,388	4,667
Electricity, Gas, Water	312	322	374	522	527	559
3. Service Sector	20,571	21,700	22,816	25,159	26,584	27,596
Transport, Communication, and Storage	1,902	2,034	2,146	2,446	2,590	2,734
Commerce	11,211	11,713	12,278	13,893	14,647	15,516
Services	7,458	7,953	8,392	8,820	9,347	9,346
Net Domestic Product	49,914	51,663	54,894	58,703	63,485	66,333
4. Net Factor Income from the Rest of the World	(50)	600	169	(244)	(205)	(204)
Net National Product or Income	49,864	52,263	55,063	59,459	63,280	66,129
5. Indirect Taxes Net of Subsidies	5,482	6,627	7,143	7,036	7,402	8,243
6. Capital Consumption Allowance	5,535	5,489	6,324	6,487	7,276	8,105
GROSS NATIONAL PRODUCT	60,881	64,739	68,530	73,342	77,958	82,477

Source: Philippine Statistical Yearbook for 1979, National Economic and Development Authority, Manila.

Table 1.2. Gross Value Added in Agriculture, Fishery and Forestry by Industry Group, CY 1973-78 (in million pesos at constant 1972 prices)

	TYPE OF PRODUCTION	1973	1974	1975	1976	1977	1978
1.	Agricultural Crops	9,013	9,858	11,198	12,069	12,707	13,244
	Paddy Rice	2,831	3,081	3,354	3,395	3,813	3,844
	Corn	947	1,085	1,228	1,240	1,336	1,498
	Coconut (incl. Copra)	1,022	764	1,135	1,437	1,327	1,220
	Sugarcane	1,109	1,371	1,358	1,640	1,344	1,231
	Banana	706	910	1,264	1,402	1,733	2,053
	Other Crops	2,398	2,647	2,859	2,955	3,154	3,398
2.	Livestock	1,992	2,059	1,704	1,740	1,808	1,871
3.	Poultry	753	765	865	868	1,057	1,207
4.	Fishery	2,873	3,023	3,186	3,300	3,491	3,655
5.	Forestry	2,395	1,760	1,265	1,594	1,583	1,564
GROSS VALUE ADDED		17,026	17,465	18,218	19,671	20,646	21,541

Source: Philippine Statistical Yearbook for 1979, National Economic and Development Authority, Manila.

The Importance of Rice

According to Camus "Rice, the plant that produces the main food--the staff of life, or as one may call it the bread of the Filipino people is the most important and most extensively cultivated crop of the Philippines."[8] This cereal has been the principal food of all oriental countries, and its cultivation has constituted the chief occupation of most of the people. It is the main source of energy for the Filipino diet providing about 45 percent of the total per capita intake per day. Its production is the most important part of the Philippine agriculture in terms of acreage and value. Rice area harvested in recent years is about 3.55 million hectares in contrast to 3.26 million hectares of corn, 2.52 million hectares of coconut, .53 million hectares of sugarcane and .25 million hectares of abaca (Table 2).

Table 2. Area Planted to Major Agricultural Crops, Philippines

Crop	Area (million ha)
Palay	3.55
Corn	3.26
Coconut	2.52
Sugarcane	.53
Abaca	.25
Total	10.11

Source: Philippine Statistical Yearbook for 1979, National Economic and Development Authority, Manila.

[8]Jose S. Camus, Rice in the Philippines, Bulletin No. 37 (Manila, 1921), p. 9.

The average annual total production of palay in the past five years (1975-1979) is 127 million cavans (1 cavan = 50 kgs) or 4 million metric tons of rough rice[9] (Table 3).

Area, Yield and Rice Production

Of 3.5 million hectares planted to rice in 1979, nearly 53 percent was located in the island of Luzon. In terms of production, Luzon accounted for more than 50 percent of the total rice production in the country. This is why the island is called the "rice bowl" of the Philippines. Mindanao was second in terms of area and production, representing about 27 and 25 percent, respectively (Table 4).

A remarkable change in the relationship of area to yield and production can be observed in Table 3. Area harvested had been relatively stable from 1961-1971. In the same period, however, total production and yield continued to gradually increase. Area harvested gradually increased from 1971 to 1975, and then later levelled off. Total production and yield dropped to low levels in 1973 after reaching high levels in 1971. During this period, there was an outbreak of a severe tungro disease in 1972 and a devastating typhoon hit the country in 1973. After 1973, total production and yield per hectare drastically increased. The annual growth rates for the years 1961 to 1979 averaged 3.48 percent for palay production and .76 percent for area harvested, indicating significant improvements in yield.

Based on the "Five Year Agricultural Plan," which is an important section of the "Five Year Philippine Development Plan for 1978-1982," palay production will increase by 4.4 percent annually in 1978-1982,

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[9]Converted at 65 percent milling recovery rate.

Table 3. Rice Production and Import, Philippines

Year	Population (million) (1)	Harvested Area (million ha) (2)	Paddy Production (million tons) (3)	Rice Production (million tons) (4)	Paddy Yield (tons/ha) (5)	Rice Import (1000 tons) (6)
1960	27.4	3.31	3.74	2.43	1.13	0
1961	28.3	3.20	3.70	2.41	1.16	186
1962	29.3	3.18	3.91	2.54	1.23	40
1963	30.2	3.16	3.97	2.58	1.25	256
1964	31.3	3.09	3.84	2.49	1.24	300
1965	32.3	3.20	3.99	2.59	1.25	569
1966	33.5	3.11	4.07	2.64	1.31	108
1967	33.7	3.10	4.09	2.66	1.32	291
1968	34.7	3.30	4.56	2.96	1.38	8
1969	35.8	3.33	4.44	2.89	1.33	9
1970	36.8	3.11	5.23	3.40	1.68	0
1971	37.9	3.11	5.34	3.47	1.72	368
1972	38.9	3.25	5.10	3.32	1.57	445
1973	40.0	3.11	4.41	2.87	1.42	312
1974	41.1	3.44	5.59	3.63	1.63	169
1975	42.2	3.54	5.66	3.68	1.60	152
1976	43.4	3.58	6.16	4.00	1.72	170
1977	44.6	3.55	6.46	4.20	1.82	NA
1978	45.9	3.51	6.89	4.48	1.96	NA
1979	47.2	3.47	7.20	4.68	2.07	NA

Source: (1) National Census and Statistics Office, Sta. Mesa, Manila.
(2), (3) and (5) Bureau of Agricultural Economics, Quezon City, Manila.
(4) From (3) converted at 65 percent milling recovery rate.
(6) National Grains Authority, Quezon City, Manila.

NA - not available.

Table 4. Palay Area Harvested, Yield per Hectare and Production by Region, 1979

Region	Area Harvested, 1000 ha			Yield/Ha, cavan[a]			Total Production	
	Total	Irrigated Farms	Non-Irrigated Farms	Average	Irrigated Farms	Non-Irrigated Farms	Million Cavans[a]	%
Southern and Western Min.	628	229	399	40.42	57.26	33.18	25.38	17.63
Central Luzon	400	278	122	60.46	69.06	37.36	24.18	16.80
Western Visayas	468	117	351	40.00	56.24	34.52	18.72	13.00
Cagayan Valley	416	211	205	40.76	49.20	29.08	16.96	11.78
Southern Tagalog	425	174	251	38.30	55.64	23.90	16.28	11.31
Ilocos Region	322	141	181	39.82	42.70	33.92	12.78	8.88
Bicol Region	286	137	149	41.88	54.16	27.78	11.98	8.32
Northern and Eastern Min.	279	99	180	36.26	54.56	24.78	10.08	7.00
Eastern Visayas	245	80	165	31.02	43.00	25.22	7.60	5.28
PHILIPPINES	3469	1466	2003	41.50	54.92	28.78	143.96	100

[a]1 cavan of paddy = 50 kg.

Source: Bureau of Agricultural Economics, Quezon City, Manila, Philippines.

expanding from a level of 6.7 to 8.0 million metric tons at the end of the five year plan period. Production is expected to increase further to 9.9 million metric tons by 1987 (Table 5).

The national level of yield per hectare at present is still around 2.07 tons per hectare, as indicated in Table 3, which ranks as one of the lowest in Asia (Table 6). This low level is caused by the fact that the yield of lowland and that of upland are averaged together.

Although the actual field acreage seems to be undetermined, the breakdown of the rice area is shown in Table 7. It is apparent from the table that a high yield of irrigated lowland is cancelled out by a very low yield of upland rice.

The effect of irrigation in increasing the yield is also clearly shown in Table 7. In addition, there are large regional differences in yield per hectare. In general, the average of Central Luzon is the highest in the country, being 46 percent higher than the national level. There are also large variations in different regions and in different locations within the same region. The existence of large variations may be regarded as a common characteristic of rice production at the initial stage of technological development.

Table 5. Projected Palay Production, Yield and Area Harvested, Philippines

	1978	1979	1980	1981	1982	1987
Production (in 000 metric tons)						
TOTAL	6,720	7,013	7,323	7,646	7,999	9,870
Irrigated	4,044	4,395	4,768	5,158	5,574	7,856
Other Areas	2,678	2,618	2,555	2,488	2,425	2,014
Area Harvested (in 000 hectares)						
TOTAL	3,608	3,617	3,638	3,753	3,669	3,747
Irrigated	1,694	1,782	1,883	1,979	2,077	2,541
Other Areas	1,914	1,835	1,755	1,774	1,592	1,206
Yield (sacks of 50 kgs./hectare)						
Irrigated	47.7	49.3	50.6	52.1	53.7	61.8
Other Areas	27.9	28.5	29.1	28.0	30.5	33.4
Ave. National Yield	37.3	38.7	40.2	40.7	43.6	52.7

Source: Five Year Philippine Development Plan, 1978-1982 and 1987. National Economic and Development Authority, Manila.

Table 6. Average Annual Yield of Rough Rice in Selected Countries

	1977	1978	1979	1977-1979
1. Rep. of Korea	5.96	6.78	6.55	6.42
2. Peoples Rep. of China	3.52	3.52	3.72	3.51
3. Indonesia	2.78	2.79	2.98	2.77
4. Philippines	1.82	1.96	2.07	1.96
5. Burma	1.80	1.94	1.99	1.93
6. Thailand	1.78	1.75	1.88	1.82

Source: FAO Production Yearbook 1979.

Table 7. Comparative Yield of Irrigated, Non-Irrigated and Upland Farms in the Philippines, 1978 and 1979

Year	Area and Yield	Irrigated	Non-Irrigated	Upland
1979	Area harvested, 1000 ha	1466	1581	422
	Paddy yield/ha, cavan	55	34	22
1978	Area harvested, 1000 ha	1515	1581	413
	Paddy yield/ha, cavan	52	32	22

Source: Bureau of Agricultural Economics, Quezon City, Manila.

CHAPTER III

THE MASAGANA 99 RICE PRODUCTION PROGRAM IN BRIEF

Rationale

Prior to the Masagana 99 era, the Philippines was heavily dependent on rice imports to augment its meager production. Because of the world grain crisis in the early 70's, the country's dwindling dollar reserves and the disastrous crop years (1971, 1972 and 1973), the government was forced to implement a crash program immediately. Out of the need to massively increase rice production, the Masagana 99 program was conceived and launched on May 21, 1973.

The program was given top priority and was called the program of national survival. Masagana means bountiful and 99 was the targetted yield per hectare (99 cavans of palay per hectare or about 4.35 tons per hectare).

Specifically, the objectives of the program are;

(1) To recoup from losses incurred in the previous years,

(2) To reduce rice importation, and

(3) To achieve self-sufficiency in rice in the shortest possible time.

Organization and Management

The organization of the Masagana 99 program involves several agencies both at the center and in the field. It is implemented by different government agencies and certain groups of the private sector. The operations of the program are planned and coordinated by the Ministry of

Agriculture (MA) through the National Food and Agriculture Council (NFAC), which is composed of representatives of the major participating agencies and assisted by a technical staff (see Figure I, Organizational Structure).

At the provincial level, there is a Provincial Action Committee (PAC) headed by the provincial governor as chairman although the responsibility of running the program lies with the Provincial Program Officer (PPO).

A municipal action team was created at the municipal level with the mayor as the chairman and production technicians as co-chairman.

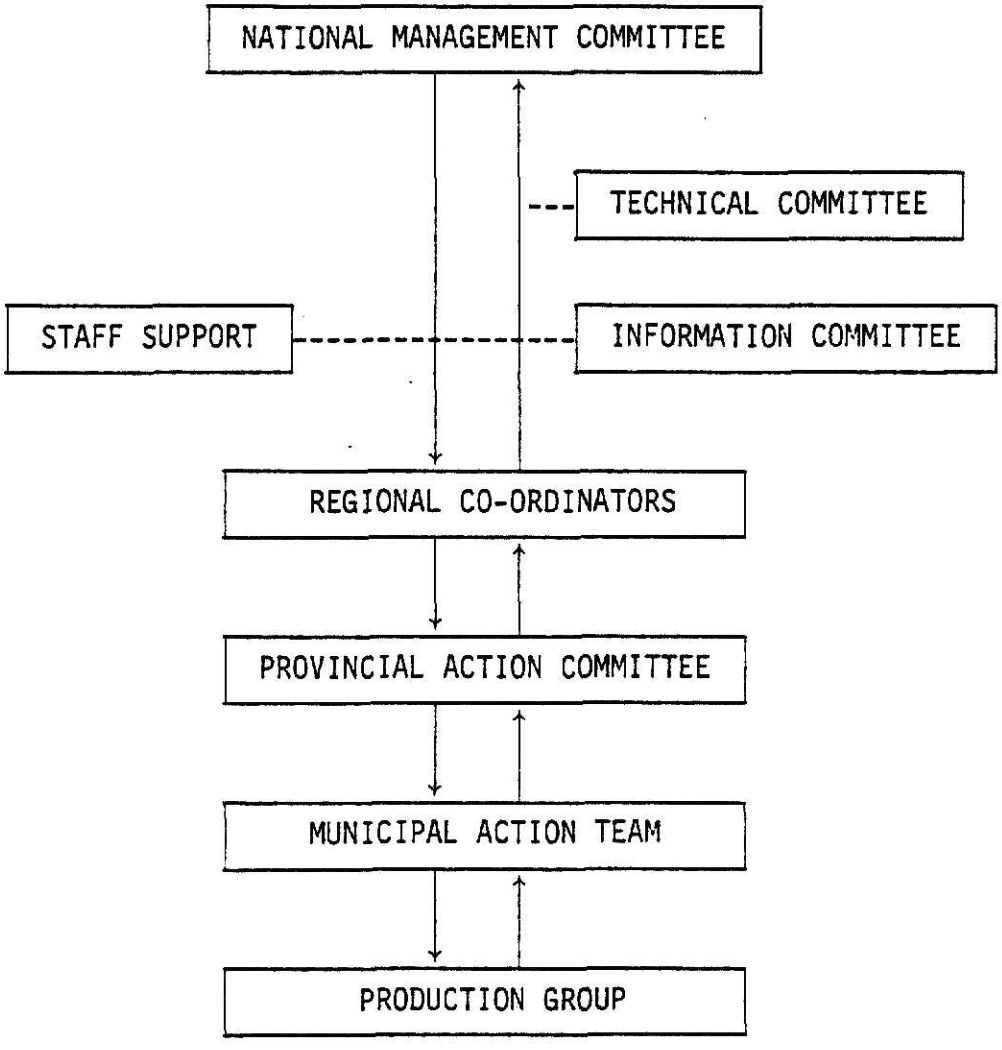
In order to iron-out/discuss plans, programs and problems incurred in its implementation, the different committees from the national to the municipal team meet about once a month or as often as necessary.

Strategy of Implementation

Farm credit on a non-collateral basis, fertilizer subsidy and extension services are the main ingredients of the Masagana 99 program. Broadly speaking, the program consists of identifying areas to be given government support, and ensuring that it is supplied in the form of credit, fertilizer and other chemicals, and guidance from farm technicians. As in previous programs, areas with better-than-average production potential are selected. Irrigation under lowland condition is the main selection criterion.

Selection of Priority Rice Areas. Major rice growing provinces and areas with very high potential of increasing production were first selected as the priority ones. However, as the program went on, several other provinces were included, covering almost all the rice producing provinces in the Philippines (Appendix A).

Figure 1. Organizational Structure Masagana 99 Program



Use of Package of Technology. Research results generated in experiment stations and applied research in farmers' fields were put together in a simple package of production technology and disseminated to farmers through the production technicians and mass media, especially radio. The package includes the use of high-yielding varieties resistant to major pests and diseases; timely and correct application of fertilizers, insecticides, herbicides and rodenticides; proper water management practices, timely harvesting and good post-harvest practices.

Supervised Credit. Non-collateral production loans under the supervision of the production technicians are extended to the farmers provided they organize themselves into a "selda." The "selda" is a loose organization consisting of two to seven farmers who are close relatives (if possible), who have contiguous rice area, and who are jointly liable to pay their loan. (For further details of this section, refer to the next Chapter of this study).

Price Support. To encourage farmers to adopt the new technology, an assurance of fair price has to be given. Hence, one of the major strategies of the Masagana 99 program was to provide a price support to rice farmers.

Massive Information Campaign. An inter-agency committee was established to coordinate the different agencies involved on the dissemination of the information. This is designed principally to facilitate the transfer of technology to farmers.

Training of Production Technicians. Production technicians from the participating agencies are being trained to update them on the new package

of technology, to train them on the procedures in implementing the credit scheme, to acquaint them with their duties, responsibilities, and different aspects of the program.

CHAPTER IV

THE MASAGANA 99 SUPERVISED CREDIT SCHEME[10]

One of the main policies being implemented by the government in support of the great recovery from the great setback in 1972 is the expansion of financial credit under the Masagana 99 rice production program. It is aimed at spreading credit generously, over a wide spectrum of farmers, with a de-emphasis on collateral or other standard prerequisites.

Effective supervision is the key component in this supervised credit scheme wherein farmers could obtain loans at low interest rates without collateral. Supervision includes the following;

a. Careful analysis of the project which is the object of financing,

b. Preparation of a farm plan and budget,

c. Periodic inspection of the project, and

d. Evaluation of the farm project at the end of the crop season.

Moreover, in order for the farmers to obtain the loan, they should organize themselves into a mutual liability group known as "selda." Farmers who can put up the necessary collateral can qualify for a Masagana 99 loan. Technical supervision is provided them by production technicians.

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[10]This chapter draws heavily from the Implementing Guidelines for the Masagana 99 Program, Various dates, National Food and Agriculture Council, Quezon City.

Strategy of Implementation

Qualification of Farmer-Borrower

As a prerequisite to become a borrower, a farmer should be any of the following;

a. holder of a leasehold contract,

b. member of a cooperative, samahang nayon, selda/damayan,

c. beneficiary of agrarian reform, or a

d. landowner cultivator.

Bona fide farmers who have participated in previous Masagana phases who have no outstanding loans from any financial institution and do not belong to a selda with a delinquent member can also participate. In cases where a member has no delinquent loan but belongs to a selda with a delinquent member, he may be entitled to participate in the program provided he follows guidelines with respect to restructuring of the selda.

Likewise, bona fide farmers who have not participated in previous Masagana phases but whose ricefields are fully irrigated are also qualified. However, bona fide farmers who have not participated in previous Masagana phase but whose ricefields are rainfed may be allowed to participate only after a very close analysis of the farm plan and budget which indicates the ability of the farmer to pay his loan.

Loan Per Hectare

The maximum loaning rate consisting of cash and input portions is ₱1,350.00 per hectare. The production technician determines the amount of the loan needed by the farmer based on the prepared farm plan and budget. The cash portion covers the costs of land preparation, pulling and transplanting of seedlings, baits and baiting station materials. The

input portion covers the costs of fertilizers, chemicals and rodenticides (Table 8).

The amount provided for seeds may be included in the cash portion when certified seeds are not available, and in the input portion when available. In case of the latter, a seed chit is issued to the farmer.

Borrowing Procedure

Organization of the Selda. A farmer could be extended a loan under the Masagana 99 provided they organize themselves into a "selda" composed of 2 to 7 members with one of them selected as selda leader based on one or combination of the following criteria;

1. Affinity of farmers -- farmers must know each other intimately either as friends, neighbor in the barrio, or better as well, closely related to each other.

2. Contiguity of farms -- farms must be adjacent or near each other in the same barrio.

3. Size of farm -- the landholding of farmers consistuting the selda shall more or less be the same.

4. Yield -- productivity performance of the farmers' farms belonging to a selda shall more or less be the same.

5. Cropping season -- selda members must at least have the same number of cropping seasons based on available irrigation facilities or cropping patterns in case the second crop is not rice.

6. Willingness to undertake the joint liability concept -- prospective members must be aware of the duties and responsibilities as members of the selda, particularly their joint obligation to pay the unpaid loan of their selda members (Appendix B).

Table 8. Breakdown of the Masagana 99 Maximum Loaning Rate per Hectare

	Amount (in pesos)	
Cash Portion:		
Land Preparation	287	
Pulling of Seedlings	26	
Transplanting	100	
Baits and Baiting Station Materials	30[a]	
Sub-total		443
Seed		90
Input Portion:		
Fertilizer	425	
Chemicals)		
Pesticides) ----------	318	
Herbicides)		
Rodenticides	20	
Zinc Oxides	15	
Sub-total		778
GRAND TOTAL		1,311
Barrio Savings Fund for Samahang Nayon Members		39[b]
MAXIMUM LOANING RATE PER HECTARE		1,350

[a]In cases where the management type of rat control is adopted, the 50 for baits and rodenticides should be given in cash but not to exceed 50.

[b]This amount is equivalent to 3 percent of the total loan. The 3 percent shall be based on the amount of the total loan released but in no case should the total loan exceed 1,350 per hectare.

Restructuring of the Selda. Farmers who previously belonged to a different selda can regroup themselves, and form another selda based on the above listed criteria provided, however, that all members have paid their loans. In the event that there is one or more delinquent member, they can be allowed to join a new selda after signing a promissory note undertaking to pay the unpaid balance of the members. Collections made from their delinquent co-selda members shall be reimbursed to them by the bank accordingly.

Old seldas that meet the above-mentioned criteria can be maintained with the same membership. However, should any member default, all the other members shall shoulder the payment of those overdue loans under the same terms and procedures as described above.

Steps in Securing Production Loans. A farmer gets a certification from the barangay leader/captain attesting that he is a bona fide farmer. Master lists of farmer-cooperators issued by the Ministry of Agrarian Reform (MAR) could be used in the absence of the above certification. On the other hand, farmers who have been issued NFAC I.D. need not accomplish the above procedures.

With the assistance of the production technician, the farmer prepares his farm plan and budget based on his actual credit needs. The farmer applies for the loan by filling up the prescribed forms then attaching the prepared farm plan and budget (Appendix C).

Release of Loans

Once the loan is approved, it is released in one lump sum and is automatically credited in a Special Saving Deposit (SSD) in the name of the farmer-borrower. The deposit earns an annual interest of 12 percent

per annum while the farmer-borrower is charged a monthly 1 percent rate of interest on the total amount of the loan he gets.

Withdrawal from the SSD is on a staggered basis in accordance with the approved farm plan and budget.

Repayments

The farmer pays his loan either in cash or in kind at the end of the loan period or preferably immediately upon harvest. A penalty interest of 2 percent per annum in addition to the regular interest is charged on past due loans.

Other Policies Affecting the Masagana 99 Credit Program

Rediscounting Policy

One of the policies which influence the volume and direction of credit in the financial system is the rediscounting window of the Central Bank. It serves as a stimulus to banks to channel their loans to selected government programs. Annual rates levied on loan papers of commercial and thrift banks vary from 6 to 8 percent depending on the classification of the loans while the rates charged under the various supervised credit scheme is only 1 percent per annum. The maximum value granted under the supervised credit is 100 percent and for eligible bank papers under ordinary lending, 80 percent of the outstanding balance can be rediscounted. The use of these rediscounting facilities at preferential interest rate serves as source of funds for the Masagana 99 program and other supervised credit schemes.

Agricultural Credit Quota

To assure a continuous supply of funds to the agriculture sector, an agricultural credit quota was instituted under Presidential Decree No. 171. All banking institutions are required to allocate 25 percent of their loanable funds for agricultural credit, at least 10 percent to the credit needs of the agrarian reform beneficiaries and the remaining 15 percent for agricultural credit in general.

Loan Guarantee Policy

One of the measures used by the government to minimize the risks of financial institutions in agricultural lending and encourage their active participation in credit programs is the loan guarantee policy. An agricultural guarantee fund provides for a guidance of 85 percent of production losses in rice, corn, sorghum and soybeans under the supervised credit due to crop failure caused by natural calamities. Under the scheme, the production loans covered by the guarantee program are restructured and the farmers refinanced another crop.

Crop and Insurance Scheme

The crop and insurance program was introduced by the Philippine Insurance Corporation (PCIC) to stabilize the income of farmers, maintain the financial viability of agricultural credit institutions and stimulate production. This insurance scheme is a form of protection for farmers to meet the problems of risks arising from natural disasters.

Premiums are set at 11 percent of the amount insured to be shared proportionately by the borrowing farmer (two percent); the lending institution (1.5 percent) and the government (7.5 percent). For the

self-financed farmer, however, the farmer's share is 3.5 percent as against government's 7.5 percent.

The insurance covers the period from one crop season to the next crop season, or the period from direct seeding or transplanting up to harvest.

All insured farmers are covered by one master policy for crops which contains all the terms and conditions of the insurance contract.

Operational Performances/Accomplishments

Loans and Repayments

The overall loans granted under the program from Phase I to Phase XIII (May 1973-October 1979) as of June 30, 1981 amounted to ₱4.24 billion, equivalent to 573 million US dollars[11] (Table 9). Of this total, 48 percent was granted by the rural banks, 47 percent by the Philippine National Bank and the rest by the Agricultural Credit Administration. Average loans granted ranged from ₱595 per hectare for Phase I to ₱1,200 per hectare for Phase XIII. On a per farmer-borrower bases, it ranged from ₱920 for Phase I to ₱1,341 for Phase XIII.

As shown in the same table, the total loans paid amounted to ₱3.53 billion (477 million US dollars) from Phase I to Phase XIII, reflecting a collection rate of 83 percent. As compared with industrial collateralized loans, this rate is considered to be a good performance, considering the absence of collateral, the vicissitudes of weather and the occurrence of pest and disease infestations.[12]

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[11]At a conversion rate of ₱7.396 per US dollar (as of June 1977).

[12]I.P. Carlos, L.B. Darrah and E.C. Quisumbing, "An Evaluation of the Masagana 99 Program," unpublished.

THIS BOOK CONTAINS NUMEROUS PAGES WITH DIAGRAMS THAT ARE CROOKED COMPARED TO THE REST OF THE INFORMATION ON THE PAGE.

THIS IS AS RECEIVED FROM CUSTOMER.

Table 9. Masagana 99 Loans and Repayments (Phases I-XIII, May 1973-October 1979) million pesos

Item	Phase													
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	I-XIII
Rural Banks granted	152.92	117.21	303.51	333.32	235.45	127.16	139.10	78.47	114.05	95.29	118.76	85.57	119.50	2020.31
Percentage repayment	98.20	98.00	95.00	87.30	83.00	85.00	86.00	89.00	88.00	81.00	80.00	78.00	67.00	86.95
Phil. Nat'l Bank granted	195.40	101.90	382.00	225.33	319.00	122.00	110.94	73.76	118.00	74.37	106.68	77.07	101.04	2007.49
Percentage repayment	91.00	92.00	76.00	77.00	73.00	81.00	81.00	80.00	77.00	85.00	81.00	84.00	76.00	79.60
Agricultural Cred. Adm. granted	21.17	11.61	30.74	13.71	18.46	6.74	25.20	12.37	18.61	9.46	14.75	14.79	I8.00	215.61
Percentage repayment	90.30	69.00	71.00	69.00	81.00	75.00	63.00	56.00	62.00	58.00	69.00	72.00	66.00	70.00
Total loans granted	369.49	230.72	716.25	572.36	572.91	255.90	275.24	164.60	250.66	179.12	240.19	177.43	238.54	4243.41
Percentage repayment	93.94	94.05	83.49	82.29	78.20	83.40	81.44	82.02	78.70	81.34	79.61	80.34	71.10	83.08
Average Loan/Area Financed (₱)	595	649	827	964	1,026	1,000	1,126	1,106	1,121	1,155	1,171	1,161	1,200	
Average Loan/ Borrower (₱)	920	977	1,353	1,613	1,898	1,689	1,907	1,837	1,902	1,936	2,035	2,023	2,341	

Source: National Food and Agriculture Council, Quezon City, Manila, Philippines.

Production, Area Harvested/Area Financed

Paddy production from the Masagana 99 areas ranged from 1.3 million metric tons to 4.18 million metric tons (Table 10). In the same table, it is further shown that not all areas planted under the program were harvested. On the average, 94 percent of the areas planted from Phase I to Phase XIII, was harvested. The areas that are not accounted for in the harvest are those whose crops were completely damaged by inclement weather, and by pests and diseases.

It is also shown in the same table that the number of hectares financed under the program is decreasing. This is attributed to low repayments during the previous phases. In addition, some studies reveal that farmers obtained loans from other sources and some are self-financed.[13]

Farmer Participation

Around 1.2 million farmers are involved in the program during Phase XI and Phase XII (Table 11). Of this 1.2 million farmers, only 17 percent are farmer-borrowers and the rest are farmers without credit. In the same table, it is further shown that the number of farmers obtaining loans are decreasing, hand in hand with the number of hectares financed. As mentioned earlier, this is caused specifically by poor repayments in the previous Phases.

Major Problem(s) Encountered

Low repayment in the later phases has been pointed out as the major problem encountered in the implementation of the Masagana 99 credit scheme.

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[13] Masagana 99; Various Phases, Various Dates, Ministry of Agriculture, Quezon City, Manila.

Table 10. Masagana 99 Production, Area Harvested and Area Financed (Phases I-XIII, May 1973-October 1979)

Item	Phase												
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Prod. (000 m.t.)	2268.17	1318.06	2779.49	2603.63	3856.10	2200.04	3546.48	2296.95	4180.27	2488.61	3760.04	3076.00	4107.08
Area Planted (000 ha)	707.5	451.8	1131.1	706.2	1086.3	662.2	1064.3	649.9	1099.9	671.9	1107.9	767.9	1098.6
Area Harvested (000 ha)	681.9	380.1	926.0	695.1	1043.7	638.6	1010.9	631.3	1080.3	651.8	1066.2	742.9	1035.5
Area Financed (000 ha)	620.9	355.4	865.6	593.7	558.3	255.9	244.5	148.8	223.6	155.1	205.1	152.8	198.8
Area Without Credit (000 ha)	86.6	96.4	265.5	112.5	528.0	406.4	819.8	501.1	876.3	516.8	861.1	590.1	836.7

Source: National Food and Agriculture Council, Quezon City, Manila, Philippines.

Table 11. Masagana 99 Farmer Participation (Phases I-XIII, May 1973-October 1979) (in 000)

Item	Phase												
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Total Number of Farmers	566.0	338.1	772.3	475.9	706.1	492.0	711.4	438.3	777.7	465.1	777.7[a]	465.1[a]	777.7[a]
Number of Farmers With Credit	401.5	236.1	529.2	354.9	301.8	151.5	144.3	89.6	131.8	92.5	118.0	87.7	101.9
Number of Farmers Without Credit	164.5	102.0	243.1	121.0	414.3	340.5	567.1	348.7	645.9	372.6	659.7	377.4	675.8

[a]Due to unavailability of data, figures for Phases IX and X were used.

Source: National Food and Agriculture Council, Quezon City, Manila, Philippines.

The repayment in Phase IX, X, XI, XII and XIII were only 79, 81, 80, 80 and 71 percent respectively. In some of the studies conducted (Octavio, 1974-1975; Segura, 1976; Carlos, 1976), the selda system has been positively identified as one of the detracting factors in the Masagana 99 program, and a definite cause for the high delinquency rate. Because of the joint liability concept embodied in the selda system, farmers simply do not want to pay because they waited for other selda members to pay. The studies show that quite a number of farmers are reluctant to join seldas because of this joint liability concept with 2 to 7 other farmers.

In another study[14] conducted on the causes for the increasing non-repayment of loans, the following were indicated as the reasons:

1. Banking institutions took an aggressive approach in extending loans but they did not exercise sufficient effort in assessing credit worthiness, in keeping in contact with the farmers during the production period, and especially in collecting loans at harvest time.

2. Production technicians were placed as loan collectors which is inconsistent with their job of educating farmers.

3. Likewise, diversion of funds for other purposes was noted.

Recommendations

Low repayment being the major problem of the credit scheme poses danger in the program. Hence, if this credit component is to survive, then something has to be done to increase repayments.

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[14] I.P. Carlos et al., "An Evaluation of the Masagana 99 Program," unpublished.

The following are some of the things which could be done to remedy the situation;

1. Because of the joint liability concept embodied in the selda system, farmers simply do not want to pay because they waited for other selda members to pay. As such, the occurrence of delinquency in one account will necessarily affect the rest. In view of this, it is suggested that the selda system be reexamined or evaluated. One alternative would be to graduate consistent good paying member(s), and allow him/them to obtain new loans individually even without collateral (a character loan).

2. The credit agencies who lack credit supervisors should hire more of them who can adequately check if the loan is being used for the specified purpose, who can faithfully follow-up repayments; and, who can evaluate or screen out high risk borrowers. The credit agencies should not depend too much on "Assigned Technicians" who are likely to be transferred and cannot be expected to feel responsible for loan servicing and loan collection.

The appropriate number of hired credit supervisors and bank employees to do loan processing, loan servicing and collection should be related to the number of farmers served by the credit agencies; the distance of farmers from the agencies and farmers' attitudes.

3. As is usually the case with public credit, a substantial portion of the borrowed funds are used by small farmers for consumption rather than production, supervision notwithstanding. In the light of this, it is suggested that a reasonable amount of loan for consumption purposes be allotted.

CHAPTER V

REVIEW OF LITERATURE AND CONCEPTUAL FRAMEWORK

A Review of Selected Related Empirical Studies

A multitude of empirical analysis have been conducted to identify factors associated with rice production in the Philippines and other Asian economies. Most of which were location specific utilizing cross section or time series aggregate data. Alix, for example, made an analyses of the Masagana impact on total palay production and yield of small farmers in the Iloilo province. He estimated a linear production function with total palay production as the dependent variable. All the regression coefficients of the explanatory variables used (labor, fertilizer, irrigation, crop season and Masagana 99) had the correct positive signs. Fertilizer was shown to be the most significant factor affecting palay production. In a second estimated production function using palay yield per hectare as the dependent variable, except for labor, all the regression parameters also had the correct signs.[15]

Antiporta conducted a similar study, identifying the key variables affecting rice production and calculating their impact for developing strategies for improving agricultural output. Land and its attributes were found to be the major production variables. In general, it was shown that (except for labor) the regression results bear out expectations

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[15]Jesus C. Alix, The Impact of the Masagana 99 Program on Small Farmer Production and Income in the Philippines, Research Report No. II (Bureau of Agricultural Economics, Quezon City, Philippines).

about the signs of the estimators (education, experience, land, nitrogen and phosphorous).[16]

Another related study was conducted in 36 villages in six Asian countries. The analysis was conducted with the hypotheses that economic, environmental, institutional and technological variables are all important in explaining differences in fertilizer use, and, hence, in yields among farmers in different villages.

The regression equations were estimated with yield and with fertilizer input as the dependent variables. It was found that the signs of the variables (nitrogen, maximum nitrogen, irrigation, institutional credit, fertilizer/modern variety-price ratio and type of farming) included in both equations agree with general expectations.[17]

Other studies have included other factors affecting the rice supply function. Price of rice and price of alternative crops were also factors influencing yield response in the Philippines.[18]

Conceptual Framework

A production function portrays an input-output relationship. It describes the rate at which resources are transformed into products.

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[16]Donato Antiporta, Agroclimatic Factors in Rice Production, Journal of Agricultural Economics and Development, Vol. VII, No. I (Philippine Agricultural Economics Association, January 1978), pp. 53-77.

[17]International Rice Research Institute Agricultural Economics Department, Technological Innovation in 36 Asian Villages, International Rice Research Institute Annual Report for 1974 (IRRI, Los Banos, Laguna, Philippines), pp. 266-272.

[18]J.F. Sison, Somsak Prakongtanapan, and Y. Hayami, Structural Changes in Rice Supply Relations: Philippines and Thailand, Economic Consequences of the New Rice Technology (IRRI, Los Banos, Laguna, Philippines, 1978), pp. 31-48.

Symbolically, a production function can be written as follows;

$$Y = f\ (X_1, X_2 \ . \ . \ . \ X_n)$$

where Y is the output that a firm or an industry can produce for a given amount of inputs $X_1, X_2 \ . \ . \ . \ X_n$ that take part in the production of output Y. Output is defined as the finished products that are measured as a flow of goods and services during a given time period. Unlike the demand and supply functions the production function can be derived from the above proposition. The variables and parameters of the production function are independent of market prices of inputs and outputs. However, the correct amount of input to use is related to marginal profit maximization conditions depending on prices of inputs and outputs.

The data used in the estimation of a production function can be either time-series or a cross-section sample. Time series data may contain a series of observations for outputs and inputs for a given firm or a given industry over a period. It is often argued that the state of technology is another important factor affecting the level of output. Over a period of time technology may improve. In order to take account of technical change, one may include a time trend variable in the production function as a proxy for measurement of technological change.

$$Y = f(X_{1t}, X_{2t} \ . \ . \ . \ X_{nt}, t).$$

Cross-section data can be obtained from individual firm or industries in a given period. The most common way is to collect output and input data from firms within an industry.

One important problem in the empirical analysis of a production function is to determine what happens when all inputs are combined in various proportions. For each combination of inputs there will be a unique amount of output. These effects follow certain well-defined laws or principles such as the law of diminishing returns. It has always been recognized that an ever-increasing product cannot be obtained from one acre of land as more seed or fertilizer is applied to it. If it could, food for the whole population might be grown upon a single acre.[19] This illustrates the principle of diminishing returns. If increasing amounts of one input are added to the production process, while all other inputs are held constant, the amount of output added per unit will eventually decrease. This principle suggests that there is a "right" amount of variable input to use in combination with fixed inputs. Diminishing returns occur when the method of production does not change as changes are made in the variable and fixed inputs. Diminishing returns do not apply when all inputs are varied.[20]

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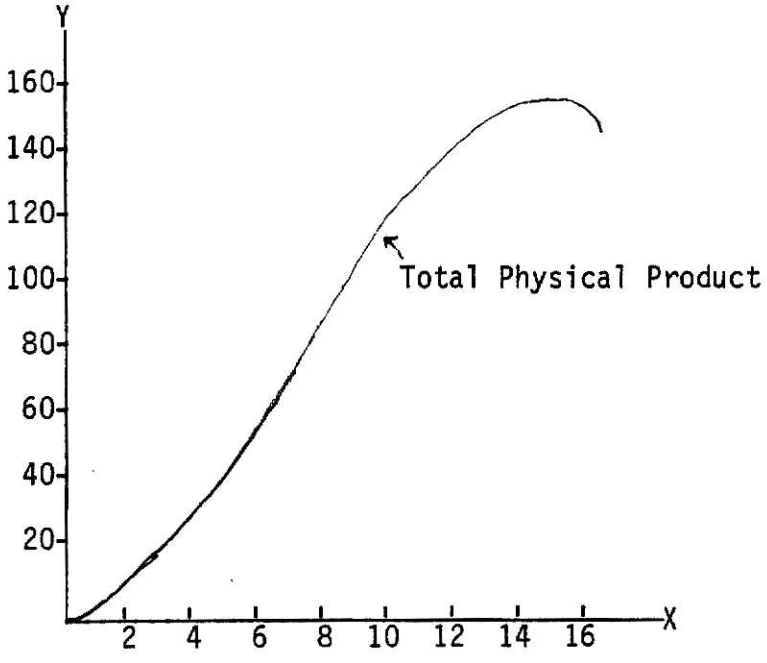
[19]John D. Black and Albert Black, Production Organization (New York City, 1926, 1929), p. 109.

[20]John P. Doll and Frank Orazem, Production Economics. Theory with Applications (Ohio, 1978), p. 23.

Figure 2. Classical Production Function



CHAPTER VI

METHOD OF ANALYSIS

The Model

In the Philippines, a number of factors might have resulted in major changes in palay production/yield relations.

First, new rice technology represented by modern semi-dwarf varieties was developed and diffused rapidly in the Philippines. These modern varieties are characterized by a high-yield response to fertilizer input, especially in irrigated fields. In 1979, almost 72 percent of the cultivated palay area was planted with these modern high-yielding varieties. Statistics also show that irrigated area in the country has more than doubled since 1960. Much of the growth has been in government assisted communal-gravity-irrigation systems, but in recent years pump irrigation has increased rapidly. Most of these irrigated areas is devoted to palay.

The development and diffusion of these modern varieties, together with increased investments in irrigation systems, has made palay production more responsive to changes in the application of fertilizer and other inputs. Fertilizer use per hectare of palay cultivated land increased from about 21 kilograms per hectare in 1961 to about 89 kilograms per hectare in 1979. On the other hand, financial loans for palay production registered a tremendous increase too, from 155 million pesos in 1961 to 809 million pesos in 1979 (a 422 percent increase). This was made possible by the implementation of the Masagana 99 program wherein non-collateralized production loans are given.

As a consequence of all these factors coupled with the vigorous support from the government in the form of other services (price support, markets, etc.), the Philippines suddenly emerged from a rice deficit to a rice exporting country. This is viewed by some as one of the outstanding agricultural achievements in the recent years.

Two multiple regression models will be estimated to demonstrate how to test the hypotheses that these factors have significantly affected the increase in Philippine palay production.

In general, the following was applied to the data:

Production Response:

$$(1)\quad P_t = b_0+b_1IRR_t+b_2NIRR_t+b_3HYV_t+b_4FU_t+b_5FL_t+b_6FP_t+e$$

Yield Response:

$$(2)\quad Y_t = b_0+b_1IRR_t+b_2NIRR_t+b_3HYV_t+b_4FU_t+b_5FL_t+b_6FP_t+e$$

where in (in year t);

P_t = total palay production in metric tons

Y_t = palay yield per hectare in kilograms

IRR_t = total cropped area with irrigation in hectares

$NIRR_t$ = total cropped area without irrigation in hectares

HYV_t = total area planted with high-yielding variety in hectares

FU_t = total fertilizer use for palay production in kilograms

FL_t = total financial loans granted for palay production in pesos

FP_t = total farming population (proxy variable for labor utilization in palay production)

and e = the error or the disturbance term

Statistical Procedure

A multiple regression model estimated through the ordinary least square method was used. The regression equations were estimated using the secondary aggregate time series data.

After having estimated the coefficients, the following test statistics were computed.

1. Coefficient of Determination (R^2)

Since the residuals show the extent of the movement in the dependent variable not explained by the independent variables, some measure relating the residuals to total variation in the dependent variable was used. Such a measure is the square of the multiple correlation coefficient, also called coefficient of determination:

$$R^2 = 1 - \frac{\Sigma e^2}{\Sigma(y-\bar{y})^2} \quad \text{or}$$

$$R^2 = 1 - \frac{ESS}{TSS} = \frac{RSS}{TSS} \quad \text{where}$$

e = unexplained residual

ESS = Error Sum of Square (variation in the dependent variable not explained by the regression model)

RSS = Regression Sum of Square (variation in the dependent variable explained by the regression model)

TSS = Total Sum of Square (total variation of the dependent variable)

TSS = RSS + ESS

Thus, R^2 is the explanatory power of the regression model. The more the variation in the independent variable explained in the regression model, the closer the R^2 will be to one; the weaker the relationship between the dependent and the independent variables, the nearer the R^2 will be to zero.

2. T-Statistic

Often variables were included from the equation based on the respective t-statistics. The t-ratio measures the statistical significance of the individual coefficients at a given level of significance. Whenever such a test was performed, it was hypothesized that, according to the null hypotheses, the coefficient is equal to zero.

If the absolute value of the t-statistic is greater than or equal to t-value from t-table for a given level of significance, the estimated coefficient is said to be statistically different from zero at the conventional levels. This means that there is a significant relationship between the tested explanatory variable and the dependent variable.

3. Durbin-Watson (d) Statistic

One more statistic was considered in the study as a tool to understand the empirical results. The Durbin-Watson statistic is a test developed with the objective of determining whether or not the error terms are successively correlated with each other. The basic assumption for computing the standard errors of regression coefficients is that the

successive observations in the error terms are independent. Such an assumption does not quite hold whenever time series is used in estimating regression equations. Thus, the residual for successive years may be significantly positively correlated. The existence of correlation between successive residuals can be tested by the Durbin-Watson statistic.[21]

4. Test for Multicolinearity

One problem that arises from a model used in the paper is the presence of multicolinearity (violation of the assumption that explanatory variables are not correlated with each other). Whenever one explanatory variable is highly correlated with another explanatory variable, multicolinearity is present.

There is no formal test[22] to check the presence of multicolinearity. The presence of multicolinearity increases the standard error of the coefficients, thereby lowering the t-test.

Data Specifications

Secondary aggregate time series data[23] used for the analyses cover the period from the 1960-1961 crop year to the 1978-1979 crop year. Data on area harvested, yield/hectare and production of palay in the

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[21] J. Durbin and G.S. Watson, "Testing for Serial Correlation in Least Square Regression," Biometrika, Vol. 38, 1951, pp. 158-177.

[22] Some textbooks suggest that a high R^2 associated with a low t-ratio could be one symptom of the presence of multicolinearity. Another rule of thumb says that whenever one or more suspect multicolinear variables are deleted from the model the size of the t-test associated with the remaining variable should substantially increase.

[23] For details, see Appendix D.

Philippines are plotted in Figure 3. (The areas are in gross terms counted twice in case of double-cropping.)[24]

From 1961 to 1964, a gradual decrease in area harvested for palay existed. By 1965, palay area harvested (3.20 million hectares) showed an increase of 3.56 percent over the previous crop year. Productivity in terms of average yield per hectare showed a modest increase during the period. From 1,160 kilograms per hectare in 1961, the average yield rose to 1,250 kilograms in 1965.

Significant increases in palay production occurred in the next five years beginning in 1966. In 1967, palay production attained an average yield of a little over 1,300 kilograms per hectare. This further increased to about 1,380 kilograms per hectare in 1968. Although the average harvest per hectare dropped down to 1,330 kilograms in 1969, productivity levels climbed to a high of 1,680 and 1,720 kilograms per hectare in 1970 and 1971, respectively. Weather conditions turned for the worse in 1972 bringing down the average yield to only 1,570 kilograms, and consequently, to 1,420 kilograms in 1973. However, from then on, production and yield continued to increase.

Despite a decrease in the amount of financial loans given for palay production from 1976 to 1979, the consumption of fertilizer continued to show an upward trend (Figure 4). This could be a result of farmers obtaining production loans from other sources. It is worthwhile to note however, that during the period of study, the increase in yield per hectare was the major factor that accounted for palay output growth. The increased utilization of high-yielding varieties starting in 1969 as

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[24]Double cropping is a successive planting to first and second crop palay on the same piece of land within the same crop year.

Figure 3. Trend in Area Harvested, Hectare-Yield and Production of Palay in the Philippines from Crop Year 1961-1979.

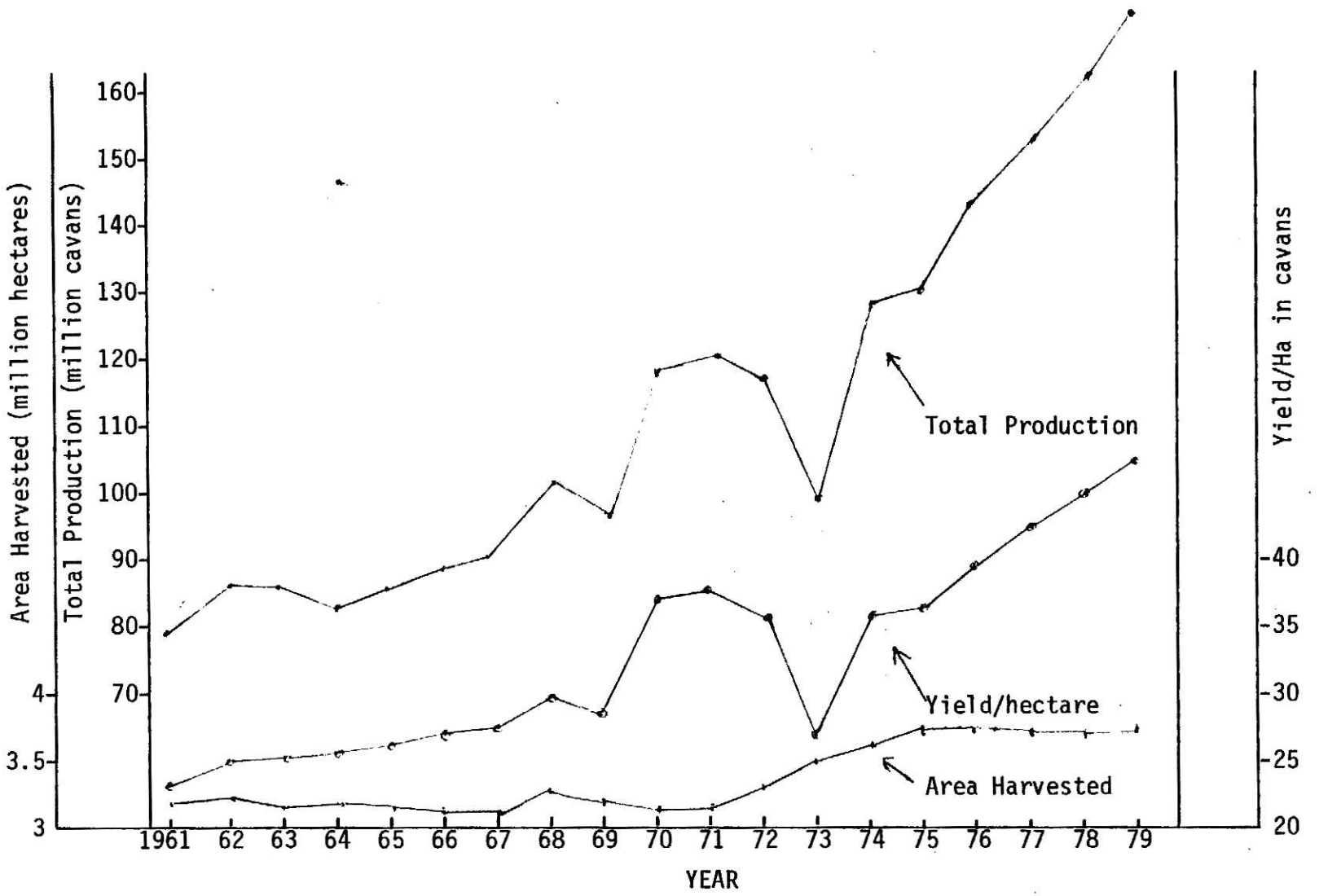
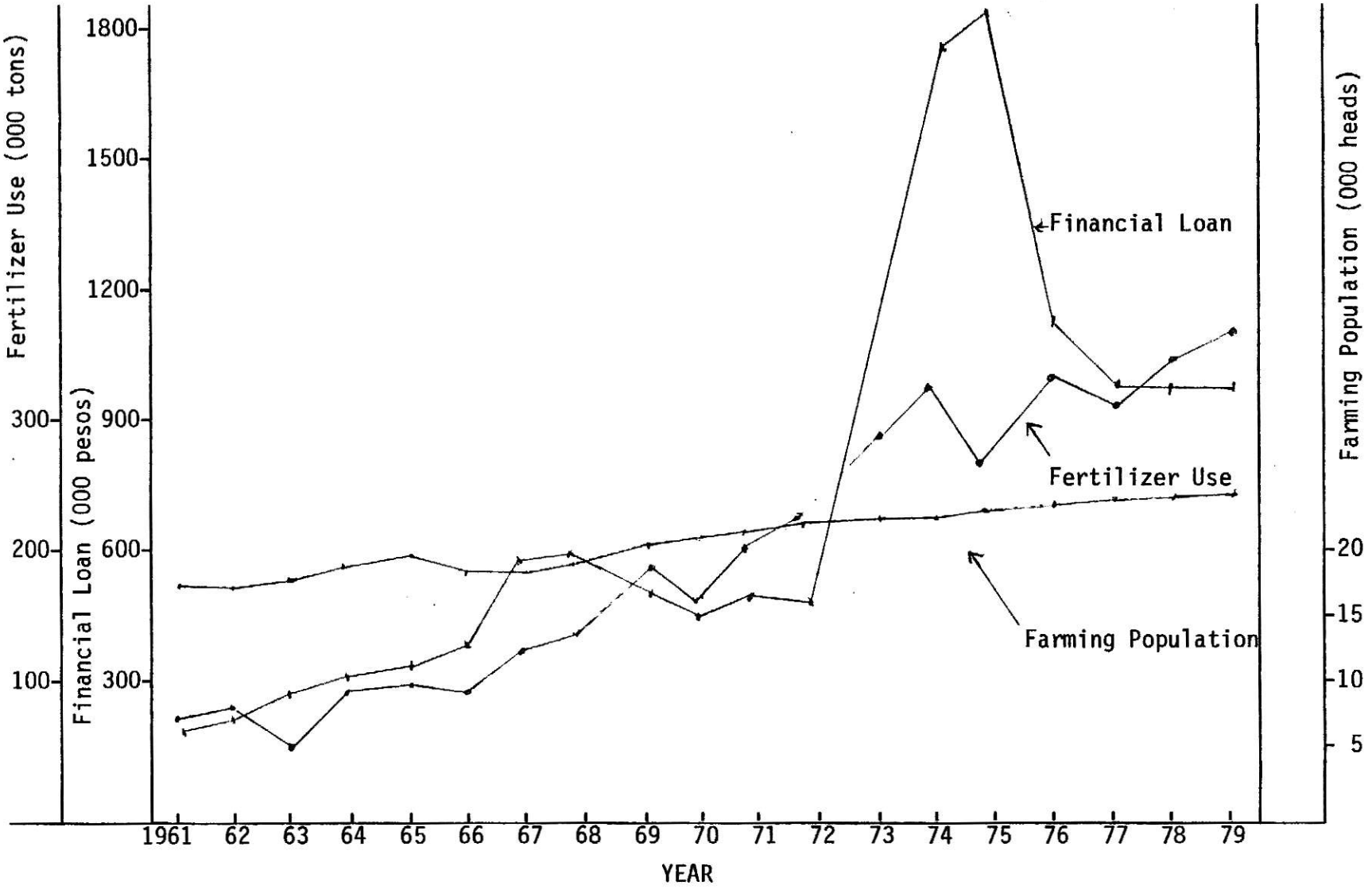


Figure 4. Trend in Fertilizer Use, Financial Loan and Farming Population in the Philippines, 1961-1979



shown in Figure 5 was accompanied by high fertilizer consumption and more irrigated rice acreage.

The basic rice production and input data were obtained from several sources. Total palay production, palay yield per hectare, total cropped area with and without irrigation and area planted with high-yielding varieties were taken from various rice production reports of the Bureau of Agricultural Economics, Ministry of Agriculture (MA). Palay cropped area was divided into irrigated and non-irrigated farms. Irrigated areas are harvested areas which are artifically watered by irrigation pumps and canals; while non-irrigated areas include rainfed, upland and kaingin areas.[25] Palay yield per hectare was obtained by dividing total palay output by total palay cropped area in a given year.

Basic data on total fertilizer consumption (all types) for palay production were gathered from an unpublished report of the Fertilizer and Pesticides Authority.

Information on financial loans includes both supervised and non-supervised palay production loans granted by the rural banks, Philippine National Bank, Agricultural Credit Administration and other financing institutions. This information was obtained from several sources; from the Agricultural Credit Report of 1972, from the Agricultural Credit Plan CY 1977-1982 of the Technical Board for Agricultural Credit, and from Philippine Agriculture in the Last Twenty Years by the National Economic and Development Authority.

Labor input is not measured by actual man days worked in the farm but by the total number of household members associated with farming

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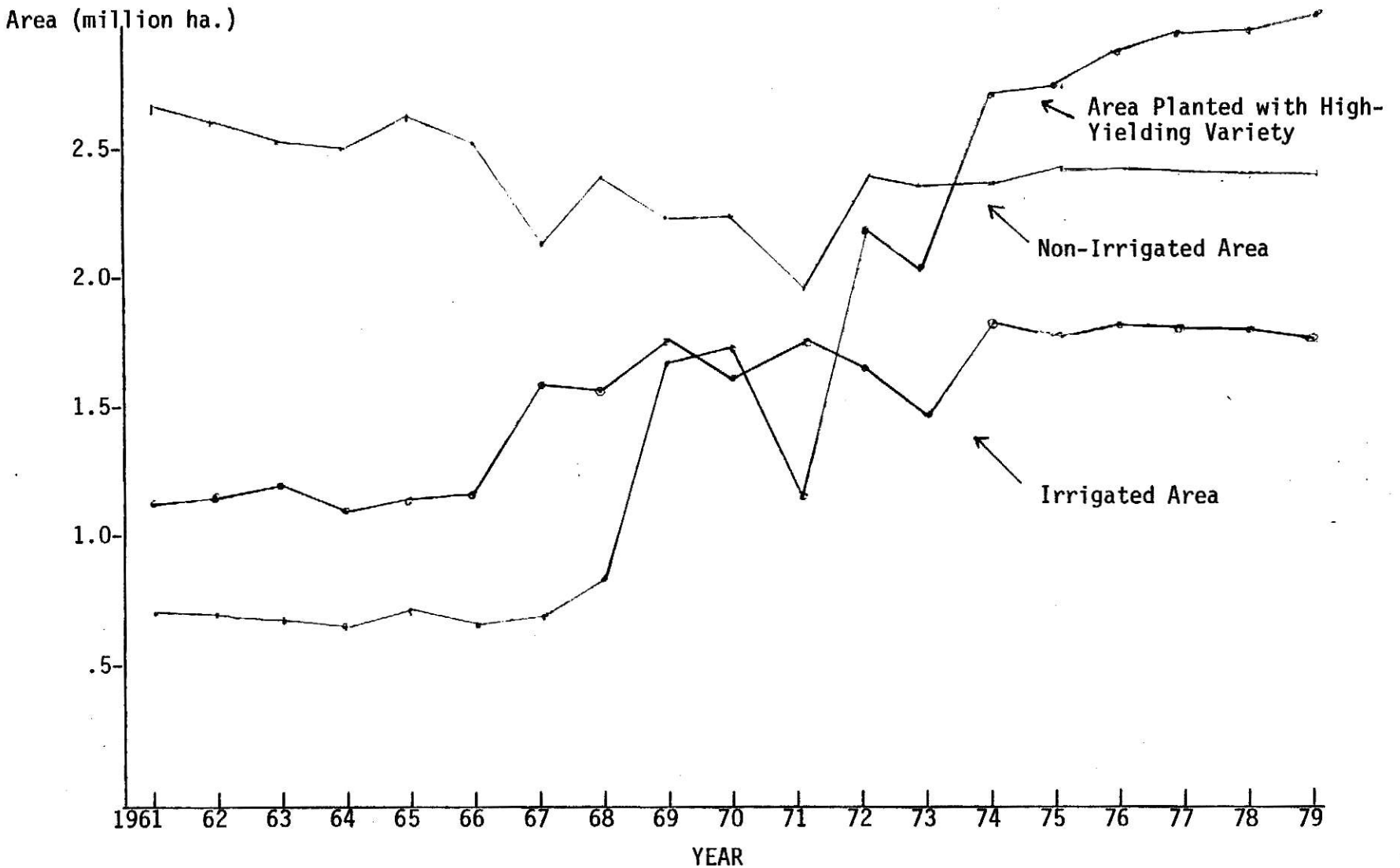
[25]As defined in the 1976 Crop and Livestock Survey (CLS) Operations Manual, Bureau of Agricultural Economics, Quezon City, Philippines.

Figure 5. Trend in Irrigated Area, Non-Irrigated Area and Area Planted With High-Yielding Variety in the Philippines, 1961-1979



population. Therefore strictly speaking, the labor variable refers to the stock of labor and not necessarily to the actual labor input in palay production. In general, there may be an upward bias on the labor input. The bias is likely to be inversely related to the size of farm, off-farm employment and level of production but directly associated with family size. Data on this total farming population was obtained from a World Bank Study on the Philippines.

CHAPTER VII

EMPIRICAL RESULTS

In this chapter, relationships among variables specified in the regression equations will be discussed as each regression equation is presented. The values of the t-statistics, R^2 and Durbin-Watson (d) statistic will be shown for each corresponding equation.

Production Equation:

$$P_t = b_0+b_1IRR_t+b_2NIRR_t+b_3HYV_t+b_4FU_t+b_5FL_t+b_6FP_t+e$$

The results of the production equation are summarized in Table 12. It can be said that from a purely statistical viewpoint, the estimated regression line fits the data well. The R^2 of .92 shows that 92 percent of the variation in palay production is explained by the six independent variables. The coefficients associated with irrigated area (IRR_t), non-irrigated area ($NIRR_t$), high-yielding variety (HYV_t), fertilizer use (FU_t) and farming population (FP_t) conform with theoretical expectation. The coefficients associated with irrigated area (IRR_t) and non-irrigated area ($NIRR_t$) are of the same magnitude indicating that a one unit change in each has about an equal effect on palay production in the Philippines. Fertilizer use (FU_t) and high-yielding variety (HYV_t) carried the expected positive coefficients, but their respective t-ratios are statistically insignificant. The coefficient associated with financial loan (FL_t) has an unexpected negative sign with a significant t-ratio. A priori one

would expect that a positive relationship between production and availability of capital or financial loans exists. It is traditionally accepted, that the more capital you have, the more you will be able to buy the required inputs such as fertilizer and pesticides, hence production should increase, other things being normal. The negative coefficient associated with financial loan (FL_t) could be partly explained by the nature of the data themselves. The data indicate that while financial loans dropped dramatically during crop years 1976 to 1979, production and yield continued to increase. This negative relationship could have affected the estimated coefficients.

Table 12. Regression Coefficients, T-Values and other Statistics for Variables Affecting Total Palay Production Using Data from 1961-1979

Independent Variable[a]	Regression Coefficient	T-Value
Irrigated Area (IRR_t)	1.9333*	1.5973
Non-Irrigated Area ($NIRR_t$)	2.0190**	1.8365
High-Yielding Variety (HYV_t)	.1276	.2335
Fertilizer Use (FU_t)	.0002	.0416
Financial Loan (FL_t)	-.7612**	-1.9785
Farming Population (FP_t)	.4848***	2.2440
Other Statistics		
Intercept	-9977.26	
R^2	.9167	
d	1.6684	

[a]***, ** and * = significant at 5, 10 and 20 percent levels, respectively.

The trend in farming population seems to most closely match the trend in production, (Previous analysis also showed that time was closely related to the trend in production.) The labor variable needs additional specification since it is only a proxy for the labor input in the production process.

Yield Equation:

$$Y_t = b_0+b_1IRR_t+b_2NIRR_t+b_3HYV_t+b_4FU_t+b_5FL_t+b_6FP_t+e$$

Table 13 summarizes the regression results of the above equation. The regression shows that the six independent variables together explain 88 percent of the variation in yield per hectare, and yet most of the variables are statistically insignificant. Irrigated area (IRR_t), non-irrigated area ($NIRR_t$), and high-yielding variety (HYV_t) although carrying the same positive coefficients as in the production equation, have insignificant t-ratios. Fertilizer use (FU_t) has a negative coefficient but an insignificant t-ratio. This suggests no relationship between fertilizer use and yield which is not correct since yield is very dependent on fertilizer use. Financial loans (FL_t) also shows a negative coefficient with a significant t-ratio. This suggests a negative relationship between financial loans and yield which is also incorrect.

Before any conclusions are made from the two equations, some weaknesses of the model should be pointed out. A time series analysis like the one performed, presents problem with respect to estimation procedure. A high degree of interdependence among explanatory variables (multicolinearity), as mentioned earlier will make the t-ratio less reliable

Table 13. Regression Coefficients, T-Values and Other Statistics of Variables Affecting Yield Per Hectare Using Data from 1961 to 1979

Independent Variable[a]	Regression Coefficient	T-Value
Irrigated Area (IRR_t)	.1155	.3206
Non-Irrigated Area ($NIRR_t$)	.0922	.2818
High-Yielding Variety (HYV_t)	.0483	.2966
Fertilizer Use (FU_t)	-.00009	-.0618
Financial Loans (FL_t)	-.2194**	-1.9156
Farming Population (FP_t)	.1453***	2.2616
Other Statistics		
Intercept	-1351.38	
R^2	.8771	
d	1.7052	

[a]*** and ** = significant at 5 and 10 percent levels, respectively.

but will still give unbiased estimates. Most variables used in the model exhibited a marked upward trend during the period studied. A simple correlation matrix is presented below for the variables used in both regression equations. It shows simple correlation among the variables as one possible indication of the existence of multicolinearity.

	T	TPP	Y	IRR	NIRR	HYV	FU	FL	FP
T	1.0000	.9360	.9186	.8550	-.3484	.9438	.9632	.7506	.9990
TPP	.9360	1.0000	.9800	.7999	-.2315	.9094	.8902	.6346	.9265
Y	.9186	.9800	1.0000	.7914	-.3586	.8567	.8674	.5578	.9143
IRR	.8550	.7999	.7914	1.0000	-.6340	.7747	.8122	.6422	.8619
NIRR	-.3484	-.2315	-.3586	-.6340	1.0000	-.1568	-.3155	-.0986	-.3777
HYV	.9438	.9094	.8567	.7747	-.1568	1.0000	.9495	.7675	.9348
FU	.9632	.8901	.8674	.8122	-.3155	.9495	1.0000	.7664	.9594
FL	.7506	.6346	.5578	.6422	-.0986	.7675	.7664	1.0000	.7472
FP	.9990	.9265	.9143	.8619	-.3777	.9348	.9594	.7472	1.0000

The possibility of autocorrelation also arises when the least square method is applied to time series data. The Durbin-Watson statistics show the existence of autocorrelation in the two equations.

The relationship among these variables were also estimated using only the data up to 1975. The regression results show that financial loan (FL_t) is positively related with production and yield (Appendix E). Nevertheless, the coefficients associated with non-irrigated area ($NIRR_t$) and fertilizer used (FU_t) in the production function became negative. When estimating yield, both irrigated area (IRR_t) and non-irrigated ($NIRR_t$) exhibited negative signs.

CHAPTER VIII

SUMMARY AND CONCLUSIONS

This report studies the Masagana 99 credit delivery system in the Philippines. Its key components as well as its procedures were reviewed and discussed. Likewise, its operational performances and accomplishments were summarized and analyzed. This study also demonstrates a technique which could be used to investigate the role of factors influencing palay farm's productivity in the Philippines. Additional data collection and analysis would be required to accurately estimate the impacts of factors on palay production.

Total palay production and yield per hectare were both expressed as a function of six independent variables; total cropped area with and without irrigation, total area planted with high-yielding varieties, total fertilizer use for palay production, total financial loans for palay production and total farming population as a proxy to labor utilization in palay production.

The empirical results reported in this paper are based on equations in which the variables are in the arithmetic form. The magnitude of R^2, the Durbin-Watson (d) and the statistical significance of the parameters were considered. In estimating the equations, multicolinearity and autocorrelation in the residuals proved to be a problem.

Measures to remedy the problem of multicolinearity are as follows; (1) use of a priori information, (2) combining cross-sectional and time-series data, (3) omitting a highly collinear variable, (4) transforming

data, and (5) obtaining additional or new data. On the other hand, the problem of autocorrelation could be remedied by transforming the data following the generalized difference equation method.

In the first equation using total production as the dependent variable, generally all explanatory variables (except financial loans) carried the expected positive coefficients. However, not all of them exhibited significant t-ratios. Only irrigated area, non-irrigated area and farming population have significant t-ratios.

The second equation with yield as the dependent variable had nearly the same pattern as the first equation in terms of the signs of the coefficients. The only difference was fertilizer which carries a negative coefficient. Only the coefficients for financial loans and farming population were significant at the 10 percent level.

This exercise did not accurately demonstrate the importance of many factors in the production of palay. It only demonstrated the use of an analytical technique in estimating the effects of various factors on palay productivity in the Philippines. It is suggested that appropriate data be collected; and that other empirical investigations be conducted for economic development policy. Increased production through the use of other factors influencing palay farm's productivity in the Philippines should also be studied. This would be possible only after a more detailed study of farmers' needs and uses of credit and other inputs at the farm level was conducted.

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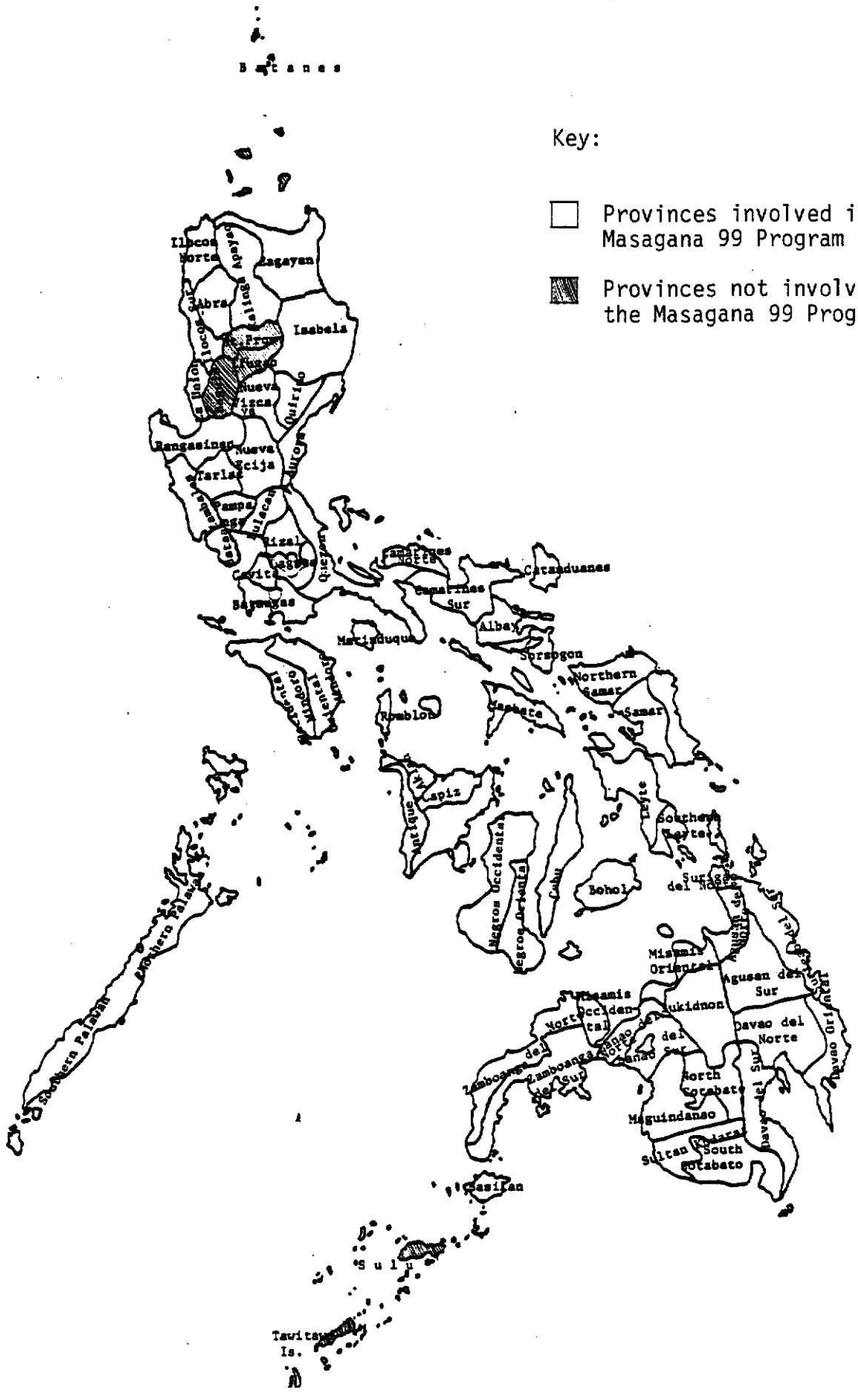
APPENDICES


Key:
Provinces involved in the Masagana 99 Program
Provinces not involved in the Masagana 99 Program
Batanes
Ilocos Norte
Apayao
Cagayan
Abra
Ilocos Sur
Isabela
La Union
Pangasinan
Nueva Ecija
Tarlac
Quirino
Aurora
Pampanga
Bataan
Zambales
Bulacan
Rizal
Cavite
Laguna
Quezon
Camarines Norte
Catanduanes
Camarines Sur
Albay
Sorsogon
Masbate
Northern Samar
Samar
Romblon
Capiz
Antique
Iloilo
Southern Leyte
Surigao del Norte
Negros Occidental
Cebu
Bohol
Misamis Oriental
Agusan del Sur
Misamis Occidental
Lanao del Norte
Lanao del Sur
Zamboanga del Norte
Zamboanga del Sur
Davao del Norte
North Cotabato
Maguindanao
Davao del Sur
Sultan Kudarat
South Cotabato
Davao Oriental
Southern Palawan
Basilan
Sulu
Tawitawi Is.

APPENDIX B. Promissory Note and Trust Receipt

Bank of _____

_____

Supervised Credit

PROMISSORY NOTE AND TRUST RECEIPT

Amount of Note: _____ Date of Note: _____

Maturity Date: _____

_____ days after date, I/We promise to pay jointly and severally, to the order of the Bank of _____, at its office at _____ the sum of _____ Pesos (₱_____). Philippine Currency, with interest at the rate of _____ percentum (_____%) per annum from _____ until fully paid.

If this loan under the supervised credit program involving food items is paid on or before maturity date, a 2% p.a. reduction in interest rate shall be granted to the borrower(s).

In the event this note is placed in the hands of a lawyer for collection, I/We jointly and severally shall pay TEN per cent (10%) as attorney's fees, computed on the principal plus interest and other allowable charges and fees, which attorney's fees shall not however, be less than FIFTY PESOS (₱50.00).

I/We furthermore expressly submit to the jurisdiction of the Municipal/City Court of _____ and/or Court of First Instance having the proper jurisdiction over any legal action arising out of this note.

Demand and dishonor waived. Holder may accept partial payment reserving his/its right of recourse against each and all endorsers.

The Bank having obliged itself to finance all inputs and cash requirements for the production of the commodities mentioned in my/our Farm Plan and Budget and for the cost of all inputs necessary to such production, it is of the essence of this contract that the portion of my/our harvest, sufficient to pay this obligation, computed at NGA support prices (in the case of palay and corn) or other government official prices, is acknowledged by me/us to belong to the bank, and for this purpose, I/We hereby execute this Trust Receipt over said portion of our harvest belonging to the bank, under the following terms and conditions, and other applicable provisions of the Trust Receipts Law (Presidential Decree No. 115).

1. I/We shall inform the bank three days in advance before harvest, to afford the bank the opportunity of sending its representatives;

2. After threshing and cleaning of the crop financed under this loan, I/we shall deposit at my/our expense with a warehouse designated by the bank that portion of the harvest in payment of this obligation in the name of the bank but for my/our account;

3. Between the date of my/our harvest and the date of the maturity of this note, I/we shall have the authority to sell or otherwise dispose of said portion of my/our harvest belonging to the bank, (whether in my/our possession or deposited in a warehouse as provided for above) at prices acceptable to the bank, and to turn over to said bank all proceeds of such sale to the extent of the amount due to bank under this note; any excess from said sale shall belong to me/us, but any deficiency shall likewise continue to be my/our obligation to the bank; should no sale or other disposition materialize on the date of maturity of this note, then the bank may sell said produce deposited in the warehouse and apply the proceeds of the payment of my/our obligation under this note, the consequences of excess or deficiency being as provided for above;

4. The risk of loss of that portion of the harvest belonging to the bank, whether in my/our possession or deposited in a warehouse designated by the bank, shall be for my/our account.

IN WITNESS WHEREOF, we have signed or thumbmarked this PROMISSORY NOTE AND Trust Receipt on this ____ day of _____, 197__ at _____.

Amount of Loan

_____ _____
(Signature/thumbmark of Maker)

_____ _____
(Signature/thumbmark of Maker)

_____ _____
(Signature/thumbmark of Maker)

APPENDIX C. Farm Plan and Budget

☐ IAF PROJECTS

Bank of _____

Loan Application for SUPERVISED AGRICULTURAL FINANCING ☒ NON IAF PROJECTS

Applicant _____ Age _____ Occupation _____
Married to _____ Age _____ No. of Dependents _____
Residence _____ Education _____
Location of Farm _____

I hereby apply for a loan of _____ (₱ _____)
for a period of _____ days repayable in installment/full at the rate of 12% per year

SPECIFIC PURPOSE OF LOAN APPLIED FOR:	AMOUNT	DATE NEEDED
	₱	

ASSETS AND LIABILITIES
As of _____
Assets:
Real Estate..₱_____
Farm Implement. ₱_____
Work Animal . ₱_____
Livestock/Poultry ₱_____
Buildings ..₱_____
Inventories.₱_____
Others .....₱_____
Total.....₱_____

SOURCES OF INCOME (PREVIOUS PERIOD)		EXPENSES (PREVIOUS PERIOD)	
	₱	Farm	₱
Rice Farming		Misc.	
Off-Farm Income			
		Family living	
TOTAL	₱	TOTAL	₱

FARM PLAN AND BUDGET

THE FARMER AND THE FARM:

	Area (Ha.)	Sharing System	Terms or Conditions
Owned			
Leased			
Tenanted			

Number of years in Farming _____
Period covered by farm plan From _____ to _____

Liabilities
Other bank loan ₱_____
Due date _____
Land Amortization ₱_____
Due date _____
Other debts ..₱_____
Due date _____
Total..₱_____
NET WORTH.. ₱_____

THE FARM PLAN:

1. CROP PRODUCTION: Wet Season Crops:	AREA 1/ NUMBER	TOTAL PRODUCTION	OPERATOR'S SHARE	QUANTITY FOR SALE	VALUE (a)
Dry Season Crops:					
Fruit Trees and Others:					
2. LIVESTOCK/POULTRY/FISH PRODUCTION					
3. AGRIBUSINESS:					
T O T A L - - - - - - - -					
OTHER SOURCES OF INCOME 2/ (Hired labor, etc.)					₱

CASH FARM OPERATING EXPENSES & CREDIT REQUIREMENTS PER PROJECT: 3/

CROP PRODUCTION:	Borrower's Equity 4/ (b)	Credit Needed (c)	Items	LIVESTOCK/FISH PRODUCTION: Borrower's Equity 4/ (b)	Credit Needed (c)
Seeds _____					
Land Preparation -					
Transplanting/Planting -					
Fertilizers -					
Pesticides and Weedicides					
Weedkiller and Rodenticides					
Labor & Irrig. Fee -					
Samahang Nayon Fee -					
T O T A L	₱	₱	TOTAL	₱	₱
	₱			₱	

1/ Excluded landlord, harvester, and thresher's shares in case of crops.
2/ Off and non-farm income of the farm family (based on the previous period).
3/ Provide extra sheets for each additional project and staple to this sheet.
4/ Includes all other farm operating expenses aside from loan.

D. SCHEDULE OF LOAN RELEASES AND REPAYMENTS:

DATE	P U R P O S E S	AMOUNT TO BE RELEASED	REPAYMENT	BALANCE
		₱	₱	₱

FARM BUSINESS ANALYSIS

1. Income from crops and livestock (Total of Item B (a)) ..... ₱_____
2. Net income from other sources (off and non-farm income) ..... ₱_____
3. Total gross income (1 + 2) ..... ₱_____
4. Family living expenses (based on previous period) ..... ₱_____
5. Other expenditure (land amort'n, debts, etc.) ..... ₱_____
6. Total family expenses and other expenditures ..... ₱_____
7. Net income before payment of the Bank loan (3 - 6) ..... ₱_____
8. Less: Cash farm operating expenses -
   8.1 Bank loan (Item C. (c)) ..... ₱_____
   8.2 Interest payment & other charges .... ₱_____
9. Net income after repayment of loan ..... ₱_____
10. Deduct: Borrower's equity (Item C, (b)) ..... ₱_____
11. Net Income (9 - 10) ..... ₱_____

I, _____, farmer-borrower under the Supervised Credit Program, do hereby promise to follow wholeheartedly the Bank Technician assisting me under this program. I am aware that to use the proceeds of this loan for purposes other than those indicated herein is unlawful.

DATE - _____ _____ (Signature of Borrower) _____ (Signature of Spouse)

I, _____, Supervised Credit Technician assisting the Bank of _____, Inc. shall be primarily responsible in supervising the farm of the farmer concerned until his loan is fully paid. Failure on my part to exercise due diligence in the course of my supervision shall be a ground for disciplinary action against me.

DATE - _____ _____ (Signature of Supervised Credit Tech.)

* *

ACTION ON LOAN APPLICATION

I. MANAGER

Approved for ₱_____
Term _____ Days _____
Remarks _____

_____
Signature:

_____

II. CREDIT COMMITTEE

Approved for ₱_____
Term _____ Days _____
Remarks _____

_____
Signature:

_____

APPENDIX D. Rice Production Data

Year	Total Palay Production (000 m.t.)	Yield per Hectare (000 kg.)	Irrigated Area (000 ha.)	Non-Irrigated Area (000 ha.)	Area Planted with High-Yielding Variety (000 ha.)	Fertilizer Use (000 m.t.)	Financial Loan (million pesos)	Farming Population (000)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1961	3705	1159	960	2238	640	66,770	155	14,871
1962	3910	1230	987	2192	635	71,920	190	15,224
1963	3967	1255	1014	2147	630	47,490	253	15,587
1964	3843	1245	930	2157	615	83,750	280	15,755
1965	3992	1248	958	2242	640	83,190	287	16,326
1966	4073	1310	960	2149	620	81,300	327	16,648
1967	4094	1322	1352	1744	620	105,610	468	16,977
1968	4561	1380	1309	1995	702	120,690	493	17,310
1969	4445	1334	1483	1849	1351	158,860	410	17,645
1970	5233	1681	1346	1768	1354	140,740	374	18,009
1971	5343	1716	1470	1642	977	167,080	434	18,440
1972	5100	1571	1328	1918	1827	187,150	341	18,709
1973	4415	1419	1241	1871	1680	250,450	848	18,985
1974	5594	1628	1491	1943	2177	273,170	1440	19,270
1975	5660	1599	1412	2127	2175	213,790	1538	19,560
1976	6159	1720	1495	2085	2300	238,280	964	19,852
1977	6456	1820	1490	2058	2417	254,040	809	20,151
1978	6895	1965	1515	1994	2457	292,850	812	20,453
1979	7198	2075	1466	2003	2510	309,320	809	20,760

Source: (1) to (5) Bureau of Agricultural Economics, Quezon City, Philippines.
(6) Fertilizer and Pesticides Authority, Manila, Philippines.
(7) Agricultural Credit Report of 1972 prepared by the Ad Hoc Committee on Credit; Technical Board and Agricultural Credit; National Economic and Development Authority, Manila, Philippines.
(8) World Bank Study on the Philippines.

APPENDIX E. Regression Coefficients, T-Values and Other Statistics of Variables Affecting Palay Production and Yield per Hectare Using Data from 1961-1975

	Total Palay Production		Yield per Hectare	
Independent Variable	Regression Coefficient	T-Value	Regression Coefficient	T-Value
Irrigated Area (IRR_t)	.9600	.8044	-.1379	-.3666
Non-Irrigated Area ($NIRR_t$)	-.0320	-.0241	-.4581	-1.0936
High Yielding Variety (HYV_t)	.5403	1.1076	.1641	1.0676
Fertilizer Use (FU_t)	-.0064*	-1.3700	-.0020	-1.3223
Financial Loan (FL_t)	.1903	.3806	.0396	.2516
Farming Population (FP_t)	.3285*	1.6425	.1037*	1.6457
Other Statistics				
Intercept	-2074.21		761.15	
R^2	.8645		.8167	
d	2.2820		2.2593	

*Significant at 20 percent level.

A STUDY OF THE MASAGANA 99 CREDIT DELIVERY SYSTEM IN THE PHILIPPINES

by

DIOSILE GALLITO ARIDA

A.B., Laguna Colleges, 1975
San Pablo City, Philippines

AN ABSTRACT OF A MASTER'S REPORT

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Agricultural Economics

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1982

Masagana 99 is a rice production program in the Philippines implemented in May 21, 1973 with the following objectives: 1) to recoup from losses incurred in the previous years, 2) to reduce rice importation, and 3) to achieve self-sufficiency in rice in the shortest possible time. In this paper, the credit component of the program was reviewed and studied, and its accomplishments discussed.

Another objective of this study was to demonstrate a technique which could be used to investigate the role of factors influencing palay farms' productivity in the Philippines.

The postulated relationship is that total palay production and yield per hectare are a function of total cropped area with and without irrigation, total area planted with high-yielding varieties, total fertilizer use, total financial loans and total farming population as a proxy for labor. Multicolinearity and autocorrelation were present in both equations.

In the first equation using total production as the dependent variable, generally all explanatory variables (except financial loans) carried the expected positive coefficients. However, not all of them exhibited significant t-ratios. Only irrigated area, non-irrigated area and farming population have significant t-ratios.

The second equation with yield as the dependent variable has nearly the same pattern as the first equation in terms of the signs of the coefficients. The only difference was fertilizer which carries a negative coefficient. Only the coefficients for financial loans and farming population were significant at the 10 percent level.

The importance of many factors in the production of palay was not accurately demonstrated in this study. It only demonstrated the use of

an analytical technique in estimating the effects of various factors on palay productivity in the Philippines. Collection of appropriate data and a conduct of other empirical analysis for policy decision is suggested.