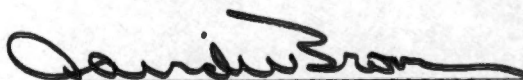


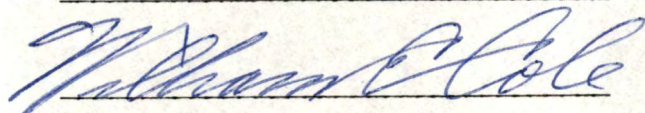
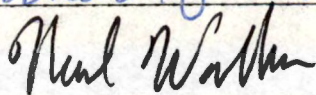
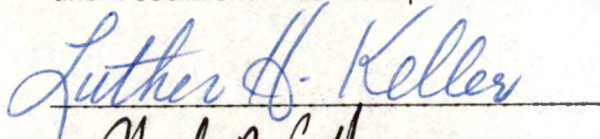
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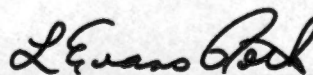


David W. Brown, Major Professor

We have read this dissertation
and recommend its acceptance:



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Graduate Studies and Research

PERSPECTIVE ANALYSIS OF SMALL COMMUNITY CAPITAL ACCUMULATION
(PASCCA): A MODEL FOR DIAGNOSING LOCAL IMPACTS OF
AGRICULTURAL CHANGES, WITH APPLICATIONS TO
WEST JAVA RICE VILLAGES

A Dissertation
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ABSTRACT

In this study an analytical tool was developed to evaluate local impacts of agricultural changes on specific groups of farmers and workers in communities that depend heavily on a single commodity. The resulting model, "Perspective Analysis of Small Community Capital Accumulation" (called PASCCA for short), uses surplus from the dominant enterprise as the indicator to evaluate these impacts. It is built around representative neighborhoods (called "production communities") within which farmers and workers are grouped according to size of farm and roles in agricultural innovation. Each production community consists of a dominant farmer (or group of farmers) and households of other producers/workers who have labor or capital transactions with that dominant producer. The components of this model include 1) the composition of a typical production community; 2) labor and capital transactions among households in that community as well with outside groups; 3) key changes in government programs or agricultural technology being analyzed; and 4) impacts of these changes on production, household consumption, and surplus of the dominant commodity.

The PASCCA model is a simplification of Leontief input-output analysis. Leontief analysis examines interrelationships among all major sectors at an area-wide level. In contrast, PASCCA focuses on household linkages associated with a single major enterprise. This makes it easier to trace changes in traditional agrarian economies, where data may be sparse and transactions are often in terms of a certain commodity rather than money.

Village situations in West Java where rice is the dominant enterprise were used to help evolve the PASCCA model and to illustrate its use. Information needed for this empirical application was synthesized from several sources: census data for 1973 and earlier; a series of agro-economic surveys in West Java, 1967-1976; reports about Indonesian agricultural modernization programs; personal insights of the author based on his roles as a program supervisor, enumerator, and analyst in West Java since 1965; and published research from elsewhere in Southeast Asia. A representative production community for West Java was defined as having one large farmer (two hectares of wet-rice land), two medium farmers (0.6 hectares each), four small farmers (0.3 hectares each), and four landless workers.

One use of the PASCCA model is to examine effects of previous programs on surpluses of communities as a whole, as well as on distribution of surpluses among farmer/worker classes. In the West Java example, three recent government rice intensification programs were compared: Bimas with intensive guidance, Bimas with less intensive guidance, and the Mass Intensification program. Under the assumption made, it appeared that the intensive Bimas program generated the most surplus, but it also seemed to be the program in which relative gains of small farmers and landless workers were least.

The PASCCA model can also aid future policy decisions by predicting changes likely to result from proposed programs. To illustrate, two possible refinements of the Bimas and Inmas programs in West Java were examined: 1) a plan to rotate intensive help from one locality to another (which was predicted to increase overall surplus levels) and 2) a plan to encourage cooperative ownership of small

tractors and rice mills (which was predicted to improve equity of rice surplus at the expense of total surplus). In further analysis, it was shown how aggregation of production community relationships to wider areas could provide a basis for estimating program net benefits as well as capabilities of specific groups to pay the costs.

It was suggested that the PASCCA model can be applied to other places in and outside Indonesia, as well as to non-rice economies, so long as there is a dominant enterprise where links and terms of trade center around a particular commodity. Also discussed were possible refinements in data sources, adaptations of the model to provide a more dynamic picture of changes over time, simplifications to encourage use by local decision makers, and useful followups in Indonesia.

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GLOSSARY OF TERMS AND ABBREVIATIONS

- Ani-ani: A small hand-knife for rice harvesting
- Bawon: Yield share for harvesters
- Bibil Unggul Nasional (Ungnas): A high yielding variety of rice which was developed by the experiment stations in Indonesia
- Bimas program: The Indonesian government rice program which was designed to increase rice production through a combination of extension activities and the cooperation of other service organizations which provide physical inputs and farm credit (Mass Guidance)
- Bimas Gotong Royong: The Bimas program which involved the Indonesian government, farmers, and seven foreign companies, mostly manufactures in 1969 and 1970 (Cooperative Bimas)
- Bimas SSBM: Self-Supporting in Foodstuffs Bimas in 1965-67
- Bimas Yang Disempurnakan: Improved Bimas program which was started in 1969/70
- BIG: Bimas with Intensive Guidance
- BIG/Inmas Rotation Programs: The program that each BIG and Inmas activities are rotated each year from one desa to another within a village unit
- BLG: Bimas with Less Intensive Guidance
- Biological Technologies in Rice: Technologies which are concerned with the use of high yielding varieties of rice
- BIPIK (Bimbingan dan Pengembangan Industri Kecil): Small Industrial Development and Guidance
- BRI (Bank Rakyat Indonesia): Indonesian People's Bank
- BUUD (Badan Usaha Unit Desa): Village Unit Administrative
- Camat: A government official who administrates a sub-district or kecamatan
- Capital: Land, building and structures, major consumer durable goods, machines and implements, livestock, perennial plants, public infrastructure, farm inputs and output inventories, financial assets, and human capital/education

Ceblokan: A system where women who help transplant and weed have the sole right to harvest a farmer's rice field

Chemical Technologies in Rice: Rice technologies which are concerned with the application of chemical fertilizers and insecticides/fungicides

DAC's: Developing Asian Countries

Demas (Demonstrasi Masal): Mass Demonstration program in rice in 1964-65

Desa: The bottom administrative unit in Indonesia

Diklat (Pendidikan dan Latihan): Education and Training

Gabah: Threshed paddy

Gotong-royong: Cooperative helps

HYV's: High yielding varieties

Ijon: The obligation to sell agricultural products or to work for somebody who lends him cash

Inmas (Intensifikasi Masal): Mass Intensification program in rice without credit provision

Kabupaten: Regency; similar to the county level

Kecamatan: A district or a township level

Kepala Desa: The head of a desa

KIK (Kredit Industri Kecil): Small Industrial Credit

KUD (Koperasi Unit Desa): Village Unit Cooperative

Landak: Rotary weeder for rice

Liliuran: Bartered labors

Mechanical Technologies in Rice: Use of tractors for land preparation, sickles for harvesting, and rice mills for processing

Modern varieties of rice: The HYV rice which has been developed in International Rice Research Institute (IRRI), the Philippines

MTGP: Program of Guidance toward the Adoption of New Mechanical Technologies

Padi: Rice plants (paddy)

Padi Centra: An Indonesian Government rice intensification program in 1959-62

Panca Usaha: The five-fold way to increase rice production: 1) using of high-yielding varieties seeds, 2) proper fertilizer application, 3) adoption of improved cultivation practices, 4) control of pests and diseases, and 5) efficient use of irrigation water

Pancen: Rice collection from the owner of wet-land rice fields for desa/village officials

Pasca Sarjana: Post-graduate study

PASCCA Model: Perspective Analysis of Small Community Capital Accumulation model

Pengairan sederhana: Simple irrigation system which is managed by desa or a locality

Penulis: Secretary

P.N. Pertain: An Indonesian Government corporation which manages the supply of fertilizers

PPIK (Proyek Pengembangan Industri Kecil): Small Industrial Development Project

PPL (Penyuluh Pertanian Lapangan): Agricultural extension field worker

Primary Consumption: Consumption of food, salt, sugar, kerosene, and coconut oil, soap, textiles, and ritual ceremony

Production Community: A community (neighborhood) consisting of one dominant producer and other producers or workers who have jobs or capital relationships with the dominant producer

Rice surplus level: Net family income from rice production and processing over primary consumption

R.K. (Rukun Kampung): A geographical and administrative unit below the desa level

R.T. (Rukun Tetangga): Neighborhood Association (below the R.K. level)

Rupiah (Rp): Indonesian currency (\$1 = Rp625)

SAEI (Survey Agro Ekonomi Indonesia): Indonesian Agricultural Economics Survey

Sawah: Wet-land rice fields

Small Rice Community: A production community in rice which in West Java typically consists of one large farmer (2.00 hectares sawah), two medium farmers (0.60 hectares sawah each), four small farmers (0.30 hectares sawah each), and four landless workers

Selamatan: Ceremonial feast

Tabanas (Tabungan Pembangunan Nasional): National Development Saving Scheme

Taska (Tabungan Asuransi Berjangka): Insurance Saving Scheme

Tebasan: The rice harvesting system where a rice buyer manages harvesting tasks himself

T.S.P.: Triple superphosphate fertilizer

Ulu-ulu: The person who handles the sawah irrigation system at desa level

VUTW (Varietas Utama Tahan Wereng): The rice variety which is resistant to a leaf-hopper which carries a virus (wereng)

Wilud (Wilayah Unit Desa): Village Unit covering between 600 and 1000 hectares sawah, and consisting of 3-4 or more desas

CHAPTER I

INTRODUCTION

Benefit Maldistribution Problems of Agricultural Changes

Governments in most developing countries have been trying to increase their main agricultural production in several ways--i.e. introduction of the high-yielding varieties (HYV), introduction of modern fertilizers and pesticides, improvement of irrigation systems, and providing credit for the farmers.

Despite their successes in terms of yields per hectare and total production, the benefits are not always widely distributed among groups of people in rural areas. Nihal Amerasinghe's study, from a random sample of 55 farmers and 7 non-farmers from 1966/67 to 1970/71 in a settlement scheme in Ceylon, concluded:¹

The benefits of the HYV rice had been inequitably distributed, and it is imperative to introduce some policy measures to ensure a better distribution and minimize such disparities in order to avoid the social tensions that could develop as a result of such polarization.

Another implication of the use of the HYV rice is the change in rice harvesting methods from the traditional to the new ones. For example, in Java rice producing areas the rice harvesting methods change from the use of small hand knives ("ani-ani") to the sickles and scales,

¹Nihal Amerasinghe, "The Impact of High-Yielding Varieties of Rice on A Settlement Scheme in Ceylon," in Readings in Asian Farm Management, ed. Tan Bock Thiam and Shao-er Ong (Singapore: Singapore University Press, 1979), p. 287.

and from the "ceblokan" to the "tebasan" systems. Collier, Wiradi and Soentoro's study about these changes, in four villages in Central Java in 1972/73, implied:²

These changes will widen the income gap between land-owners, traders, and village leaders on one side and harvesters, especially the itinerant labours who cannot effectively protest, on the other. . . . It is clear that certain segments of the rural population are gaining at the expense of the poorer groups from these social changes.

The introduction of small rice mills has also the undistributional effects on the village life. One Indonesian economist (cited by W.L. Collier) has stated that:³

Nowdays villages are humming with small Japanese-made engines, milling paddy; they are called rice hullers. These innovations profit the landowners or the owners of the paddy. The rice is better polished, less broken, and hence fetches a better price. It can also be stored a little longer than the hand-pounded rice. Yet, as a result many female workers at hand pounding are forgone with adverse distributional effects.

Based on the consideration that small farmers need financial assistance to have access to the introduction of HYV rice and modern fertilizers/pesticides, most developing Asian Countries (DAC's) have been providing agricultural credit assistance for about two decades.

²W.L. Collier et al., "Recent Changes in Rice Harvesting Methods: Some Serious Social Implications," in Readings in Asian Farm Management, ed. Tan Bock Thiam and Shao-er Ong (Singapore: Singapore University Press, 1979), p. 265.

³W.L. Collier, "A Comment on Choice of Technique in Rice Milling on Java by C. Peter Timmer" in Readings in Asian Farm Management, ed. Tan Bock Thiam and Shao-er Ong (Singapore: Singapore University Press, 1979), pp. 333-334.

Unfortunately, in most cases this assistance has not performed as well as expected. Tongroj Onchan argues that:⁴

In most developing Asian countries, the increased availability of funds from credit institutions has been to the advantage of larger and wealthier farmers. This is quite evident for programmes such as the Masagana 99 (in the Philippines), Bimas/Inmas (in Indonesia), and IADP (in India) where staggering overdues were experienced.

Further he argues that the small and landless farmers appear to reject public credit programmes either by non-participation or by defaulting repayment. This defaulting repayment might be either their intention not to repay the loans or other factors--e.g. the low productivity of credit use associated with low incomes, ineffective loan collection methods, and natural calamities.

Based on the above issues, the contents of this dissertation will be concerned with the effects of agricultural changes (either with or without government actions) on the wellbeing of specific groups of people in the rural areas.

An Analytical Tool for the Evaluation of Agricultural Changes

The main task of this study is to find and develop an analytical tool (model) for evaluating the effects of agricultural changes on

⁴Tongroj Onchan, "Agriculture Credit Policy in Asian Countries" in Readings in Asian Farm Management, ed. Tan Bock Thiam and Shao-er Ong (Singapore: Singapore University Press, 1979), pp. 307-311.

different groups of people.⁵ West Java rice producing areas will be presented as an example of the empirical application of the model.

Several factors will be considered in developing the model. First, the model would include different groups of people in terms of the size of their enterprises and their influences on the adoption of a new agricultural practices. The model would also take account of the actual interactions among these groups of people. These interactions might be in the forms of labor and capital transactions.

Second, the model would have to avoid bias of estimation, especially bias through the aggregation and specification processes. Three approaches would be useful to handle these bias problems, i.e.: 1) the area to be analyzed by the model is small (a small locality), 2) the information to be obtained is from a smallest unit of production or enterprise (primary data) and 3) the activities to be included relate only to the main enterprise of those different groups of people.

Third, the model would consider the scarcity of computer facilities in most developing countries. Most developing countries do not have sophisticated computers for complicated analysis.⁶ The

⁵Earl R. Swanson, in the matter of the agricultural economist's contribution in working with other disciplines, argues that agricultural economist may contribute the modeling approach to provide a satisfactory environment. Earl R. Swanson, "Working with Other Disciplines" in American Journal of Agricultural Economics, Volume 61, No. 5 (December 1979), p. 857.

⁶Richard A. King argues that modern computers and detailed systems models make it feasible to analyze larger sets of choices than ever before. However, time and money seldom permit estimation of all the need underlying relationships. Richard A. King, "Choices and Consequences" in American Journal of Agricultural Economics Volume 61, No. 5 (December 1979), p. 839.

model would not require either the sophisticated computer for analysis or high mathematics to be understood.

Finally, the model should be usable not only by persons who are at university campuses (faculty and students), special research institutes, or government agencies but also by local government officials who usually do action more than research or the informal leaders of certain localities. For this purpose, the model should be developed according to their levels of education. For example, in Indonesia most government officials at district level have not studied beyond junior college or even high school levels. A model without highly complicated computer analysis and mathematics might be useful for their knowledge or as an aid for their decisions.

Agricultural Surplus as A Key Indicator for the Evaluation

Surplus of a main agricultural product can be one of the main indicators of economic progress in a locality. The availability of a surplus means there is the possibility of the rural people forming their own capital.⁷ The availability of the agricultural surplus indicates improved abilities of the farmers to repay their debt, to pay the irrigation fee or to buy modern inputs from the market. The surplus indicates also the possibility of absorbing products that are produced outside the area. This suggests good prospects for non-

⁷The term of capital here includes: land, building and structures, major consumer durable goods, machines and implements, livestock, perennial plants, public infrastructure, farm inputs and outputs inventories, financial assets and human capital/education.

agricultural production and secondary agricultural production in the region. It will encourage individual businessmen to come to rural places and open new businesses that serve the changing needs and demand patterns of the rural people. It also creates non-farm employment.

If in fact there is a negative surplus or deficit in one area, it shows how important it is to have secondary crops and non-agricultural products to provide employment and income for local people. Whether it is positive or negative, the surplus carries further implications for policy makers. Analysis of surplus potentials helps to identify the kinds of government assistance that can increase the surplus.

In addition to the total surplus, the distribution of the surplus among classes of people has also to be considered for the implementation of such programs. This is due to the other major goal of rural development--to have a better income distribution in rural areas. Differences in the surplus among classes of people in a locality indicate the variations of the capability of rural people to accumulate their capital. Since capital generates income in a reproducing process, variation in surplus is probably a good indicator of the variation of income in the near future. The finding of the surplus distribution provides supplementary information to help policy makers to consider the appropriate programs for a locality.

Based on these considerations, the surplus of a dominant enterprise in a locality will be considered the main indicator of the local impacts of an agricultural change or a government program.

Objectives of the Study

This study has four central objectives:

1. To develop a model for diagnosing the effects of agricultural changes--i.e. government programs and technological changes--on different groups of people in a locality.
2. To show how the model works by using a typical rice producing area in West Java as an example. The effects of government rice programs--Bimas and Inmas--on the total and distribution of rice surplus in this locality will be examined. This work will be based on available data about West Java from a variety of sources.
3. So far as possible from data and estimates available, to illustrate the use of the model for policy decisions concerning the alternative government programs that can stimulate larger rice surpluses and more equal distribution among households in a typical rice producing area (West Java).
4. To identify the specific kinds of information that are needed if more refined analyses of agricultural changes are to be undertaken by using the model developed here as a point of departure.

The Analytical Approach

This study approaches these objectives in the following manner:

Chapter II depicts in further detail the West Java situation on which the representative example for building a model is based. The discussion includes a description of 1) the desa as the bottom administrative unit in Indonesia, 2) the rural people, and 3) certain aspects of rice production. It discusses present patterns of spending

incomes from rice production, including the spending on capital. Ways that rural people get the liquid assets from within the desa or from nearby towns will also be shown in this chapter. The relationships among classes of people in terms of production, capital and labor are described for the rice producing areas. Likely directional impacts of changes in institutions and rice technologies on these relationships are postulated. Finally, the discussion will emphasize the government programs that are being used to stimulate the rural people to form capital through the accumulation of the rice surplus. This will include the problems that occur in connection with the implementation of those government programs.

Chapter III discusses the conceptualization of the model. This includes comparisons of its characteristics with a standard model--i.e. Leontief input-output analysis. The key components of the model will 1) be described in general and 2) depicted for the specific West Java rice producing situation with the Bimas and Inmas programs. Finally, this chapter will discuss the application of the model to the typical West Java situation in more formalized matrix terms.

Chapter IV shows how the model works by using the available data in West Java. The discussion will include: 1) the sources of data and methodological approach; 2) the basic characteristics of the typical small rice community; 3) the detailed flow of labor hours, labor income, and capital among classes of people; 4) the standard input-output coefficients in rice production and processing; and finally 5) interpretation of the summary analysis for the typical small rice community (production community) with the implementation of different government rice programs.

Chapter V discusses the applications of the model to policy decisions. The discussion will depict the usefulness of the forward analysis of the model in predicting the local impacts of proposed policy and action programs in West Java. Local impacts of two kinds of government program will be predicted by using the model developed here: 1) programs to increase rice production per hectare and, 2) programs for solving income maldistribution problems.

Chapter VI discusses the further applications and refinements of the model. Applications potential of the model will be discussed for 1) non-rice production communities and 2) places other than West Java-- i.e. in Indonesia and other countries. The possible refinements of the model include: 1) the key information needs and ways to get this information, 2) improvements of the model for further research ideas, and 3) adaptations of the model for use by local decision makers. The suggested followups in terms of: 1) teaching and research and 2) diffusion to Indonesian government and other countries will be also depicted in this final chapter.



CHAPTER II

DESCRIPTION OF WEST JAVA RICE-PRODUCING SITUATION

Introduction

West Java is one of the 27 provinces in Indonesia. Its area surrounds the metropolitan area of Jakarta, the capital city of Indonesia. To the east, it borders the province of Central Java, the Java Sea to the north, the Sunda Straits to the west and the Indian Ocean to the south.¹

Generally, West Java is a complex mountainous area in the center of the Priangan highlands. Bandung, the capital city of West Java province, is located in those highlands. It is populated to a great extent by Sundanese. There were about 22 million people in 1971 and 24 million in 1976.² The Sundanese were originally indigenous to the Priangan uplands known for the poor soil. They have moved down to the lowlands to establish wetland farms (sawah) and grow rice.

The Sundanese language, which has a written literature and its own script, consists of several dialects. It gradually changes into Javanese in the areas of Indramayu and Cirebon to the east of the Priangan Highlands. In the northwestern part of West Java--Banten area--the rural people are bilingual. They speak Sundanese and a dialect of Javanese.

¹See Figure A-1.

²R.C. de Iongh et al., *Indonesia: Yesterday and Today* (Sydney: Ian Novak, 1973), p. 28. See Statistical Pocketbook of Indonesia 1977/1978 (Jakarta: Biro Pusat Statistik, 1978), p. 29.

According to the population census in 1971, the population of West Java was about 22 million and increasing at a rate of 2.1 percent. The average density of population was more than 1400 people per square mile.³

Administratively, West Java consists of 23 kabupaten (regencies) and 350 kecamatan (sub-districts).⁴

Description of Desa

General

In Indonesia, the desa is the bottom administrative unit; it is below the kecamatan level. Generally, it is called local or village level. As a comparison, the desa is the same level as the barrio in the Philippines, brigade and production team in China, hamlet in Japan and Korea, kampong in Malaysia, local community in Yugoslavia and panchayat in India.⁵

In relation to the importance of agriculture for the population, there are two types of desa: 1) rural desas, and 2) urban desas. A rural desa is a desa where agriculture is the main source of its

³Nena Vreeland, Area Handbook for Indonesia. Third Edition Washington, D.C.: U.S. Government Printing Office, 1975), p. 75.

⁴Norman T. Uphoff and Milton J. Esmen, "Local Organization for Rural Development in Asia" in Development Digest Vol. XIII, No. 3 (July 1975), p. 33. Kabupaten is usually known as the county level, with population of one or more hundred thousands. Other similar levels are changwat in Thailand, counties in China, Korea and Taiwan. Kecamatan is usually known as a township level, with population generally in the range of 20,000 to 50,000. Similar terms used are amphoe in Thailand, blocks in India, divisions in Srilangka, mukim in Malaysia, mura in Japan, township in Korea and Taiwan, and union in Bangladesh and Pakistan.

⁵Ibid.

population income; on the other hand, an urban desa is a desa where most of the income is not from the agricultural sector.⁶

This study will emphasize the rural desa, especially where rice is the main agricultural product--the rice village. Since some references use the term village instead of desa, the terms village and desa will substitute for each other in further discussion.

Historically, the desa was developed from the establishment of wet-rice culture. Land was owned collectively, reflecting the communal nature of the irrigation system and the labor plan for cultivating the terraces. Each family had its rights to use and to manage collective domains.⁷ Now most of the land is owned by individuals. However, some communal land is still reserved by the village for the common benefit.

A typical village is a cluster of houses or huts, surrounded by rice fields (sawah) or dry fields (tegalan) and occasionally by hedges or bamboo groves (Figure 2.1). At various spots in the village are found a few small shops (warung) which sell tobacco, kerosene, sugar, salt, other foodstuffs and articles for daily consumption. Some of these also serve meals and drinks.

⁶Agro Economic Survey, Rural Dynamic Study-Methodology Report No. 2: The Identification of Urban Desa (Bogor: Agro Economic Survey-Rural Dynamic Study, 1975), p. 2. This survey defined the urban desa as having the following characteristics: 1) Seventy-five percent or less of desa land is for agriculture, 2) The leading source of income is from the service sector, 3) More than 25 percent of the primary employment is from outside agriculture, 4) Its population density is 4000 people or more per square-kilometer, 5) The number of four-wheeled vehicles in the desa is 20 or more, and finally 6) The number of tukang (artisan) occupation is 14 or more. This identification was needed for the elimination of the urban desa from the samples in the Rural Dynamic Study. The numbers are likely to change due to the time and development process.

⁷S. Tas, Indonesia: the Underdeveloped Freedom. Translated from the Dutch by Derek S. Jordan (New York: Pegasus, 1974), p. 3.

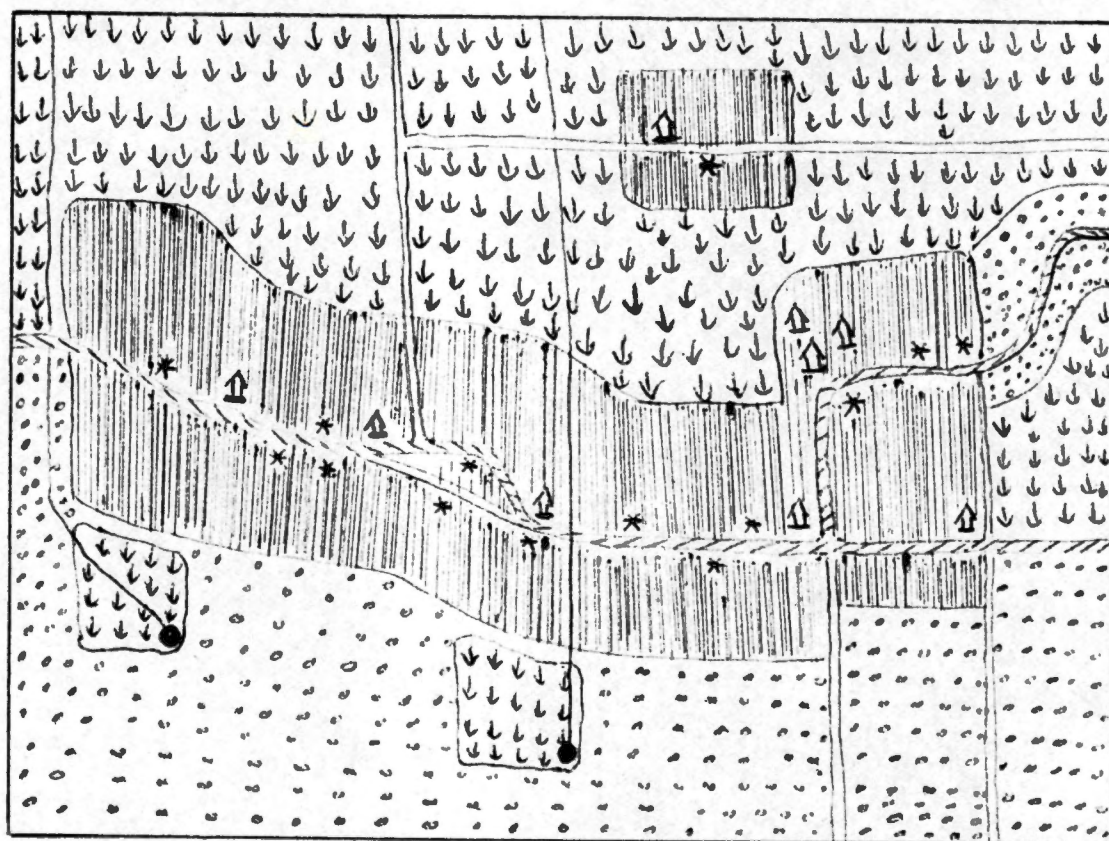


Figure 2.1. A Typical Desa in West Java.

-  Residential area.
-  Small shops or rice mills.
-  Public buildings: desa hall, elementary schools, mosques, and night-watches.
-  Provincial or regency road; it is managed by the provincial or regency governments.
-  Desa road; it is managed by the desa government.
-  Local water sources and simple irrigation canal (pengairan sederhana).
-  Wet-land rice fields (sawah).
-  Dry agricultural land ("tegalan" or "kebun").

The desa hall (balai desa) is normally built by the villagers themselves, who contribute money, or building materials and labor, or both. Government subsidies are available to cover part of the costs. Other public buildings in the village might include a mosque or a church according to the prevailing religion in the village. Near the major road junction there is usually a night watch house (gardu), a sort of police station. The kampung which is far from the desa hall has a kampung hall; its size is less than the desa hall. Finally, there is the elementary school (sekolah) building except in the very small village.

Markets vary considerably in size and appearance. The market may be just an open space at the junction of a main road and the village road where the village woman squat with baskets of rice, corn, or fruit awaiting the middleman to buy the product. Or it may be a large building with tiled roof and a great number of stalls. The desa government levies a small fee in return for permission to trade. The goods coming for sale from outlying villages are mostly foodstuffs such as corn, rice, fruits, vegetables, handmade batiks, baskets, mats, and products of cottage industries. The goods coming from the town include such items as clothing, metal utensils, different kinds of goods that are made from plastic, radios and food. These markets usually open once a week; two or three desas might have the same day of market operation.

Desa Administration

The head of the desa (kepala desa) is either elected by the villagers or appointed by the government. The kepala desa appoints one or more clerks (penulis)--depending on the desa size. Each desa consists

of several villages (rukun kampung, RK); each RK is headed by a ketua RK. In one RK there are several neighborhoods (rukun tetangga, RT); each RT is headed by ketua RT. Other desa officials include: 1) the person who handles the security and safety of the desa (polisi desa); 2) the person who handles the religious matters (penghulu), and 3) the person who works for the sawah irrigation system (ulu-ulu).

The salary system for desa officials is not always the same for all desas. In one desa, the kepala desa and penulis might be provided a public wet-land or dry-land block (bengkok). They have the right to cultivate these lands as long as they serve the desa. In a desa which does not have this kind of land, the land owners in the desa have an obligation to contribute a portion of their rice or money for the salary of desa officials (pancen). The collected pancen is distributed to the desa officials--except the ketua RT--according to their rank.⁸ The ketua RT is compensated by being freed from doing public works tasks as a desa citizen.

Desa funds are largely from rental properties and village taxing power. The desa, especially where the kecamatan (sub-district) government is located, rents the land or building to the government--branch or central--for use as banks, schools, post office, and kecamatan office. The other sources are from selling perennial trees or fruits from desa land, sport fields, taxes on marriage, celebration,

⁸ Andrea W. Palmer, "Situradja: A Village in Highland Priangan" in Villages in Indonesia ed. Koentjaraningrat (Ithaca: Cornell University Press, 1967), p. 317. This study found out that from pancen collected from the landowners were distributed to kepala desa (42 percent), two clerks (13 percent each), 5 ketua kampung, polisi desa, and ulu-ulu (4 percent each), and 3 penghulu (1 percent each).

slaughtering cattle, house building, heavy transportation, interest on money saved, contributions from citizens for building, and pancen. The desa expenditures consist of salaries of the desa officials, administrative costs for tickets and paper, capital costs for construction or rehabilitation of public buildings.

Description of Rural People

Households and Their Occupations

The household usually consists of members of one nuclear family. However, it frequently includes other relatives, boarders, or servants. Its composition is constantly changing, as relatives come to stay after economic hardship in the city; sons-in-law move in temporarily at marriage, married daughters come home to bear their children or return after divorce, and grandchildren join the household for periods ranging from days to years. This indicates the very close relationship between the children and their parents. In addition, the parents of young couples become relatives after the marriage.

In some desas in the northern area, the Karawang regency, the average size of the large, medium and small farmer household was 9.7, 5.8, and 5.2 persons respectively in 1963. These households consisted of members of the immediate family, other relatives, and permanent laborers--5.3, 2.3 and 2.1 persons for large farmers, 4.3, 0.9, and 0.7 for medium farmers, and 4.2, 0.9 and 0.1 for small farmers.⁹ These

⁹E. Rukasah Adiratma, Income and Expenditure Pattern of Rice Producers in Relation to Production and Rice Marketed: A Case Study in Karawang, West Java. PhD Dissertation. (Institute Pertanian Bogor, 1969), p. 74.

figures show that the larger the amount of farm land owned, the more people live in the household, especially the number of relatives and permanent labors.

The kinds of jobs in rural areas vary according to the location, topographic characteristics, availability of raw materials, and skills of the people. Nevertheless, employment sources often include farming, trading, central government, village/desa government, the village cooperatives, and cottage industries.¹⁰ In the rice village, there are several jobs that relate to the rice economy besides rice farming. These include hired farm labor, hired labor in rice processing, rice retailing, and others related to rice marketing (tukang kiser, tukang tumbuk, and tengkulak padi/beras).¹¹

Health, Housing, Education and Electricity

Health services to the villagers are available on a limited scale only. Hospitals are restricted to towns and cities, but doctors and nurses visit villages from time to time to enable people to consult them. More villages are obtaining baby health centers as part of

¹⁰For example, in one desa (1967)--also where the kecamatan government was located--the kinds of cottage industries and special services included making shrimp chips (11), soy sauce (4), fried bean curd (15), "oncom"--fermented bean (25), peanut oil (51), roof tiles (20), repairing bicycles (4), blacksmiths (5), carpenters (6), cement works (4), tailors (6), and launderers (3). The number in the brackets is the number of households in the certain job. See A. Palmer op. cit., p. 308.

¹¹Tukang kiser is the rice trader and processor of stalk paddy at the stage of half-milled rice. Tukang tumbuk is the rice hand-pounder, who buys stalk paddy and sells the home-pounded rice. Tengkulak padi and beras is the trader who procures stalk paddy from the producers and resells it to the other traders or rice mills. E. Adiratma, op. cit., p. 95.

family planning programs. Medical centers and their equipments are also gradually improving.

The government is trying to reduce the death rate, especially in the infant group, and to bring the population explosion under control. This has yielded some encouraging results. The health standard is rising; tuberculosis is still fairly common among the poor peasants, but the occurrence of malaria, cholera, dysentery, and skin diseases has been substantially reduced.¹²

Most of the children in the rural area are born at home with the help of a midwife or local nurse. Generally, midwives have been trained by nurses or doctors to use new technology and hygienic requirements. Vaccination is undertaken regularly in the school building for the school-age children and in the desa-hall for adults and infants.

Housing in rural areas poses a qualitative rather than a quantitative problem. Few rural families are without shelter; it is because of the adequate building materials which are locally available and the favorable climate. The climate is such that the people require protection from only heat and torrential rains. Simple houses can be constructed quickly and cheaply with the help of a few neighbors.

Most of the houses in a village are built of wood and bamboo. Due to the development process, more houses are being built from brick. Thatched roofs were common in the past but tiles and corrugated iron roofing materials are becoming more popular, as are concrete floors.¹³

¹²R.C. de Iongh et al., op. cit., p. 105.

¹³E. Adiratma, op. cit., p. 87.

For the improvement of the human well-being, education of the people has received a great attention from the government. The majority of the village people between the ages of 14 and 45 are supposed to be able to read and write as a result of large-scale literacy campaigns in rural areas.¹⁴ The portion of literate persons must be increasing recently through the improvement of facilities, more adequate teachers, and rising aspirations of the rural people toward education. In some cases, these aspirations are forced by the changing nature of social relationships and job opportunities. In one region, young couples cannot be married unless they have certificate from elementary school or sixth grade. Besides, it is difficult for them to find jobs without knowing how to read and write.

Electricity has reached only a few rural desas. The villagers use simple kerosene lamps and pressure lamps for lighting their houses. It is customary to have a light on during the whole night; however, it is a small light inside or in a verandah. Lanes and footpaths are not

¹⁴From a sample survey of 140 households in 1963, it was shown that most heads of households had not attended any regular school--76 percent of all household samples. This does not mean that those people could not read or write; some of them could read and write through the literacy campaigns. Twenty percent of the household heads attended, but did not complete primary schooling; they did not pass the sixth grade. Another 3 percent completed primary school and, finally, 1 percent attended at least some high school. According to the population census in 1961, 40 percent of the population in West Java rural area can read and write. The children at the age of 7-15 years old who were going to school was 37 percent on the average and ranged from 12 percent in one desa to 91 percent in another desa. According to the census, 53 percent of rural population at the age of 7-13 was attending school. E. Adiratma, op. cit., p. 77, and Biro Pusat Statistik, Almanak Indonesia 1968, Jilid I (Jakarta: Biro Pusat Statistik, 1969), pp. 334-335.

lit, apart from a few isolated kerosene lamps at junctions of main village roads.

Firewood is still widely used for cooking. Kerosene stoves are replacing the traditional hearth only in homes where the villagers can afford them. Nevertheless, for most well-to-do people in rural places, having the kerosene stoves is only for special occasions and not a permanent substitute for the traditional hearth.

The Interrelationships Among People

This subsection will describe the interrelationships among people in terms of labor services by one person for another in a village. This subsection describes employment linkages in general. Specific information about labor interrelationships in agriculture will be depicted in the next subsection--the characteristics of agriculture.

The rural daily life of each member in a family or a household is different one from another. The men, in general, look after the fields and do all the heavy work throughout the year. They prepare the fields for planting by ploughing or hoeing; they make dikes and simple irrigation channels. They also help women during rice transplanting, weeding, and harvesting stages by moving heavy materials from one place to another. The women work primarily at home: preparing the meals, cleaning the house and looking after small children. They also hand-pound rice, especially in the village where there is no rice miller or, even if there is, some poor people prefer hand-pounding rice to going to pay the rice miller. During the peak harvest season, when the need for the harvesters is greater than the available harvesters, some men take care of their little children at home while their wives are

harvesting. If there is any time left, many village wives try to earn some extra money by making baskets, plaiting mats, or weaving. Some make rice pudding, brown sugar etc. to be sold at the market. Children, after lunch, are required to look after their small brothers or sisters, or are sent to herd cattle, ducks or goats. Older children may even go to the fields to help their parents.

The relationships among neighbors are very close and cordial. One of the reasons is that they believe they have common ancestors which creates a sense of blood relationship among them. Another reason is that the spirit of mutual help is very strong. This spirit is referred to the Indonesian popular term of "gotong royong."

The two most typical examples of gotong royong are the building of a house and the death of a villager. In the former case, the family which intends to erect a house on the land it has acquired asks relatives and immediate neighbors for help. As the building proceeds, other villagers, even though they have not been asked, come spontaneously to the assistance of the home builders. They know that help will be available to them in turn when they need it. The meals are provided are different from one place to another; generally, the helpers are given two meals, a snack and drink each day.

Recently, due to the process of modernization and monetization, some people are not eager for such gotong-royong help in building a house. This is because gotong royong help is usually unskilled labor. Many cases show that many extra people come but only sit because there is no work for them to do.

If someone dies, not only the neighbors but frequently all the villagers attend the funeral. The family of a deceased person is given money, food and other things without being asked to repay these at a later date. Similarly, with less spontaneity, the whole community participates in the ceremonies accompanying a marriage, birth circumcision and several other life cycle feasts.

The rural people are conscious of the fact that they are dependent upon each other. This feeling of closeness results frequently in the formation of neighbors' associations consisting of up to twenty households.¹⁵ These associations, called "rukun tetangga" (neighborhood, RT), are concerned mostly with the welfare of their members. They elect a chief (ketua RT) whose position is honorary; he receives no financial reward for his activities. Official information is delivered to the people by the ketua RT. Whenever a new government program or special project is to be started, he announces it to the neighborhood members.

Frequently a group of neighbors gathers in the evening in the front yard or on the verandah of a house to listen to the radio, especially when traditional music or plays are broadcast. Those who own the radio are often willing to turn it loudly for benefit of the others. In connection with the agricultural extension programs of the provincial government, the farmers are often together in the informal association (kelompok pendengar) to listen to the agricultural extension broadcast (siaran pedesaan). This broadcast is concerned with agricultural techniques and management. The members of this association are

¹⁵R.C. de Iongh et al., op. cit., p. 99.

encouraged to give a feedback to the broadcaster or agricultural extension service.

Gotong royong may be applied to a wide variety of work arrangements. Government authorities, though not always the villagers, often use free labor of the village citizens on desa projects and even occasionally on central government projects. In many cases, the central government projects--for example rehabilitation of irrigation--pay the labor wages in cash or in kind.¹⁶ Therefore, because of this shift from no wages to wage payment, some rural people now consider government projects that provide no labor payments not to be genuinely gotong royong.

Desa citizens are obliged to provide labor for the purpose of desa security and concern of the desa officials. For example, in one desa, each family is required to do "hiras labor"¹⁷ one day a year on the village officials' fields or houses. If a person cannot work himself, he can pay wages for another person to replace him. A similar principle applies to obligation for the security of the village. Each family head is required to be a night-watchman once in a certain period of time.

Expenditure Pattern

Surveys made in the late 1960's for Java and Madura showed that over 70 percent of per capita monthly expenditures was spent on food.

¹⁶ Recently, the food from P.L. 480 has been used some as the wage good for such government projects.

¹⁷ Hiras labor is done at the request of another without wages.

This constituted a decline of about 3 percent from the expenditure for food in the mid 1960's.¹⁸ The next largest expenditure was for housing; it was approximately 10 percent. Four percent was for clothing, 2 percent for durable goods, and 3 to 4 percent for entertainment. The remainder was for miscellaneous expenditures.¹⁹

Since the nuclear family is the unit of budgeting--the unit making most decisions about consumption, production, saving, and investment--the expenditure pattern in the village reflects the family's expenditures and not per capita expenditures. From the view point of management aspects, it is difficult to distinguish clearly between income/inflow and expenditure/outflow of the family. On the traditional West Java farm, most of the agricultural production, especially rice, is required first for family or household consumption. If there is more than enough to meet their needs, the rest is sold to the market.

The main meal of the day is in the evening between five and seven o'clock.²⁰ It consists of rice, raw or cooked vegetables and a side dish.²¹ As in any other region in Indonesia, rice is the main

¹⁸In 1971-75, consumption on cereals was 66 percent of all food consumption; this includes 55 percent consumption on rice and 11 percent on other cereals. Asian Development Bank, Rural Asia: Challenge and Opportunity (New York, London: Praeger Publisher, 1978), p. 338.

¹⁹Nena Vreeland, op. cit., p. 114.

²⁰Generally, they eat two times--breakfast and dinner--but during the busy days they eat lunch. Children of wealthy families have breakfast before leaving for school and some are given money to buy food and drinks. All have lunch at home; there is no school lunch provided by government.

²¹It has been known among Indonesian people that the Sundanese people like vegetables more than other ethnic groups do.

staple food for the people in West Java--rural and urban.²² The most common side dish is fermented beans (tempe) and bean cake (tahu). Chillies and soya are favorite spices to go with any meal; prawn crisps (krupuk) and salted fish (ikan asin) are usually in their daily menu. Only for some rich people is meat and egg consumption part of the regular menu, most rural people consume these only occasionally. Cow's milk is too expensive for the majority of the people. They keep cattle, sheep, goats and fish in the ponds, but these are regarded more as marketing commodities or as investments in case of such circumstances as ceremonies or emergency needs.

A family may hold a ceremonial feast (selamatan) for different kinds of purposes--i.e., the annual agricultural cycle, house building and several numerous life cycle events. The life cycle events include births, circumcisions, marriages and funerals. The family involved in a "selamatan" (ceremony) prepares a great variety of food and drinks. The smallest feast is usually shared by the members in the family and the immediate neighbors only; it is provided by a small food offering with a special cone of rice. Certain life-cycle feasts, while always including the small feast, are usually elaborated ceremonially and artistically. The nature and extent of this celebration, the expense for food, ceremony and entertainment, and the number of participants

²²E. Adiratma, op. cit., p. 195. His study shows that the average consumption of rice is 19 liters (15.2 kg) of milled rice per capita per month. This amount was about 71 percent of total food consumption or 61 percent of total non-durable consumption.

depend on the event, social status and personal preference of the family who hold the selamatan.²³

The seventh month of pregnancy is often celebrated. Other feasts associated with the birth are the ceremony of cutting the baby's hair--at the age of 40 days--and the ceremony to mark the cutting of the baby's umbilical cord. The ceremony connected with the circumcision of the boys is more important than that of birth; in some districts, it is as elaborate as a marriage ceremony. The feast is lavish and long; the parents often hire entertainers for "wayang" performances or riding dancing horse (kuda renggong). All muslim boys are circumcised between the age of three and twelve. Boys from wealthy families undergo the operation individually; otherwise, two or three brothers, cousins or close neighbor's sons are grouped together. Mass circumcision of boys from poor families are organized and paid for by the village community.

Marriage in rural areas--especially for the rich people--has a more complicated procedure than in urban areas; the procedure involves many steps and expenses. Before marriage, the groom's parents have to pay a ceremonial visit to the bride's parents (melamar). The festivities--as mentioned in circumcision before--begin after the ceremony, for which the bride is traditionally dressed as a princess and the groom as a prince. The ceremony resembles a reenactment of a royal marriage.

²³According to the amount of expenditure, the number of participants and entertainment, A. Palmer classified the ceremonies into: a) simple ceremony, b) one day of ceremony with less than a hundred participants, and c) the ceremony with more than a hundred participants and taking place in part outside the house. A. Palmer, op. cit., p. 312.

Death in the village is made known immediately to the neighbors, who spread the information throughout the community. The villagers visit relatives of the dead person and bring money, rice and other suitable gifts.²⁴ A selamatan is held after the funeral, and repeated on the third, seventh, fortieth, and hundredth days after the death, as well as sometimes the first anniversary. If the dead person is the head of the family or has something for inheritance, these expenditures for selamatan are subtracted from his/her wealth before it is inherited.

The biggest Muslim religious festival is "lebaran." It is celebrated on the first and second day of the tenth month of the Muslim calendar, it follows the fasting month. During this celebration, the best food that the family can afford is offered to relatives and visitors. Everybody wears new clothes and sometimes there is some form of entertainment in the village.

In connection with buying/wearing new clothes, besides for lebaran, the rural people usually buy and wear new clothes for the celebration of Indonesian Independence Day (August 17). The children wear new clothes also at the end of the school year, when getting their report cards and passing on to the next grade. When coming to the selamatan of circumcision and marriage, people dress better than usual.

In some regions, the festival of cleaning the village or "bersih desa" is held after the rice harvest. This festival--its performances and finances--is organized by the head of the village and is held usually at the community hall. The festival also includes entertainment in the form of traditional dances, music or puppet performance.

²⁴These kinds of gifts are also common in circumcision and marriage ceremonies.

As general, the expenditures of the rural people that are collected by the desa or central government have been mentioned in the previous section. These expenditures are a share of their agricultural products--in rice equivalent--for the desa officials' salary, taxation on marriage, celebrations, house building and cattle slaughtering, contribution for the desa security. Several other expenditures are land taxes that are levied by the provincial government, payments for children education and contributions for the poor.²⁵

The Ways That Rural People Obtain Cash

This description of the ways that rural people obtain cash does not include cash obtained from conventional sales of their agricultural and non-agricultural products.

The most common, which has been practiced for a long time, is selling jewelry--gold and diamond--to the jewelry shops. Jewelry shops are usually located in regency towns or large cities. The villagers, during the rice harvest time or not long afterwards, sell their rice and buy other goods including jewelry. At that time, the price of jewelry is the market price level; it is usually called buying price (harga beli). In case of not having cash for an emergency need, the former buyer usually sells jewelry back to the jewelry shop where he bought it. The price of jewelry at selling back time is called selling price (harga jual). The selling price is usually around 70 to 90 percent

²⁵ The obligation of a Muslim in offerings to the poor is called "zakat" and "fitrah." Most people cannot pay complete zakat--2.5 percent of one's annual income--but almost every Muslim subject to pitrah pays something--about 1 liter rice for each member in a family--through the village government.

of the buying price.²⁶ It is valued according to the carat level of gold and weight in grams. The purchase receipt must be kept in order to be able to sell the jewelry back to the same shop with its selling price not too far below the buying price.

Selling back of jewelry is usually due to such emergency needs as education fees for children, building houses, buying land or any other assets, and buying consumer durable goods (radios, television sets, cassette recorders, bicycles, motorcycles etc.). Or it might be for hiring labor in land preparation or for traditional celebrations. This practice is not limited to a certain class of rural people; it is done by large farmers, small farmers and even the landless workers.

In some regions in West Java, the government pawnshop is still a very important source of cash. The function of the government pawnshop for helping rural people has become less important than it was in earlier times. One of the factors is its lack of competition with other systems in terms of services to the borrowers. It is also due to the fact that money circulation in rural areas is becoming more widespread than before.²⁷

The pawnshop system is similar to lending and borrowing through the private money lender, which will be discussed later. The pawnshop

²⁶ If the buying price is Rp 5400 per gram at time t , one year later ($t+1$), when the buying price or market price is Rp 5800 per gram, the selling price--at 90 percent of the buying price--is $90/100 \times \text{Rp } 5800 = \text{Rp } 5200$ per gram.

²⁷ In 1924 it was officially reported that 99 percent of the credit issued by the public pawnbrokers concerned sums of less than three guilders. This figure indicated that the need for money was very low. S. Tas, op. cit., p. 87.

system of lending and borrowing money requires collateral. Most of the collateral is jewelry; other items such as clothes, radios, kitchen utensils are also used occasionally. The amount of cash that can be borrowed varies according to the amount and the market price of the collateral. The pawnshop's valuation on gold collateral is usually around 25 to 40 percent of its market price.²⁸ The debt and its interest must be paid back at specified times. The consequence of delaying repayment is the loss of one's ownership collateral. The unredeemed collateral items are sold by the public pawnshop through auction in order to get cash for further lending operations.

The reasons for borrowing cash from the pawnshop are not very different from the system of selling back to the jewelry shop. The difference is only the degree of confidence of the borrower. The borrower who is confident that he can afford to collect the collateral back, usually prefers pawnshop system to the jewelry shop system. Otherwise, he prefers the latter.

The most popular way, not only in West Java but in many other developing countries, is getting cash from private money lenders. In West Java, a private money lender might be a pure money lender or both a money lender and trader. The system of lending and borrowing from a pure money lender is not different from the pawnshop system. This system also needs collateral; the most popular forms of collateral are gold and land. As long as the credit has not been repaid, the

²⁸In May 1979, the market price of 24 carat of gold was Rp 5400 per gram. At the same time, the pawnshop price was Rp 2000 per gram; it was about 37 percent of the market price.

creditor has the right to cultivate the collateral land. Compared to the conventional land rental system or sharecropping system, this money lending system is far more profitable for the creditor; in addition to having the products of the land used as collateral, the creditor still has the possibility of getting his/her money back.

The system of borrowing money from a money lender who is also a trader is different from the jewelry shop and pawnshop systems. In case of emergency needs, the rural people borrow money from the trader, especially the rice trader. The borrower has an obligation to sell his rice products to the creditor trader. This system is called "ijon." The money sources of the trader are different from one place to another; it depends upon the closeness of the marketing channel agents in certain commodities. In some places, the trader has his own capital and, in some other places, the money is provided by the wholesalers in towns or big cities. Regardless of the sources of the money through this system, the bargaining position of farmers is very weak. They are forced to sell their products at relatively low prices.

The new way that farmers get cash is from government credit. This government credit program has been developed since 1965, when the Bimas program began. This credit is intended to help farmers in acquiring modern inputs to increase agricultural production. The government subsidizes this credit through low interest payment; it is 1 percent a month or 6 percent in one season of rice production. The farmers receive credit in the form of fertilizer, pesticide and cash allowances.²⁹ This cash is supposed to be used for labor payment

²⁹To some degree, they have certain flexibility in determining the dosage of fertilizer and insecticide. Detail of the Bimas credit

or any other cash requirement during the process of production. The amount of credit depends on the acreage of owned land to be used for agricultural production. Most of this government credit goes to rice production. This is because rice is the main staple food as well as the wage good for agricultural and non-agricultural sectors.

The Characteristics of Small Holder Agriculture

Land Tenure, Farm Size, Land Fragmentation and Cropping Intensity

Most of the land in the rural area is owned privately.³⁰ The portion in a desa which is owned by government--either provincial or local--varies from one region to another. Dry land is more likely to be owned by government than wet land. Some of this government land is used by the rural people. Grazing land is provided for the rural people who have cattle. Other tracts are managed by government; this land is usually for forest.

Increasing population has created pressure for more land for food crops. The provincial government has been trying to solve this problem by changing the ownership of the land from government to private rural people, or by giving rural people the right to cultivate land for three to five years. The former way is usually applied to the grazing land and the latter way is applied to forest land. The process of changing land ownership takes a long time, and it is not uncommon to find land that does not have a clear ownership title.

program are explained in the next section about the government rice programs.

³⁰In one desa, of 1,197 hectares, 1,036 hectares or 87 percent were under private ownership. A. Palmer, op. cit., p. 304.

This uncertainty of ownership affects the attitude of the farmers in maintaining or managing those lands. The problem of soil erosion occurs largely on those lands. Farmers do not have full responsibility to protect their land from erosion due to the uncertainty of ownership; they do not have any incentives for growing perennial crops since they are not certain whether they will enjoy the yield of those perennial crops.

A similar problem is found on the forest land where the rural people are allowed to cultivate as long as the farmers obey the government and grow certain kinds of trees for soil conservation. Many cases show that it is hard to find successful forest replanting through this arrangement.

Land tenure systems in desas which are far from large cities are different from the systems in desas near large cities. Cash rent systems are more common in desas around large cities. This is true mostly in the areas around Bandung and Bogor, where the farmers grow highland vegetables (sayuran dataran tinggi). These crops are considered as commercial crops; the main motive of the farmers is to sell those commodities, which involve a high degree of risk and uncertainty of yield and price.

In areas that grow mostly rice, share cropping systems are more common than cash rent systems. The detailed arrangements in share-cropping system are not the same among desas in different regions or even among neighboring desas. Generally, the tenant pays the cost of labor, seed, fertilizer and pesticide. If the owner pays for one of those items, it is returned to him before division of the harvest.

Payments of rice to desa officials and for the irrigation supervision are subtracted before the crop is halved. State land taxes seem to be paid by the owner. For sawah with rice crops once a year, the tenant usually decides what the secondary crop will be. The more valuable the crop in terms of money income, the higher the proportion that is given to the owner.³¹

It is generally believed that there are more farm operators in a desa or village than there are farm owners. This indicates that more landless people are tenants than land owners who do not themselves farm.³² According to the agricultural census in 1973, of almost 25 million farm operators in West Java, 71 percent owned all of their farmland, 25 percent owned part of their farmland, and 4 percent did not own any land.³³

The average size of farm in West Java is very small, especially if compared with farms in countries like the United States. With

³¹For example, if it was peanuts, the owner would get half; if it was tubers, the owner was given some, but no formal division was required. A. Palmer, op. cit., p. 309.

³²E. Adiratma, op. cit., p. 55. In six villages in Karawang, in 1963, a study showed that 16 percent in the sample were landless tenants and 7 percent were land-owner non-operators. The former operated 27 percent and the latter owned 28 percent of the hectareage. This study showed also that the average hectareage of the owner family was 1.49 hectares while of the operator family was 1.10 hectares. The rest were categorized as owner-part-operators (3 percent), owner-operators (19 percent) and owner-part-tenants (3 percent). The owner-part-operator operated parts of his owned land and rented the other parts to others; the owner-operator operated all of his own land without rent to or from the others; owner-part-tenant operated his own land and rented from others.

³³Central Bureau of Statistics, 1973 Agricultural Census: Agriculture, Volume I (Jakarta: Central Bureau of Statistics, 1976), p. 204.

increasing of population in one hand, and hectarage of agricultural land remaining constant or even decreasing on the other, the size of farm is becoming smaller. Comparative data for Java in 1905 and 1973 show that the number of farmers with small farms (around 0.25 hectare or 0.55 acres) in 1973 was double the number in 1905. In contrast, the number of large farms (2 hectares average) has decreased by about 40 percent.³⁴

Since sawah (wet rice cultivation) is the most intensive form of cultivation, wet rice villages or *desas* usually have the greatest densities of population.³⁵

Beside small farm size, fragmented land ownership is another problem that occurs in smallholder agriculture. In a typical village in Sumedang (1957), one farmer had twenty-four pieces of land, with a total area of 1.8 hectares of dry land and 4.5 hectares of sawah.³⁶

³⁴Bambang Ismawan, "Peranan Lembaga Swasta dalam Pembangunan Usaha Kooperatif di Pedesaan" *Prisma* No. 6 (July 1978), p. 17. See also A. Palmer, op. cit., p. 304. Palmer's study found that in *desa* Situraja, in 1940 there were 1,444 private owners of land. By June 1957 there had been a gain of 719 new owners and a loss of 264 owners. Therefore, the net gain was 455 owners. The reasons for these transfers included inheritance, sale, pawning and exchanges.

³⁵S. Tas, op. cit., p. 1 and E. Adiratma, op. cit., p. 49. In six villages in Karawang (1963), the total number of families per hectare of rice ranged from 4.4 to 14.2 with an average of 6.6. Rice land per family was in the range between 0.31 hectare and 1.12 hectares, and averaged 0.68 hectares. Small farmers (less than or equal to one hectare) had 73 percent of the rice land; medium farmers (1.01-2.00 hectares), 17 percent; and large farmers (greater than 2 hectares) 9 percent.

³⁶A. Palmer, op. cit., p. 306.

In 1973, 20 percent of all farmers in West Java operated four or more parcels of land.³⁷

Increasing crop intensity is one of the ways to compensate for the problems of small size of farm and land fragmentation. Rehabilitation of the irrigation system--restoring canals and dams that have been deteriorated--increases the cropping intensity of sawah.³⁸ The rice intensity of sawah in a desa is usually in the range 100 to 200 percent.³⁹

Labor and Wage Systems in Rice Production and Processing

Traditionally, when relationships among neighbors were very close, little use was made of labor wages paid in money form or even in rice forms. Bartered labor (liliuran) was more common in West Java. A man would go or sent his servant to plow another's sawah in exchange for later work on his own. This system is still practiced in some areas that are quite distant from large cities or are isolated from other areas.

³⁷Central Bureau of Statistics, op. cit., p. 64.

³⁸In 1926, it was reported that land utilization rate was 126 percent and in 1940 the figure was 145 percent. S. Tas. op. cit., p. 89.

³⁹Rice intensity of sawah in a village is the ratio between the rice planting in one year and sawah hectarage. For example, sawah in a village is 100 hectares. If all sawah are planted with rice twice a year, the rice intensity is $2 \times 100/100 \times 100$ percent = 200 percent. If all sawah are planted with rice once a year, the rice intensity is $1 \times 100/100 \times 100$ percent = 100 percent. If 50 hectares are planted with rice once a year, and the other 50 hectares are planted with rice twice a year, the rice intensity is $1 \times 50 + 2 \times 50/100 \times 100$ percent = 150 percent.

In six villages in Northern West Java (1963), the rice intensity in sawah in the range of 114 percent to 194 percent, with an average of 144 percent. This percentage must be increasing through the continuing process of rehabilitation of Jatiluhur Irrigation Project areas. Adiratma, op. cit., p. 49.

Even in places near the city, the liliuran (barter) system still exists among close relatives or neighbors. This system requires only that meals be provided by the person who operates the land.

The wage system in land preparation for rice production varies according to region. In one village/desa, the wage may be paid all in cash; no meals are provided. In another place, it may be paid in cash and meals--usually three times a day. In still other areas, it may be paid in the forms of rice and meals. The most common system is the second system. The preference of the worker or the operator depends upon the price of rice at a certain time. If the price of rice is low, the laborer will prefer the first system; if the price is high, the operator prefers the third system. However, a certain system usually has been practiced for a long time in any particular region or neighborhood; both parties are assumed to know that the system will be used.

In contrast, male and female servants living in the household seldom are paid regular wages. They usually get their keep, perhaps occasional pocket money, new clothes at lebaran and the expense of their wedding feast.

In some villages, enough labor for land preparation might be provided by the local workers, but in other desas these must be supplemented by the labor from outside the desa--even from another district or regency. During the peak season of land preparation, the farmers in Sumedang regency often hire laborers from Majalengka and Indramayu regencies. They often spend two months hoeing other people's sawah and then come back to their origin to operate their own lands.

The labor and wage systems for transplanting, weeding and harvesting rice are closely related. The laborers are mostly women from within the village and from neighboring villages. Some systems do not restrict anyone who wishes to participate in the harvest, and others specify who are allowed to harvest in certain sawah fields. In some areas, a system called "ceblokan"--an example of the second system--is commonly practiced.⁴⁰ This system involves a group of women joining together to transplant and weed a farmer's sawah. For these tasks, they are provided meals only. At harvest time, this group of women has the right to harvest and no one else may join in without its permission. These women receive one-sixth of the harvest.

Lesser degrees of restriction than the ceblokan system are commonly applied in many areas in West Java. The women who transplant and weed still have the right to harvest; they have priority. Other people can participate as long as the farmer allows them. Therefore, the decision is strongly held by the farmer instead of the transplanters or the weeders. They get paid in the form of cash or rice, plus meals, for transplanting and weeding tasks. The wage for harvesting is one-tenth or one-eleventh of the harvest they get, depending on the region.⁴¹ The share is called "bawon," it is smaller than the ceblokan share.

⁴⁰ W.L. Collier, et al., op. cit., p. 261.

⁴¹ However, Adiratma (1963) found out that the average share of rice harvesters in five villages was 24.5 percent, with a range between 19.3 and 27.1 percent. The rice received by such harvester ranged between 0.35 and 6.3 quintals of stalk paddy. In one desa the number of harvesters was as high as 675 people per hectare including 282 men and 393 women.

Traditionally, before the HYV was introduced the actual portion to the harvester--in the form of stalk paddy--was greater than it was supposed to be. The harvesters normally made the bundle of stalk paddy for his share larger than the bundle for the farmer's share. With the HYV, the farmer or members of his family make the decision according to its volume or weight. Therefore, the farmers receive not only higher yields but also a larger share of the crop by using HYV.

In the past, most rural people hand-pounded rice for their family consumption. The rice sold would be in the form of stalk paddy or threshed paddy (gabah). Hand pounding was done by family members, servants or hired laborers from nearby. The number of handpounders depended upon the amount of paddy that was pounded. The laborers were usually paid with the one-tenth of the rice pounded and were also provided meals--three times a day. This system still exists in desas that do not have a rice miller.

In a desa where one or more rice millers exist, people tend to have the rice-miller mill their rice for their own consumption. The owners of the rice mill charge a certain weight of rice according to the amount of rice that is milled. Some charge higher rates but do not keep the by-products (katul).⁴² Others charge lower rates but they keep

⁴²In 1973, in two sample villages in West Java, Collier's study showed that the rice milling costs were \$0.73 per quintal gabah (threshed paddy) in desa Warungjaud, Serang regency and \$0.61 in desa Jati, Cianjur regency. The rice mill owners retained the by-products (katul). W.L. Collier, "A Comment on Choice of Technique in Rice Milling by C. Peter Timmer" in Readings in Asian Farm Management, ed. Tan Bock Thiam and Shao-er Ong (Singapore: Singapore University Press, 1979), p. 341.

the by-products. A rice miller typically hires several permanent workers, both men and women, who receive daily wages and meals.

The presence of a rice miller in a rural area has both advantages and disadvantages for the local people. The people who have rice prefer the rice miller, because of fast service and better quality of rice--in appearance, though not in nutrient content. On the other hand, the previous hand pounders--at least those who do not work in the rice mill--lose their income from rice pounding.

Technology in Rice Production and Processing

Traditionally, the cultivation of rice has formed the basis for the farmers' way of life in West Java. This system has been handed down from their ancestors; they learn how to grow rice from childhood days. They have been more competent in growing rice than in growing other commodities. Everybody in the family, the neighborhood, the village, and the district consumes rice daily. People grow rice because they like rice, not because of its profitability. Rice can be used for many other purposes: it can be the raw material for various kinds of cookies or snacks; it can be the wage goods for rice and other production processes; it can be the contribution for the teacher of their children, for desa officials or for neighbors in case of ceremonies; and finally, it can be a payment for many assets--land, cattle or houses. Hence, rice cultivation has been considered as the very essence of subsistence farming, and rice products have been the mainstay of home consumption.

When population pressures were not so great and rice imports were not so much, the state government was not so eager to increase rice

production.⁴³ However, since late 1950's the government has realized that efforts to increase rice production are becoming necessary. In Java, increasing rice production through higher yields per hectare of sawah is one of the government's main goals.

Panca Usaha, the Five-Fold Way, is a well known and frequently voiced slogan that refers to the five ways to increase rice production: 1) use of high-yielding variety seeds; 2) proper fertilizer application; 3) adoption of improved cultivation practices; 4) control of pests and diseases; and 5) efficient use of irrigation water.

Traditional rice varieties are still planted but only on a small proportion of the farmers' sawah area. Sticky rice--one of the traditional varieties--is usually reserved not for daily use or for sale, but instead for special meals or as raw material for different kinds of snack foods. These varieties do not have high yields per hectare, but they are more resistant to pests and diseases. Some farmers still prefer these varieties because of such advantageous characteristics.

High yielding varieties are grown mainly for the purposes of daily consumption and sale. A farmer often grows several kinds of HYV, one at a time. One parcel of an improved local variety is grown,

⁴³In 1937, Indonesia (then called Netherlands Indies) imported only 178,000 tons rice, compared to an average of 1 million tons annually in the late 1970's. L.B. Bacon and F.C. Schloemer, World Trade in Agricultural Products: Its Growth: Its Crisis; and the New Trade Policies (Rome: International Institute of Agriculture, 1940), p. 102.

and another block of a modern variety is grown.⁴⁴ This practice is a matter of risk avoidance, self experiment or the condition of the sawah--soil fertility and irrigation. Farmers prefer to continue with varieties that are certain while trying out new varieties which are unproven locally.⁴⁵ The portion of their sawah in new varieties depends on the success--production per hectare--of their experiment. Some skilled farmers recognize easily the characteristics of each parcel that make a certain rice variety appropriate.

In addition to these factors, the likelihood of getting fertilizer affects the farmers' decision as to which rice varieties should be grown. The modern varieties are more responsive to fertilizer application than the local varieties. Unavailability of fertilizer makes farmers hesitant to plant new varieties. Without fertilizer, the yield of modern varieties is usually lower than local varieties.⁴⁶ A similar pattern results from lack of pesticide.

⁴⁴ Teresa A. Lacsina and Randolph Barker, "The Adoption of Modern Varieties" in Interpretive Analysis of Selected Papers from Changes in Rice Farming in Selected Areas of Asia. (Manila: The International Rice Research Institute, 1978), pp. 28-33. They divide the HYV into local varieties and modern varieties. Improved local varieties (Bibit Unggul Nasional, Ungnas) are those developed through breeding programs in Central Institute in Indonesia prior to 1965. These varieties include Bengawan, Dara, Intan, Pelita, Peta, Remaja, Sigadis and Syntha. Modern varieties are those developed after 1965, mostly by IRRI. These include IR5, IR8, IR20 and C4-63.

⁴⁵ Ibid., p. 17. The 1971 study in desa Cidahu, West Java--a locality where adoption of new practices had been slow--showed that 45 percent of sample farmers had tried modern varieties. In contrast, in Nganjat, Central Java--where adoption has been most rapid--showed that 100 percent of the farmers in the sample had already tried modern varieties.

⁴⁶ R. Barker classified the 32 survey villages in Asia in terms of a) N fertilization: 1. low (less than 45 kg N per hectare) and 2. high (45 kg N or over per hectare), and b) the percentage of rice field in a

Before the introduction of inorganic fertilizer, farmers used to rely on organic fertilizers (animal manure and green crops) to get the higher yield. This organic fertilizer could be derived from cropping rotation of sawah with leguminous crops, from making organic fertilizer outside sawah or from herding cattle in the sawah field when no rice was grown.

Due to the introduction of inorganic fertilizer and the more adequate irrigation water for double rice planting in a year, inorganic fertilizer is becoming a substitute for organic fertilizer. This tendency is related also to the rapid adoption of HYV by the farmers. Ironically, when the farmers are already aware of the benefits of using modern fertilizers, those inputs are not available for them. This problem is caused by inadequate fertilizer supply--domestic production and imports. A Bimas type package program associated with the availability of irrigation is one way to increase the productivity of available fertilizer.⁴⁷

The farmers who participated in the Bimas program often could not apply the fertilizer in the right time and in the right dosage.

village which was planted with modern varieties (MV) of rice: 1. low (less than 50 percent) and 2. high (50 percent or over). The survey (Wet Season 1971/72) showed that the villages with combination of a.1 and b.1 (4) yield an average of 2.8 ton/hectare, a.1 and b.2 (7) yield 2.6 ton/hectare, a.2 and b.1 (8) yield 3.0 ton/hectare, and a.2 and b.2 (13) yield 4.3 ton per hectare. The number in the brackets are the number of sample villages. Randolph Barker, "Yield and Fertilizer Input" in Interpretive Analysis of Selected Papers from Changes in Rice Farming in Selected Areas of Asia (Los Banos: The International Rice Research Institute, 1978), p. 38.

⁴⁷See the discussion about government programs in rice production.

Poor organization, communication, and road conditions have been factors which cause the delay of fertilizer delivery to the villages.⁴⁸

Therefore, fertilizer applications on rice in West Java vary according to farmers' conditions and innovation levels. Some farmers still need guidance about how to apply fertilizer, some need capital for fertilizer, some need only the availability of fertilizer in the market, and some need the improvement of their sawah irrigation for better fertilizer utilization.⁴⁹

The labor intensity depends upon the time and water condition of the sawah. Land preparation for wet-season rice is usually more intensive than for dry season rice. On sawah that are over-flooded with water, it is difficult to do the intensive work needed.

The preparation is usually done by hand or by oxen. Oxen are only for the farmers who can afford to own or rent from somebody. Tractors are not common for small rice production, especially in sawah, except for those farmers who have large tracts of sawah.⁵⁰

⁴⁸E.A. Roekasah and D.H. Penny, "Bimas: A New Approach to Agricultural Extension in Indonesia" in Bulletin of Indonesian Economic Studies No. 7 (June 1967), p. 65. Gary Hansen, Episodes in Rural Modernization: Problem in the Bimas Program (Honolulu: East West Center, 1971), p. 79.

⁴⁹Christina C. David, "Factors Affecting Fertilizer Consumption" in Interpretive Analysis of Selected Papers from Changes in Rice Farming in Selected Areas of Asia (Los Banos: The International Rice Research Institute, 1978), p. 73. The study concluded that, besides the improvement of irrigation or the development of modern varieties suitable for urea, the fertilizer price/rice price ratio influences the consumption of fertilizer.

⁵⁰Even during the mid-1960's, many farmers used hand tractors made by Japan (Padi Tractor); now those tractors are becoming disappearing from the small holder rice field because of the inappropriate maintenance of those tractors.

There is no evidence that different rice varieties affect the method of land preparation. The ways that farmers prepare the land have not been changing very much, except for the equipment they use.

Transplanting and weeding methods have been changing since the introduction of "Panca Usaha." The straight planting system (tandur jajar) and using a rotary weeder (landak) are considered as labor-saving devices. Besides, this system saves seed by about 50 to 75 percent and it makes fertilizer application easier. Another labor-saving device is the use of sickles for harvesting instead of "ani-ani" (small hand knife).

Farmers have been less responsive toward using insecticides and fungicides for plant protection than toward using fertilizer. Most peasants--not all--hesitate to buy and use insecticide when there is no evidence that their rice fields are attacked. Insecticide is used when the rice plant is already in a dangerous situation.

The efficient use of irrigation water is necessary due to the problem of lack of irrigation water, the need for fertilizing purposes and the biological requirements of rice crops. To achieve this goal, each village usually has officials called "ulu-ulu" to distribute water to the farmers.⁵¹ Farmers in the same block of sawah are supposed to plant rice at the same period--not exactly the same date but within a week or so of one another. Besides being an efficient way

⁵¹ Dibylo Prabowo and Sajogyo, in their study in Cidahu, Subang, West Java, found out that each of 15 officials in the village was responsible for about 17.5 hectares of sawah. International Rice Research Institute, Changes in Rice Farming in Selected Areas of Asia (Manila: IRRI, 1975), p. 183.

of water distribution, this system also protects the rice crop from rats and other pests. Without planting of crop plants in the same period, the life cycles of pests will be continued and be difficult to control.

The management of water by individual farmers is more complex after the introduction of fertilizer and insecticide than before. Previously, water was managed only according to the stage of rice plant and the need for weeding. But now attention is also given to the need for fertilizer and insecticide application.

Government Programs in Intensification of Rice Production

Historical Background

Historically, the programs include those which were carried prior to 1965 and those carried out after 1965. Three of the earlier programs were 1) Padi Centra (Paddy Center) that was initiated in 1959; 2) Action Research that was carried out in 1963-64; and 3) Demas (mass demonstration) that was carried out in 1964-65.

More recent programs are 1) Bimas (mass guidance) initiated in 1965-66; 2) Inmas (mass intensification) initiated in 1967-68; 3) Bimas Gotong Royong (cooperative Bimas) initiated in 1969-70; and 4) Improved Bimas initiated in 1969-70 to date.

The three-year plan of Padi Centra from 1959-62 was to have resulted in self-sufficiency in rice. The target was to establish 250 such centers to cover 1.5 million hectares by 1961/62. Farmers were supplied farm inputs on credit and had to repay in kind after rice harvest. Although there was an effort to intensify the extension

services, lack of trained manpower for various activities in this institute made the program unsuccessful.

The hoped-for surplus of 390,000 metric tons in 1962 turned out to be a record deficit of one million tons.⁵² As a result, farmer repayment rates were very low. In the wet season 1959-60 the repayment rate in West Java--the lowest of all provinces--was 56 percent. This was due to the lack of technical assistance to the farmers while they received inputs from Padi Centra.

In 1963, twelve students from the Institute of Agriculture in Bogor were sent to villages to undertake intensive extension work as a way of learning about the action program with farmers. They were assigned to promote the five principles of rice growing or Panca Usaha.⁵³ The experiment was successful; the program area of about one hundred hectares had yielded 50 percent more than neighboring areas. During the 1964-65 wet season the action research expanded to Demas (mass demonstration). Four hundred forty students from nine colleges of agriculture--all parts of Indonesia--were sent to 220 villages to cover an area of almost 10,000 hectares. The tasks of the students were the same as what they did in action research. The only difference was the number of students and farmer ratio (each student had to work with more farmers). Nevertheless, the program was successful in terms of national effort to increase production. However, as the size of the

⁵²Ingrid Palmer, The Indonesian Economy Since 1965: A Case Study of Politics (London: Frank Cass and Company Ltd., 1978), p. 82.

⁵³See page 41.

program grew in size, the problem of input delays was becoming serious.

Bimas was initiated during the wet season of 1965-66 using the pattern of the Demas program.⁵⁴ The program was rapidly expanded and has been recently modified substantially. Program areas were selected on the criteria: 1) the availability of irrigation and 2) adequacy of road network. These areas were heavily concentrated in the island of Java. In West Java there were 35,000 hectares of Bimas coverage. Farmers received credit accommodations through their village cooperatives. The cooperatives were loosely registered organizations that served as channels for loans but did not meet cooperative standards of education, organization, and financial management.

During the 1965-68 period varying institutional sources of loans for the farmers were utilized. In the wet season 1965/66 credit was from Bank Rakyat Indonesia (BRI, then called Bank Koperasi Tani dan Nelayan). During the dry season 1966 and wet season 1966/67 it was from Badan Urusan Logistik (Bulog, then called Kolognas). In the dry season 1967, it was from P.N. Pertani and finally, by 1967-68 the loans were from BRI (then called BNI Unit II).

Loans, in package form, consisted of farm supplies and cost of living allowances.⁵⁵ These loans were to be repaid in different forms,

⁵⁴The original Bimas program was, and is, designed to increase rice production through a combination of extension activities and the cooperation of other service organizations which provide physical inputs and farm credit. Delmar Yoder, "Expanding Indonesian Rice Production: The Role of Bimas" Land Tenure Center Newsletter 30 (September 1969-January 1970), p. 6.

⁵⁵The composition of the 1968 Bimas loan package per hectare for Improved National Varieties (Bimas biasa) were Rp3,533 consisting of:

depending upon the institutional sources of credit. Loans financed by BRI were to be repaid in cash. Those financed by Bulog were collected in kind, yet cash payment was allowed.

In mid-1967, some alterations were made to these programs. They were divided into Inmas (mass intensification) and Bimas. Inmas embraced farmers who were self-financing and voluntary participants. It was assumed that farmers who had been assisted under the Bimas program would have increased their production and income substantially. Further, it was assumed that they no longer need credit and would be provided only with technical advice. In fact, there was no evidence that the extension service had been intensified under the Inmas program. For the purpose of statistical program coverage, any farmer who financed his own farm supplies and used improved varieties was considered an Inmas farmer.

During the wet season of 1968-69, Bimas Gotong Royong was introduced.⁵⁶ It was designed to have a dramatic impact on production. There were 791,000 hectares in 1969 and 969 hectares in 1970 as

1) fertilizer: Rp. 1,350 for 75 kg of Urea and Rp 787.50 for 50 kg of TSP, 2) Rp 864.00 for insecticide and spraying, 3) Rp 500 for cost of living and Rp 31.50 for transport cost. Loans for modern varieties--i.e., PB varieties (Bimas baru)--were Rp 9,625, consisting of: 1) Rp 1,000 for 25 kg of seed, 2) Rp 4,125 for 150 kg of Urea and Rp 1,950 for 80 kg of TSP, 3) Rp 1,500 for insecticide and spraying, and Rp 1,050 for cost of living. Source: Bank Rakyat Indonesia cited from Achmad T. Birowo, Bimas: A Package Program for Intensification of Food Crop Production in Indonesia (New York: The Asia Society--SEADAG, 1975), p. 4.

⁵⁶ Gotong Royong means cooperation. The cooperation was arranged among Indonesian government, farmers, and seven foreign companies, mostly manufactures. These companies supplied fertilizer, pesticides, and some equipment on a one year deferred-payment basis.

the Bimas Gotong Royong coverage in Indonesia. Most of the covered areas were in Java--94 percent and 96 percent of all areas in 1969 and 1970 respectively. This program in West Java covered 343,000 hectares in 1969 and 318,000 hectares in 1970.

The loan packages of this program were larger--in terms of value and amount of each item--than they were before.⁵⁷ The packages were channeled through the village head. All farmers in the village were assumed to respond to the program very well; they would grow a high-yielding variety, and apply the required dosages of fertilizer and pesticides. The farmers were supposed to accept the package and to deliver one-sixth of their harvest (in 1969) as payment, or else pay a fixed amount (in 1970) in cash or in a kind.

Despite some benefits of the mandatory introduction of new inputs to the farmers through the Bimas Gotong Royong, repayment rates were very low, even lower than in Padi Centra program in 1959-62. During all four seasons of the program, the repayment rate was only 18 percent.⁵⁸ This problem was due partly to the lack of flexibility of farmers to participate in the program, lack of dosage flexibility for fertilizer and insecticide, and many areas covered by the program not having enough irrigation. Most of all, the farmers did not feel

⁵⁷ It was Rp 12,664 for PB seed varieties and Rp 8,426 for Improved National seed varieties. The amount of fertilizer was 200 kg of Urea and 45 kg of TSP for the former and 100 kg for Urea and 35 kg of TSP for the latter. A.T. Birowo, op. cit., p. 6.

⁵⁸ According to the data of Bank Indonesia and BRI, this repayment rate was decreasing throughout the program. It was 30, 20, 12, and 7 percent for the season of 1968/69, 69, 69/70, and 1970 respectively.

much responsibility to repay the loan, since not very much opportunity was given to farmers to decide whether to participate in the Bimas Gotong Royong program.

In terms of low repayment rate, wastage of farm supplies, high cost of the program and alternative investment opportunities, this program was considered not successful and it was terminated at the end of 1970.

A new Bimas program was then developed. It was called "Bimas Yang Disempurnakan" or Improved Bimas. The program was started as a pilot project in Yogyakarta in 1969-70. The success of this pilot project led to its being carried out on a nationwide scale. Under this program, farmers receive loans individually from village units which are organized by BRI. A village unit located in a center village or desa covers 600 to 1,000 hectares of sawah (wilayah unit desa, Wilud) which is farmed by 1,800 to 3,000 farmers living in about five adjoining villages.⁵⁹ Supplies of fertilizer and pesticide go through the usual marketing channels instead of being distributed directly by the government. Farmers are given more freedom than before to choose the mix of inputs.

A Wilud (village unit) is also provided the village unit administrative (Badan Usaha Unit Desa, BUUD) whose officials are appointed from villages. It was hoped that at a later date, when local administrative resources were strong enough, the BUUD would turn into Village Unit Cooperative (Koperasi Unit Desa, KUD); it was hoped that this KUD would form the basis of a new village development

⁵⁹A.T. Birowo, op. cit., p. 12.

unit. Since 1973 BUUDs and KUDs have combined in many areas. They serve both the Bimas and Inmas programs.⁶⁰

Beside BUUD/KUD, Village Unit Bank, one wilud is also provided one or two persons of extension services. They are called "Penyuluh Pertanian Lpaangan" (PPL). Most have graduated from a senior high school of agriculture. Their task is to provide contact with the farmers in guiding the rice techniques to be applied.

The Problem of Program Implementation

Basically, the rice intensification programs in Indonesia consist of four sub-categories of work: 1) agricultural extension, 2) credit provision, 3) distribution of modern inputs, and 4) improvement of irrigation. Other policies that are concerned with rice are the price policies for rice and fertilizer. There are many controversies as to whether the price policies of rice and fertilizer encourage farmers to increase rice production.⁶¹

⁶⁰ Bimas program areas--all Indonesia--were 2,990, 3,097 and 2,971 thousands hectares in 1974, 75, and 76 respectively. Inmas areas were 1,101, 1,151, and 1,503 thousands hectares in the same years. Igusti B. Teken et al. Kebijaksanaan Pengadaan Pangan Dewasa Ini dan Di Masa Datang (Bogor: IPB, 1978), p. 11.

⁶¹ In 1971, the Indonesian government gave subsidies on fertilizer price; at the same time, it gave subsidies on rice price for the urban dweller. The fertilizer import price was Rp 27.06 per kg. With additional of RP 8.76 for distribution cost, the real cost at the farmer's level was Rp 35.82 compared with the actual price for the farmer which was Rp 26.60. The subsidy was about 33 percent of the real cost. On the other hand, U.S.P.L. 480 rice was costing the government as much as Rp 73.80 per kg (\$190 per ton) and long-term Japanese credit rice was Rp 59.80 (\$155 per ton) while the maintained domestic price was only Rp 37.50. Ingrid Palmer, op. cit., p. 84.

The Bimas program, since it was started in 1965/66, has mainly included all those first three sub-categories of work. Even though in reality, the improvement of irrigation that is undertaken is mostly associated with the Bimas program, the irrigation fee itself is not included in the Bimas credit package. Therefore, further discussion of the program implementation is concerned mainly with the agricultural extension work, credit provision and distribution of modern inputs.

Before the introduction of the "Padi Centra" program in 1958, the rice intensification program concentrated mainly on the labor-and seed-saving devices associated with the rice planting and weeding. Application of inorganic/modern fertilizer were not undertaken intensively. Suddenly, in 1959 the Padi Centra program was established to provide modern fertilizers together with using of the credit system. The farmers were supplied farm inputs on a credit basis, and they had to repay these loans after harvest.

Even with the existence of expansion activities during the Padi Centra program, low credit repayment rates resulted. This was due mainly to the fact that farmers were not ready to use new kinds of fertilizer. The adoption of new technology needs time for farmers to watch, to try, to compare, and to be self-confident before adopting it. The introduction of new kinds of fertilizers on a trial basis should have been carried out before the large Padi Centra program was established.

Three years of experience with the Padi Centra program resulted in initiation of an "Action Research" (experimental) program in 1963-64. It stressed mainly technical guidance for the farmers rather than the credit system that was used in Padi Centra program. The

extension program was very intensive; there were 12 students to supervise 100 hectares of sawah. This action was considered successful and it was extended to what became the Demas and Bimas program.

The extension of the Action Research to the Demas (in 1964/65) and Bimas program (started in 1965/66) was due not only to the success of this Action Research but also to the need for achieving the target of self-sufficiency in rice in a relatively short time. In the Bimas program, the credit system was again based on the consideration that farmers needed financial help in increasing rice production through use of the modern inputs. Even so, some farmers who did not need any financial help were reluctant to buy modern inputs without having experience in using those inputs.

During the Demas program, the number of students who served as extension agents seemed to be appropriate for the hectarage of the program. Two students had responsibility for the 50 hectares of rice fields. They had enough time to contact farmers and to give them advice on rice techniques and fertilizer application. Unfortunately, starting with the Bimas program in 1965/66, the number of students for agricultural extension work has not been appropriate for the hectarage of sawah and for the number of farmers who participate in the Bimas program.⁶²

As a result, as happened also in the Padi Centra program, the inputs that were obtained through credit were not applied to rice

⁶²In 1965/66, one student had to supervise an average of 3 or 4 village projects with the coverage of around 200 hectares. In 1974, 75, and 1976 one PPL (field agricultural extension workers) had to supervise 750 hectares of sawah for the Improved Bimas program.

fields appropriately. Some farmers use fertilizer in less dosage than that recommended, and some do not use it at all. It is likely that the unused fertilizer is used for fertilization of other crops or for sale.⁶³ This is one of the factors that helps explain the low rate of loan repayment.

The evidence shows that in each successive period of Bimas-- Bimas SSBM (Self Supporting in Foodstuffs), Bimas Gotong Royong (1968/68-1970), and Improved Bimas (since 1971)--the repayment rate became lower (Table II.1).

It can be generalized that, when any one program has been expanded, the responsibilities program personnel--especially extension workers--have become larger. The reliability of farmers in using the credit appropriately has become loose, and the credit results have fallen far short of targets. At the termination of both the Bimas SSBM and the Bimas Gotong Royong programs, the repayment rate was very low. There might be two implications. First, because of low repayment rate, the program was terminated or, second, the lowest repayment rate was because of the loan institution was not actively asking farmers to repay the credit.

Bimas Gotong Royong shows the lowest repayment rate of the three kinds of Bimas. This was due to inflexibility of the credit

⁶³ Some might argue that, since the fertilizer will end up in crop fertilization regardless whoever will use it and what kind of crops will be fertilized, the macro-effects of fertilization credit will be the same. However, if we recall the goals of self-sufficiency in rice and helping farmers who need help, the inappropriateness of using the credit is a serious problem to be considered.

Table II.1. The Hectarage of Bimas and Loan Repayment Rates

Program and Area	Years	Thousand of Hectares Covered	Repayment Rate (Percent)
Bimas SSBM in West Java	1965/66	35	90
	1966	80	50
	1966/67	144	17
Bimas Gotong Royong in Indonesia	1968/69	298	30
	1969	493	20
	1969/70	778	12
	1970	191	7
Improved Bimas in Indonesia	1973/74-74	2990	88
	1974/75-75	3097	80
	1975/76-76	2971	60

Sources: Bimas SSBM is from Economic Development Institute, 1968.

Bimas Gotong Royong is from A.T. Birowo, op. cit., pp. 6 and 11.

Improved Bimas is from Igusti B. Teken, op. cit., pp. 11 and 22.

package for farmers. Lack of individual contact with the credit institution made the farmers feel less responsible to repay their debts. The problem of inappropriateness of the technical guidance still existed. This was even more serious since the farmers had less participation in protecting their field from insect and diseases.⁶⁴

The discontinuity of the rice intensification program during the period from Padi Centra program until the improved Bimas program has been due to mainly the considerations of: 1) the achievement of self sufficiency in rice in relatively short period, 2) the basis of trial and improvement of the programs, 3) lack of manpower for the extension work, and 4) the simplifying assumption that every village can do in the full scale program what the successful pilot project does.

The weaknesses of certain programs were considered to be eliminated and the government felt it necessary to form a new program. Experimentation with a new program in a relatively small area showed a successful result--usually in terms of yield per hectare. Then, the new program was extended to the provincial or national level.⁶⁵

⁶⁴During the implementation of Bimas Gotong Royong (1969 and 1970), seven foreign companies from Germany, Switzerland and Japan contracted with the Indonesian Government to supply fertilizer, pesticides, seeds and other items to increase rice production. In West Java, the contractors did the aerial spraying for pesticides by themselves. Farmers had less participation in it. Gary Hansen, op. cit., p. 64.

⁶⁵The examples were the termination of the Padi Centra and Bimas Gotong Royong programs. The expansions from the Action Research to the Demas and Bimas programs, and from the pilot project of the BUUD in Yogyakarta (1969/70) to the Improved Bimas program were the examples of the program expansions.

The quality and the quantity of the supporting institutions for the program--PPL, BUUD/KUD, or Village Unit Bank--and the farmers themselves were not ready for such an expansion of the program.

Sometimes the wrong assumption was made that every village/desa had similar conditions and that farmers will respond to new programs in the same way as in pilot projects. The farmers in other areas are not necessarily as responsive to the program as the farmers inside the pilot project.

The situation in one village--institution and farmers--might be appropriate for Bimas and might not be appropriate for Inmas. If there are not enough supervision workers for bringing 3 or 4 villages under the Bimas program, why not give them one desa for Bimas and the rest desa for Inmas rather than involving all four desas in the Bimas program at once? The concentration on one desa or small area makes it easier for the institution to administrate and supervise inputs utilization.

CHAPTER III

CONCEPTUALIZATION OF THE MODEL

Introduction

Chapter I mentioned that a model was needed in order to evaluate the effects of government programs on the process of surplus creation at the farmer's level. This dissertation develops a model called "Perspective Analysis of Small Community Capital Accumulation." For short it will be called "PASCCA Model."

"Small community" refers to the production community of dominant enterprise in a local area or a village. This community consists of a large dominant farmer--according to the size of his farms or his influence on technological adoption--and the number of farmers or landless workers who have labor and capital transactions with the large farmer in the main agricultural enterprise.¹

Capital accumulation refers to the process of creating the main agricultural product surpluses by the members of the production community. "Perspective analysis" refers to knowing the object, the creation of the surplus prediction in the community, from different classes of farmers/workers' point of view for the implementation of a government program (Figure 3.1).

In mathematical form, this PASCCA model is a simplification of Leontief input-output analysis. The differences between the PASCCA

¹Sometimes the dominant force may be a group of large farmers, rather than a single farmer.

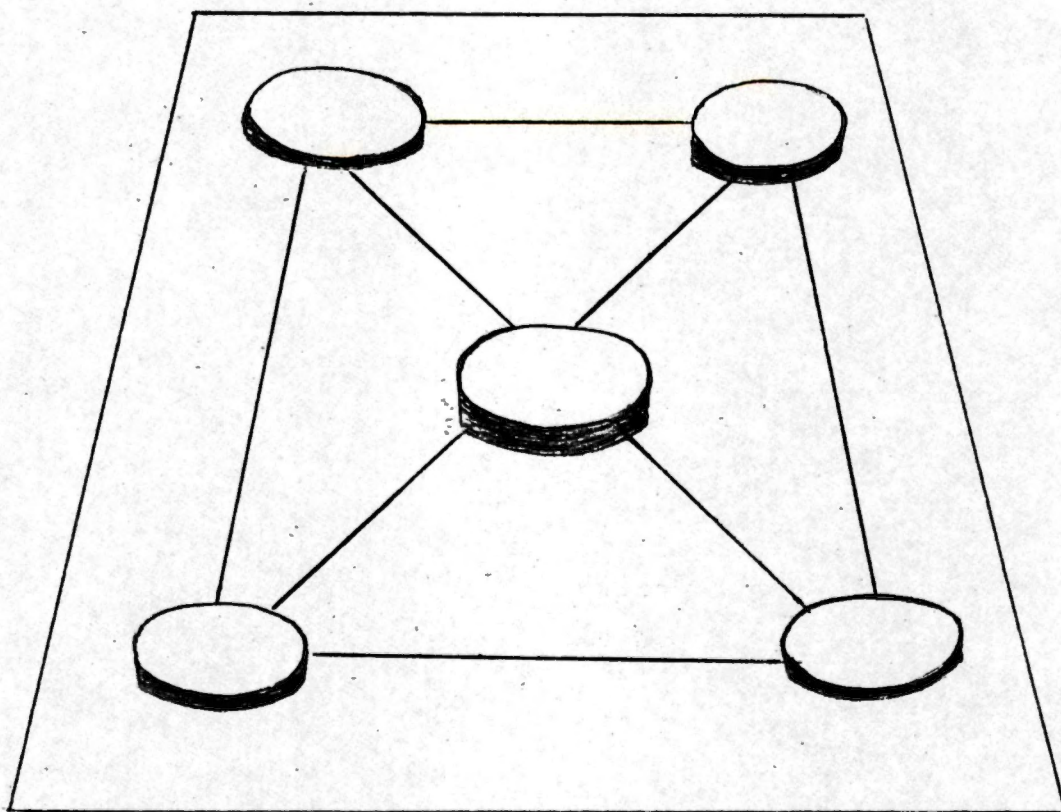


Figure 3.1. Key Farmer/Worker Groups Around Which the PASCCA Model is Built

model and input output analysis are: 1) the subjects to be analyzed, 2) the main tasks of the models, and 3) the complexity of the models.

The analyzed subjects in the input-output analysis are the interrelationships of inputs and outputs among sectors in a certain geographical area, while in the PASCCA model, the subjects are the interrelationships of labor and capital among farmers/workers in a production community. The main task of input-output analysis is to estimate the effects of a change in outside demand for a sector on: a) the production level of each sector, b) the new input-output interrelationships among sectors, and 3) the level of income per capita in the region. The main task of the PASCCA model is to estimate the effects of certain government programs--for a certain commodity--on the surplus level of locality, both for the total community and for each member in the community. Input-output analysis is concerned with the average per capita income in an area, while the PASCCA model is concerned with the surplus income of different classes of farmers/workers in a small production community.

Input-output analysis often involves intricate computer programs for estimation purposes, since it is concerned with the analysis of a matrix system, while the PASCCA model can use simple accounting of an enterprise in terms of labor, capital and production.

The discussion that follows in this chapter will center on: 1) the basic components of the PASCCA model, 2) the components of the PASCCA model applied specifically to West Java rice producing areas, and 3) formalization of the PASCCA model application.

Basic Components of the PASCCA Model

The basic components of the PASCCA model are shown in Figure 3.2. This model uses the dominant enterprise in a locality as the focus theme of its analysis.² It does not analyze the labor, capital and production interrelationships among households in other enterprises. The model is developed to know how important the contribution of the main sources of the farmers/workers' income are to their daily life in the community.

Government Programs and Technological Changes As the Key Changes

Both government programs and technological changes in a main agricultural product are considered the factors to evaluate in terms of their effects on the creation of the main agricultural product surplus in a locality.

Some examples of government programs that can affect agricultural commodity are: 1) a government credit program, 2) an improvement of

²One example of research that analyzed all economic sources and economic activities of a peasant is the Anatomy of a Peasant Economy by Yujiro Hayami. The research was undertaken intensively in a rice village in the Philippines for a one-year period on the basis of a current rice production account, current non-agricultural account, income-expenditure account, fixed capital production account, capital finance account, and transaction account. The subjects of economy was divided into large farmers, small farmers and landless workers. Through the analysis of the samples in each group and the number of each group in a village, the study analyzes the social accounts of the village. Compared to this study, the PASCCA model analyzes lesser sectors--the most important economy related to the external variables and primary consumption--but having samples which have actual relationships in the economy. Yujiro Hayami, Anatomy of A Peasant Economy: A Rice Village in the Philippines (Los Banos: International Rice Research Institute, 1978), pp. 3-6.

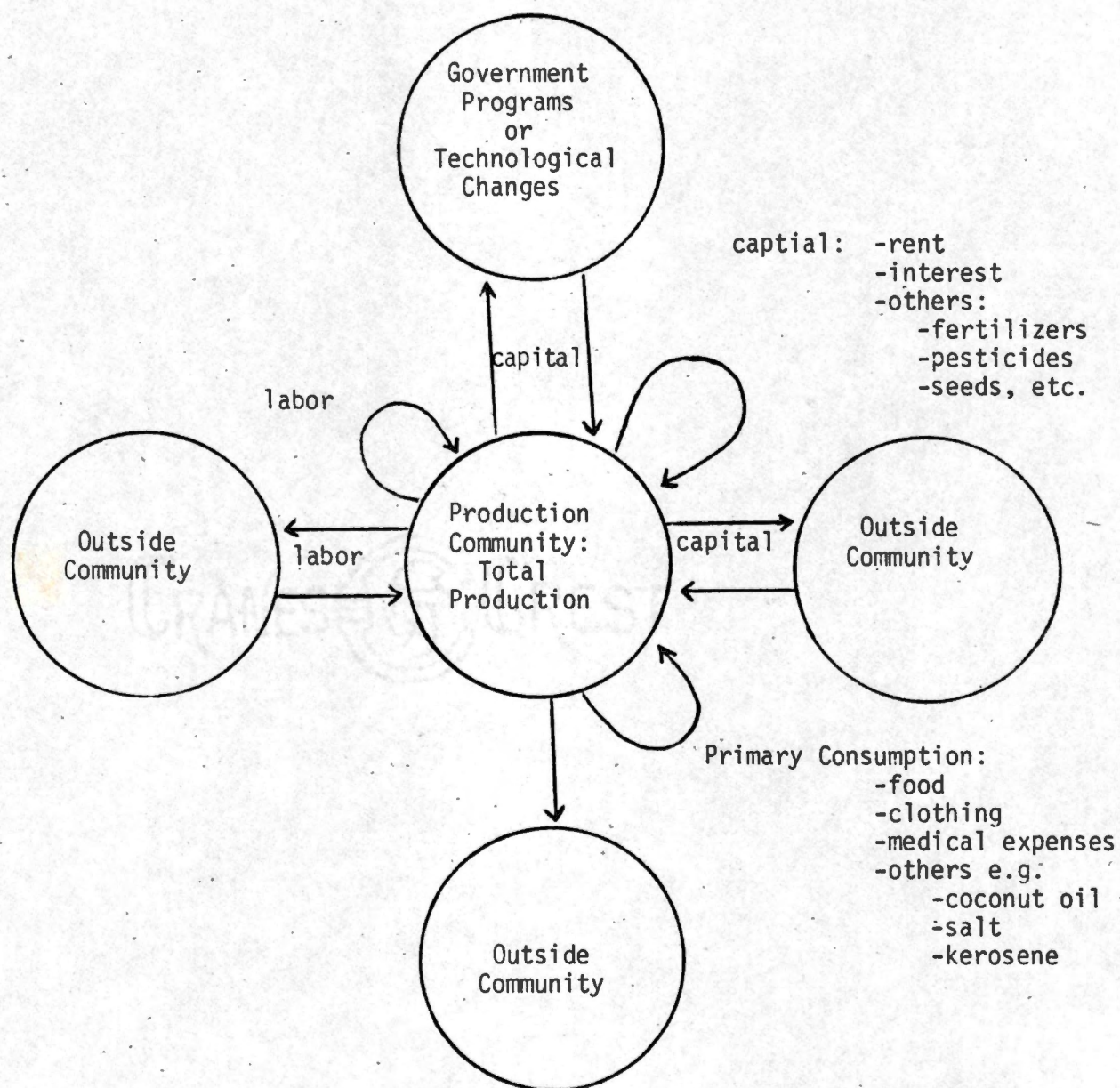


Figure 3.2. The Key Components of the PASCCA Model

irrigation systems, 3) an improvement of technology, 4) a soil conservation program, 5) an acreage/hectarage control program, and 6) maximum or minimum price determination. Technological changes can include biological, chemical, and mechanical technologies.

A Production Community as A Unit of Analysis

It was mentioned that a production community consists of a dominant farmer and a number of other farmers and landless workers who have labor or capital transactions with the large farmer in the dominant enterprise.

The area of the production community to be observed is according to the government programs or technological changes that would be evaluated. For example, if the key change is the government rice program, the community to be observed is a rice producing area. If the key change is a government program on cattle, the community to be observed is a cattle village.

Labor Transactions Among Households and Outside the Community

Labor transactions among households, in the locality are limited in the model to the tasks of the production and processing of the main agricultural products. These labor transactions include transactions: 1) within a household (family labor), 2) among the households in the production community, and 3) between the households and outside the community.

The variables included in the labor transaction category are the labor man-days and wages for each task in the production and processing of the main agricultural product. Wages include cash or payment in

kind and meals, if they provide meals. Wages for family labor within a household include meals and opportunity costs if these family laborers have opportunities to work outside their family's farms. If they do not have the opportunities, the only wages are the meals.

Figure 3.3 shows the interrelationships of labor and capital within a household, among five typical households in a typical production community and between these five households and outside the community.

Capital Transactions Among Households and Outside the Community

Similar to the labor transactions, the capital transactions (in the main agricultural production and processing) include transactions within a household, among the households in the production community, and between the production community and outside the community. For a certain government program--i.e. government credit--there are capital transactions between government and the households in the locality. These transactions are also included as key components of the PASCCA model.

Rent, interest, and other non-labor expenditures are categorized as the capital transactions. Other non-labor expenditures include expenditures on: seeds, fertilizers, fungicide, pesticide, and operation costs for machinery.

Total Production, Primary Consumption and Commodity Surplus

The capability of the households in the production community to accumulate capital--i.e. land, building, consumer durables, machinery, livestock, perennial crops, output, and input inventories, financial

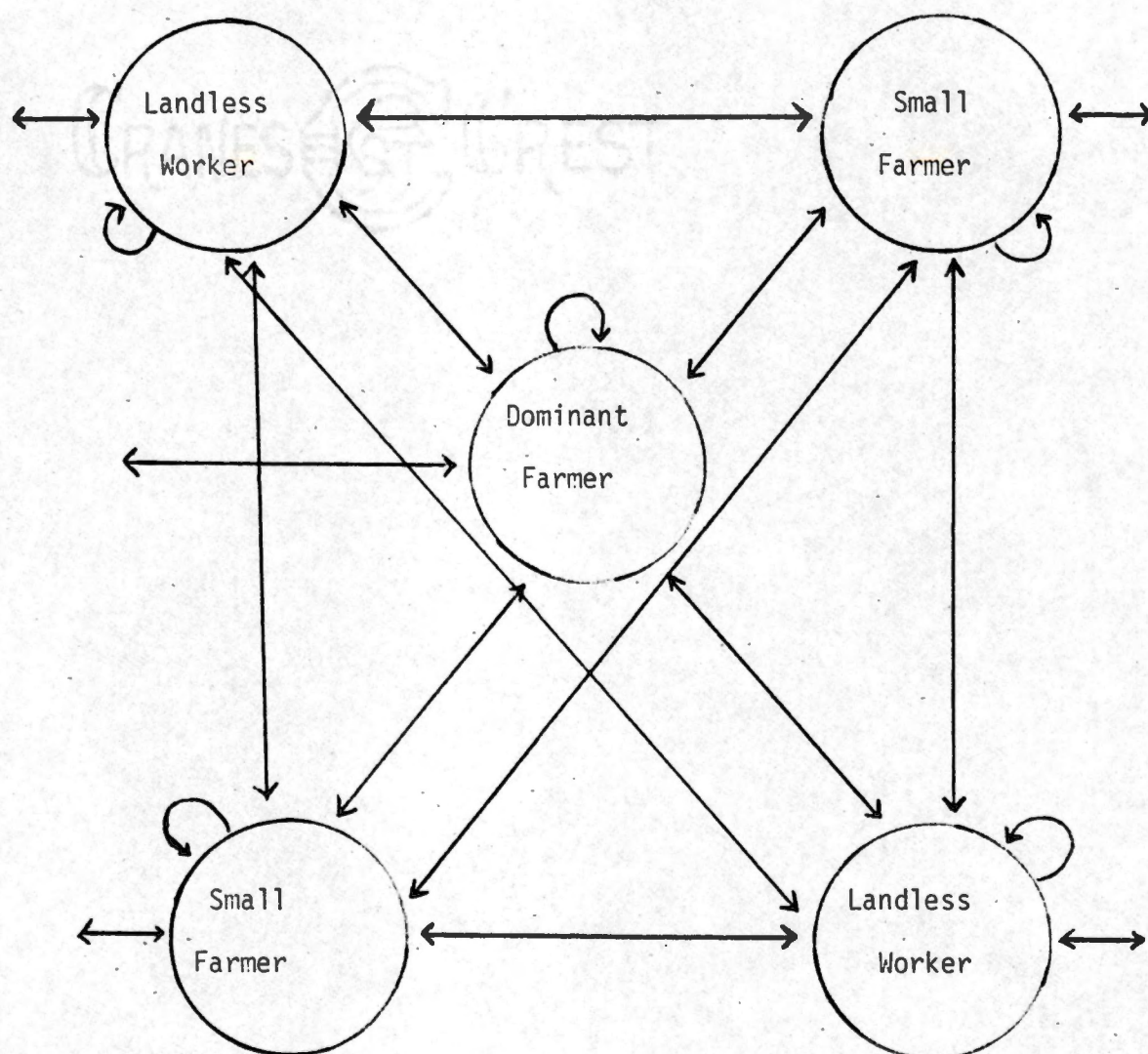


Figure 3.3. The Interrelationships of Labor, Capital, and Primary Consumption Among Five Households in A Typical Production Community and Outside the Community

-  : Transaction of labor and capital within the community
-  : Transaction of labor and capital between households in the community and outside the community
-  : Use of labor and capital within a household and primary consumption

assets, public infrastructures and education³--is indicated by the available surplus from their main agricultural products. This available surplus is the total production less labor, capital expenditures and primary consumption.

Primary consumption includes the expenditures on food, clothing, medical expenses, and others--e.g. kerosene, coconut oil, soap and possibly ritual spendings. The kinds of food and other spendings that are considered the primary consumption depends on the locality. For instance, one locality might consider rice as the main food, and another locality might consider cassava as their staple food.

These components of labor, capital expenditures, and primary consumption, total production, and surplus are shown in Table III.1.

Application of the PASCCA Model to the West Java Rice Producing Area

Applied to the West Java situation, the PASCCA model analyzes only the rice economy of the community in a rice village. It does not analyze the interrelationships among the households for other crops or non-farm occupations.⁴ The key components for the application of the

³Ibid., p. 99.

⁴The author realizes the importance of the Three Basic Policies of Indonesian Agriculture Development (Trimarta Pembangunan Pertanian) for Pelita III (1979-84)--i.e. Integrated Farming Policy (Kebijaksanaan Usahatani Terpadu), Integrated Commodities Policy (Kebijaksanaan Komoditi Terpadu), and Integrated Region Policy (Kebijaksanaan Wilayah Terpadu). Moeljadi Banoewidjojo, "Trimarta Pembangunan Pertanian" Agro Ekonomika no. 11, tahun X (October 1979), pp. 121-126. The analysis of PASCCA model may seem to be at odds with those three principles, because the analysis is concerned only with the main income sources and does not include the other sources of farming. However, in its final implication, this PASCCA model is not at odds with the first and second

Table III. 1. The Basic Form of the PASCCA Model

Income Earning Farmers/Workers	Source of Income ^a				
	1	2	3	4	5
1	11	12	13	14	15
2	21	22	23	24	25
3	31	32	33	34	35
4	41	42	43	44	45
5	51	52	53	54	55
Total Labor Expenditures in the Community and Primary Consumption ^b	LPC ₁	LPC ₂	LPC ₃	LPC ₄	LPC ₅
Labor Income from Outside the Community	OL ₁	OL ₂	OL ₃	OL ₄	OL ₅
Rent	R ₁	R ₂	R ₃	R ₄	R ₅
Interest	I ₁	I ₂	I ₃	I ₄	I ₅
Other Inputs	OI ₁	OI ₂	OI ₃	OI ₄	OI ₅
Surplus ^c	S ₁	S ₂	S ₃	S ₄	S ₅
Total Production	TP ₁	TP ₂	TP ₃	TP ₄	TP ₅

^aThe same letters code (e.g. 11) means primary consumption of household 1. The different letters code (e.g. 12) means labor income of household 1 from household 2.

^b $11 + 21 + 31 + 41 + 51 = \text{LPC}_1$, etc.

^c $S_1 = \text{TP}_1 - \text{LPC}_1 - \text{OL}_1 - R_1 - I_1 - \text{OI}_1$, etc.

PASCCA model in West Java Rice Producing area are as follows.

Government Rice Intensification Programs and New Rice Technologies As the Examples of Key Changes

According to the intensity of guidance, the government programs on rice production could be classified into 1) the programs with intensive guidance, and 2) the programs with less intensive guidance. The action research (1963), Demas (1964/65), and pilot project of the Improved Bimas (1969/70) could be categorized as the programs with intensive guidances. Padi Centra (1959-62), Bimas SSBM (1965-1967), Bimas Gotong Royong (1968-1970), Improved Bimas (since 1971), and Inmas (since 1967) could be categorized as the programs with less intensive guidances.

Based on this classification, the rice programs that will be analyzed by the PASCCA model would be 1) Bimas with intensive guidance (BIG), 2) Bimas with less intensive guidance (BLG), and 3) Inmas program. Inmas is similar to BLG in terms of lack guidance intensity. However, since Inmas does not involve credit provision as the BLG does, the Inmas program would be separated from BLG in the PASCCA analysis.

Two different kinds of rice technologies will be analyzed in this study--i.e. 1) biological and chemical technologies, and 2) mechanical rice technologies. Biological technologies are concerned with the

principle. It is compatible with the third principle, that the agricultural development programs must be adopted to the local potentials both from physical and human viewpoints.

use of high-yielding varieties of rice (HYV);⁵ even though for such a region the HYV cannot yield more than the traditional varieties, this study assumes that the physical conditions are appropriate for using the HYV. These physical conditions include the irrigation, the weather and the soil fertility. Therefore, the only conditions that are different between one area and another for using the HYV are the level of farmers' adoption of HYV and the kinds of existing government rice programs at a certain time.

The chemical rice technologies are concerned with the application of chemical fertilizer and insecticide/fungicide. These technologies are very much associated with the biological technologies; hence, both technologies--biological and chemical--are grouped together in the analysis. The applications of chemical fertilizer and chemical plant protection occur mostly together with the use of HYV. The HYV is very responsive to the chemical fertilizer.⁶ Without using chemical fertilizer, the HYV yields less than the traditional varieties. It is useless to grow the HYV without proper fertilization. Except the VUTW--which was developed in solving the "wereng" explosive problem--most HYV are less resistant to pests and diseases. Therefore, the growing numbers of farmers who plant the HYV tend also to use chemical insecticide, fungicide, and rodenticide.

⁵These varieties are the result of the experimentation research in the Philippines and Indonesia. Recently, farmers are encouraged to plant the variety of VUTW (varietas utama tahan wereng); this variety is resistant to the leaf-hopper which carries a virus.

⁶In Cidahu, West Java, the farmer's yield of modern varieties--HYV from the Philippines--are 3.3 ton/ha with using 31-60 kg N/ha and 4.2 ton/ha with using 91-120 kg N/ha. The local varieties--HYV from Indonesian Experiment Station--yield 2.7 ton/ha with 31-60 kg/ha and 3.1 ton/ha using 91-120 kg N/ha. R. Barker, op. cit., p. 41.

In a neighborhood where no farmers have tried any HYV and chemical fertilizer, without any government program in rice intensification, those farmers will hardly have access to those innovations in a short time. They will have to spend two or three seasons watching, comparing and doing self-experiments. Even where there is enough supply of fertilizer in the local market or kiosk, they will not want to buy it if they still lack confidence in the profitability of using those fertilizers. At the beginning of the self-experiment stage, there might be the large or medium farmer--depending on personal willingness to take risks--who will be willing to pioneer in fertilizer use.

Mechanical rice technology is indicated by using tractors--hand or four-wheel--for land preparation, using sickles for rice harvesting, and using rice milling or hullers for rice processing. Those technologies yield benefits large farmers mostly and may hurt small farmers and landless workers. It reduces labor needs for the operation of one hectare of rice production or for one quintal of rice processing. The laborers usually consist of small farmers, landless workers or even the medium farmers. Therefore, at the given conditions of rice biological/chemical technologies and the existence of government rice intensification programs, the different levels of mechanical technologies in a neighborhood will have different effects on amounts and distribution of surplus.

The Small Rice Community As An Example of A Production Community

In Chapter II the existence of the neighborhood association (Rukun Tetangga, RT) was mentioned. This neighborhood association consists of several households which have close relationships among

them in terms of social and agricultural life. It is common that they have close blood relationships among them or farming relationships such as between landowner and sharecropper, or the farmer and his permanent worker or servant.

Historically, such a typical community was started by one farmer as a new settler of a sawah (wet rice land) or dry rice field. As the number of family members became large, they erected new houses which were as close to each other as a cluster. Their farmland was inherited by the members of the family and the size of each unit was becoming smaller and more fragmented. In addition to the members of family, the permanent workers or servants have been often provided houses for their families. Some of the permanent workers have become the owners of small farms, or sharecroppers, while others have never had a farm of their own but only worked for their neighbors.

Regardless of the absolute hectarage of the farm, one neighborhood association or RT generally consists of families or households in different classes of social life or size of their farms. In this study, for the purpose of systematic analysis, the assumed classes of rural people will be: the large farmer, the medium farmer, the small farmer, and the landless worker.

The number and the size of farms in each class in a neighborhood vary according to density of population and farming culture of the village. In a rice village, the population density is usually higher than in a non-rice village. Despite this variation, the typical small rice community in West Java was assumed to have: one large farmer

(2 hectares sawah), 2 medium farmers (0.6 hectares sawah each), 4 small farmers (0.3 hectares sawah each), and 4 landless workers.⁷ However, a typical small community in other Javanese situations might take quite a different form.

In practice, the interrelationships among rural people are not limited to the people in the same neighborhood association (RT); there are also links between different neighborhood associations. Nevertheless, according to the assumption that the interrelationships among people in the same neighborhood are closer than between neighborhoods, the analysis of one neighborhood is not an unreasonable basis for representing the picture of a desa/village.

If, in one village, it is difficult to find a neighborhood association in which all households have job interrelationships in rice production and processing, it is suggested to take one large farmer from a village as a representative. The definition of "large farmer" must be based on the size distribution of farm owners in the village.⁸ For the purpose in evaluating the effects of Bimas and Inmas, the definition of large farmer can best be based on the size of sawah that he owns, not what he operates. Parts of his sawah might be rented to other farmers--medium, small farmers or landless workers.

⁷The agricultural census in 1973 showed that 60 percent of farmers operated less than 0.50 hectare, 20 percent operated between 0.50 to 1.00 hectare and 17 percent operated 1 hectare or more. Central Bureau of Statistics, Agricultural Census 1973, Vol. I. p. 230.

⁸In West Java, it is difficult to ascertain the size distribution of farms or sawah according to operators, unless the particular desa administrator has the previous census. To solve this problem, the size distribution must be based on ownership; most desas have documents about land ownership, even not in recent years. If a desa does not have this document, interviews with local leaders are useful for identifying the representative large farmer.

If, according to the interviews or to the list of sawah ownership, there is more than one large farmer, the representative large farmer will be chosen according to the government programs that will be observed. In evaluating the effects of Bimas and Inmas program that have been implemented, it is appropriate to select the large farmer who has participated in these programs.

Based on the interviews with the chosen representative large farmer, the neighbors or non-neighbors who work for his household in rice production and processing, and who sharecrop or borrow inputs from him, can be identified. Those neighbors who live in the same village as the representative large farmer will also be the representative samples for the interviews. It is not necessary for non-neighbors who live outside the village or desa to be taken as respondents.

The definitions of medium farmers, small farmers and landless workers will be based on the size of sawah that they own according to the interviews. In some cases, the small community might not have the medium farmers or landless workers and, in some cases, it may have all these categories.

Labor Transactions Among Households and Outside the Community

Labor interrelationships in a rice village, West Java were discussed in Chapter II (see the section "Labor and Wage System in Rice Production and Processing"). The discussion that follows is concerned only with the formalization of the PASCCA model.

The information is concerned mainly with the labor interrelationships among households in a neighborhood that center around rice production and rice processing. The major rice production tasks

include land preparation, transplanting, weeding and harvesting. These tasks employ more workers than the other tasks--sowing, fertilizing, spraying, field supervising and output drying. Yet, the latter tasks use mostly family labor rather than hired labor. Whether rice processing includes hand pounding or rice milling depends on the condition of the neighborhood in a desa.

Wage payments for those hired laborers have different forms. It might be all in cash, all in rice form, in cash and meals, in rice and meals, or only with meals. In order to eliminate the problem of this difference, this study uses the equivalent of kilogram of rice as the unit of measurement for all activities in the rice economy and in primary consumption.

Using kilograms of rice as the unit of measurement is based on the characteristics of rice as the wage goods for labor in agricultural sector. Yet, in the situation when the inflation rate varies from year to year, the measure, kilograms of rice, can be considered to be a deflated form of prices.⁹

When one laborer or one member in a family gets the meals for his/her work, these meals are included in his primary consumption category. His only surplus is his wage in cash or in rice form measured or kg of rice equivalent.

⁹Indonesia had an experience of severe hyperinflation during 1962-68 with 278 percent of annual rate of inflation. During other periods, the annual rate of inflation were 35 percent in 1957-61, 17 percent in 1969-73, 20 percent in 1974-77 and 9 percent in 1978. Mubyarto, "Indonesia's Economic Prospects for Pelita III" Prisma: The Indonesian Indicator No. 14 (September 1979), p. 9.

Capital Transactions Among Households and Outside the Community

Despite the improvement in the flexibility of farmers to get credit from Bimas program individually, the small farmers have continued to have difficulty in gaining access to Bimas program. Official loans and extension assistance in some areas by-pass the small farmers and go mainly to the large farmers.¹⁰

The incomes of small farmers in Java are so low that they cannot afford to buy fertilizer in the Inmas program or to apply for the Bimas credit. The lack of opportunity for the small peasants to communicate with the formal local loan institutions and the very small size of their sawah makes it difficult to have access to loans. Even if they are willing to borrow and in fact they do get the loans, some farmers cannot use the loans for rice; instead they use the credit for other purposes.¹¹ Loans through the Bimas program have had a low interest rate--1 percent per month, compared to the local money lenders' around 10 percent a month. By the time they should have repaid the loans--after two rice seasons or almost one year from taking the credit--there is no income left to repay the loan, or they may have already forgotten it.

¹⁰Iain Buchanan, "Indonesia" The Far East and Australasia (1977/78), p. 468-69. The study found out, that even in village where ecological conditions were optimal for the success of HYV rice and where class divisions were not sharp as elsewhere, only 20 percent of farm households were using loans in 1973 and in other villages the proportion was even lower.

¹¹When studying desa Tanjakan, kecamatan Rajeg, kabupaten Tangerang in 1975, the author found out that some farmers wanted to participate in Bimas program because they wanted the cash loans (cost of living, COL). They used this credit for consumption, not for rice production. They were not attracted to the loans for modern inputs.

If the small farmers cannot get the Bimas credit directly from the village unit bank, some of them will get it second hand--i.e. from the large farmers.. This second-hand credit often entails a higher interest rate (around 10 percent a month) than the government subsidized credit.

In reality, the high interest rate can be in the form of cash payment, in-kind payment or in labor contract system. The cash payment usually occurs when there is no land tenure relationship between the small farmer and the large farmer; it occurs also when there is a loose labor relationship between them. Yet, the interest rate in terms of rice-equivalent calculations seems to be higher than in terms of standard currency.¹² If the small farmer is a sharecropper of the large farmer's land, the fertilizer and seed expenditure that is spent by the land-owner must be subtracted from the yield before it is shared. This share in rice form is higher when it is shared than during the months of fertilizer or seed application. In the village or small community where the labor relationship is very close, the loan is usually repaid in the form of "ijon-kerja" system. This system requires the worker to pay off the debt bondage. This system implies a low wage--lower than the prevailing wage in labor market.

In a village where the response of farmers to new techniques and modern inputs is very low, some large farmers borrow not for

¹²The rice price at the borrowing time, usually non-harvest time, is usually higher than its price at the repayment time or at the rice harvest time.

increasing their rice production but for other businesses that are more profitable or yield faster returns than rice farming. Those businesses might be trading, rice processing, or even money lending. It is not unusual to find cases in which fertilizer is moving out from a village which participates in the Bimas program to villages without the Bimas program or even to an area where certain crops--highland vegetable--need fertilizers more than rice does. This is one of the sources of difficulty in achieving the target of rice self-sufficiency.

The circulation of fertilizer through the large-rice farmer in the Bimas program yields benefits for them but, on the other hand, the small rice farmers in rice villages and other farmers in non-rice villages are the losers. The scarcity of fertilizer in the open market--because most fertilizer is for Bimas--makes its price relatively high; the non-rice farmers have to pay it. If the fertilizer supply is large enough for both rice and non-rice uses, then circulation through the large rice farmers can be avoided.

Therefore, the Bimas program with less intensive guidance or adequate services seems to be a stimulator of more unequal distribution of wealth among classes of farmers, and between large rice farmers and non-rice farmers.

With the Inmas program or when providing inputs without credit, farmers who have already adopted the new rice technology will buy the modern inputs according to their capability to pay. The farmers who have a rice surplus left over from their primary consumption and labor expenditures might buy the fertilizer and insecticide from a local store. The farmers who do not have capability to buy the fertilizers

have two alternatives--either 1) borrow fertilizer from the neighbors who have already bought it or 2) not use fertilizer at all in rice production. Even when they do not have enough cash to buy fertilizer, they may be willing to borrow from the large farmers since they already know that the fertilizer is helpful in rice production.

Through the BIG program, the intensity of lending and borrowing among households especially for modern inputs will be reduced due to the appropriateness of quantity in the inputs and the quality of guidance. Lending and borrowing will be more competitive between the formal and informal institutions.

Total Rice Production, Primary Consumption and Rice Surplus

Related to the objectives of the government rice program--to have self-sufficiency in rice, an equitable distribution of the benefits of development programs and rural capital formation--the rice surplus will be used as the indicator of the capability of neighborhood associations to form capital.

The concept of rice surplus used in this study has quite a different meaning from the usual concept of marketable rice surplus. The general term "marketable rice surplus" means the quantity of rice in one area or desa available for sale to other areas. The quantity is usually derived from the total rice output in the area less the quantity of rice that goes for seed input, waste and local consumption. In contrast, the term "rice surplus" in this study refers to the residual amount left after variable cost of rice production and all household consumption needs are met--i.e. what a family has left over.

Hence, the subtraction is not only by the local rice consumption but also by other primary consumption items--salt, sugar, kerosene, coconut oil, soap, and textiles. For the matter of quantitative aspects, the rice surplus here must be always less than the general concept of marketable rice surplus.

The following lists show the difference between the meaning of marketable rice surplus and the rice surplus in this study.

<u>Marketable Rice Surplus</u>	<u>Household Rice Surplus</u>
Total rice production in an area	Total rice production from an individual farm
Minus:	Plus:
--rice used for seed	--rice shares from other households as harvesters
--rice lost due to handling	--family wage payments from other households in rice production and processing
--local rice consumption	Minus:
	--wage payments to other households in rice production and processing
	--seeds and other non-labor input payments for his rice farms and processing
	--basic family needs

The rice surplus is the family's net income from the rice economy--farming and processing--over its primary consumption. The capability of one farmer to buy fertilizer or other modern inputs is assumed to be influenced by the availability of the rice surplus of his family.¹³ If they do not have enough surplus--not only in rice form but also in cash--for buying new inputs, they would rather not buy it. Instead, they borrow from neighbors or money lenders. Even if they can get loans for their rice production in the Bimas program, they often cannot afford to repay the loan; as a consequence, they are not allowed to participate in the next bimas program.

Formalization of the PASCCA Model Applied to the West Java Rice Producing Area

The model is concerned with the possible interrelationships of labor income among classes of farmers/workers in the typical neighborhood or small rice community. In table form, the example form of the PASCCA model is described in Table III.2.

The number of households in each farmer/worker class in a typical neighborhood has already been mentioned. In Table III.2 all

¹³Theoretically, the decision of farmers to apply new techniques or new additional units of input depends upon the net contribution to output (marginal value product, MVP) compared to the unit cost of the input. As long as MVP is higher than the unit cost and the inputs are unlimited, the farmer will use the additional new input. However, this concept is not fully applicable for the small farmers in Indonesia. They do not have the facts needed to make decisions on this basis. Their decisions depend mainly on whether they have extra income for buying new additional inputs and the opportunity cost--i.e. payoffs of alternatives ways to use those funds.

Table III.2. The Basic Form of the PASCCA Model Applied to the West Java Rice Producing Area

Income Earning Farmer/Worker	Source of Income ^a				LPC ^b (5)	P ^c (6)	I ^d (7)	RS ^e (8)	TRP ^f (9)
	L (1)	M (2)	S (3)	W (4)					
Large Farmer (L)	LL	LM	LS	LW	LPC _L	P _L	I _L	RS _L	TRP _L
Medium Farmer (M)	ML	MM	MS	MW	LPC _M	P _M	I _M	RS _M	TRP _M
Small Farmer (S)	SL	SM	SS	SW	LPC _S	P _S	I _S	RS _S	TRP _S
Landless Worker (W)	WL	WM	WS	WW	LPC _W	P _W	I _W	RS _W	TRP _W
Total Labor Expenditures and Primary Consumption	LPC _L	LPC _M	LPC _S	LPC _W	ΣLPC				
Input Payment (P)	P _L	P _M	P _S	P _W		ΣP			
Interest Payment (I)	I _L	I _M	I _S	I _W			ΣI		
Rice Surplus (RS)	RS _L	RS _M	RS _S	RS _W				ΣRS	
Total Rice Production (TRP)	TRP _L	TRP _M	TRP _S	TRP _W					ΣTRP

^aL: large farmer; M: medium farmer; S: small farmer; W: landless worker.

^bLPC: total labor expenditures and primary consumption; $LPC_L = LL + ML + SL + WL$, etc.

^cP: input payment.

^dI: interest payment.

^eRS: rice surplus; $RS_L = TRP_L - LPC_L - P_L - I_L$, etc.

^fTRP: total rice production.

households in the same class are grouped together--e.g. 4 households of small farmers are put in one column/row of small farmer category.

Column/rows 1-5 are considered as a sub-set of the interrelationships among classes of farmer/worker in terms of jobs/wages in the rice production/processing and primary consumption. The cells with double letter codes mean the level of primary consumption of each class: LL means primary consumption level of large farmers, MM medium farmers, SS small farmers, WW landless workers. The cells with different letter codes mean the labor cost for the spender and the labor income for the receiver. The first letter of the code means the receiver (row) and the second letter means the spender (column), ML means the labor income of M (medium farmers) as the receiver from source L (large farmers) and so on. Two cells having the same combination letters but in different orders, will have the same absolute value of labor income/cost but have different signs. ML has the same absolute value as LM, SL, as LS, etc.; if ML is positive, LM must be negative and vice versa.

Total labor expenditure and primary consumption are symbolized as LPC_L , LPC_M , LPC_S , and LPC_W . LPC_L means the total labor expenditures and primary consumption of large farmers. Since this typical small rice community is assumed to be a closed society in terms of job relationships, the total labor expenditures and primary consumption for all classes in the community ($LPC_L + LPC_M + LPC_S + LPC_W$) is equal to the total of primary consumption of all households or LL + MM + SS + WW. This is due to the consideration that income for the receiver is also expenditure for the spender in the same production community.

As mentioned in the previous section, the labor expenditure or labor income is derived from the rice enterprise of each class of farmer/worker; it consists of rice production and rice processing. Primary consumption is the consumption of food, medical expenses, clothing and other items--salt, coconut oil and kerosene--that are excluded from the capital expenditures (land, building, input and output inventories, farm equipment, financial assets, livestock, perennial crops, public infrastructure and education). Details of rice production tasks, labor hours, wage and primary consumption levels will be discussed in Chapter IV.

In connection with the roles of government programs, in rice intensification that deal mostly with the non-labor input provision and credit, the expenditures for non-labor input and its interest payment--if there is any--are treated in the table separately from the labor expenditures.

The payment for inputs (row/column 6) consists of expenditures on rice seeds, fertilizers, and pesticides/fungicides. The amount of payment is based on the price of those inputs and rice at the time of using those inputs on rice farming. Meanwhile, the interest payment (column 7) is based on the difference of rice equivalent between 1) the credit payment with price of rice during at harvest time and 2) the payment for non-labor inputs (6). Therefore, $(6) + (7) = \text{credit payment in rice equivalent at harvest time.}$ ¹⁴

¹⁴For example, given 1) the rice price now (non-harvest) is Rp 250/kilogram, 2) the rice price at six months later (harvest time) is Rp 200/kilogram and 3) the nominal interest rate on loans is 6 percent/ 6 months, a Rp 1000 loans now ($\text{Rp } 1000 / \text{Rp } 200 = 5 \text{ kilograms}$) has to be repaid six months later on the amount of $\text{Rp } 200 = 5.3 \text{ kilograms}$. Hence, the interest payment is $5.3 \text{ kilograms} - 5.0 \text{ kilograms} = 0.3 \text{ kilograms rice}$.

Rice surplus (RS) for each class of farmer/worker is the total rice production (TRP) after subtracted total labor expenditures, total primary consumption, payment and interest rate for inputs. This rice surplus is considered the indicator of the small rice community's capability to accumulate capital. The greater the level of rice surplus in the community or in each class, the greater the capability of the community/individual to form capital.

The effects of each government rice program on a small rice community can be seen in terms of the total rice surplus in the community and the distribution of the rice surplus among classes. One kind of government program might have a good impact on increasing total community's rice surplus but not have a good impact on the distribution of the rice surplus.

CHAPTER IV

AN EMPIRICAL APPLICATION OF THE MODEL

Introduction

This chapter will show how the PASCCA model helps identify the effects of programs that have been implemented on a) size of surplus and b) distribution of surplus in a small rice community. This analysis is considered the application of the model to "backward analysis."

The discussion that follows will consist of 1) methodological approach, 2) basic and detailed characteristics of the typical small rice community, and 3) the results of the perspective analysis. The detailed characteristics of the typical small rice community that will be stressed are 1) the number of farmer/worker households in each class, 2) size of their farms, 3) number of people in each household, and 4) the basic interrelationships among households in terms of jobs, wage payment and their lending/borrowing systems. These interrelationships will be associated with the levels of rice technologies in the community and with three previous government rice programs--Bimas with intensive guidance (BIG), Inmas and Bimas with less intensive guidance (BLG).

The detailed community characteristics under this chapter are based on the author's observations while he was an enumerator or staff analyst for several farmer household surveys in West Java from 1967 to 1976, and while he was a Bimas SSBM agent in Sumedang regency in

1965/66 and a Bimas supervisor in Karawang regency in 1970.¹ The model also requires information about the coefficients of labor days in rice production and rice processing, yield per hectare, wage, price of inputs and rice. These figures are based on several references that will be mentioned in discussion of each characteristic in the text, as well as in related appendices.

The details of the analysis are shown mostly in the appendices, which are arranged so that the sequence is easy to understand. The presentation of tables in the text tries to avoid detailed figures as much as possible.

Methodological Approach

The specific objective of the empirical application of the PASCCA model is to compare the effects of 1) the Bimas program with intensive guidance (BIG), 2) Bimas with less intensive guidance (BLG), and 3) Inmas program on levels of rice surplus in the typical rice community.

In connection with the level of rice technologies of the typical community, those three rice programs are combined with these rice technology variables to formulate the table of the rice surplus picture (Table IV.1). There will be nine rice surplus descriptions in the typical small rice community. There is no combination between non-biological/chemical technologies and mechanical technologies in Table IV.1.

¹ Several surveys were carried out by Faculty of Agriculture, Padjadjaran University in West Java concerning: cooperative development, animal husbandry, soil conservation in Cimanuk area, and the effects of rehabilitation of irrigation infrastructure on agriculture in several river basin area--Cimanuk, Citanduy, Jatiluhur, Cisadane and Ciujung.

Table IV. 1. The Rice Surplus Picture As the Combination of Technological and Government Rice Programs

Government Rice Programs	Level of Rice Technologies		
	Non-Biological/ Chemical Non-Mechanical	Biological/Chemical	
		Non-Mechanical	Mechanical
Bimas with intensive guidance (BIG)	1	2	3
Bimas with less intensive guidance (BLG)	4	5	6
Inmas	7	8	9

This is because in most rice villages, the biological and chemical technologies come first to the rural area; then the mechanical technologies came as an implication of the change biological and chemical technologies. Using sickles for harvesting is appropriate for the relatively short stems associated with the modern rice varieties from the Philippines (IR5 and IR8). The introduction of the small rice mills to the village is the result of the increasing number of farmers who grow HYV. Yet, at the present time the number of farmers who have tried the HYV and chemical fertilizers is much larger than the number of farmers who own or practice the mechanical technologies.²

²From 2.4 million farmers in West Java (in 1973), 54 percent of them used chemical fertilizer, 6 percent used huller for rice processing (.14 percent used their own) and .30 percent used hand tractor (.03 percent used their own). Central Bureau of Statistics, Agricultural Census 1973 vol. VII, p. 107.

In addition to total rice surplus, the rice surplus differences among households in the community are also considered to be an indicator of the effectiveness of the rice programs. These rice surplus differences will be indicated by 1) range and 2) standard deviation. The rice surplus description of the typical small rice community can be shown as in Table IV.2.

Table IV.2. The Rice Surplus Description of A Typical Small Rice Community

Government Rice Programs	Level of Rice Technologies					
	Non-Biological/ Chemical		Biological/Chemical			
	Non-Mechanical		Non-Mechanical		Mechanical	
	Total	Differ- ence	Total	Differ- ence	Total	Differ- ence
Bimas with intensive guidance (BIG)	1	2	3	4	5	6
Bimas with less intensive guidance (BLG)	7	8	9	10	11	12
Inmas	13	14	15	16	17	18

There are 18 cells in this rice surplus description table. Based on the analysis results, those 18 cells will be ranked into high (H), medium (M), and low (L) categories. The total rice surplus is high if large rice surplus is accumulated, and low if small or negative rice surplus occurs. The distribution of rice surplus is high if there is small variation among classes of farmers/workers, and low if there is large variation.

Basic Characteristics of the Typical Small Rice Community

The typical small rice community has several assumed basic characteristics in terms of the description of the community itself-- number of people, interrelationships among them and their responses to different government rice programs. The basic characteristics of this typical community are:³ 1) The typical small rice community consists of one large farmer's household, two medium farmers', four small farmers', and four landless workers' households. They have close interrelationships in rice production and processing. These tasks involve all households in the production community.⁴ 2) The level of rice technologies--both biological/chemical and mechanical technologies-- among those classes of farmers in the community are the same. The process of innovation is not in the early stage, where only the early adopters who adopt the new technologies, while the other farmers still wait and see. Hence, all households in the typical community once are assumed to have and once are assumed to have not adopted new technologies. 3) The reactions of different classes of farmers in the typical community to each government rice program will be different. The difference is due to the varying levels of their income. Yet, the

³Incidentally, those basic characteristics might have been mentioned earlier. This specific discussion is in order to explain it systematically in the model. The detailed characteristics will be discussed in the next section.

⁴If there is any work relationship with the outside neighborhood/ community it can be handled by entering a new row/column in the PASCCA model for working outside and employing workers from outside.

levels of rice technologies of the typical community will affect reactions to the programs. The specific characteristics concerning the reactions of farmers to the program are: 3a) In a small rice community where the biological/chemical technologies are already adopted, with the Bimas program with less intensive guidance and Inmas, farmers will apply less than the recommended dosage of fertilizer. This is because the small farmers do not have access to the appropriate dosage. Hence, the total rice production by those two programs are less than in the program of Bimas with intensive guidance. 3b) In a small rice community like in that 3a, the Bimas program with less intensive guidance gives the large farmer opportunity to get loans--inputs in kind and cash--at relatively low interest rates. The small farmers borrow part of those Bimas loans from the large farmer. They have to pay a relatively high interest rate during the rice harvest. The same happens under the Inmas program, the only difference being in the way that the large farmer gets the inputs. In the Inmas program, the large farmer obtains inputs through cash payment. 3c) In a small rice community where the biological/chemical rice technologies are not yet adopted, the loans from the Bimas program are used for other businesses or money lending. The small farmers borrow cash from the large farmer for primary consumption. This is true not only for the small farmers but also for the landless workers. As with the former case, the borrowers must repay with a high interest rate. 3d) Whether or not the biological and chemical technologies have been adopted, the Bimas program with intensive guidance has positive effects on the dosage of fertilizers applied and the lending-borrowing system between the

large farmer and the other classes. With intensive guidance, the farmers will use the recommended input dosages. It also eliminates the second-hand lending by the large farmers. Total rice production will be higher than under the two other programs due to the appropriate level of fertilizers and other inputs. 4) Mechanical rice technologies have much more effect on the labor interrelationships among classes involved in rice production and processing. The adoption of new technologies will use less human labor per hectare of sawah or per quintal of rice product. These technologies will not have significant effects on the total rice production of each class of farmer/worker: they will affect total labor expenditure. Hence, they will affect the level of the rice surplus. The actions of different classes toward the three different programs will not be influenced significantly by the level of mechanical rice technologies.⁵

The Number of Households and Their Farm Size in Each Class of Farmer/Worker

Some actual data are available for Java from surveys and the census.⁶ From these figures the following "typical small rice community" picture can be constructed:

⁵The action is influenced mostly by the different level of biological and chemical of rice technologies.

⁶Sajogyo, "Lapisan Masyarakat Yang Paling Lemah di Pedesaan Jawa," *Prisma*, No. 3, April 1978, pp. 3-14, cited by B. Ismawan, op. cit., p. 17. Sajogyo says that, in 1973, 59 percent of the Java farmers operated 0.7 hectares, and 17 percent operated an average of 1.8 hectares. According to the agricultural census in 1973, 60 percent of farmers in West Java operated less than 0.50 hectares, 23 percent operated 0.50-1.00 hectares and 17 percent operated more than one hectare. Central Bureau of Statistics, op. cit., p. 12.

1 large-farmer household.....2.0 hectares of sawah....8 members
 2 medium-farmer households.....0.6 hectares each.....6 members
 4 small-farmer households.....0.3 hectares each.....5 members
 4 landless-worker households.....no land.....5 members

Each farmer cultivates his own land. The assumed composition of these households is shown in Table IV.3.

Table IV.3. Assumed Composition of Households in Each Farmer/Worker Class

Farmer/ Worker	Head	Spouse	Children		Parents		Permanent Workers	
			Less than 13 years	13 years or more	Male	Female	Male	Female
Large Farmer	1	1	2	1	0	1	1	1
Medium Farmer	1	1	2	1	0	1	0	0
Small Farmer	1	1	2	1	0	0	0	0
Landless Worker	1	1	2	1	0	0	0	0

The different household sizes of the large farmer, medium farmers and small farmers/landless workers reflect the existence of parents (senior citizens) and permanent workers. Due to the large size of his farm, the large farmer needs two permanent workers. Often they are husband and wife. A senior citizen usually stays with his/her relatively well-to-do children. There is no reason to differentiate the composition

of their children among different classes of farmer/worker; hence, the age and sex distribution of children is assumed to be the same for all classes.⁷

These household differences affect their members' contribution to rice production and processing. The family head is assumed here to be the husband--usually does land preparation, except for the large farmer. The head of the large-farmer household often supervises a male permanent worker who does the land preparation. Adult women do transplanting, weeding, harvesting and hand pounding. Thirteen years is the youngest age that children are included for analytical purposes as family labor for rice production and processing.⁸

The household compositions also determine the levels of primary consumption; the more members in a family working in rice production and processing, the higher the level of primary consumption, especially rice consumption.

⁷As a comparison, the population census in Java and Madura in 1961 showed that 3.3 percent of the rural households have 8 members in a household, 11.2 percent have 6 members and 15.8 percent have 5 members. Biro Pusat Statistik, Almanak Indonesia, 1968 Jilid 1, p. 172.

⁸Yujiro Hayami differentiates the term of "working" from "economically active." Working means working full time at rice planting and harvesting periods, while economically active is the person in the family whose age is 13-65 years old. In 1975, in Barrio Tabuan, Laguna, Philippines, Hayami found out that the average of 7.5 members in a large farmer's family, 2.5 are categorized as working and 4.4 the economically active, while of 5.3 members in a small farmer's family, 1.3 are working and 2.3 are economically active, and of 4.8 members in a landless worker's family, 2.2 are working and 3.2 are economically active. Yujiro Hayami, op. cit., p. 25.

The Labor Interrelationships Among Farmers/Workers in Rice Production and Rice Processing

In order to distinguish the households of small farmers and landless workers that have a special job relationship with the large farmer from other households in the same category, this study uses the terms "typical" and "other." Typical Small Farmer (TSF) and Typical Landless Worker (TLW) have closer relationships to the large farmer than the Other Small Farmers (OSF) and Other Landless Workers (OLW).

The closer relationship occurs especially in the job of rice processing. Only the members in TSF and TLW help the large farmer's household in rice pounding or rice milling (besides other tasks). The help of OSF and OLW to the large farmer is limited to rice jobs other than rice processing--land preparation, transplanting, weeding and harvesting.

The number of households in the OSF and OLW category is three. In the discussion of the interrelationships in each job, the terms OSF1, OSF2, OSF3, OLW1, OLW2, and OLW3 will be used as designation to distinguish them from TSF and TLW. This code is applied also to the medium farmers--medium farmer 1 and medium farmer 2 (MF1 and MF2).

Further discussion will be based on each kind of work in rice production and processing in two mechanical technologies situations--i.e., mechanical and non-mechanical technologies.

The Situation of Non-Mechanical Technologies

In the situation of non-mechanical technologies, the large farmer uses oxen and human labor for ploughing and harrowing, while medium farmers and small farmers use only human labor for hoeing. The scheme

shown in Figure 4.1 shows that each small farmer prepares the land of the large farmer and one of the medium farmers besides working on his own land. Each landless worker who prepares the land works for three different classes of farmers. He typically works for the large farmer, one of the medium farmers and one of the small farmers. In this situation, it can be shown that the land preparation tasks are shared wisely by all households in the community. On the larger farms, the family works mostly on its own land; on the other hand, on the smaller farms, the family members work mostly on others' lands.

The tasks of transplanting, weeding, and harvesting have similar patterns of job interrelationships. The adult females from other households are allowed to participate in harvesting of a certain household's field as long as they have already helped the household in rice transplanting and weeding. Hence, the job interrelationships of those three kinds of work will be described all together in one scheme (Figure 4.2).

The interrelationship pattern in transplanting, weeding and harvesting is basically the same as in land preparation. The difference is the help to the large farmer provided by the adult female in the medium farmer's household. The transplanting, weeding and harvesting tasks need more intensive labor for a few days but are shorter in duration than land preparation.

Rice pounding for daily consumption and labor payment including meals is usually done by family members except in the case of the large farmer. TSF and TLW are the only households who do rice pounding for the large farmer regularly (Figure 4.3). For occasional needs such as

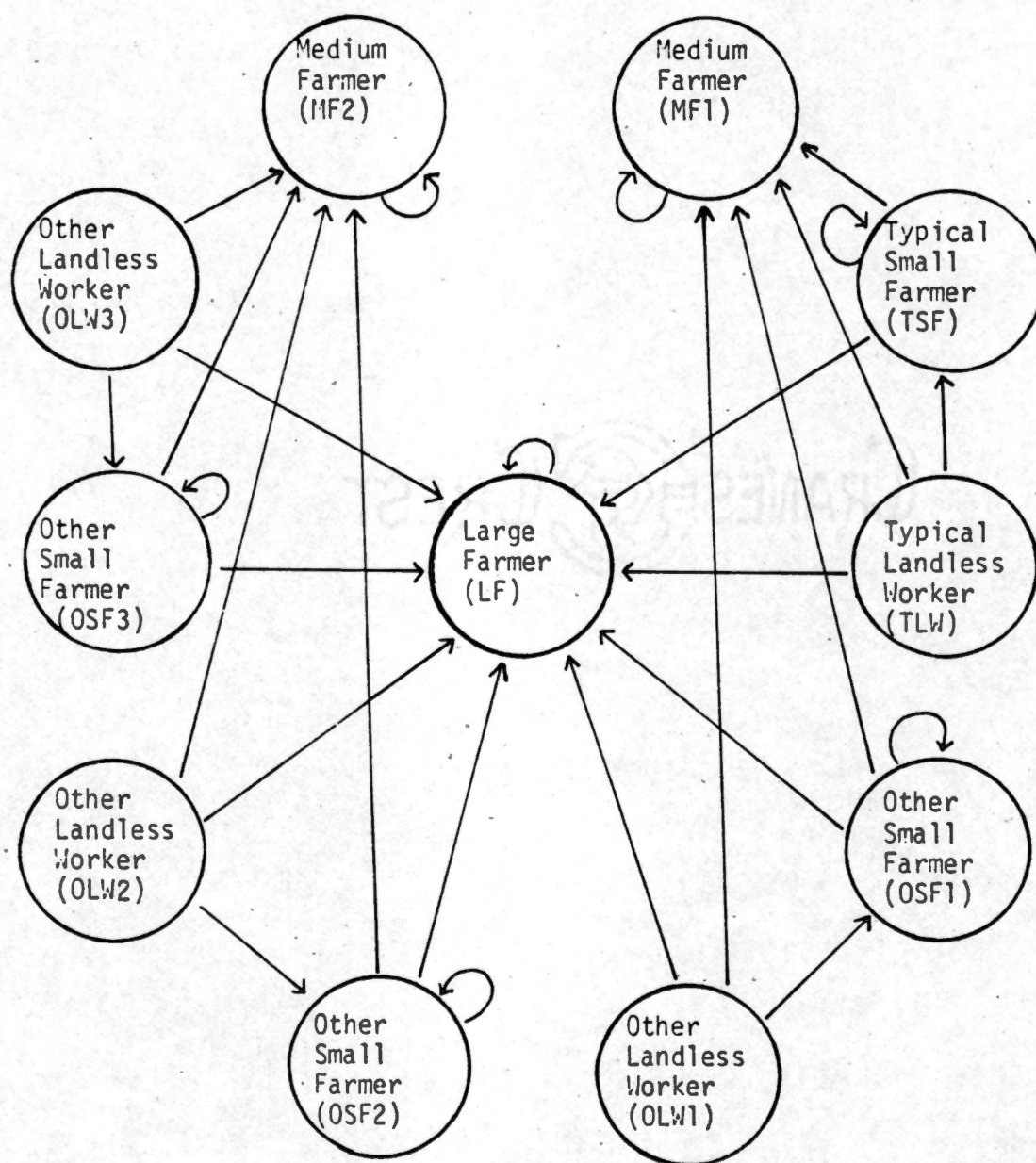


Figure 4.1. The Scheme of Labor Interrelationships in Land Preparation for Non-Mechanical Technologies

→: flow of hired labor

↻: flow of family labor

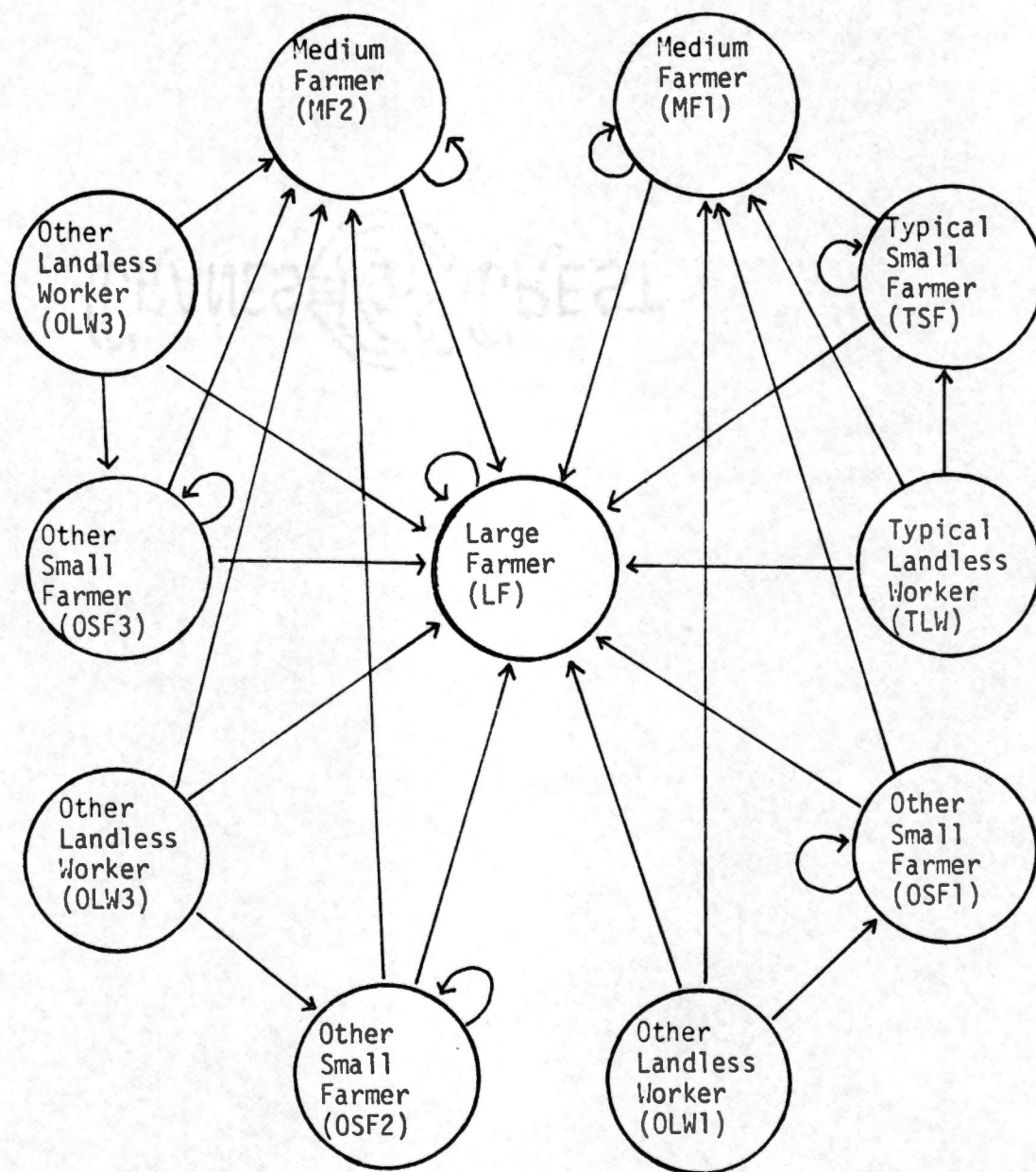


Figure 4.2. The Scheme of Labor Interrelationships in Transplanting, Weeding and Harvesting and Non-Mechanical Technologies

→: flow of hired labor

↻: flow of family labor

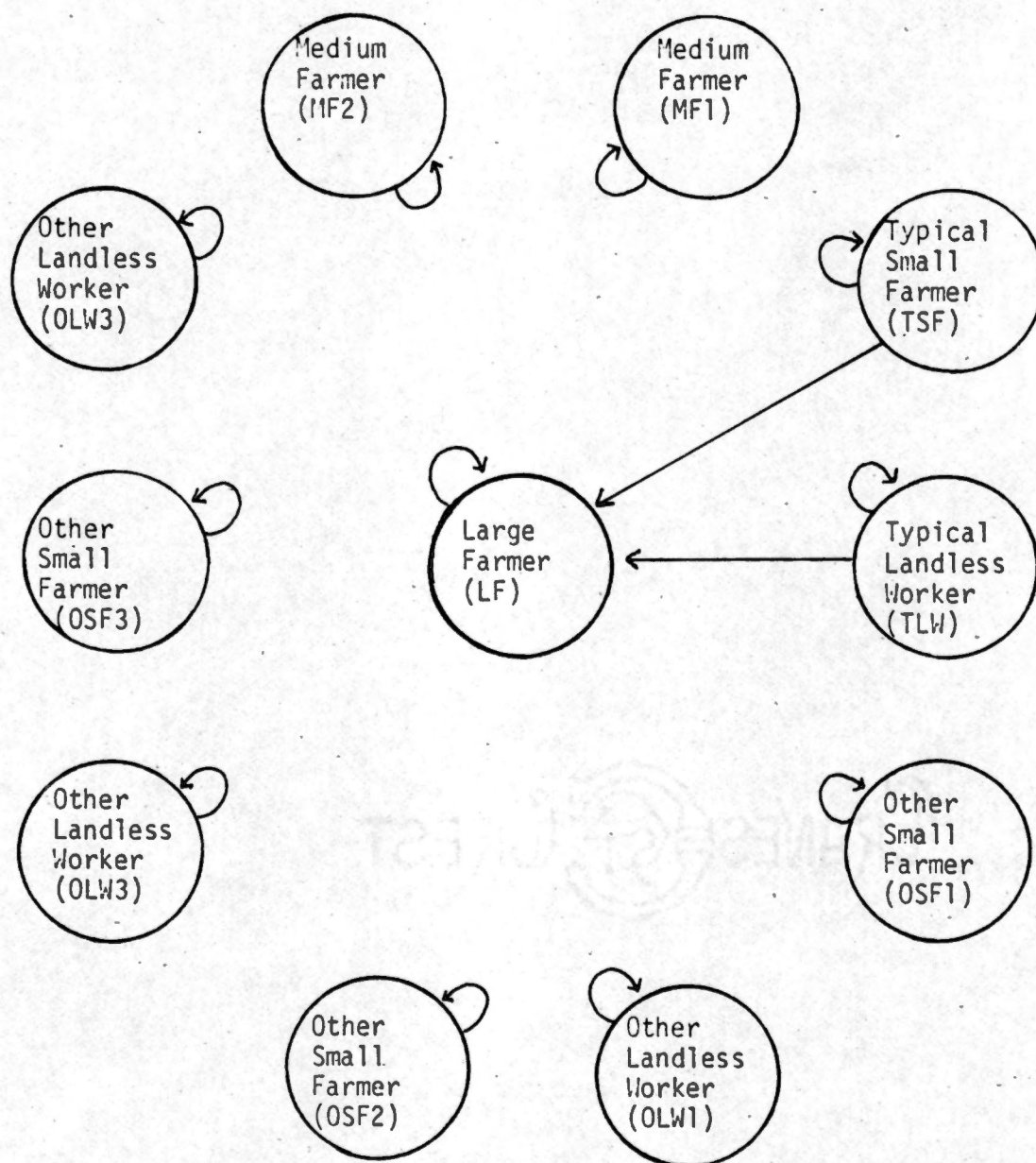


Figure 4.3. The Scheme of Labor Interrelationships in Rice Processing and Non-Mechanical Technologies

→ : flow of hired labor

↻ : flow of family labor

traditional ceremonies, rice pounding involves more households than shown in Figure 4.3. But, for our analytical purposes, it is assumed that the pounding is only for regular consumption and labor payments. Landless workers, even though they do not have rice fields, hand pound the rice that they obtained from harvesting shares.

The Situation of Mechanical Technologies

The labor interrelationship pattern in the situation of mechanical technologies--use of hand tractors, sickles and small rice mills--is quite different from the situation of non-mechanical technologies. Unlike the situation of non-mechanical technologies, the large farmer who uses mechanical technologies works also for both medium farmers. These services include use of his hand tractor and his male permanent worker as the tractor operator (Figure 4.4).

The number of human labor days per hectare required when using hand tractors is less than when non-mechanical technologies are used. As a consequence, the number of households as hired labor involved in helping the large farmer and medium farmers is less than non-mechanical technologies--five vs. eleven. The change--from non-mechanical to mechanical technologies--is not only the smaller number of small farmers and landless workers who find work in the large farmer's fields, but work done by the large farmer for medium farmers (Figure 4.4).

The pattern in Figure 4.5 is exactly the same as the pattern in Figure 4.2. This study assumes that the institutional arrangements among those households in the community do not change in response to the adoption of mechanical technologies. The informal arrangement still holds that those who transplant, weed and harvest one household's

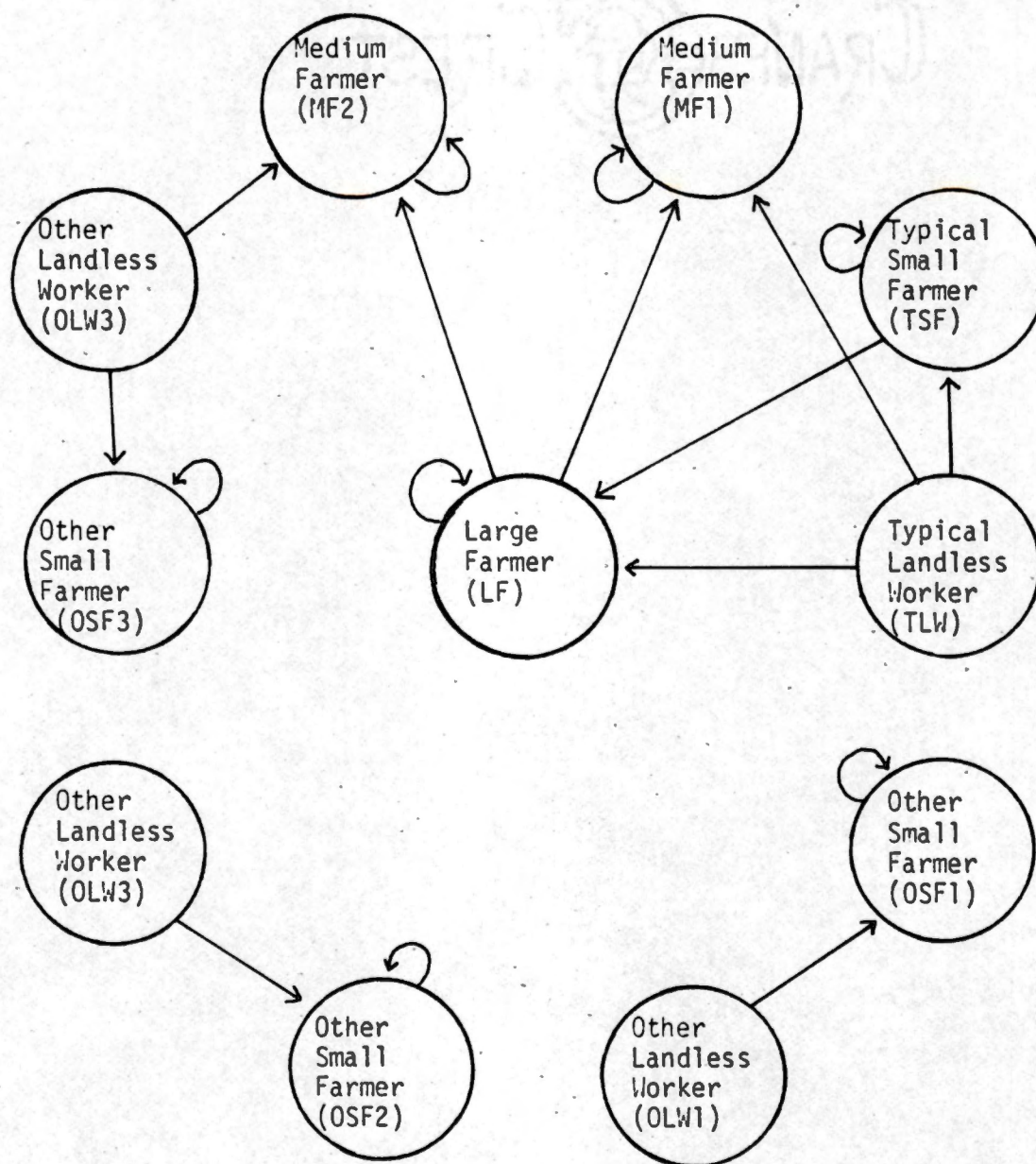


Figure 4.4. The Scheme of Labor Interrelationships in Land Preparation for Mechanical Technologies

→: flow of hired labor

↻: flow of family labor

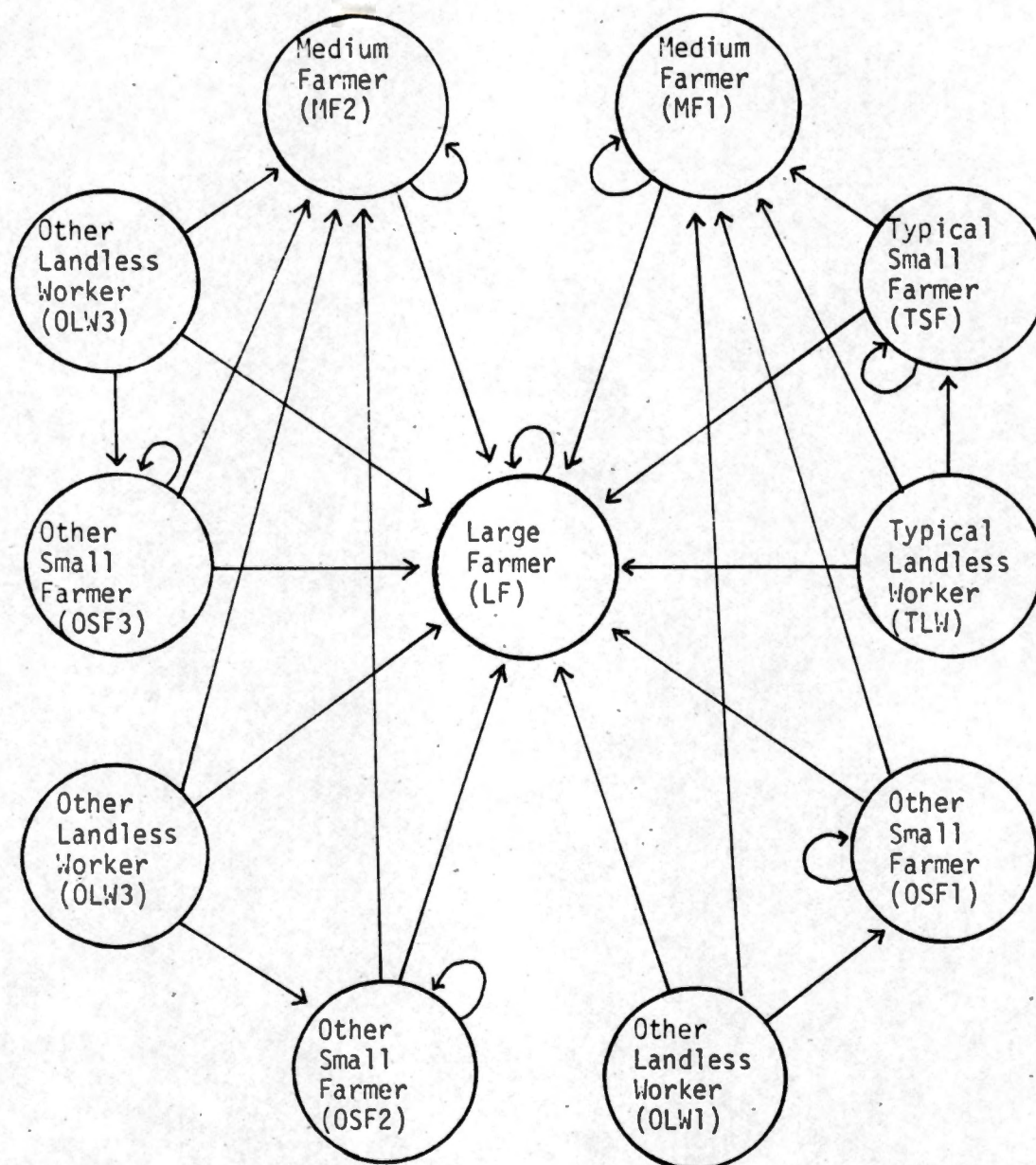


Figure 4.5. The Scheme of Labor Interrelationships in Transplanting, Weeding, and Harvesting for Mechanical Technologies

→: flow of hired labor

↻: flow of family labor

rice fields must be the same persons.⁹ The difference between mechanical and non-mechanical technologies is the tools that are used for harvesting. By using sickles, the number of labor days and the share for harvesters will be less than by using the traditional small hand-knife (ani-ani).

When there is a local rice mill, the large farmer's household becomes the supplier of rice milling services to other classes; his mill does the milling of their rice. The TSF and TLW members work as the hired labor in the rice milling unit. In the scheme shown in Figure 4.6, the TSF and TLW supply only labor for the rice mill owner (LF) but, in calculation of labor payments (in Tables F-7 and F-8, Appendix F), all households give payments to TSF and TLW for labor share for each unit of rice milled.

Time Distribution of Activities in Rice Production and Processing

This study assumes that the rice field (sawah) is sown in rice two times a year--rainy season and dry season rice. Distribution of activities in rice production and processing in a year is shown in Figure 4.7.

This time distribution is used also to determine the level of primary consumption in each household in the community. The primary

⁹W.L. Collier et al., op. cit., pp. 261-265. Their study (1972) in four villages in Central Java found that the tebasan--the system when the buyers harvest rice by themselves--often use sickles. The buyer decided who will participate in the harvesting process, and not the owner of the rice field. Sometimes, the harvesters were not from inside the village; it depended on the distance of the rice field from the buyer's (penebas) resident.

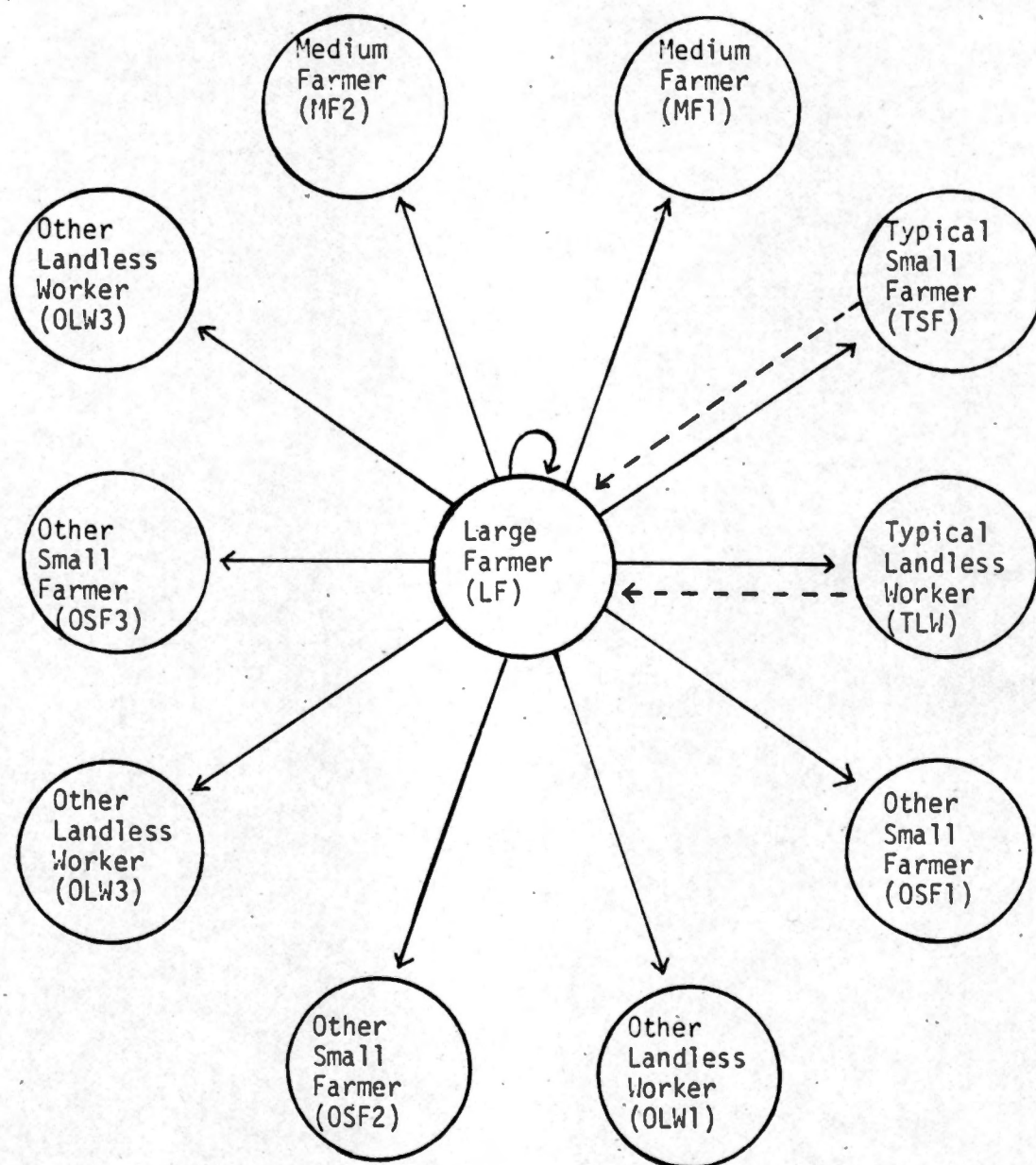


Figure 4.6. The Scheme of the Service/Labor Interrelationships in Rice Processing by Rice Mills

—→: flow of rice milling service

-----→: flow of hired labor

Activities	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Land Preparation	_____					_____						
Transplanting		_____					_____					
First Weeding		_____					_____					
Second Weeding		_____					_____					
Third Weeding			_____					_____				
Harvesting					_____							_____
Processing	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

Figure 4.7. Time Distribution of Activities in Rice Production and Processing

_____: the activity is undertaken

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consumption level depends upon the activities that members in a household have. The more active they are in physical activities, the higher the level of primary consumption, especially rice consumption.

Each season in rice production consists of a six months' period of activities, in which harvesting is the busiest month; followed by the periods of land preparation and transplanting. The activities of crop supervision, including weeding, are not considered the busy periods in rice production. When there are no rice production tasks, many rural people go to the urban areas to get additional income, some small farmers and landless workers work for the large farmer or government projects other than rice operations.

The Standards of Labor Days, Labor Payments, and Primary Consumption

This section discusses the coefficients of 1) labor days that are used for each task per hectare sawah in rice production and per 100 kilogram rice in processing; 2) labor payments (wage) for one labor day in each task; and 3) levels of daily or monthly primary consumption--rice, other foodstuffs, salt, coconut oil, clothes, soap, medical expenses, and ritual consumption--for a member of the household.

These coefficients are based on the author's own observations as well as information from the references cited in the section that follows.

Land Preparation

By using oxen (kerbau) for land preparation (mainly ploughing and harrowing), one hectare of wet-land (sawah) uses about 20 man-days

of work.¹⁰ A work day is about 9 hours, from 7 a.m. to 4 p.m. Without using oxen or a hand tractor, one hectare of sawah needs 60 man-days of land preparation work.

In the situation when mechanical technologies are already adopted, using a hand tractor, one hectare needs 14 man-days of labor. The cost for labor is about 30 kg of rice, and fuel and repairs require about 30 kg of rice for one hectare of land preparation.¹¹

The cost for one man-day both mechanical and non-mechanical cultivation--is about 2 liters or 1.60 kg of milled rice. The workers are provided meals three times a day; these amount to about 1.20 kg of rice. Hence, one-man-day of hired labor costs about 1.60 kg + 1.20 kg = 2.80 kg of rice.

Transplanting

One hectare of wet-land rice needs about 20 women-days of transplanting work.¹² The women work about three or four hours a day--from 7 a.m. to 10 or 11 a.m. The cost to the transplanters is only one meal, which is provided during the working hours. The meal for each transplanter is about 0.50 kg of rice equivalent. There is no payment

¹⁰ Nelly G. Alviar, "An Economic Comparison Between Tractor Operated and Carabao Cultivated Rice Farms" in Readings in Asian Farm Management ed. Tan Bock Thiam and Shao-er Ong (Singapore: Singapore University Press, 1979), p. 222. The Alviar study of 1964-65 shows that one hectare carabao-cultivated farm used 20.5 man-days.

¹¹ Ibid., p. 223.

¹² Randolph Barker and Ernesto P. Abarientos, "The Economics of Rice Production" in Readings in Asian Farm Management ed. Tan Bock Thiam and Shao-er Ong (Singapore: Singapore University Press, 1979), p. 138. They indicate that for C4-63G variety with distance 25 cm x 25 cm; one hectare needs about 13 man-days for transplanting.

in cash or in rice form; this is because the transplanters have the right to harvest the rice fields that have already been transplanted.

Weeding

The same number of women-days is needed for weeding as for transplanting.¹³ The difference is the length of a work day; it is about 5 or 6 hours--from 7 a.m. to 12 or 1 p.m. Two meals are provided. One woman-day costs about $2 \times 0.50 \text{ kg} = 1.00 \text{ kg}$ of rice. Weeding is usually done three times a season--at the stages of 14 days, 1 month, and 45 days after transplanting.

Harvesting

The harvesters can be assumed to be the same persons who help the farm operator in transplanting and weeding. The most common labor payment system is the "bawon" system associated with use of the small hand-knife, in which the harvesters get a portion of the harvest they obtain. Different regions have different sharing formulas arranged between the rice owner and the harvesters. This study uses a 1 : 6 system of sharing--one portion for the harvester and six portions for the owner.¹⁴

The number of woman-days for harvest is derived from the yield of the rice and one-seventh of it as the share to the harvesters. This

¹³Ibid. The weed control, rotary and handweeding required 56 man-days per hectare.

¹⁴W.L. Collier et al., op. cit., p. 264. With using the sickles and money wages, the capacity of one harvester is 100 kg of threshed paddy. One hectare needs about 60 woman/man days of harvesters. The money wages were Rp 200/quintal threshed paddy in 1972. Based on the price of dry stalk paddy, Rp 1500/quintal, every 100 kg of rice harvested 11 kg is for the harvester. Therefore, almost a ninth of the harvested rice is the share for the harvester.

share is distributed to the individual household according to the scheme of harvesting interrelationships described earlier and the number of working members in each household.

Rice Processing

Handpounding rice from threshed paddy (gabah) is usually done by the small farmers and landless workers. The share going to the handpounder is usually 1 : 9; the handpounder will get one-tenth of weight unit of rice pounded.

In one day, the pounder can pound about 32 kg of gabah or $32 \times 0.62 \text{ kg of rice} = 19.84 \text{ kg of rice}$. The share to one pounder in a day = $1/10 \times 19.84 \text{ kg} = 1.98 \text{ kg of rice}$. The meals provided for the pounder add up to about 1 kg of gabah or 0.62 kg of rice for two or three times a day. Hence, in one day, one pounder can get paid about 2.60 kg of rice.¹⁵ In one month, the amount of pounded gabah depends upon the amount of rice needed for primary consumption, land preparation, weeding and transplanting.

If local rice is processed with a small rice mill or huller, all households in the community mill their rice with the large farmer's huller. The payment to the owner of the huller is 5 kg of rice for 100 kg of gabah (threshed rice), or 8 kg of rice for 100 kg of rice

¹⁵William Collier, "A Comment on Choice of Technique in Rice Milling on Java by C. Peter Timmer" in Readings in Asian Farm Management, ed. Tan Bock Thiam and Shao-er Ong (Singapore: Singapore University Press, 1979), p. 340. Based on 12 survey desas, in 1973, he argues that the average laborer can pound 31.2 kilograms of gabah in eight hours a day. If the pounder receives a 10 percent share which was valued at RP 42 per kilogram, and also she receives two meals per day valued at RP 25 each, then she receives a daily wage of RP 180. Converted to rice equivalent, the wage is $RP 180 / RP 42 \times .62 \text{ kg of rice} = 2.48 \text{ kg of rice}$.

milled. The owner of the huller also gets the by-products (broken rice called "menir" or "katul"). The wage for the laborers, that is paid by the huller owner, is about 1 kg of rice per 100 kg of rice milled. The average number of laborers for one huller is 4 women. The other spending--i.e. fuels, oils, repairs, taxes, and contribution to desa government--is about 2 kg rice per 100 kg rice milled.¹⁶

Primary Consumption

Primary consumption consists of farm household consumption of rice and other essential goods besides rice (e.g. other foodstuffs, salt, kerosene, and clothing). Its amount varies according to the distribution of works (Figure 4.7, p. 105). During the harvest season, they eat rice and other commodities much more than in other months; this is due to the heavy work activities and the availability of rice to them. Also, many of the traditional ceremonies are undertaken during the harvest period or soon afterwards.

Each household's consumption of rice is derived from the consumption of each member in the household. The standards used for rice consumption are 0.60 kg a day for a male adult, 0.50 kg for a female adult, and 0.30 kg for a child (less 13 years old) and for a senior citizen.

¹⁶Ibid., pp. 339-341. The study of 4 desas in West Java (1973) shows that the total cost of rice milling are \$0.89 and \$0.77 per quintal of gabah in Kabupaten Serang and Cianjur respectively. With the exchange rate of rupiah (the currency of Indonesia) at \$1.00 = Rp 413.00 and Rp 42.00 being the price of gabah at that time, the average total cost in those areas was 8.16 kg of gabah or 5.06 kg of rice for 100 kg gabah milled. The total wages for the average of 4.5 laborers to mill 92.50 tons of gabah were \$78.36; this is calculated to be .83 kg of rice for labor per 100 kg of rice milled.

Other consumption besides rice depends on the class of farmers/workers and the number of household members. During the non-harvest months, the large farmer's household consumes on the average two kg of rice a day, whereas the medium farmers, small farmers and landless workers consume only about one kg a day per household. During the harvest time, the consumption of items other than rice is doubled; extra spending for such needs as new clothes usually is undertaken during this period.¹⁷

Non-Labor Inputs and Output in Rice Production

This study assumes constant returns to scale in rice production.¹⁸ Under the Bimas program with intensive guidance (BIG), the farmers will use the technical guidance. In the Bimas program with less intensive guidance (BLG) and Inmas program, the farmers use less than the recommended amounts of inputs. These cases occur in the situation where farmers have already adopted new biological and chemical technologies.

¹⁷According to Sajogyo, in order to subsist, the people of Indonesia require 10-15 kg of rice per person per month. The remaining 5-10 kg of rice equivalent is needed to cover costs of essential goods. Cited by Soelistyo et al., "Employment Opportunities and Income Distribution in Repelita III" Prisma: The Indonesian Indicators Vol. 14 (September 1979), p. 25.

¹⁸The dosage level of non-labor inputs (seeds, fertilizer, and insecticide), the man-days or woman-days of labor inputs, and the rice yields are proportional to the acreage of rice fields (sawah).

In the situation where farmers have not adopted any new biological and chemical technologies, Bimas with less intensive guidance (BLG) and Inmas leave the farmers with traditional varieties of rice and no use of modern fertilizer or insecticide.

This discussion will describe the level of seeds, fertilizer, insecticide and yield of rice production in one season--or a six months period. The details of typical rice inputs and yields are shown in the Tables H-1 through H-5, Appendix H.

The figures in Table IV.4 are based on the general recommended dosage in the past Bimas packages--Bimas SSBM and Gotong Royong--and the average dosage that farmers use when the government program with less intensive guidance and Inmas are undertaken.¹⁹

As mentioned earlier, the physical condition of sawah is assumed to be appropriate for the adoption of new rice technologies. Therefore, BIG program will have the full beneficial effects on production. Regardless of the level of previous farmers' adoption of new technologies, with intensive guidance farmers are induced to use the recommended dosage.

On the other hand, under the BLG program, the previous level of new technologies adoption will have different effects on the actual dosage that is used by farmers. In the village where the farmers have already adopted new biological/chemical technologies, they use modern

¹⁹The IRRI study of three villages in Central Java (1971/72) showed that with 121-150 kg N application per hectare, the yields were 5.7 tons paddy/hectare for local varieties and 5.8 tons/ha for modern varieties. With 61-90 kg N/hectare, the yields were 4.2 tons paddy for local varieties and 4.8 tons paddy for modern varieties. Randolph Barker, op. cit., pp. 40-41.

Table IV.4. Non-Labor Inputs and Output in Rice Production in One Season (6 months)

Government Programs	New Bio./ Chemical Technologies	Inputs/ Outputs/ Acreage	Unit	Large Farmer	Medium Farmer	Small Farmer
Bimas with intensive guidance (BIG)	Before/ After	Acreage	hectare	2.00	0.60	0.30
		Seeds	kilogram	50	15	7.50
		Urea ^a	kilogram	300	90	45
		T.S.P. ^b	kilogram	160	48	24
		Insecti- cide	liter	4	1.20	0.60
		Total Production	kilogram	5456	1637	819
Bimas with less intensive guidance (BLG) and Inmas	Before	Seeds	kilogram	50 ^c	15 ^c	7.50 ^c
		Urea ^a	kilogram	0	0	0
		T.S.P. ^b	kilogram	0	0	0
		Insecti- cide	liter	0	0	0
		Total Production	kilogram	1988	595	298
	After	Seeds	kilogram	50	15 ^c	7.50 ^c
		Urea ^a	kilogram	140	80	20
		T.S.P. ^b	kilogram	80	40	10
		Insecti- cide	liter	2	2	0
		Total Production	kilogram	4167	1249	625

^aNitrogen fertilizers.^bPhosphate fertilizers (Triple Superphosphate, TSP).^cLocal/traditional varieties of seeds.

inputs even though not in appropriate dosage. In areas where the farmers have not already adopted new technologies, the program with less intensive guidance (BLG) will not have much impact on the input application in the very short time. Farmers have to adopt these new inputs gradually because this entails sacrificing other spending that they usually incur every year--primary consumption or other capital goods (e.g. houses and land).

Results of the Analysis

Table IV. 5 is the summary table of the analysis results; it describes the rice surplus level for each farmer/worker class, the total community's rice surplus, rice surplus range and its standard deviation. These descriptions are based on various combinations of government rice programs and levels of rice technologies.

As mentioned in Chapter III (page 57), the rice surplus does not mean the physical amount of residual rice stocks at farmer or worker level. Instead, it means the family net income from rice production and processing activities, expressed as kilograms of rice.

The following analytical results are based on the assumed facts about the typical small rice community (in the previous sections of this chapter). Any implications of the analytical results are illustrative only and limited to assumptions made for this typical community. It is not a general conclusion for all West Java. Any change of facts or assumptions could lead to inferences that differ from those that follow.

Table IV. 5. Summary of the Analysis Results of the PASCCA Model Application in West Java Rice Production Areas^a

Program/ Bio./Chem. Mechanical ^b Technology	Rice Surplus Level (kg rice) ^c					Total	Aver- age ^d	Range ^e	St. f Dev.
	LF (1)	MF (2)	TSF (1)	TLW (1)	OSF (3)	OLW (3)			
BIG/N/N	5397	2208	260	-885	481	-2949	4512	6380	1704
I/N/N	202	-1325	-727	-1096	-2381	-3681	-9008	1429	365
BLG/N/N	458	-1480	-782	-1129	-2481	-3746	-9170	1707	440
BIG/B/N	5397	2208	260	-885	481	-2949	4512	6380	1704
I/B/N	3934	871	-69	-964	-507	-3187	78	4996	1331
BLG/B/N	3650	871	-69	-964	-507	-3187	-206	4712	1251
BIG/B/M	6712	2126	130	-974	-36	-3356	4602	7831	2112
I/B/M	5019	869	-185	-1047	-942	-3523	191	6193	1670
BLG/B/M	4735	869	-185	-1047	-942	-3523	-93	5909	1586

^aThe figures of this table are derived from appendices I (Tables I-1 through I-9).^bN: Non-Biological/Chemical or Non/Mechanical Technologies

B: Biological/Chemical Technologies

M: Mechanical Technologies

Table IV. 5. (Continued)

^cLF: Large Farmer; MF: Medium Farmer; TSF: Typical Small Farmer; TLW: Typical Landless Worker; OSF: Other Small Farmer; OLW: Other Landless Worker. Number in the parentheses is the number of households in each class of farmer/worker.

^dAverage = Total/11; 11 is the number of households in the community.

^eRange is the difference between the highest (large farmer) and the lowest rice surplus level (other landless worker) or LF - OLW/3.

^fStandard Deviation of the rice surplus is derived according to the formula:

$$Sd = \sqrt{\frac{(Xi - X)^2}{n-1}}$$

n = the number of households (11)

Non-Biological/Chemical Technologies and Non-Mechanical Technologies

In this type of community, Bimas with less intensive guidance or Inmas does not seem to have effects on the yield or total rice production, the rice surplus--both in each class and at the community level--is very low. Only the large farmer has a positive rice surplus, while the others have a negative rice surplus. Medium farmers do not have a rice surplus for consumption other than for primary family needs and for labor expenditure in rice production. Small farmers and landless workers do not have enough rice for their primary consumption. The rice surplus of the large farmer is not enough to provide other households' primary consumption. Local rice production in the community is not adequate for the households to form capital or even to meet basic subsistence needs. There must be a program to accumulate this rice surplus both in each class of farmer/worker at the community level.

Table IV.6 shows that in the case of Bimas with less intensive guidance and Inmas the large farmer has different rice surplus tendencies from other classes. With Bimas with less intensive guidance, other classes have lower rice surplus levels than with the Inmas program, while the large farmer has more. This is due to the fact that in BLG the large farmer has the opportunity to obtain loans from the government bank with an interest of 1 percent a month. He then lends part of it to other classes with 5 percent interest.

Bimas with intensive guidance (BIG) has tremendous effects on the rice surplus levels of each class, as well as in the total community level. The incremental total rice surplus of BIG program is 13682 kg

Table IV. 6. The Rice Surplus Level as Affected by Different Programs Where the Community is Using Non-Biological/Chemical and Non-Mechanical Technologies

Rice Programs	Rice Surplus Level (in kg of rice) ^a						Total	Average ^b	Range ^b	Sd. ^b
	LF (1)	MF (2)	TSF (1)	TLW (1)	OSF (3)	OLW (3)				
BIG	5597	2208	260	-885	481	-2949	4512	410	6380	1704
BLG	458	-1480	-782	-1129	-2481	-3746	-9170	-834	1707	440
Inmas	202	-1325	-727	-1096	-2381	-3681	-9008	-818	1429	365

^aNumber in the parentheses is the number of household in each class of farmer/worker.

^bThe explanation how to derive these components are shown in Table IV.5.

from the BLG program and 13520 kg from the Inmas program. This amounts to about 1244 kg per household. Hence, the rice economy in the community is able to form capital other than in rice production. The large farmers and medium farmers can provide jobs for the small farmers and landless workers, especially the landless workers since they still have the negative rice surplus from the rice economy.

There are several possibilities for action by the large farmer in using his rice surplus (Table IV.7). The first possibility is investment that provides jobs for other people without having negative reverse effects on workers in the future--e.g. building a house. The second possibility is investment that has negative effects on job

Table IV.7. Some Possible Ways for the Large Farmer to Spend His Rice Surplus and Effects on Other Classes of Farmers and Workers in a Production Community

No.	Some Uses of the Large Farmer's Surplus	Job Opportunities for Other Classes			Capital from Other Classes		
		Provide Jobs During Construction	After Construction		Land Ownership	Rent	Interest
			More Jobs	Reduce Jobs			
1.	Residential building	yes	no	no	no	no	no
2.a.	Buy and operate hand tractor	no	no	yes	no	yes	no
b.	Buy and operate a rice mi-l	yes	no	yes	no	yes	no
3.	Establish a small industry	yes	yes	no	no	no	no
4.	Buy land	no	no	no	yes	yes	no
5.	Lend money	no	no	no	yes	yes	yes
6.	Buy Luxury goods	no	no	no	no	no	no

opportunities for other people--e.g. hand tractor and rice milling. The third possibility is investment that provides jobs for other farmers/workers in the long run--e.g. craft or small textile industries. The fourth possibility is investment that automatically reduces the other people's capital--e.g., buying land from small or medium farmers. The fifth is lending cash/money to other farmers/workers, which usually means charging higher interest payment than formal institutional credit. The last is spending on luxury goods that do not have effects directly on job opportunities and capital level of other farmers/workers in a small community. However, this type of spending will have an effect of increasing the level of consumption of other people in the long run. Such consumption can be for clothing, a radio, a television set, a motorcycle or jewelry.

These kinds of possible actions by the large farmer, or even medium farmers, are caused by the larger increase in the large farmer's surplus than those of the other classes. This is due to the existing size of his farm that is very accessible to the program. The range and standard deviation of the rice surplus with BIG program are very much higher than with BLG and Inmas; they are 6380 and 1704 vs 1707 and 440 in BLG and 1429 and 365 in the Inmas program.

Biological/Chemical Technologies but Non-Mechanical Technologies

Generally, similar to the Table IV.6, Table IV.8 indicates the better effects of BIG on the level of rice surplus than of BLG and Inmas programs. The different level is not so wide as in the previous condition of rice technologies--4512 kg vs -206 in BLG and 78 in Inmas.

Table IV. 8. The Rice Surplus Level as Affected by Different Programs in a Community That Has Adopted the New Biological/Chemical Technologies but Non-Mechanical Technologies

Rice Programs	Rice Surplus Level (in kg of rice) ^a						Total	Average ^b	Range ^b	Sd ^b
	LF (1)	MF (2)	TSF (1)	TLW (1)	OSF (3)	OLW (3)				
BIG	5397	2208	260	-885	481	-2949	4512	410	6380	1704
BLG	3650	871	-69	-964	-507	-3187	-206	-19	4712	1251
Inmas	3934	871	-69	-964	-507	-3187	78	7	4996	1331

^aNumber in the parentheses is the number of household in each class of farmer/worker.

^bThe explanation how to derive these components are shown in Table IV.5.

The small and medium farmers still use fertilizers that are borrowed from the large farmer. The large farmer borrows inputs from government with the same dosage as in BIG, but then redistributes the inputs to medium and small farmers. Hence, the input dosage of each farmer is less than the recommended dosage, and so are the yields.

Medium farmers have just barely enough rice to cover the labor expenditure, primarily consumption and input payment. They have a slight possibility of access to modern inputs for further rice production. The small farmers do not have enough rice surplus to gain access to modern inputs. They still have to borrow inputs from the large farmer if the BLG and Inmas continue.

The difference between effects of BIG and BLG or Inmas on the community's rice surplus when biological/chemical technologies are

used is not as large as when these technologies are not used; it is 4434 kg in Inmas and 4718 kg in BLG. Its range and standard deviations also do not differ very much--1704 kg vs 1331 kg for Inmas and 1251 kg for BLG program.

Nevertheless, BIG still has the better effects in terms of the total rice surplus than BLG and Inmas. However, these better effects should be weighted against cost comparisons of the BIG program vs BLG and Inmas, and also the possible cost to farmers of interest payments under the BIG program. This aspect will be discussed in Chapter V.

Biological/Chemical and Mechanical Technologies

In a community that has already adopted the mechanical technologies, the analysis shows that the total rice surplus levels are higher than with non-mechanical technologies, and so are their ranges and standard deviations. The total community's rice surplus is slightly higher because of less rice consumption in rice production and processing as the consequence of new mechanical technologies.

The more important effect of the mechanical technology adoption is the wider gap between the large farmer and other classes, especially small farmers and landless workers, in terms of their rice surplus level (compare Table IV.9 with Table IV.8).

The wide variation of rice surplus indicates the wide variation among households in the community in their capability to form capital--land, building, farm equipment, input inventory, perennial crops, financial assets and education. These forms of capital generate income in the next stage. Hence wide differences in the capability of rice village people to accumulate capital unfortunately lead to even wide income gaps in subsequent periods.

Table IV.9. The Rice Surplus Level as Affected by Different Programs in a Community That Has Adopted the New Biological/Chemical and Mechanical Technologies

Rice Programs	Rice Surplus Level (in kg of rice) ^a						Total	Average ^b	Range ^b	Sd ^b
	LF (1)	MF (2)	TSF (1)	TLW (1)	OSF (3)	OLW (3)				
BIG	6712	2126	130	-974	-36	-3356	4602	418	7831	2112
BLG	4735	869	-185	-1047	-942	-3523	-93	-9	5909	1586
Inmas	5019	869	-185	-1047	-942	-3523	191	17	6193	1670

^aNumber in the parentheses is the number of household in each class of farmer/worker.

^bThe explanation how to derive these components are shown in Table IV.5.

The analysis of this typical small rice community concludes that the adoption of new rice technologies, both biological/chemical and mechanical technologies, unfortunately widens the differential of rice surplus between the large farmer and small farmers or landless workers. Biological/chemical technologies cause this gap to widen because of the existence of different farm sizes. Mechanical technologies cause the gap to widen because of the replacement of human labor in rice economy by machinery. However, without improvement of biological/chemical technologies, the total rice surplus in the community or village is hardly enough to be noticed.

Summary

Table IV.10 shows the absolute values and the ranks of the total community rice surplus and its differential according to different government rice programs and rice technological levels.

BIG shows the highest total rice surplus. The second largest rice surpluses are BLG and Inmas in the area where farmers have already adopted the biological and chemical technologies. The smallest total rice surpluses are the Inmas and BLG for the community where farmers have not adopted the biological and chemical technologies.

Before doing the PASCCA analysis, this author would have hypothesized that the BIG program has had greater effects on the equity of rice surplus than the BLG and Inmas programs. This was based on the expectation that BIG program will be able to give fair opportunities to all households--even to the landless workers--in a community that has access to modern inputs and low-interest credit, and is enjoying increasing of rice yields. In contrast, the PASCCA analysis implies that the BIG program leads to the widest differences of rice surpluses among the households of all the rice programs examined. This is because the large farmer gets much more beneficial effects from the BIG program than from the BLG or Inmas program.

Table IV.10. The Level and Rank of 'Total Community's Rice Surplus and Its Differences'^a

Rice Program	Non-Bio/Chemical Non-Mechanical				Biological/Chemical Technologies							
	Non-Mechanical				Non-Mechanical				Mechanical			
	Total		Difference		Total		Difference		Total		Difference	
	Kg	Rank ^b	Kg	Rank ^b	Kg	Rank ^b	Kg	Rank ^b	Kg	Rank ^b	Kg	Rank ^b
BIG	4512	H	1704	M	4512	H	1704	M	4602	H	2112	L
BLG	-9170	L	440	H	-206	M	1251	M	-93	M	1586	M
Inmas	-9008	L	365	H	78	M	1331	M	191	M	1670	M

^aThis ranking system is according to the average and standard deviation of the sample. The average of the total is -509 kg and its standard deviation is 5300 kg. The average of Sd is 1351 kg and its standard deviation is 591 kg.

^bH = high; M = medium; L = low.

CHAPTER V

APPLICATIONS OF THE MODEL TO POLICY DECISIONS

Introduction

As mentioned earlier, the objective of using this PASCCA model in Chapter IV example was to evaluate the effects of previous government rice intensification programs (i.e. Bimas and Inmas) on rice surplus accumulation in the typical small rice community.

The PASCCA model can be used also to help predict the outcomes of future programs being considered. The interviews, besides information about what respondents are doing now, would also include their predictions about what they will do for rice production management if the program were implemented.

This chapter will demonstrate use of the PASCCA model for predicting the rice surplus creation of proposed policy and action programs in the West Java situation. Two different kinds of program that will be discussed are 1) programs to increase rice production per hectare, and 2) programs for solving income maldistribution problems. Use of PASCCA to gauge the local impacts on rice surplus of one of each kind of these programs will be demonstrated. These impacts will be based on the analysis of the typical small rice community that was presented in Chapter IV.

Programs to Increase Rice Production per Hectare

Two changes in the rice intensification programs might be considered; first, the improvement of Bimas and Inmas programs, and

second, the improvement of irrigation systems. The improvement of Bimas and Inmas programs will be related to the results of the analysis of the typical small community in this dissertation, while improvement irrigation systems will rely more on opinions of several experts on irrigation policy in Indonesia or elsewhere in Southeast Asia.

Improvement of Bimas and Inmas Programs

With the limited number of agency personnel in a wilud for the guidance of farmers using the credit, the inclusion of all desas in the Bimas program at one time will result in a problem of low repayment rate (see Figure 5.1). The question arises to what would happen if the Bimas program were concentrated in a small portion of the area according to the available manpower to carry on credit and extension services.¹

From a practical point of view, to avoid inequality among desas or villages in one wilud (village unit), a rotation system of Bimas programs in a wilud might be more appropriate than a system of serving all villages at once. Whatever the implementation of the program, it depends upon the availability of the personnel in the supplementary services. If it is possible to have more and better-trained personnel, it might be possible to undertake the BIG program for all desas at once.

¹This possibility might be quite doubtful from the banking point of view. To maintain the credit operation, the village unit bank must have sources to finance itself. With the smaller area of Bimas coverage together with low interest rates, it is unlikely that they be able to finance themselves. Nevertheless, we must not forget that with risk of default payment included in the consideration, it might be that the smaller the area and the number of farmers covered by Bimas program at a time, the greater the capability of village unit banks to finance themselves.

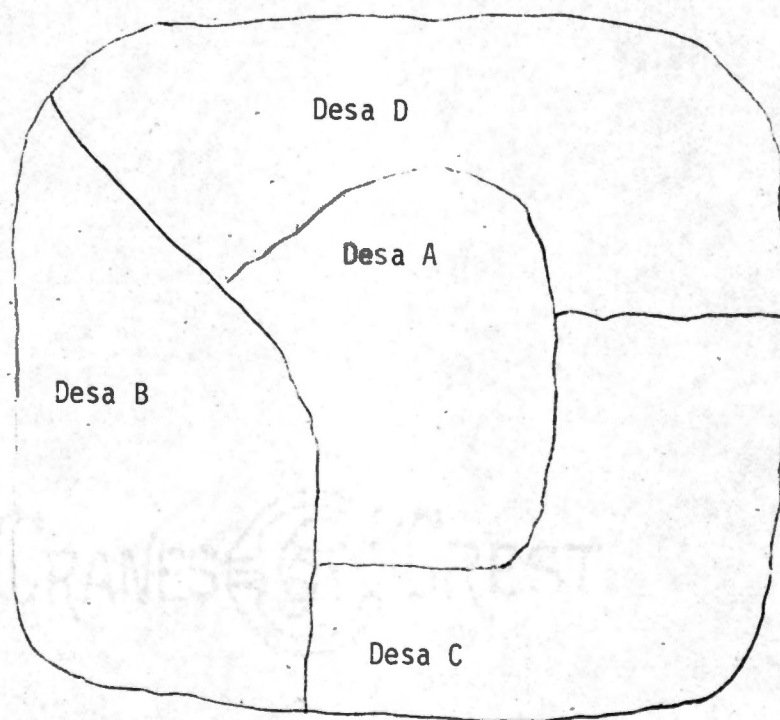


Figure 5.1. The Structure of Desas/Villages in One Wilud (Village Unit)

Notes: The total coverage of sawah (wet land) in one wilud is between 600 and 1000 hectares; it consists of 3,4 or more desas

This wilud is served by one village unit bank, one BUUD/KUD (Village Administrative Units/Cooperative Units, one or more input kiosks (inputs stores) and one or two PPL (Field Agricultural Extension Agents)

The BIG/Inmas rotation system in a village unit (wilud) seems to have better support from governments at all levels than the full BIG program.² The rotation system does not need very much more manpower and funds than the current programs--Improved Bimas (Bimas yang disempurnakan) and Inmas program. The available manpower and budget would be allocated mostly to the desa that participates in the BIG program, and the rest of the budget would be for desas that participate in the Inmas program.

Improvement of Irrigation

The irrigation of sawah is necessary for the success of using modern inputs, especially modern fertilizers. The implementation of the BIG program must have been accompanied by the improvement of irrigation.

Some alternative strategies for developing the irrigation infrastructure are 1) constructing new irrigation projects, 2) rehabilitating the existing infrastructure, and 3) providing more intensive terminal facilities in existing systems.³ The first strategy involves

²The full BIG program is the Bimas program where all desas in a village unit participate in the BIG program at the same time, while the BIG/Inmas rotation system is the program that each desa in a village unit has different time in participating the BIG or Inmas program. The additional manpower and funds (in BIG program) are needed for increasing the intensity of guidance to farmers from PPL (extension agents), checking information and more contact between the extension-workers or village unit bank officials and the farmers in using modern inputs, yield estimation, and handling repayments of debts to the government.

³R.C. Lazaro, D.C. Taylor, and T.H. Wickham, "Irrigation Policy and Management Issues: An Interpretive Seminar Summary" in Irrigation Policy and the Management of Irrigation Systems in Southeast Asia, ed. Donald C. Taylor and Thomas H. Wickham. (Bankok: The Agricultural Development Council, Inc., 1979), pp. 1-12.

pumping, river diversion, and reservoir storage. In West Java, river diversion is usually done during the dry season of rice. It has lower financial, ecological and social costs than the reservoir storage. This irrigation system is usually called the simple irrigation system (Pengairan sederhana). It is managed by the group of farmers or the village leader. Reservoir storage projects can involve either small-scale or large-scale systems. Small-scale projects are now being emphasized more than before, since they afford close links between farmers and irrigation development; they increase the willingness of farmers to participate in the operation. Small-scale irrigation systems are technically simple to design and construct. Also, the gestation period between project construction and realization of irrigated production is relatively short (less than two years).

Rehabilitation of the existing infrastructure is the strategy to restore the infrastructure that has deteriorated due to inadequate maintenance. The rehabilitation projects involve repairing diversion dams and expanding their capacities, desilting and limiting irrigation and drainage channels, repairing and replacing water control structures, improving service roads, and providing additional training for operation and maintenance (O & M) personnel.⁴

The third strategy involves projects that extend the irrigation terminal facilities and drainage network to provide water directly to

⁴Ibid..

individual fields or smaller areas.⁵ Evaluation studies of effects of increasing ditch density on rice production have been conducted by experts in irrigation. The costs for additional construction, operating, and maintaining the additional facilities are relatively high. Also, loss of the area that used to be planted in rice must be included in the opportunity cost of the projects. Nevertheless, from the conceptual standpoint, the possibility of expanding irrigated production through more intensive terminal irrigation facilities has considerable appeal.⁶

As in implementation of the Bimas and Inmas programs, the improvement of irrigation must also consider its effects and requirements. These include the possibility of achieving income redistribution through irrigation development and the prospects for securing repayment of the costs of providing irrigation.

⁵This strategy began in Taiwan and now receives considerable emphasis throughout Southeast Asia. It has been considered the most recent phase of long term irrigation development in Thailand and Malaysia. It is also being introduced in the Philippines. Ibid.

⁶The study of Alfian Lains (1966-1976) shows that the response of rice production toward the irrigation water in Bali, which has the best terminal facilities in Indonesia, is the highest. Its elasticity (Production to water) is 0.099 compared to other provinces which have the ranges from 0.031 to 0.093. Further Lains argues that the rice production response to the irrigation area in twelve Indonesian rice producing provinces is much higher than to the price of fertilizer. With 10 percent increase in irrigation acreage, the rice production per hectare will increase one percent. Dr. Alfian Lains, "Peningkatan Produsku Padi Melalui Peningkatan Hasil Rata-Rata per Hectare." Agro Ekonomika, Tahun X, No. 11 (October 1979), p. 47.

The PASCCA Model in Predicting the Impacts

Results of A Program to Increase

Rice Production per Hectare

The PASCCA model can be used to predict the creation of rice surplus in a production community if the BIG/Inmas rotation program were implemented. The creation of a rice surplus which is caused by the BIG/Inmas rotation program is the difference between rice surplus level with and without the proposed program.

Table V.1 shows two alternative time schedules for rice intensification programs in a typical wilud (village unit, see Figure 5.1). The BIG/Inmas rotation programs show that in the year 1, most of the Bimas guidance activities are concentrated in desa A; other desas are provided inputs for the farmers who are willing and able to buy. In year 2, the guidance activities are concentrated in desa B; in year 3 in desa C and year 4 in desa D. This rotation system will be rounded until every desa has the opportunity to participate in the program. Under the second alternative (full BLG), each desa in the typical wilud participates every year in Bimas with less intensive guidance.

If all farmers in the typical small rice community by now have been participating in the BLG program for at least two years, the prediction of rice surplus creation by BIG/Inmas rotation program will be the differences of rice surplus level between the implementation of BIG/Inmas rotation program in two years (BIG + Inmas) and full BLG programs (BLG + BLG). These differences in rice surplus will be based on the total rice surplus in the community and in each group of people.

Table V.1. Two Alternative Time Schedules for Rice Intensification Programs in A Wilud

Year	BIG/Inmas Rotation				Full BLG Programs			
	Desa A	Desa B	Desa C	Desa D	Desa A	Desa B	Desa C	Desa D
1	BIG	I	I	I	BLG	BLG	BLG	BLG
2	I	BIG	I	I	BLG	BLG	BLG	BLG
3	I	I	BIG	I	BLG	BLG	BLG	BLG
4	I	I	I	BIG	BLG	BLG	BLG	BLG

Table V.2 shows the predicted rice surpluses associated with the implementation of BIG/Inmas rotation program. The bottom row of Table V.2 predicts the rice surplus level in the community would increase as much as 4979 kilograms of rice if the BIG/Inmas rotation program were implemented. The large farmer would benefit greatly from the program--i.e. 2261 kilograms of rice or about 45 percent of the rice surplus increase in the community. However, regardless the distribution of the rice surplus increase in the community, all households will receive benefits from the BIG/Inmas rotation programs.

The information in Table V. 2 can be used for policy decisions at a local level in two ways:

(1) The information can be used for an aggregate prediction of rice surplus creation at the village/desa level. The number of production communities in a village must be estimated for this aggregate rice surplus prediction. Several facts should be obtained for

Table V.2. The Additional Rice Surplus in a "Typical Small Rice Community" Caused by Implementation of BIG/Inmas Rotation Program (kg of rice)^a

Rice Programs	Farmers/Workers ^b						Total
	LF (1)	MF (2)	TSF (1)	TLW (1)	OSF (3)	OLW (3)	
BIG ^c	6712	2126	130	-974	-36	-3356	4602
Inmas ^d	5019	869	-185	-1047	-942	-3523	191
BLG/Inmas Rotation ^e	11731	2995	-55	-2021	-978	-6879	4793
BLG ^f	4735	869	-185	-1047	-942	-3523	-93
BLG ^f	4735	869	-185	-1047	-942	-3523	-93
Full BLG ^g	9470	1738	-370	-2094	-1884	-7046	-186
Additional Rice Surplus from Big/Inmas Rotation ^h	2261	1257	315	73	906	167	4979

^aIn a situation when all farmers have already adopted the biological/chemical and mechanical technologies.

^bThe numbers in parentheses are the number of households in each class of farmer/worker.

^cSee Appendix I-7.

^dSee Appendix I-8.

^eBIG + Inmas.

^fSee Appendix I-9.

^gBLG + BLG.

^hBIG/Inmas Rotation minus the Full BLG program.

this purpose--the number of large farmers, distribution of landownership and total hectareage of sawah (wet-land) in a village/desa.

(2) The aggregate prediction of rice surplus at the village level can be used to help decide whether the BIG/Inmas programs should be implemented according to two criteria: a) the capability of farmers to repay their debt if the proposed programs were implemented, and b) benefit-cost analysis of the proposed programs. The BIG/Inmas rotation programs will cost the government more than the BLG program. The additional costs are for the increase of manpower for guidance per hectare of sawah. In order to sustain the programs, this additional cost might be paid by the farmers. The additional rice surplus at the village level with the BIG/Inmas rotation program can be considered one indicator of the capabilities of farmers to repay this additional cost.

The added rice surpluses at the village level can be considered the additional benefits of the BIG/Inmas rotation compared with the BLG program. This additional benefits would be compared with the additional costs, and the benefit-cost analysis of the proposed BIG/Inmas can be determined.

Programs for Solving the Income Maldistribution Problem

One of the conclusions of the empirical analysis of previous programs for West Java (Chapter IV) is that, the greater total rice surplus level in the small rice community, the greater the rice surplus differential among households in the community. The increasing gap between the large farmers and small farmers or landless

workers is caused by the actions of a few rich people in the community or rural area especially mechanization that replaces the labor traditionally supplied by the small farmers and landless workers.

The nature of economic development is affected by the facilities and resources of each group in the community. Large farmers have more resources, especially land, than small farmers/landless workers. This gives them greater access to benefits of economic development programs such as the BIG program.

Should we terminate the government programs that cause the widening gap between large farmers and small farmers or landless workers, even though those programs cause the increasing net production for the whole community? Or should we continue those programs and search for the supplementary actions that would restrain the negative side effects of the widening gap? The second approach seems to be more plausible than the first one. Further discussion will be concerned with four types of actions that could reduce the gap as supplements to programs that increase rice production per hectare.

Redistribution of Land Resources

Land ownership distribution is one cause of the widening gap. A way to reduce the gap is to redistribute land ownership through land reform or regulation of land transaction processes. Land reform is not likely to be practical in the short-run since it is a very complicated and sensitive matter. It needs careful planning and a strong government organization and control over the program. Transferring ownership from one individual to someone else without his

full willingness is a serious matter that is difficult for the previous owner to forget; it will disturb the peacefulness of the society in the village. On the other hand, pressure of the small farmers or landless workers to get lands from their rich neighbors is another factor that will disturb their concentration on working and village peacefulness.

One factor that should be defined, before the implementation of a land reform program, is the long-run prediction of the future distribution of lands after land reform is carried out. To help predict this, the past trends of land ownership for a period of, say, 20 years should be studied. Is it true that the present large-size holdings were also as large-size holding in the past? If it is true, this means that the larger the land holding, the greater the possibility of adding to its size in the future. It also implies that a land reform program might be effective in solving the problem of land ownership maldistribution at the present time and in the future.

If it is not true, there must be other factors that cause the attainment of land ownership, on one hand, and the increasing number of landless workers, on the other. One possible factor is the degree of entrepreneurship of each individual in a village. An entrepreneur in a village--a trader, the ownership of transportation means or a money lender--might accumulate land, through buying or getting ownership titles as lending collateral from small, medium or even from large farmers. Another possibility is that rich people from urban areas--either originally from rural places or not--buy land from the present rural people. During inflation periods, when land prices rises are

higher than interest rates, buying land is considered as a wise way to invest their money. Hence, a land reform program that centers around redistribution of land ownership cannot be considered to be a very effective tool for reducing maldistribution of land ownership in the long run.

An alternative emphasis for land reform is the improvement of regulations or conditions for land transfers and inheritances. These include transfers of both private and government lands. For private land transactions, certain conditions might be placed on people who will buy the land. The occurrence of absentee land ownership where the residence of the landowner is far from the village, could be avoided. Absentee landownership might affect the productivity of the land due to the less intensity of crop supervision or due to the leasing systems to the sharecroppers. Requirements that local people will take care of the land, if the buyer is not a village resident, is one way to make certain that the transaction will not lead to neglect of the land.

This required condition for the buyer might reduce land transactions between non-residents and the villagers. The lack of cash circulation in rural areas, compared to urban areas, makes the bargaining position of the villagers as sellers be weaker than the buyer. For purposes of building houses, traditional ceremonies, or continuing their children education, the villagers are often forced to sell their agricultural land at much lower prices than land sold for residential or business purposes in urban areas.

The process of transferring land from government ownership to private ownership, through selling or free distribution, should

consider such conditions as the size of holding and definition of the new land owners. Restriction of maximum size of new holding units is one way to reduce the problem of maldistribution of landownership. Another solution is to specify that the buyer or the receiver of the land title must be a farmer unless there is specific recommendation from the land-use planning agency that the land in question be for purposes other than for farming.

Guidance Toward the Adoption of New Mechanical Technologies

Another way to reduce income maldistribution is guiding the rural people in adopting mechanical technologies both in rice production/processing and in other commodities or enterprises.

As mentioned earlier, the decisions of rich people in rural areas, who may or may not be large farmers, to invest their money will affect the welfare of other households in the same village or community. Investments in machinery that replace the human labor which comes from their neighbors or even from outside village will benefit some people and hurt others. The introduction of small rice mill might benefit the owners of the rice mills as well as rice consumers and rice traders. Most consumers like milled rice better than pounded rice. Rice traders favor milled rice since its price is higher than pounded rice. On the other hand, it reduces earnings of the households who used to pound the rice. The introduction of hand tractors might benefit the large farmer due to less worry about not being able to hire labor at the right time during the peak season than before. On the other hand, it hurts the landless workers who used to work for

him. The introduction of sickles and scales for harvesting benefits the owner of the rice fields and harms the harvesters since it results in a smaller share for the harvesters and a larger share for him.

Guidance can be in the form of 1) restructuring the technological equipment ownership⁷ and 2) relating its capacity to local sources of raw material and labor. This program would involve a feasibility of possible ownership systems on the new equipment. The analysis would estimate the human labor that would be replaced by one unit of equipment. It would include information about who will be replaced and also who will benefit from the introduction of new equipment.

Collective ownership systems such as a cooperative in a neighborhood association or a village is one example. This institution would have the responsibility to manage this equipment, to distribute profits to the members and hire laborers for machinery operation.

Another consideration is the determination of material capacities of a village or locality to utilize fully one kind of equipment, for example a small rice mill. This must be considered to prevent over-capacity of small rice mill facilities in a village. There are many cases to show that there are too many small rice mills (hullers) in one desa during non-harvest season.

⁷ Iskandar Alisjahbana argues that technology application always results in progress in the long run. He says that, the use of technology which replaces human labor with tremendous economic efficiency is an economic opportunity that should not be rejected. He argues that, the improvement of technology must be accompanied by the restructuring the ownership system of the technological equipment. Iskandar Alisjahbana, "Technology" in Prisma: The Indonesia Indicator Vol. 14 (September 1979), pp. 41-43.

Changes in both rice varieties planted and the tools for rice harvesting often lead to changes in labor share for harvesters. Typically the harvester's share has fallen from one-seventh to one-tenth. In a labor-surplus area this decrease of labor share might hurt the small farmers and landless workers. This depends on whether the higher yields more than offset smaller received.

If new technology does reduce the received for this work, the government could encourage the small farmers and landless workers to organize themselves into bargaining associations or cooperatives based on labor and crop share interests.

Another alternative would be to impose farm rental and wage standards. However, previous efforts in Indonesia and other developing countries to provide such protection have proven very hard to enforce.

Provide More Employment Outside the Rice Economy

Negative rice surpluses for small farmers and landless workers imply the significant contributions of non-rice agricultural sectors and non-agricultural sectors in providing employment opportunities for them. Opportunities in non-rice agricultural sectors can include improvement of techniques, cropping intensity, management and marketing of other commodities such as cassava, corn, sweet potatoes, soybeans, peanuts, other lowland vegetables, pond fish and cattle.

In the non-agricultural sector, the development of rural industries such as cottage industries is one of the ways that government can solve the problem of lack of employment in rural areas. Government is encouraged to develop rural industries to provide job

opportunities, since urban industries seem to lack capacity to absorb labor from the agricultural sector.⁸ Several government programs have related to small industries since 1974: Small Industrial Development and Guidance (Bimbingan dan Pengembangan Industri Kecil, BPIK), Small Industrial Development Project (Proyek Pengembangan Industri Kecil, PPIK), Education and Training (Pendidikan dan Latihan, Diklat), Small Industrial Credit (Kredit Industri Kecil, KIK), and Operation Capital and Marketing Credit (Kredit Modal Kerja dan Pemasaran, KMKP). The KIK and KMKP programs are concerned more with the capital and marketing aspects, while PPIK and BPIK and Diklat are more concerned with technical aspects.

Mubyarto, et al., in their recommendations about the small industrial development argue that 1) the Village Unit Bank, which was established for the Bimas rice program, should help small industries in solving their financial problem, 2) there must be better condition among representatives of the Trade, Industry, and Cooperative ministry at the bottom level, and Village Unit Bank on the problem of input and output marketing.⁹

⁸Most of small industries in Indonesia are located in the rural area. Of 1.2 million firms (1978), 94 percent were located in the rural area. Labor for this industry was about 1.7 million people--80 percent of all industrial workers--and it produced 20 percent of the Gross National Product (GNP) from all industrial sectors. Mubyarto, Sudarsono, and Daryanto, "Pengembangan Industri Pedesaan di Jawa Tengah dan Daerah Istimewa Yogyakarta," Agro Ekonomika Tahun X, No. 11 (October 1979), pp. 81-82.

⁹Ibid., pp. 87-88. They argue that at the present time, the Industrial Ministry seems to be concerned with only the production aspects, while the Trade Ministry is concerned more with consumption and consumers aspects.

Another way to provide employment opportunities for small farmers and landless workers is the implementation of government projects at the village level. These government projects include irrigation, roads, bridges and building projects. Two funding sources for the public projects in a village are 1) local sources--collections from village people--and 2) government grants. The collection of local funds and their use are managed by the village/desa head (kepala desa). There are two kinds of government grants that come to a village: 1) a fixed amount of funds in a year and 2) a flexible amount that determined by the regency level according to the needs and potentials of certain projects.¹⁰ In 1976, the fixed amount of President Instruction for Rural Development Grant (Inpres) for a village or desa was Rp 300,000, while the Inpres for a regency or a municipality was Rp 400 per capita.

Besides providing employment for small farmers and landless workers, public projects are one way to redistribute the surplus of large farmers or rich people to the poor. The village projects in which funds are collected from local people get capital mostly from large farmers, according to land size. The small farmers and landless workers provide labor. Public projects are very important during the

¹⁰The Central Government makes a development grant to each province based on the following elements: 1) a "per capita element" to take account of size of population in the provinces; 2) a "growth potential element" to speed the exploitation of natural resources; 3) a "backward areas element" to help the development of transport, communications and infrastructure of poor areas; and 4) an "incentive factor" that depends on the increase or decrease in the local authorities' public saving rates. Albert Waterston, "A Viable Model for Rural Development" Development Digest Vol. XIII, No. 3 (July 1975), pp. 3-11.

earlier stages of development of a village. However, in the long run, after construction of necessary infrastructure, the importance of public projects in providing employment diminishes, except for maintenance of certain facilities, such as irrigation and roads. Such maintenance does not use as much labor as during the construction stages. Therefore, the programs concerning the development of private or cooperative enterprises--farming and non-farming--in terms of techniques, management, financial, and marketing are becoming more important than the public projects in the long run.

Related to the strategy of development, it is very fortunate if a desa or village has a long run development plan that includes project priorities according to their benefits, potentials, and costs.¹¹

Improvement of Rural Financial Markets

One consequence of the widening gap of rice surplus level between large farmers and other classes in the community is the growing tendency for the large farmer to become the money lender for certain emergency needs of other classes. There is nothing wrong with the existence of lending and borrowing among households in the community, as long as nominal interest rates are fair enough for both the borrowers and the lenders. Yet, if one considers the real interest rate based on the rice price during borrowing time (non-rice harvest market) and

¹¹ Albert Waterston argues that where local areas are completely dependent on outside grants and loans, rural development planning becomes a matter of drawing up "shopping lists" of desires for outside funding without making the hard allocative choices which realistic planning requires. Ibid.

repaying time (harvest market), the informal money lending system charges are even higher than people realize.¹²

In the normal situation of economy--not during the hyper-inflation like in 1962-68--the local informal money lender charges higher interest rates than the formal financial markets. The question is how to improve or develop a rural financial market that can replace the informal money lender in providing cash for small farmers and landless workers or other classes. Through the competition of formal rural financial markets--in terms of interest rate and loan servicing--local money lenders might choose either lowering the interest rate or investing their funds on other kinds of uses that are more profitable than lending money. Some of these other uses may create employment opportunities for other households.

In developing a formal rural financial market, there must be integrated approaches toward the saving and lending aspects. In the long run, there must be a close link between the borrowers and the savers in the rural financial markets. The borrowers should have the responsibility to repay their debts since the funds that they borrow include their saving accounts. On the other hand, the savers will be encouraged to save since they realize that sometime they need those funds for certain emergency needs, both consumption

¹²The conventional calculation of real interest rate is the nominal interest rate minus the inflation rate. Hence, from the conventional determination, the real interest rate will be lower than people realize, with the assumption that the inflation rate is positive. However, from the small farmers' points of view, whose main consideration is kilograms of rice, the real interest rate will be higher than the nominal interest rate.

and production.¹³ Therefore, the effort in saving mobilization and government credit must have the integrated policy implementation.

Two questions should be considered for the improvement of rural financial markets. The first question is how to induce the rural people to save their money in rural financial market institutions. Aspects that are included in this approach are location, time, and training of the bank/rural financial market officials to reach the rural people. If located in the market center of a village unit and open for longer hours during the market day, the rural financial market might encourage more people to save.¹⁴ The second aspect is laying foundations for the young generation in elementary schools to have a better understanding and attitude toward the saving account. The third aspect is the determination of interest rates that can attract savings on one hand and attract borrowing on the other hand. Flexible interest rates, instead of a fixed interest rate policy, might be more appropriate to attract both savers and borrowers. This flexible interest rate could be based on the main indicator that rural people use to compare their savings accounts earnings. It might be the price of gold, price of rice, or the price of other commodities.¹⁵

¹³At the present time, in the Bimas program and KIK, farmers and the owners of cottage industries receive credit from government agencies and not from their own savings. Some rural people who have savings accounts in Tabanas (National Development Saving Scheme) and Taska (Insurance Saving Scheme) withdraw their savings not related to their government credit for production.

¹⁴In rural areas, the market day is once or twice a week.

¹⁵The exact indicator must be identified through careful study of certain localities.

The second question is how to develop the formal rural financial market institutions through lending to the rural people. Several possible approaches are 1) simplifying the loan application forms, 2) eliminating the necessity of a cosigner, 3) considering the best location and time of service, 4) considering the kinds of collateral other than physical property, and 5) considering the appropriate level of interest rate. Rural people have difficulty in understanding the complicated loan application forms due to their low education and their aversion to formal loan system. Saving deposits can serve as an alternative kind of collateral besides land and building. This change of collateral would have a positive indirect effect on the willingness of the borrowers to save their money. The level of interest rate that is charged should be such that it covers the administrative cost of the institution, the rate of inflation, saving interest rate, and is able to attract the rural people to borrow from the institution in competition with the informal money lender.

The PASCCA Model in Predicting the Effects of A Program Aimed at Solving the Income Maldistribution Problem

Guidance toward the adoption of new-mechanical technologies is the one of the programs that can be considered for reducing income maldistribution problem among households in a small rice community.

It was mentioned in a previous section that the programs to solve the income maldistribution problem in this dissertation have been considered supplements to the programs to increase rice production.

The program of guidance toward the adoption of new-mechanical technologies here would be a supplement to the proposed BIG/Inmas rotation program.

For the prediction of changes in rice surplus distributions among households in the community brought about by the guidance toward the adoption of new technologies, all households in the production community will be assumed to be participating in the BIG/Inmas rotation programs.

Table V. 3 shows the predicted changes of rice surplus at both community and household levels that are brought about the proposed guidance program. The bottom row of Table V. 3 shows that rice surplus levels of the large farmer and two medium farmers are reduced, while rice surplus levels of other classes (small farmers and landless workers) increase. It shows also a reduction of total community surplus by as much as 203 kilograms of rice.

As the information in Table V. 2 (page 134), the information in Table V. 3 can be used to predict changes in rice surplus distribution at the village or desa level. The kinds of facts that are required for this prediction are the same as for BIG/Inmas rotation programs--i.e. the number of large farmers, the distribution of sawah holdings and the total hectarage of sawah in a village.

This estimation procedure can be used not only for the implementation of the mechanical technologies guidance program, but also for the BIG/Inmas rotation programs. With the supplement of the mechanical technologies guidance program (MTGP), the BIG/Inmas

Table V.3. Predicted Changes of Rice Surplus in A "Typical Small Rice Community" Generated by Guidance Toward the Adoption of New Mechanical Technologies (in kg of rice)^a

Rice Programs	Farmers/Workers ^b						Total
	LF (1)	MF (2)	TSF (1)	TLW (1)	OSF (3)	OLW (3)	
BIG/G ^c	5397	2208	260	-885	481	-2949	4512
Inmas/G ^d	3934	871	-69	-964	-507	-3187	78
BIG/Inmas Rotation and Guidance on Mechanical Technology ^e	9331	3079	191	-1849	-26	-6136	4590
BIG/N ^f	6712	2126	130	-974	-36	-3356	4602
Inmas/N ^g	5019	869	-185	-1047	-942	-3523	191
BIG/Inmas Rotation without Guidance on Mechanical Technologies ^h	11731	2995	-55	-2021	-978	-6879	4793
Change of Rice Surplus with Guidance on Mechanical Technologies ⁱ	-2400	84	136	172	952	743	-203

^aIn a situation when all farmers have already adopted the biological/chemical and mechanical technologies.

^bThe numbers in parentheses are the number of households in each class of farmer/worker.

^cG means with guidance in mechanical technologies; see Appendix I-4.

^dSee Appendix I-5.

^eBIG/G + Inmas/G

^fN means without guidance on the adoption of mechanical technologies; see Appendix I-7.

^gSee Appendix I-5.

^hBIG/N + Inmas/N

ⁱBIG/Inmas/G minus BIG/Inmas/N.

rotation programs do not benefit large farmers. In fact, these programs reduce the typical large farmer's rice surplus as much as 139 kilograms of rice (2261 kg - 2400 kg).¹⁶ This reduction of the rice surplus level implies the lack of capability of these large farmers in a village to pay the additional cost of the BIG/Inmas rotation programs.

From benefit-cost analysis point of view, the BIG/Inmas with the MTGP might be still profitable--i.e. total rice surplus at the village level still increases. But since large farmers would not gain more surplus from paying the additional BIG costs, those programs may not be feasible to undertake. In other words, one might conclude that the MTGP program is not an appropriate supplement for the BIG/Inmas programs, even though it creates a better distribution of rice surplus in a village unless the government were willing to subsidize the program.

These policy implications are not necessarily true for all rice villages in West Java. These apply to this typical rice village and might apply to other rice villages which have characteristics similar to this typical community.

¹⁶See Table V. 2 and V. 3

CHAPTER VI

FURTHER APPLICATIONS AND REFINEMENTS OF THE MODEL

Summary

The perspective Analysis of Small Community Capital Accumulation (PASCCA) is the model that has been developed in this dissertation. In mathematical form, this PASCCA model is a simplification of Leontief input-output analysis.

As an example, this dissertation has used the PASCCA model to evaluate the effects of the Indonesian Government Rice Intensification Programs on the rice surplus of a typical rice production community in a rice village in West Java. The typical production community consists of one large farmer (two hectares of sawah), two medium farmers (0.60 hectares of sawah each), four small farmers (0.30 hectares of sawah each) and four landless workers. This typical community is a hypothesized community for which the numbers of farmers/workers in each category and the size of their farms are based on the agricultural census of West Java in 1973.

The PASCCA model was used to diagnose the local impacts of several government rice intensification programs: Bimas with intensive guidance (BIG), Bimas with less intensive guidance (BLG) and Inmas (Mass Intensification) programs. The model can provide answers to the questions of 1) which government programs have the greatest effects on rice surplus in the locality as a whole, and 2) which create the least differential surplus among classes of farmers/worker. In the illustrative analysis used for this dissertation, the BIG program was

found to create the most rice surplus in the community, but also the most differential rice surplus among classes.

For policy decisions, the PASCCA model can be used to predict the outcomes of proposed programs compared to the present actions in terms of additional surpluses. In this dissertation, the PASCCA model has been used to predict the additional rice surpluses with the implementation of two examples of government actions: BIG/Inmas rotation programs and program of guidance toward the adoption of rice mechanical technologies (MTGP). Aggregation of the additional rice surpluses to the village level provides a basis for estimating: 1) the capability of each group of farmers to pay the additional cost of the proposed actions, and 2) the net benefits of the programs for the purpose of benefit-cost analysis.

Possible Application to Other Situations

Non-rice Production Communities

Besides the rice intensification programs, the PASCCA model can be used as a tool for evaluating other government programs or changes in technologies. The programs or technological changes that involve different classes of people--those who participate or are affected by these programs--are very well suited to the application of the PASCCA model.

Examples of these programs can be: an improvement of irrigation, soil conservation practices, credit and training on small scale industry, credit and guidance on certain farm commodities (e.g. rubber, tea, sugar cane, cattle, and fisheries).

The production community can be a group of small-scale industries or cottage industries which consists of one large homeowner who has cottage industries, the owner of raw materials, the laborers, or the traders. It might be a group whose livelihood centers around other crops, such as rubber, tea, fruit, highland vegetables, sugar cane, and coconuts. It might be fishermen. Regardless of the kinds of enterprises or commodities, the small community will basically include one household that tends to dominate the enterprise, and the other classes in the community which interlink with one another.

Other Places

The use of the PASCCA model is not limited to West Java. It can be applied anywhere as long as there is a dominant "production community" where links and terms of trade center around a particular commodity or enterprise. The PASCCA model can be used in other provinces in Indonesia, developing countries other than Indonesia, or even developed countries such as the United States.

Several examples of study in Indonesia that can be analyzed by the PASCCA model are:

- 1) The local impacts of the changes in contract system between the government processing companies and farmers in sugarcane producing areas especially in Central and East Java. The changes are from requirements that land owners (farmers) rent their land to government companies for sugar plantation to the opportunities that are given to these farmers to plant sugarcane and sell the yields to the government companies for processing.

- 2) The local impacts of government credit on rubber farmers in South Sumatra and South Kalimantan.
- 3) The local impacts of government fishery credit on coastal villages in Central Java.
- 4) The local impacts of Pekalen Sampean Irrigation Project (PSIP) in East Java.¹

Examples of possible PASCCA model applications to other developing countries are:

- 1) The International Agricultural Research Centers might use the PASCCA model in evaluating effects of the introduction of agricultural technologies on local farmers. The major centers include: the International Rice Research Institute (IRRI), Los Banos, Philippines; the International Maize and Wheat Improvement Center (CIMMYT), Mexico City, Mexico; the International Center of Tropical Agriculture (CIAT), Cali, Colombia; the International Institute of Tropical Agriculture (IITA), Ibadan, Nigeria; the International Crops Research Institute for the Semi Arid Tropics (ICRISAT), Hyderabad, India; the International Potato Center (CIP), Peru; the International Laboratory for Research on Animal Diseases (ILRAD), Nairobi, Kenya; and the International Livestock Centre for Africa (ILCA), Ethiopia.²

¹Donald C. Taylor ed., op. cit., p. 122. Taylor's study in six irrigation systems in Pekalen Sampean Irrigation Project in 1973-74 concluded that, due to the small farm size in the project area, the levels of net agricultural income were extremely modest, about \$20 per capita per year.

²Robert D. Stevens ed. "Transformation of Traditional Agriculture: Theory and Empirical Findings" in Tradition and Dynamics in Small Farm Agriculture (Ames: The Iowa State University Press, 1977), p. 13.

2) The effects of technological changes on small farm groups in Rio Grande do Sul, Brazil.³ In 1970, farm size varied from one to over 50 hectares; a majority of the farms contained 10 to 25 hectares. The labor supply was drawn from members of the immediate family and seasonal labor during peak seasons. Maize (corn) was the principal crop grown; it occupied from one-half to two thirds of the cultivated acreage.

3) The local impacts of the introduction of high-yielding wheat in Pakistan's Punjab. Jerry B. Eckert, in his study in Sahiwal District in Pakistan's Punjab province, from 1965 to 1970, stated that the acceptance of dwarf wheat had induced changes in landlord-tenant relationships.⁴ Many large farmers began to take much more direct interest in the management of their fields. In some cases absentee landowners moved back to their farms and lessened their involvement in urban pursuits.

4) The local impacts of labor saving devices in farming on traditional Hausa Dryland Farmers in the North of Nigeria.⁵ In Dan Mahayawi village (1967) there was a high degree of inequality in the distribution of use rights to farmland. The average size of farms

³Normal Rask, "Factors Limiting Change on Traditional Small Farms in Southern Brazil," in Tradition and Dynamics in Small-Farm Agriculture ed. Robert Stevens (Ames: the Iowa State University Press, 1977), pp. 98-99.

⁴Jerry B. Eckert, "Farmer Response to High-Yielding Wheat in Pakistan's Punjab" in Tradition and Dynamics in Small-Farm Agriculture ed. Robert D. Stevens (Ames: the Iowa State University Press, 1977), p. 173.

⁵David W. Norman, "Economic Rationality of Traditional Hausa Dryland Farmers in the North of Nigeria" in Tradition and Dynamics in Small-Farm Agriculture ed. Robert D. Stevens (Ames: Iowa State University Press, 1977), pp. 66-72.

was almost 12 acres, and the holdings ranged between 0.6 and 54 acres. The main sources of income were crops, especially sorghum. D.W. Norman argues that the shortage of available labor during the peak months (June and July) was the primary factor that limited income. Hence, if a labor saving device had been introduced since 1967, the impacts of this device on large farmers and small farmers would have been different.

5) The local impacts of agricultural credit policy on oil palm or cocoa farmers in Formal Eastern Region of Nigeria.⁶ These two crops are considered the main income for most farmers in the region. The cocoa farmers commonly have larger acreages than the oil palm farmers. The large cocoa farms range between 120 and 360 acres while the small farms range between 5 and 10 acres. The large oil palm farms range between 10 to 20 acres while the small farms are less than 2 acres.

The large farmers seem to benefit more than the small farmer from the government credit. They have more access to the programs since they are able to fulfill the minimum acreage requirement for collateral (5 acres of oil palm farm). In many cases, the large farmers have become the moneylenders. Oil palm or cocoa farms are often used for collateral. The money lenders have the right to harvest oil palm or cocoa of the borrowers until the debt is repaid.

⁶The author wishes to thank his colleague, Dan Nwaogbo, for his useful information about the characteristics of the oil palm and cocoa farmers in eastern of Nigeria.

The small farmers do many tasks as workers for the large farmers. Besides cash, sometimes the laborers are paid in kind--e.g. yam plants for the near production.

Therefore, the large farmers can be considered the sources of cash, food seeds and often the cocoa-seed. The improved cocoa varieties are mostly adopted by the large farmers first. Then, these improved varieties are grown and sold to the small farmers. The small farmers prefer getting the new varieties from the large farmers than from the government agency. This introduction of new improved cocoa varieties can be evaluated also by using the PASCCA model.

Possible Refinements

Key Information Needs and Ways to Get this Information

The basic kinds of information needed for the PASCCA model was discussed in Chapter III (in the general discussion of the key components). This sub-section is concerned only with the information that was not included in the empirical application in Chapter IV and Table III.2 (page 82). This information includes 1) labor transactions with groups outside the community, 2) land leasing or renting among the households, and 3) the inclusion of primary consumption in the analysis.

The empirical application (Chapter IV) assumes that all farmers in the typical small rice community operate their own lands: there is no land leasing or renting from one farmer to other farmers. If in a representative small production community, land is leased or rented, the rows and columns in Table III.2 must have an additional row/column

about renting and leasing. This additional row/column is to be put in the same group as the variables of input and interest payment. This grouping system is due to the fact that land leasing and renting can be considered a capital interrelationship.

Labor relationships between households in the production community and households outside the community can be shown in Table III.2 (page 82) as a new row/column before the row of total labor expenditure. If a household works more for other households outside the production community than outside households work for it, the sign is negative. On the other hand, if a household in the community hires households from outside the community more than it works for outside households, the sign is positive.

Primary consumption may or may not be included in the analysis; it depends on the nature of the problem itself. Some decisions related to the entrepreneurs might be influenced by the level of food consumption. The clearer the division between the production and consumption sector in one enterprise or economic decision, the less important of considering food consumption levels. For example, in cash crop farming, primary consumption influences the use of modern inputs less significantly than in a subsistence farming.

The empirical application of the PASCCA model in this dissertation has used farm-budgeting analysis of the information based on both the author's observations and published references. Further refinements of the PASCCA model would make use of farm record analysis. Farm records would provide information about farmers' actual experiments with improved practices. One would not have to rely so heavily

on subjective estimates or results from other places when developing budget coefficients for the PASCCA model.

Farm records would be gathered from households in a production community. The period of information gathering and analysis would be according to the growing season of an enterprise. For example, in rice production the period can be six months for one season or one year for two seasons. This depends on whether there are differences in labor and capital used between the rainy and dry season. If the pattern and intensity of using labor and modern inputs are very different it is better to use a one-year period as the time unit of analysis.

Information about the use of labor and capital could be obtained when each task is undertaken if time and funds are available.

Information about primary consumption could be obtained with help of simple list forms that are given to respondents for certain periods. Respondents could be asked to fill out the forms regularly (e.g., daily, weekly or even monthly) according to the consumption pattern of each household. If funds and time are not adequate to undertake the above intensive research, the information could be obtained through one-time interviews of all households in a production community.

Additional information for farm budgets needed by the PASCCA model can be obtained from references about the places near the production community in question. For example, rice yields per hectare could be gathered from the nearby experiment stations, demonstration plots or innovative farmers in a neighboring village.

Some Ideas to Improve the Model Further

Two ideas will be put forward as possibilities for improving the PASCCA model. First, the basic form of the model (Table III.1, page 68) could consist of two tables--one for labor transactions and another for capital transactions rather than only one table. Second, the model can be connected into a "dynamic" form from the "comparative-static" model presented in this dissertation.

The one-table form (Table III.1) shows only the labor interrelationships among households in a production community but not the capital. Capital (rent, interest and other inputs) has been shown in terms of links between a household and others (without knowing which households). With the introduction of another table for capital transactions, the capital interrelationships among households in a production community could be clarified.

The empirical application of the model in this dissertation has been comparative-static analysis. The analysis has been concerned with situation before and after implementation of a program or a technological change--the changes in rice surplus in a single (one year) period. Instead, the model could be developed to show the evaluation of surpluses over a sequence of several time periods. For example, what will be the local impacts of BIG (Bimas with intensive guidance) after one, two, five and ten years of its implementation?

Such a dynamic approach might help to analyze the process of agricultural technological changes. For example, it would be that in the first year only the large farmers adopt a new HYV rice; in

the second year the large farmers sell their new HYV rice seeds to other farmers at a price higher than common varieties; and so on.

In evaluating programs that have already been implemented, this dynamic model would require respondents to recall events over several periods of time. Another way to obtain the needed information would be to undertake an intensive study in a production community for a period of, say, five years.

In the analytical results of the PASCCA model, the effects of agricultural changes (exogenous variables) on the rice surplus level depend on the following endogenous variables of the model: 1) the composition of members within a household and in the community; 2) the hectarage of farms; 3) the capital and labor interrelationships among households; 4) the distribution of rice activities in a year; 5) wage-rate and crop shares; and 6) the price ratio between a) rice and b) fertilizers, seeds, insecticides, and other items of primary consumption.

Any change in value of one endogenous variable will affect the impact level of the agricultural changes. The refinements of the PASCCA model might include sensitivity analysis. This sensitivity analysis will help predict impacts changes in the values of the endogenous variables--e.g. a change of the price ratio between rice and other commodities, or a change in wage rate.

Adaptations of the Model for Use by Local Decision Makers

A government official who works at the district level in West Java --e.g. an agricultural extension field worker (PPL), a village unit bank official, or a district official (camat)--often has

formal education that is limited to the junior college or even high school level. However, such a person need not have difficulty in understanding the PASCCA model and its application for his decision making.

For this purpose, there are several ways to simplify the PASCCA model as applied empirically in this dissertation: 1) exclusion of the primary consumption from the analysis, 2) use of one-sided (Table III.1, page 68) rather than two-sided analysis (Table III.2, page 82), and 3) use of "with" and "without" program comparison rather than comparing one program with another.

The primary consumption information is often very complicated for the local decision makers to gather. Rural people usually do not have written records on this. If implementation of a government program does not change the level of primary consumption significantly, the component of primary consumption can be excluded from the analysis. The components to be analyzed need include only those which change significantly by the implementation of the program.

Two-sided analysis (Table III.2 and Tables I-1 through I-9, Appendix A) looks more complicated than one-sided analysis (Table III.1). Two-sided analysis is similar to double-entry accounting. For example, in Table III.2, ML and -LM have the same number, but different signs; P_L at the bottom side and P_L at the right side are also identical numbers. Hence, for the use by the local decision makers, the PASCCA model might present the figures only the bottom side (a) not with the right side (b) (see Figure 6.1). Figure 6.1 shows that one-sided is similar than two-sided analysis.

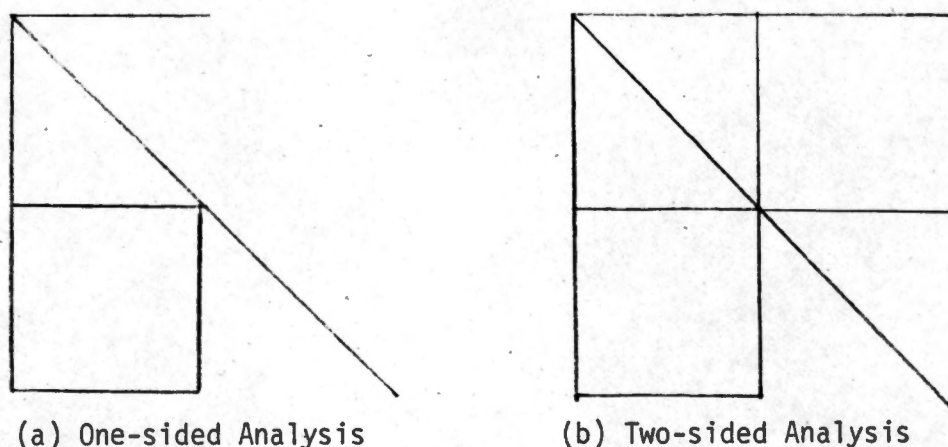


Figure 6.1. One-sided and Two-sided Analysis of the PASCCA Model

The empirical application of the PASCCA model in this dissertation compared the effects of three different rice intensification programs for three different situations in a village in terms of rice technology level. This analysis needs nine tables of surplus accumulation (Tables I-1 through I-9, Appendix I). The PASCCA model that analyzes with and without program comparison would be similar than that compares one program with another. A local official can apply the PASCCA model, in evaluating either a proposed program or a program that has already been implemented in a village, by comparing two tables of surplus accumulation: with and without the implementation of the program.

Suggested Followups

Teaching and Research in Padjadjaran University, Indonesia

This PASCCA model will be first introduced to faculty members and students in the Department of Agricultural Social Economics,

Faculty of Agriculture, Padjadjaran University in Bandung, Indonesia. This model might be introduced to the graduate students through the research methodology course or special seminar.

There are two kinds of agricultural economic research in this university: 1) graduate student master degree thesis research and 2) research that is funded by sources outside the university. These outside sources can include funds from the Ministry of Education, from other government agencies (e.g. the Agriculture Ministry, Public Works Ministry, Domestic Affairs Ministry, or Provincial Government), from private enterprises, or from special research programs such as the Indonesian Agricultural Economics Survey (Survey Agro Ekonomi Indonesia, SAEI) and the Agricultural Development Council, Inc. (A/D/C).

In practice, many master's thesis studies are undertaken while the students help carry out the research that is funded by outside sources. The subject matter of a master's thesis depends on the interest of the student and his advisor, whereas the nature of the outside-funded research depends upon the problem that has already defined by its funding source. In the latter case, the university has to identify what causes the problem and what will be the appropriate solution.

The PASCCA model can be used in both research contexts as long as the problem relates to evaluation of government programs or institutional/technological changes on the wellbeing of local groups in a rural area or the agricultural sector. It can be useful especially to persons or institutions who are interested in evaluating effects of a program like Bimas or Inmas on the improvement of different classes

of people in rice village. In the case of Padjadjaran University, these persons can be the agricultural social economics students or faculty members who are involved in helping Bimas officials to formulate the action and improvement of Bimas and Inmas programs.

Diffusion to the Indonesian Government

One medium for introducing the PASCCA model to other universities and government officials in Indonesia can be the working paper resulting from a seminar, articles in Indonesian journals or in Post Graduate Study (Pasca Sarjana) that are held either at Padjadjaran University or at other universities.⁷

Introduction to the officials at village unit or district levels will need a long period of time. The introduction of the PASCCA Model--or a similar analytical perspective--to village unit officials can provide them with a new aid 1) for handling information requests from their superiors and 2) for their own program decisions. Regarding the first use, the village unit officials (i.e PPL) do not have real authority to decide which desas/villages will participate in a program. This results in information requests that usually come from the top, making the local officials only enumerators to collect data or to fill out questionnaires. These local officials have not been involved much in the problem--formulation process; they are usually involved only in discussions of how to fill out the questionnaires.

⁷ Pasca Sarjana (Post Graduate Study) is a study program for a special field of interest by persons who have already received master's degree and are interested in studying further. It is offered by universities which have strong programs in certain subjects.

These kinds of questionnaires usually relate to the policy needs at a broader level than the village level. Policy makers at the provincial or national level need an empirical basis for designing and implementing certain policies. Often the results of research analysis are considered only in terms of average results or general results for all areas or all samples. The specifics of each locality are not considered when deciding how to implement the policy. As a consequence, the insights of the local enumerator about the problem that are gained during the interviews are not utilized, since his village unit is considered only as part of a sample and not as a distinct unit.

The second possible use of local information via the PASCCA approach is related to the trends toward the decentralization of decision-making authority for certain government programs. A village unit official often realizes that he, besides being a survey enumerator, can be also an information analyst and decision-maker in helping local leader to solve problems or implement programs that they themselves have to deal with.

Using a simple and researchable model, such as the PASCCA model is one way to give opportunities to the local government officials, besides taking actions, to analyze problems. In Indonesia this process of decentralization in decision making will need a very long period before achieving its goal. However, if one does not start to give them tools of analysis, the goal will not ever be achieved. Therefore, the introduction of the PASCCA model can be considered one of the steps to enable local officials to have an integrated view for

their information-gathering, observational, decision-making, and action role.

Diffusion to Other Countries

The introduction of the PASCCA model to agricultural economists or research analysts in other countries can be through articles in journals (English edition) e.g. Economic Development and Cultural Changes, American Journal of Agricultural Economics, Bulletin of Indonesian Economic Studies, International Development Review, Development Digest and Agricultural Development Council publications.

It can be also through international seminars on matters of:

1) analytical tools in agricultural economics, and 2) the local impacts of government programs or agricultural changes.

One such international forum is the International Conference of Agricultural Economists, which will be meeting next in Indonesia in 1982. A presentation on the PASCCA model and subsequent applications to Indonesia at that conference could be a good way to discuss and refine the idea with other agricultural economists.



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APPENDICES

APPENDIX A

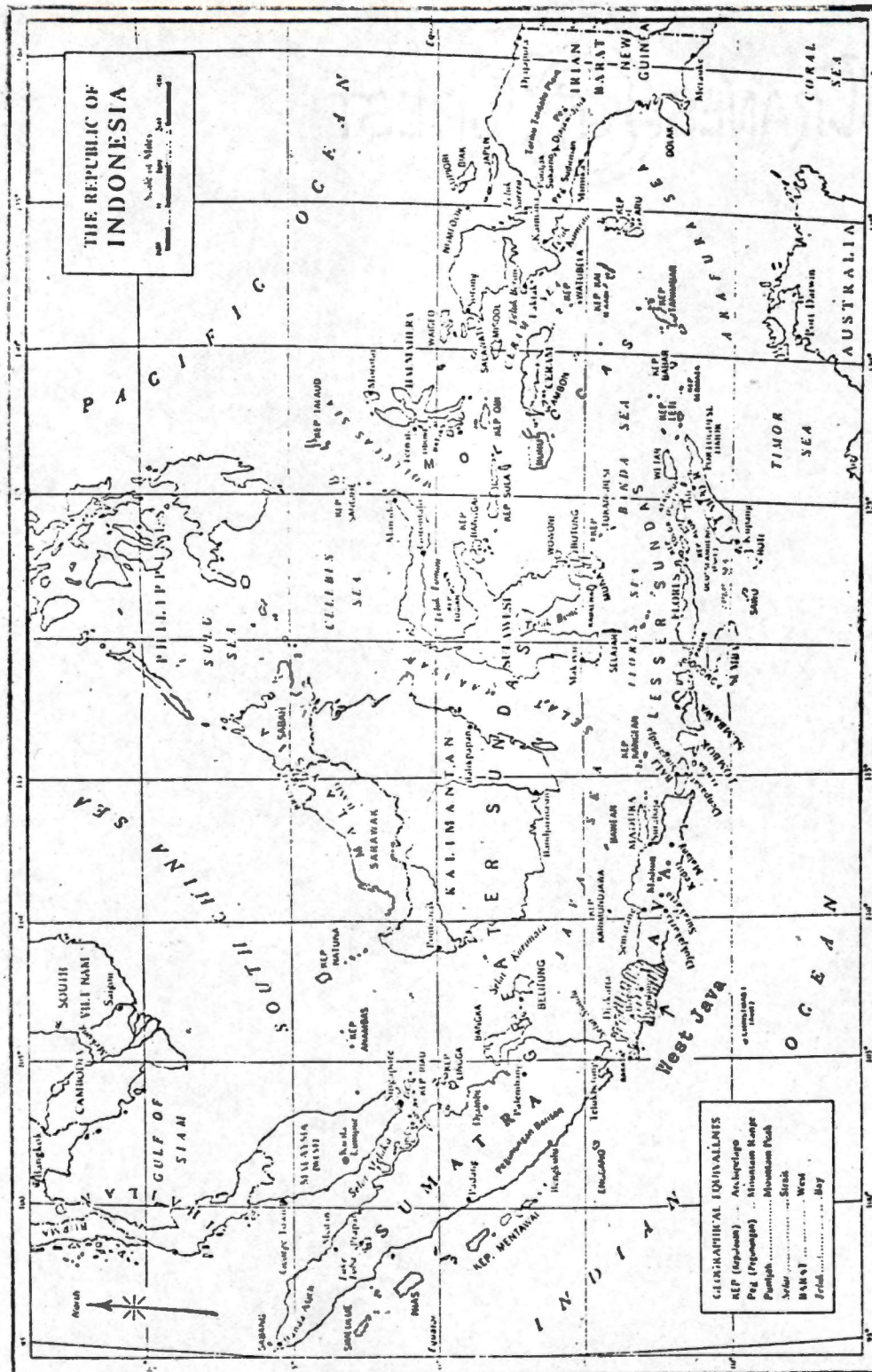


Figure A-1. Map of the Republic of Indonesia

APPENDIX B

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Table B-1 The Labor Flows Among Households for Land Preparation in the Situation of Non Mechanical Technologies (man days/two seasons)

Income Earning People	Source of Income							Total
	LF	MF1	MF2	TSF	TLW	OSF (3)	OLW (3)	
LF	10 ^a	0	0	0	0	0	0	10
MF1	0	16 ^a	0	0	0	0	0	16
MF2	0	0	16 ^a	0	0	0	0	16
TSF	10	14	0	18 ^a	0	0	0	42
TLW	10	14	0	18	0	0	0	42
OSF (3)	30	14	28	0	0	54 ^a	0	126
OLW (3)	30	14	28	0	0	54	0	126
Total	90	72	72	36	0	108	0	378

^aFamily labor-man days

Table B-2 The Income Flows Among Households for Land Preparation in the Situation of Non Mechanical Technologies (kg of rice/two seasons)

Income Earning People	Source of Income							Total
	LF	MF1	MF2	TSF	TLW	OSF (3)	OLW (3)	
LF	12 ^a	0	0	0	0	0	0	12
MF1	0	19 ^a	0	0	0	0	0	19
MF2	0	0	19 ^a	0	0	0	0	19
TSF	28	39	0	22 ^a	0	0	0	89
TLW	28	39	0	50	0	0	0	117
OSF (3)	84	39	78	0	0	65 ^a	0	266
OLW (3)	84	39	78	0	0	151	0	352
Total	236	175	175	72	0	216	0	874

^a Amount spent to provide meals for family labor

Table B-3 The Labor Flows for Land Preparation in the Situation of Mechanical Technologies in Two Seasons (man days or tractor days)

Income Earning People	Source of Income							Total
	LF	MF1	MF2	TSF	TLW	OSF (3)	OLW (3)	
LF	24 ^a	8 ^a	8 ^a	0	0	0	0	40
MF1	0	8	0	0	0	0	0	8
MF2	0	0	8	0	0	0	0	8
TSF	24	0	0	18	0	0	0	42
TLW	24	8	0	18	0	0	0	50
OSF (3)	0	0	0	0	0	54	0	54
OLW (3)	0	0	8	0	0	54	0	62
Total	72	24	24	36	0	108	0	264

^aIn man-days and also in tractor-days e.g. 24 means 24 man-days and 24 tractor-days.

Table B-4 The Labor Income Flows for Land Preparation in the Situation of Mechanical Technologies in Two Seasons (kg of rice)

Income Earning People	Source of Income							Total
	LF	MF1	MF2	TSF	TLW	OSF (3)	OLW (3)	
LF	29	36	36	0	0	0	0	101
MF1	0	10	0	0	0	0	0	10
MF2	0	0	10	0	0	0	0	10
TSF	67	0	0	22	0	0	0	89
TLW	67	22	0	50	0	0	0	139
OSF (3)	0	0	0	0	0	65	0	65
OLW (3)	0	0	22	0	0	151	0	173
Others ^a	120	36	36	0	0	0	0	192
Total	283	104	104	72	0	216	0	779

^aOthers are the expenditure for oil, fuel, and repairs; these are 30 kg/ha season

APPENDIX C



Table C-1 The Flows of Labor for Rice Transplanting in
All Situations in Two Seasons (woman-days)

Income Earning People	Source of Income							Total
	LF	MF1	MF2	TSF	TLW	OSF (3)	OLW (3)	
LF	8	0	0	0	0	0	0	8
MF1	6	6	0	0	0	0	0	12
MF2	6	0	6	0	0	0	0	12
TSF	4	4	0	4	0	0	0	12
TLW	4	4	0	4	0	0	0	12
OSF (3)	12	4	8	0	0	12	0	36
OLW (3)	12	4	8	0	0	12	0	36
Total	52	22	22	8	0	24	0	128

Table C-2 The Flows of Labor Income for Rice Transplanting
in All Situations in Two Seasons (kg of rice)

Income Earning People	Source of Income							Total
	LF	MF1	MF2	TSF	TLW	OSF (3)	OLW (3)	
LF	4	0	0	0	0	0	0	4
MF1	3	3	0	0	0	0	0	6
MF2	3	0	3	0	0	0	0	6
TSF	2	2	0	2	0	0	0	6
TLW	2	2	0	2	0	0	0	6
OSF (3)	6	2	4	0	0	6	0	18
OLW (3)	6	2	4	0	0	6	0	18
Total	26	11	11	4	0	12	0	64



APPENDIX D

Table D-1 Flows of Labor for First, Second, and Third Weeding in All Situations in Two Sessions (woman-days)

Income Earning People	Source of Income							Total
	LF	MF1	MF2	TSF	TLW	OSF (3)	OLW (3)	
LF	8	0	0	0	0	0	0	8
MF1	6	6	0	0	0	0	0	12
MF2	6	0	6	0	0	0	0	12
TSF	4	4	0	4	0	0	0	12
TLW	4	4	0	4	0	0	0	12
OSF (3)	12	4	8	0	0	12	0	36
OLW (3)	12	4	8	0	0	12	0	36
Total	52	22	22	8	0	24	0	128

Table D-2 Flows of Labor Income from First, Second, and Third Weeding for All Situations in Two Seasons (kg of rice)

Income Earning People	Source of Income							Total
	LF	MF1	MF2	TSF	TLW	OSF (3)	OLW (3)	
LF	8	0	0	0	0	0	0	8
MF1	6	6	0	0	0	0	0	12
MF2	6	0	6	0	0	0	0	12
TSF	4	4	0	4	0	0	0	12
TLW	4	4	0	4	0	0	0	12
OSF (3)	12	4	8	0	0	12	0	36
OLW (3)	12	4	8	0	0	12	0	36
Total	52	22	22	8	0	24	0	128



APPENDIX E

Table E-1 Flows of Income from Rice Harvesting where
Farmers Use Appropriate Dosage of Modern
Inputs and Traditional Tools for Harvesting
in Two Seasons (kg of rice)

Income Earning People	Source of Income ^a							Total Income
	LF ^b	MF1 ^c	MF2 ^c	TSF ^d	TLW	OSF ^d (3)	OLW (3)	
LF	10912 ^e	0	0	0	0	0	0	10912
MF1	203	3274 ^e	0	0	0	0	0	3477
MF2	203	0	3274 ^e	0	0	0	0	3477
TSF	136	85	0	1637 ^e	0	0	0	1858
TLW	136	85	0	117	0	0	0	338
OSF(3)	408	85	170	0	0	4910 ^e	0	5573
OLW(3)	408	85	170	0	0	351	0	1014
Total Cost	1494	340	340	117	0	351	0	

^aThe number of harvesters for the large farmer's field is 23 persons i.e. one from the large farmer, 3 from each medium farmer, and 2 from each small farmer and landless worker. The number of harvester for one medium farmer's field is 11 persons i.e. 3 from the medium farmer, and 2 from each small farmer and landless worker. The number of harvester for one small farmer's field is 4 persons--two from the small farmer and 2 from one landless worker.

^bThe rice to be harvested from the large farmer is $5496 \text{ kg} \times 2 = 10912 \text{ kg}$. The capacity of one harvester is $1/23 \times 10912 \text{ kg} = 474.43 \text{ kg}$. Share to one harvester is $1/7 \times 474.43 \text{ kg} = 67.77 \text{ kg}$.

^cThe rice to be harvested from medium farmer's field is $2 \times 1636 \text{ kg} = 3274 \text{ kg}$. The capacity of one harvester is $1/11 \times 3274 \text{ kg} = 297.636 \text{ kg}$. Share to one harvester is $1/7 \times 297.636 \text{ kg} = 42.52 \text{ kg}$.

^dThe rice to be harvested from small farmer's field is $2 \times 818.4 \text{ kg} = 1636.80 \text{ kg}$. The capacity of one harvester is $1/4 \times 1636.80 \text{ kg} = 409.2 \text{ kg}$. Share to one harvester is $1/7 \times 409.2 \text{ kg} = 58.46 \text{ kg}$.

Table E-1 (Continued)

^eTotal rice production in each farmer's household

Table E-2 Flows of Income from Rice Harvesting Where Farmers Use Non-Appropriate Dosage of Modern Inputs and Use Traditional Tools for Harvesting (kg of rice)

Income Earning People	Source of Income							Total Income
	LF ^a	MF1 ^b	MF2 ^b	TSF ^c	TLW	OSF ^c (3)	OLW (3)	
LF	8333 ^d	0	0	0	0	0	0	8333
MF1	155	2498 ^d	0	0	0	0	0	2653
MF2	155	0	2498 ^d	0	0	0	0	2653
TSF	104	65	0	1250 ^d	0	0	0	1419
TLW	104	65	0	89	0	0	0	258
OSF(3)	312	65	130	0	0	3750 ^d	0	4257
OLW(3)	312	65	130	0	0	267	0	774
Total Cost	1142	260	260	89	0	267	0	

^aThe rice to be harvested from large farmer's field is 8333 kg. The capacity of one harvester is $1/23 \times 833 \text{ kg} = 362.31 \text{ kg}$. The share to one harvester is $1/7 \times 362.31 \text{ kg} = 51.76 \text{ kg}$.

^bThe rice to be harvested from each medium farmer's field is 2498 kg. The capacity of one harvester is $1/11 \times 2498 \text{ kg} = 227.091 \text{ kg}$. The share to one harvester is $1/7 \times 227.091 \text{ kg} = 32.44 \text{ kg}$.

^cThe rice to be harvested from each small farmer's field is 1250 kg. The capacity of one harvester is $1/4 \times 1250 \text{ kg} = 312.50 \text{ kg}$. The share to one harvester is $1/7 \times 312.50 \text{ kg} = 44.64 \text{ kg}$.

^dTotal rice production in the typical farmer household.

Table E-3 Flows of Income from Rice Harvesting Where Farmers Do Not Use Modern Inputs and Use Traditional Tools for Harvesting in Two Seasons (kg of rice)

Income Earning People	Source of Income							Total Income
	LF ^a	MF1 ^b	MF2 ^b	TSF ^c	TLW	OSF ^c (3)	OLW (3)	
LF	3976 ^d	0	0	0	0	0	0	3976
MF1	74	1190 ^d	0	0	0	0	0	1264
MF2	74	0	1190 ^d	0	0	0	0	1264
TSF	49	32	0	596 ^d	0	0	0	677
TLW	49	32	0	43	0	0	0	124
OSF(3)	148	32	64	0	0	1688 ^d	0	1932
OLW(3)	148	32	64	0	0	129	0	373
Total Cost	542	128	128	43	0	129	0	

^aThe rice to be harvested from the large farmer's field is 3976 kg. The Capacity of one harvester is $1/23 \times 3976 \text{ kg} = 172.869 \text{ kg}$. Share to one harvester is $1/7 \times 172.869 \text{ kg} = 24.69 \text{ kg}$.

^bThe rice to be harvested from each medium farmer's field is 1190 kg. The capacity of one harvester is $1/11 \times 1190 \text{ kg} = 108.18 \text{ kg}$. Share to one harvester is $1/7 \times 108.18 \text{ kg} = 15.45 \text{ kg}$.

^cThe rice to be harvested from each small farmer's field is 596 kg. The capacity of one harvester is $1/4 \times 596 \text{ kg} = 149 \text{ kg}$. Share to one harvester is $1/7 \times 149 \text{ kg} = 21.29 \text{ kg}$.

^dTotal rice production in the typical farmer household.

Table E-4 Flows of Income from Rice Harvesting where Farmers Use Appropriate Dosage of Modern Inputs and Use Sickles for Harvesting in Two Seasons (kg of rice)

Income Earning People	Source of Income							Total Income
	LF ^a	MF1 ^b	MF2 ^b	TSF ^c	TLW	OSF ^c (3)	OLW (3)	
LF	10912 ^d	0	0	0	0	0	0	10912
MF1	158	3274 ^d	0	0	0	0	0	3432
MF2	158	0	3274 ^d	0	0	0	0	3432
TSF	105	66	0	1637 ^d	0	0	0	1808
TLW	105	66	0	91	0	0	0	262
OSF(3)	315	66	132	0	0	4910 ^d	0	5423
OLW(3)	315	66	132	0	0	273	0	786
Total Cost	1156	264	264	91	0	273	0	

^aThe rice to be harvested from the large farmer's field is 10912 kg. The capacity of one harvester is $1/23 \times 10912 \text{ kg} = 474.43 \text{ kg}$. Share to one harvester is $1/9 \times 474.43 \text{ kg} = 52.71 \text{ kg}$.

^bThe rice to be harvested from each medium farmer's field is 3274 kg. The capacity of one harvester is $1/11 \times 3274 \text{ kg} = 297.64 \text{ kg}$. Share to one harvester is $1/9 \times 297.64 \text{ kg} = 33 \text{ kg}$.

^cThe rice to be harvested from each small farmer's field is 1637 kg. The capacity of each harvester is $1/4 \times 1637 \text{ kg} = 409.25 \text{ kg}$. Share to one harvester is $1/9 \times 409.25 \text{ kg} = 45.47 \text{ kg}$.

^dTotal rice production in the typical farmer household.

Table E-5 Flows of Income from Rice Harvesting where Farmers Use Non-Appropriate Dosage of Modern Inputs and Use Sickles for Harvesting in Two Seasons (kg of rice)

Income Earning People	Source of Income ^a							Total
	LF	MF1	MF2	TSF	TLW	OSF (3)	OLW (3)	
LF	8333 ^b	0	0	0	0	0	0	8333
MF1	121	2498 ^b	0	0	0	0	0	2619
MF2	121	0	2498 ^b	0	0	0	0	2619
TSF	81	50	0	1250 ^b	0	0	0	1381
TLW	81	50	0	69	0	0	0	200
OSF (3)	243	50	100	0	0	3750 ^b	0	4143
OLW (3)	243	50	100	0	0	217	0	610
Total	890	200	200	69	0	217	0	

^aThe rice to be harvested from the large farmer's field is 8333 kg. The capacity of one harvester is $1/23 \times 8333 \text{ kg} = 362.30 \text{ kg}$. Share to one harvester is $1/9 \times 362.30 \text{ kg} = 40.26 \text{ kg}$. The rice to be harvested from the medium farmer's field is 2498 kg. The capacity of one harvester is $1/11 \times 2498 \text{ kg} = 227.09 \text{ kg}$. Share to one harvester is $1/9 \times 227.09 \text{ kg} = 25.13 \text{ kg}$. The rice to be harvested from each small farmer's field is 1250 kg. The capacity of one harvester is $1/4 \times 1250 \text{ kg} = 312.5 \text{ kg}$. Share to one harvester is $1/9 \times 312.50 \text{ kg} = 34.72 \text{ kg}$.

^bTotal rice production in the typical farmer household.



APPENDIX F

Table F-1

Flows of Labor in Rice Processing in the
 Situation of Non-Mechanical Technologies
 where All Farmers Use the Appropriate Dosages
 of Modern Inputs (woman days/two season)^a

Income Earning People	Source of Income							Total
	LF	MF1	MF2	TSF	TLW	OSF (3)	OLW (3)	
LF	20	0	0	0	0	0	0	20
MF1	0	50	0	0	0	0	0	50
MF2	0	0	50	0	0	0	0	50
TSF	40	0	0	35	0	0	0	75
TLW	40	0	0	0	17	0	0	57
OSF (3)	0	0	0	0	0	116	0	116
OLW (3)	0	0	0	0	0	0	51	51
Total	100	50	50	35	17	116	51	419

Table F-2 Flows of Labor Income in Rice Processing in the
 Situation of Non-Mechanical Technologies where
 All Farmers Use the Appropriate Dosages of
 Modern Inputs (kg of rice)^a

Income Earning People	Source of Income							Total
	LF	MF1	MF2	TSF	TLW	OSF (3)	OLW (3)	
LF	13	0	0	0	0	0	0	13
MF1	0	30	0	0	0	0	0	30
MF2	0	0	30	0	0	0	0	30
TSF	107	0	0	21	0	0	0	128
TLW	107	0	0	0	10	0	0	117
OSF (3)	0	0	0	0	0	70	0	70
OLW (3)	0	0	0	0	0	0	31	31
Total	227	30	30	21	10	70	31	419

Notes for Table F-1 and F-2

In the situation of non mechanical technologies in rice processing, all households in the community hand pound their rice for consumption and payment for hired labor in rice production and processing. Access to other primary items besides rice is obtained by selling rice to the trader in the form of threshed paddy or dry stalk paddy. Hence, for a household whose rice production plus the household members' shares as the harvesters (TP + S) is larger than the household rice consumption plus labor expenditures (C + L), the amount of rice to be pounded is the total rice consumption plus labor expenditures (C + L). For a household whose TP + S is less than C + L, the amount of rice to be pounded is equal to its rice production and its harvest shares (TP + S).

Those two appendices are derived from Appendix E (harvesting) and Appendix G (primary consumption). The amounts of rice to be pounded for each class of people are:

	<u>Rice Production plus Harvest Share^a</u>		<u>Hired^b Labor</u>	<u>Total</u>
Large Farmer	1335 kg ^c	+	378 kg	= 1713 kg
Each Medium Farmer	977 kg ^c	+	180 kg	= 1157 kg
Typical Small Farmer	851 kg ^c	-	143 kg	= 708 kg
Typical Landless Worker	338 kg ^d	+	0	= 338 kg
Other Small Farmers (3)	2553 kg ^c	-	429 kg	= 2124 kg
Other Landless Workers (3)	1014 kg ^d	+	0	= 1014 kg

The capacity of each pounder is about 20 kg of rice a day.

^aOr rice consumption

^bPositive (+) is labor expenditures and negative (-) is labor income

^cRice consumption

^dTotal rice production plus harvesters' shares

Table F-3 Flows of Labor in Rice Processing in the
 Situation of Non Mechanical Technologies,
 where Farmers Use Non Appropriate Dosages of
 Modern Inputs (woman days/two seasons)^a

Income Earning People	Source of Income							Total
	LF	MF1	MF2	TSF	TLW	OSF (3)	OLW (3)	
LF	20	0	0	0	0	0	0	20
MF1	0	50	0	0	0	0	0	50
MF2	0	0	50	0	0	0	0	50
TSF	40	0	0	35	0	0	0	75
TLW	40	0	0	0	13	0	0	53
OSF (3)	0	0	0	0	0	116	0	116
OLW (3)	0	0	0	0	0	0	39	39
Total	100	50	50	35	13	116	39	403

Table F-4

Flows of Labor Income in Rice Processing in the Situation of Non Mechanical Technologies where Farmers Use Non Appropriate Dosages of Modern Inputs (kg of rice/two seasons)^a

Income Earning People	Source of Income							Total
	LF	MF1	MF2	TSF	TLW	OSF (3)	OLW (3)	
LF	13	0	0	0	0	0	0	13
MF1	0	30	0	0	0	0	0	30
MF2	0	0	30	0	0	0	0	30
TSF	107	0	0	21	0	0	0	128
TLW	107	0	0	0	8	0	0	115
OSF (3)	0	0	0	0	0	70	0	70
OLW (3)	0	0	0	0	0	0	23	23
Total	227	30	30	21	8	70	23	409

^aNotes for Table F-3 and F-4

The general information is the same as the notes of Table F-1 and F-2. Based on this information, the amount of rice to be pounded are:

<u>Class of People</u>	<u>Rice Production plus Harvest Share or Rice Consumption</u>		<u>Hired Labor or Harvest Spending</u>	<u>Total</u>
Large Farmer	1335 kg	+	378 kg =	1713 kg
Each Medium Farmer	977 kg	+	180 kg =	1157 kg
Typical Small Farmer	851 kg	-	143 kg =	708 kg
Typical Landless Worker	258 kg	-	0 =	258 kg
Other Small Farmers (3)	2553 kg	-	429 kg =	2124 kg
Other Landless Worker (3)	774 kg	-	0 =	774 kg

Table F-5 Flows of Labor in Rice Processing in the
 Situation of Non Mechanical Technologies
 where Farmers Do Not Use Modern Inputs
 (labor days/two seasons)^a

Income Earning People	Source of Income							Total
	LF	MF1	MF2	TSF	TLW	OSF (3)	OLW (3)	
LF	20	0	0	0	0	0	0	20
MF1	0	50	0	0	0	0	0	50
MF2	0	0	50	0	0	0	0	50
TSF	40	0	0	32	0	0	0	72
TLW	40	0	0	0	6	0	0	46
OSF (3)	0	0	0	0	0	90	0	90
OLW (3)	0	0	0	0	0	0	19	19
Total	100	50	50	32	6	90	19	347

Table F-6 Flows of Labor Income in Rice Processing in
the Situation of Non Mechanical Technologies
where Farmers Do Not Use Modern Inputs (kg/two
seasons)

Income Earning People	Source of Income							Total
	LF	MF1	MF2	TSF	TLW	OSF (3)	OLW (3)	
LF	13	0	0	0	0	0	0	13
MF1	0	30	0	0	0	0	0	30
MF2	0	0	30	0	0	0	0	30
TSF	107	0	0	19	0	0	0	126
TLW	107	0	0	0	4	0	0	111
OSF(3)	0	0	0	0	0	54	0	54
OLW(3)	0	0	0	0	0	0	11	11
Total	227	30	30	19	4	54	11	375

Notes for Table F-5 and F-6

Based on the general information in Tables F-1 and F-2, the amounts of rice to be pounded are:

<u>Class of People</u>	<u>Rice Production and Harvest Share or Rice Consumption</u>		<u>Hired Labor or Harvest Spending</u>	<u>Total</u>
Large Farmer	1335 kg	+	378 kg	= 1713 kg
Each Medium Farmer	977 kg	+	180 kg	= 1157 kg
Typical Small Farmer	677 kg	-	43 kg	= 634 kg
Typical Landless Worker	124 kg	-	0	= 124 kg
Other Small Farmers (3)	1932 kg	-	129 kg	= 1803 kg
Other Landless Workers (3)	373 kg	-	0	= 373 kg

Table F-7 Flows of Income in Rice Processing with Using
Rice Mill where All Farmers Use Appropriate
Dosages of Modern Inputs (kg/two seasons)

Income Earning People	Source of Income ^a							Total
	LF	MF1	MF2	TSF	TLW	OSF (3)	OLW (3)	
LF	0	158	158	86	13	258	40	713
MF1	0	0	0	0	0	0	0	0
MF2	0	0	0	0	0	0	0	0
TSF	49	16	16	9	1	26	4	121
TLW	49	16	16	9	1	26	4	121
OSF(3)	0	0	0	0	0	0	0	0
OLW(3)	0	0	0	0	0	0	0	0
Other Ex- penditures ^b	195	63	63	34	5	103	16	479
Total	293	253	253	138	20	413	64	1434

^aAll the rice production in the community--for local consumption and sale--is milled by the huller that owned by the large farmer. The amount of rice milled from every class of people are: (from Table E-4)

Class of People	Harvest Share from Other Class plus Rice Produc- tion	Harvest Share to Other Classes	Total
Large Farmer	10912 kg	- 1156 kg	= 9756 kg
Each Medium Farmer	3432 kg	- 264 kg	= 3168 kg
Typical Small Farmer	1808 kg	- 91 kg	= 1717 kg
Typical Landless Worker	262 kg	- 0	= 262 kg
Other Small Farmer	5423 kg	- 273 kg	= 5150 kg
Other Landless Worker	786 kg	- 0	= 786 kg

^bThe costs for 100 kg of rice milled are:

- 1 kg for laborers of TSF and TLW
- 2 kg for other expenditure (fuel, repairs)
- 5 kg for the owner of the huller (LF).

Table F-8 Flows of Income in Rice Processing with Using Rice Mill where All Farmers Use Non Appropriate Dosages of Modern Inputs (kg/two seasons)

Income Earning	Source of Income ^a							Total
	LF	MF1	MF2	TSF	TLW	OSF	OLW	
LF	0	121	121	66	10	196	31	545
MF1	0	0	0	0	0	0	0	0
MF2	0	0	0	0	0	0	0	0
TSF	37	12	12	7	1	20	3	92
TLW	37	12	12	7	1	20	3	92
OSF(3)	0	0	0	0	0	0	0	0
OLW(3)	0	0	0	0	0	0	0	0
Other Expenditure	149	48	48	26	4	79	12	366
Total	223	193	193	106	16	315	49	1095

^aAll rice production in the community--for local consumption and sale--is milled by the huller owned by the large farmer. The amount of rice milled are: (from Table E-5).

Class of People	Harvest Share from other Class plus Rice Production	Harvest Share to other Classes	Total
Large Farmer	8333 kg	- 890 kg	= 7443 kg
Medium Farmer	2619 kg	- 200 kg	= 2419 kg
Typical Small Farmer	1381 kg	- 69 kg	= 1312 kg
Typical Landless Worker	200 kg	- 0	= 200 kg
Other Small Farmer	4143 kg	- 217	= 3926 kg
Other Landless Worker	610 kg	- 0	= 610 kg

^bCosts per 100 kg is the same as the Table F-7

APPENDIX G

Table G-1 Level of Primary Consumption of the Large Farmer in the Situation of Non Mechanical Technologies.

Month	Level of Consumption (in kg of rice)			
	Rice Consumption ^a	Others ^b	Clothing	Total
1	115	62	0	177
2	105	56	0	161
3	114	62	0	176
4	108	60	0	168
5	112	62	0	174
6	108	120	200	428
7	115	62	0	177
8	116	62	0	178
9	110	60	0	170
10	112	62	0	174
11	108	60	0	168
12	112	120	200	432
Total	1335	848	400	2583 ^c

^aSince in non mechanical technologies the large farmer seldom works for other classes, the categories of rice consumption of meals outside is neglected. Daily rice consumption in a regular month (not in harvest time) are:

2 adult males = 2 x 0.60 kg = 1.20 kg
 3 adult males = 3 x 0.50 kg = 1.50 kg
 2 children(13) and one senior citizen female =
 3 x 0.30 kg = 0.90 kg
Total] = 3.60 kg

^bIncluding salt, soap, coconut oil, sugar, kerosene, ritual expenditures and medical expenses

^cIncludes the meals for a female servant for hand pounding--4 kg, the total primary consumption is 2583 kg + 4 kg = 2587 kg.

Table G-2 The Level of Primary Consumption of Medium Farmer in the Situation of Non Mechanical Technologies (kg of rice)

Month	Rice Consumption						Others ^a	Cloth- ing	Total
	Head	Spouse	Children		Parent				
			13	13		13			
			male	female		female			
1	25	16	9	9	16	9	31	0	115
2	20	16	8	8	16	11	28	0	107
3	19	17	9	9	17	10	31	0	112
4	18	15	9	9	15	9	30	0	105
5	19	16	9	9	16	9	31	0	109
6	18	15	9	9	15	9	60	100	235
7	25	16	9	9	16	9	31	0	115
8	22	18	9	9	18	12	31	0	119
9	18	16	9	9	16	10	30	0	108
10	19	16	9	9	16	9	31	0	109
11	18	15	9	9	15	9	30	0	105
12	19	16	9	9	16	9	62	100	240
Total	240	192	107	107	192	115	426	200	1579 ^b

^aSee Table G-1

^bWhen the rice consumption of adult female for rice processing is included, the primary consumption is added by the consumption difference between hand pounding and not (.20 kg/day/person). Therefore, the primary household consumption for each medium farmer are:

Non Mechanical - Non Biological/Chemical = 1579 kg + 10 kg = 1589 kg

Non Mechanical - Non Appropriate Dosage = 1579 kg + 10 kg = 1589 kg

Non Mechanical - Appropriate Dosage = 1579 kg + 10 kg = 1589 kg

Table G-3 The Level of Primary Consumption of a Small Farmer or a Landless Worker in the Situation of Non Mechanical Technologies (kg of rice)

Month	Rice Consumption					Others ^a	Cloth- ing	Total
	Head	Spouse	Children					
			13 male	13 female	13 female			
1	31	16	9	9	16	31	0	112
2	18	17	9	9	17	28	0	98
3	19	17	9	9	17	31	0	102
4	18	15	9	9	15	30	0	96
5	19	15	9	9	15	31	0	98
6	18	15	9	9	15	60	100	226
7	31	16	9	9	16	31	0	112
8	19	19	9	9	19	31	0	106
9	18	17	9	9	17	30	0	100
10	19	16	9	9	16	31	0	100
11	18	15	9	9	15	30	0	96
12	19	16	9	9	16	62	100	231
Total	247	194	108	108	194	426	200	1477 ^b

^aSee Table G-1

^bConsumption levels include the additional consumption of adult female who pound their own rice or other households' rice. Therefore, the levels of primary consumption are:

In the Situation of Non Mechanical and Non Biological/Chemical Technologies:

$$\text{TSF} = 1477 \text{ kg} + 72 \times .2 \text{ kg} = 1477 \text{ kg} + 14.4 \text{ kg} = 1491.4 \text{ kg}$$

$$\text{TLW} = 1477 \text{ kg} + 46 \times .2 \text{ kg} = 1477 \text{ kg} + 9.2 \text{ kg} = 1486.2 \text{ kg}$$

$$\text{OSF} = 3(1477 \text{ kg}) + 90 \times .2 \text{ kg} = 4431 \text{ kg} + 18 \text{ kg} = 4449 \text{ kg}$$

$$\text{OLW} = 3(1477 \text{ kg}) + 19 \times .2 \text{ kg} = 4431 \text{ kg} + 3.8 \text{ kg} = 4434.8 \text{ kg}$$

In the Situation of Non Mechanical and Non Appropriate Dosages of Inputs:

$$\text{TSF} = 1477 \text{ kg} + 75 \times .2 \text{ kg} = 1477 \text{ kg} + 15 \text{ kg} = 1492 \text{ kg}$$

Table G-3 (Continued)

$$\text{TLW} = 1477 \text{ kg} + 53 \times .2 \text{ kg} = 1477 \text{ kg} + 10.6 \text{ kg} = 1487.6 \text{ kg}$$

$$\text{OSF} = 3(1477 \text{ kg}) + 116 \times .2 \text{ kg} = 4431 \text{ kg} + 23.2 \text{ kg} = 4454.2 \text{ kg}$$

$$\text{OLW} = 3(1477 \text{ kg}) + 39 \times .2 \text{ kg} = 4431 \text{ kg} + 7.8 \text{ kg} = 4438.8 \text{ kg}$$

In the Situation of Non Mechanical Technologies and with Appropriate Dosages of Inputs:

$$\text{TSF} = 1477 \text{ kg} + 75 \times .2 \text{ kg} = 1477 \text{ kg} + 15 \text{ kg} = 1492 \text{ kg}$$

$$\text{TLW} = 1477 \text{ kg} + 57 \times .2 \text{ kg} = 1477 \text{ kg} + 11.4 \text{ kg} = 1488.4 \text{ kg}$$

$$\text{OSF} = 3(1477 \text{ kg}) + 116 \times .2 \text{ kg} = 4431 \text{ kg} + 23.2 \text{ kg} = 4454.2 \text{ kg}$$

$$\text{OLW} = 3(1477 \text{ kg}) + 51 \times .2 \text{ kg} = 4431 \text{ kg} + 10.2 \text{ kg} = 4441.2 \text{ kg}$$

Table G-4 The Level of Primary Consumption in the Situation of Mechanical Technologies where Farmers Use Appropriate Dosages of Inputs (kg of rice in two seasons)^a

Class of Farmer/Worker	Primary Consumption of Non Mechanical Technologies	The Different Consumption of Meals Between Mechanical and Non Mechanical Technologies		
		Land Preparation	Rice Processing	Total
LF	2587	18	-4	2601
MF1	1589	-9	-10	1570
MF2	1589	-9	-10	1570
TSF	1492	0	16	1508
TLW	1489	5	27	1521
OSF	4454	-43	-23	4388
OLW	4441	-38	-10	4393

^aSources of derivation are: 1) Tables F-1 and F-7
2) Tables B-1 and B-3

Table G-5 The Level of Primary Consumption in the Situation of Mechanical Technologies where Farmers Use Non Appropriate Dosages of Inputs (kg of rice in two seasons)^a

Class of Farmer/Worker	Primary Consumption of Non Mechanical Technologies	The Different Consumption of Meals Between Mechanical and Non Mechanical Technologies		
		Land Preparation	Rice Processing	Total
LF	2587	18	-4	2601
MF1	1589	-9	-10	1570
MF2	1589	-9	-10	1570
TSF	1492	0	1	1493
TLW	1489	5	14	1508
OSF	4454	-43	-23	4388
OLW	4441	-38	-8	4395

^aSources of derivation are: 1) Tables F-3 and F-8
2) Tables B-1 and B-3

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APPENDIX H

Table H-1 Inputs and Interest Payments for Bimas with Intensive Guidance (B.I.G.)

Inputs	Class of Farmer/Worker			
	Large Farmer	Medium Farmer	Typical Small Farmer	Other Small Farmers(3)
N Fertilizer ^a	Rp 15,954	Rp 9,576	Rp 2,394	Rp 7,182
P Fertilizer ^a	Rp 8,516	Rp 5,107	Rp 1,277	Rp 3,830
Insecticide ^a	Rp 14,399	Rp 8,640	Rp 2,160	Rp 6,480
Seeds ^a	Rp 4,004	Rp 2,400	Rp 600	RP 1,800
Total Credit	Rp 42,873=557 ^b	Rp25,723=334 ^b	Rp6,431=84 ^b	Rp19,292=251 ^b
Six Percent Interest	Rp 2,572	Rp 1,543	Rp 386	Rp 1,158
Total Payment	Rp 45,445=842 ^c	Rp27,266=505 ^c	Rp6,817=127 ^c	Rp20,450=379 ^c
Real Interest ^d	285 kg	171 kg	43 kg	128 kg

^bIn kg of rice based on rice price of Rp 77/kg

^cIn kg of rice based on rice price of Rp 54/kg

^{b,c}The price of rice in rural market in 1973 was Rp 76.51 per kg (Source: Statistical Pocket Book 1978/79, p.424). The observation from 1948-1971, shows that the different price in harvest and non harvest time was about 42.5 percent. Hence, the price at harvest was assumed Rp 54/kg. Richard H. Goldman, "Seasonal Rice Prices in Indonesia, 1953-69: An Anticipatory Price Analysis" in Food Research Institute Studies Vol XIII, No.2, (Food Research Institute-Stanford University, 1974), p. 99-143

^aIn 1973, the price of Urea (N fertilizer) was Rp

Table H-1 (Continued)

26.60/kg, TSP (Phosphate fertilizer) was Rp 26.60/kg, modern varieties of seeds was Rp 40/kg of threshed paddy, and insecticide was Rp 1800/liter.

^dReal interest is total payment (kg) minus total credit (kg).

Appendix H-2 Inputs and Interest Payments for Bimas with
Less Intensive Guidance (BLG) where Farmers
Do Not Use Modern Inputs.

In the situation of non biological/chemical technologies, the large farmer get loans from goverment for only fertilizers:

$$\text{Urea} = 600 \text{ kg} \times \text{Rp}26.60 = \text{Rp } 15,960$$

$$\text{TSP} = 320 \text{ kg} \times \text{Rp}26.60 = \text{Rp } 8,512$$

$$\text{Total} = \text{Rp } 24,472 = 318 \text{ kg of rice}$$

$$\text{Six percent interest} = \text{Rp } 1,468$$

$$\text{Loans repayment} = \text{Rp } 25,940 = \underline{480 \text{ kg of rice}}$$

$$\text{Real interest to the government} = 162 \text{ kg of rice}$$

The large farmer sold the fertilizer to outside villages at a price of Rp.40/kg; hence his sales receipts were:

$$\text{Urea} = 600 \text{ kg} \times \text{Rp } 40.00 = \text{Rp } 24,000$$

$$\text{TSP} = 320 \text{ kg} \times \text{Rp } 40.00 = \text{Rp } 12,800$$

$$\underline{\text{Rp } 36,800}$$

It is assumed that all fertilizer sales are used by the large farmer for his money lending business with 5 percent interest a month--or 30 percent for 6 months. If all money was lent to all households in the community, the distribution of money was:

$$\text{Medium Farmers (2)} = 2 \times \text{Rp } 7000 = \text{Rp } 14,000 \text{ or } 181.8 \text{ kg of rice}$$

$$\text{Typical Small Farmer} = 1 \times \text{Rp } 5000 = \text{Rp } 5,000 \text{ or } 64.9 \text{ kg of rice}$$

$$\text{Typical Landless Worker} = 1 \times \text{Rp } 3000 = \text{Rp } 3,000 \text{ or } 39.0 \text{ kg of rice}$$

$$\text{Other Small Farmer} = 3 \times \text{Rp } 3000 = \text{Rp } 9,000 \text{ or } 116.9 \text{ kg of rice}$$

$$\text{Other Landless Worker} = 3 \times \text{Rp } 1933 = \underline{\text{Rp } 5,800} \text{ or } 75.3 \text{ kg of rice}$$

$$\underline{\text{Rp}36,800}$$

With interest rate of 5 percent a month or 30 percent/6 months, the payments were:

Appendix H-2 (Continued)

Loan Repayments	Loans	Real Interest
MF(2) = 1.3 x Rp 14000 = Rp 18200 or 337 kg-	182 kg=	155 kg
TSF = 1.3 x Rp 5000 = Rp 6500 or 120 kg-	65 kg=	55 kg
TLW = 1.3 x Rp 3000 = Rp 3900 or 72 kg-	39 kg=	33 kg
OSF(3)= 1.3 x Rp 9000 = Rp 11700 or 217 kg-	117 kg=	100 kg
OLW(3)= 1.3 x Rp 5800 = <u>Rp 7540</u> or <u>140 kg-</u>	<u>75 kg=</u>	<u>65 kg</u>
Total	Rp 47840	886 kg 478 kg 408 kg

Therefore, the interest payment paid by the large farmer was 162 kg - 408 kg = - 246 kg. In other words, the large farmer received 246 kg.

Input payments for all farmers was only for traditional varieties of seeds; its price was Rp 35/kg.

$$\text{Large Farmers} = \frac{100 \text{ kg} \times \text{Rp } 35}{\text{Rp } 77} = 45 \text{ kg}$$

$$\text{Medium Farmers (2)} = \frac{2 \times 30 \text{ kg} \times \text{Rp } 35/\text{kg}}{\text{Rp } 77} = 27 \text{ kg}$$

$$\text{Typical Small Farmer} = \frac{15 \text{ kg} \times \text{Rp } 35/\text{kg}}{\text{Rp } 77} = 7 \text{ kg}$$

$$\text{Other Small Farmers (3)} = \frac{45 \text{ kg} \times \text{Rp } 35/\text{kg}}{\text{Rp } 77} = 21 \text{ kg}$$

Appendix H-3 Input and Interest Payments for the Inmas
Program where Farmers Do Not Use Modern
Inputs.

The Inmas program for the village where farmers have not yet applied any biological/chemical technologies, the typical large farmer was not willing to buy any fertilizer and sell to other regions since the price differential among regions was not enough to make it very profitable for him to trade. Therefore, no lending and borrowing was caused by the program and there was no interest payment to the large farmer. The input payments were the same with BLG program i.e. for traditional varieties of seeds--45 kg for large farmer, 27 kg for two medium farmers, 7 kg for TSF, and 21 kg for three other small farmers.

Appendix H-4 Input and Interest Payment for Bimas with less Intensive Guidance (BLG) where Farmers Have Already Adopted New Biological/Chemical Technologies

a. Inputs used by farmers:

Inputs	Large Farmer	Medium Farmer (2)	Typical Small Farmer	Other Small Farmer	Total ^a
N Fertilizer (kg)	280	160	40	120	600
P Fertilizer (kg)	160	80	20	60	320
Insecticide (liter)	4	4	0	0	8
Seeds (kg)	100	60 ^b	15 ^b	45 ^b	220

^aThe credit inputs to large farmer from government were 600 kg urea (N fertilizer), 320 kg TSP (P fertilizer), 8 liter insecticide, and 100 kg modern varieties.

^bFrom their own sources of seeds.

b. Inputs and Interest Payments:

Inputs	Large Farmer	Medium Farmer	T.S.F.	O.S.F.
N Fertilizer	Rp 7448	Rp 4256	Rp1064	Rp3192
P Fertilizer	Rp 4256	Rp 2128=176 kg	Rp532=21kg	Rp1596=63kg
Insecticide	Rp 7200	Rp 7200	0	0
Seeds	<u>Rp 4000</u>	<u>Rp 2100</u>	<u>Rp 525</u>	<u>Rp1575</u>
Total	Rp22904 = 298 (kg)	Rp15684 = 204 (kg)	Rp2121=28 (kg)	Rp6363=83kg

Nominal Interest 30%/6 month

	<u>Rp 4075</u>	<u>Rp 479</u>	<u>Rp1436</u>
Debit Repayment	<u>362 kg Rp17659=327 kg</u>	<u>Rp2075=38 (kg)</u>	<u>Rp6224=115 (kg)</u>

Real Interest Payment

64 kg 151 kg 17 kg 52 kg

The large farmer gets payment from medium farmers, TSF and OSF are 327 kg + 38 kg + 115 kg = 480 kg. Meanwhile, the large farmer must pay to the government as much as 842 kg (see H-1). The net payment to the government by the large farmer from his sources is 842 kg - 480 kg = 362 kg. The real interest rate is 362 kg - 298 kg = 64 kg.

Appendix H-5 Inputs and Interest Payments for the Inmas Program where Farmers Have Already Adopted New Biological/Chemical Technologies.

For TSF, MF and OSF are the same with BLG. The large farmer will have a different payment for interest from BLG due to his paying cash for inputs. The input payments by the large farmer is Rp 7448 + Rp 4256 + Rp 4000 + Rp 7200 = Rp 22904 or 297.50 kg. The interest payments that come from the medium farmers, TSF and OSF are considered as the negative interest payment for the large farmer. (See Table H-4). The interest and input payments are:

	<u>Large Farmer</u>	<u>Medium Farmer</u>	<u>Typical Small Farmer</u>	<u>Other Small Farmer</u>
Input Payment	298 kg	204 kg	28 kg	83 kg
Interest Payment	<u>-220 kg</u>	<u>151 kg</u>	<u>17 kg</u>	<u>52 kg</u>
Total	78 kg	335 kg	45 kg	135 kg

APPENDIX I

Table I-1

Flows of Income, Inputs and Interest Payments, Total Rice Production and Rice Surplus Level in the Typical Small Rice Community with the Situation of Non Biological/Chemical Technologies, Non Mechanical Technologies and BIG Program (kg of rice)^a

Income Earning People	LF (1)	Source of Income					In-put pay-ment	Inter-est pay-ment	Rice Sur-plus	Total Rice Prod.
		MF (2)	TSF (1)	TLW (1)	OSF (3)	OLW (3)				
LF(1)	2587	-448	-285	-285	-534	-534	557	285	5397	10912
MF(2)	448	3178	-138	-138	-414	-414	334	171	2208	6547
TSF(1)	285	138	1492	-181	0	0	84	43	260	1637
TLW(1)	285	138	181	1489	0	0	0	0	-885	0
OSF(3)	534	414	0	0	4459	-544	251	128	481	4910
OLW(3)	534	414	0	0	544	4441	0	0	-2949	0
Total	4673	3834	1250	885	4050	2949	17645			
Input Payment	557	334	84	0	251	0	1226			
Interest Payment	285	171	43	0	128	0		627		
Rice Sur-plus	5397	2208	260	-885	481	-2949			4512	
Total Rice Production	10912	6547	1637	0	4910	0				24006

Table I-1 (Continued)

^aDerived from Tables B-2, C-2, D-2, E-1, F-2, G-1, G-2, G-3, and H-1

Table I-2

Flows of Income, Inputs and Interest Payments, Total Rice Production and Rice Surplus Level in the Typical Small Rice Community with the Situation of Non Biological/Chemical, Non Mechanical Technologies and Inmas Program (kg of rice) ^a

Income Earning People	Source of Income						In-put payment	Inter-est payment	Rice Sur-plus	Total Rice Prod.
	LF (1)	MF (2)	TSF (1)	TLW (1)	OSF (3)	OLW (3)				
LF(1)	2587	-190	-198	-198	-274	-274	45	0	202	3698
MF(2)	190	3178	-85	-85	-255	-255	27	0	-1325	2380
TSF(1)	198	85	1491	-107	0	0	7	0	-727	595
TLW(1)	198	85	107	1486	0	0	0	0	-1096	0
OSF(3)	274	255	0	0	4449	-225	21	0	-2381	1785
OLW(3)	274	255	0	0	225	4435	0	0	-3681	0
Total	3721	3678	1315	1096	4145	3681	17636			
Input Payment	45	27	7	0	21	0	100			
Interest Payment	0	0	0	0	0	0		0		
Rice Sur-plus	202	-1325	-727	-1096	-2381	-3681			-9008	
Total Rice Production	3968	2380	595	0	1785	0				8728

^a Derived from Tables B-2, C-2, D-2, E-3, F-6, G-1, G-2, G-3, H-2, and H-3

Table I-3

Flows of Income, Inputs and Interest Payments, Total Rice Production and Rice Surplus Level in the Typical Small Rice Community with the Situation of Non Biological/Chemical Technologies, Non Mechanical Technologies and BLG Program (kg of rice)a

Income Earning People	Source of Income						Input Payment	Interest Payment	Rice Surplus	Total Rice Prod.
	LF (1)	MF (2)	TSF (1)	TLW (1)	OSF (3)	OLW (3)				
LF(1)	2587	-190	-198	-198	-274	-274	45	-246	458	3968
MF(2)	190	3178	-85	-85	-255	-255	27	155	-1480	2380
TSF(1)	198	85	1491	-107	0	0	7	55	-782	595
TLW(2)	198	85	107	1486	0	0	0	33	-1129	0
OSF(3)	274	255	0	0	4449	-225	21	100	-2481	1785
OLW(3)	274	255	0	0	225	4435	0	65	-3746	0
Total	3721	3678	1315	1096	4145	3681	17636			
Input Payment	45	27	7	0	21	0	100			
Interest Payment	-246	155	55	33	100	65		162		
Rice Surplus	458	1480	-782	-1129	-2481	-3746			-9170	
Total Rice Production	3968	2380	595	0	1785	0				8728

Table I-3 (Continued)

^aDerived from Tables B-2, C-2, D-2, E-3, F-6, G-1, G-2, G-3, and H-2

Table I-4

Flows of Income, Inputs and Interest Payments, Total Rice Production and Rice Surplus Level in the Typical Small Rice Community with the Situation of Biological/Chemical Technologies, Non Mechanical Technologies and BIG Program (kg of rice) ^a

Income Earning People	Source of Income					In-put Payment	Inter-est Payment	Rice Sur-plus	Total Rice Prod.
	LF (1)	MF (2)	TSF (1)	TLW (1)	OSF (3)	OLW (3)			
LF(1)	2587	-448	-285	-285	-534	-534	4673	557	10912
MF(2)	448	3178	-138	-138	-414	-414	3834	334	6547
TSF(1)	285	138	1492	-181	0	0	1250	84	1637
TLW(1)	285	138	181	1489	0	0	885	0	0
OSF(3)	534	414	0	0	4454	-544	4050	251	4910
OLW(3)	534	414	0	0	544	4451	2949	0	0
Total	4673	3834	1250	885	4050	2949	17641		
Input Payment	557	334	84	0	251	0	1226		
Interest Payment	285	171	43	0	128	0	627		
Rice Surplus	5397	2208	260	-885	481	-2949		4512	
Total Rice Production	10912	6547	1637	0	4910	0			24006

^aDerived from Tables B-2, C-2, D-2, E-1, F-2, G-1, G-2, G-3, and H-1

Table I-5

Flows of Income, Inputs and Interest Payments, Total Rice Production and Rice Surplus Level in the Typical Small Rice Community with the Situation of Biological/Chemical Technologies, Non Mechanical Technologies with Inmas Program (kg of rice) ^a

Income Earning People	LF (1)	Source of Income				In-put Payment	Inter-est Pay-ment	Rice Sur-plus	Total Rice Prod.
		MF (2)	TSF (1)	TLW (1)	OSF (3)	OLW (3)			
LF(1)	2587	-352	-253	-253	-438	-438	298	-220	8333
MF(2)	352	3178	-118	-118	-354	-354	204	151	4996
TSF(1)	253	118	1492	-153	0	0	28	17	1250
TLW(1)	253	118	153	1488	0	0	0	0	0
OSF(3)	438	354	0	0	4454	-460	83	52	3750
OLW(3)	438	354	0	0	460	4439	0	0	0
Total	4321	3770	1274	964	4122	3187	17638		
Input Payment	298	204	28	0	83	0	613		
Interest Payment	-220	151	17	0	52	0	0		
Rice Surplus	3934	871	-69	-964	-507	-3187		-78	
Total Rice Production	8333	4996	1250	0	3750	0			18329

^aDerived from Tables B-2, C-2, D-2, E-2, F-4, G-1, G-2, G-3, and H-5

Table I-6

Flows of Income, Inputs and Interest Payments, Total Rice Production and Rice Surplus Level in the Typical Small Rice Community with the Situation of Biological/Chemical Technologies, Non Mechanical Technologies with BLG Program (kg of rice) ^a

Income Earning People	Source of Income						In-put Pay-ment	Inter-est pay-ment	Rice Sur-plus	Total Rice Prod.	
	LF (1)	MF (2)	TSF (1)	TLW (1)	OSF (3)	OLW (3)					Total
LF(1)	2587	-352	-253	-253	-438	-438	4321	298	64	3650	8333
MF(2)	352	3178	-118	-118	-354	-354	3770	204	151	823	4996
TSF(1)	253	118	1492	-153	0	0	1274	28	17	-69	1250
TLW(1)	253	118	153	1488	0	0	964	0	0	-964	0
OSF(3)	438	354	0	0	4454	-460	4122	83	52	-514	3750
OLW(3)	438	354	0	0	460	4439	3187	0	0	-3187	0
Total	4321	3770	1274	964	4122	3187	17638				
Input Payment	298	204	28	0	83	0	613				
Interest Payment	64	151	17	0	52	0		284			
Rice Surplus	3650	871	-69	-964	-507	-3187				-206	
Total Rice Production	8333	4996	1250	0	3750	0					18329

^a Derived from Tables B-2, C-2, D-2, E-2, F-4, G-1, G-2, G-3, and H-4

Table I-7

Flows of Income, Inputs and Interest Payments, Total Rice Production and Rice Surplus Level in the Typical Small Rice Community with the Situation of Biological/Chemical Technologies, Mechanical Technologies with BIG Program (kg of rice)^a

Income Earning People	LF (1)	Source of Income					In-put Payment	Inter-est Payment	Rice Sur-plus	Total Rice Prod.
		MF (2)	TSF (1)	TLW (1)	OSF (3)	OLW (3)				
LF(1)	2601	30	-149	-222	-99	-317	3358	557	285	10912
MF(2)	-30	3140	-112	-132	-240	-262	3916	334	171	6547
TSF(1)	149	112	1508	-163	26	4	1380	84	43	1637
TLW(1)	222	132	163	1521	26	4	974	0	0	0
OSF(3)	99	240	-26	-26	4388	-466	4567	251	128	4910
OLW(3)	317	262	-4	-4	466	4393	3356	0	0	0
Total	3358	3916	1380	974	4567	3356	17551			
Input Payment	557	334	84	0	251	0	1226			
Interest Payment	285	171	43	0	128	0		627		
Rice Sur-plus	6712	2126	130	-974	-36	-3356			4602	
Total Rice Production	10912	6547	1637	0	4910	0				24006

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^aDerived from Tables B-4, C-2, D-2, E-4, F-7, G-5 and H-1

Table I-8

Flows of Income, Inputs and Interest Payments, Total Rice Production and Rice Surplus Level in the Typical Small Rice Community with the Situation of Biological/Chemical Technologies, Mechanical Technologies with Inmas Program (kg of rice) ^a

Income Earning People	Source of Income					In-put Payment	Inter-est Payment	Rice Sur-plus	Total Rice Prod.
	LF (1)	MF (2)	TSF (1)	TLW (1)	OSF (3)	OLW (3)			
LF(1)	2601	30	-133	-189	-89	-254	298	5019	8333
MF(2)	-30	3140	-86	-110	-192	-214	204	879	4996
TSF(1)	133	86	1493	-139	20	3	28	-185	1250
TLW(1)	189	110	139	1508	20	3	0	-1047	0
OSF(3)	89	192	-20	-20	4388	-410	89	-942	3750
OLW(3)	254	214	-3	-3	410	4395	0	=3523	0
Total	3236	3772	1390	1047	4557	3523	17525		
Input Payment	298	204	28	0	83	0	613		
Interest Payment	-220	151	17	0	52	0	0		
Rice Sur-plus	5019	869	-185	-1047	-942	-3523		191	
Total Rice Production	8333	4996	1250	0	3750	0			18329

^a Derived from Tables B-4, C-2, D-2, E-5, F-8, G-5 and H-5

Table I-9

Flows of Income, Inputs and Interest Payments, Total Rice Production and Rice Surplus Level in the Typical Small Rice Community with the Situation of Biological/Chemical Technologies, Mechanical Technologies with BLG Program (kg of rice) ^a

Income Earning People	Source of Income						In-put payment	Inter-est payment	Rice Sur-plus	Total Rice Prod.
	LF (1)	MF (2)	TSF (1)	TLW (1)	OSF (3)	OLW (3)				
LF(1)	2601	30	-133	-189	-89	-254	298	64	4735	8333
MF(2)	-30	3140	-86	-110	-192	-214	204	151	869	4996
TSF(1)	133	86	1493	-139	20	3	28	17	-185	1250
TLW(1)	189	110	139	1508	20	3	0	0	-1047	0
OSF(3)	89	192	-20	-20	4388	-410	83	52	-942	3750
OLW(3)	254	214	-3	-3	410	4395	0	0	-3523	0
Total	3236	3772	1390	1047	4557	3523	17525			
Input Payment	298	204	28	0	83	0	613			
Interest Payment	64	151	17	0	52	0		284		
Rice Sur-plus	4735	869	-185	-1047	-942	-3523			-93	
Total Rice Production	8333	4996	1250	0	3750	0				18329

^aDerived from Tables B-4, -2, D-2, E-5, F-8, G-5 and H-4

VITA

Tuhpawana Priatna Sendjaja was born in Sumedang, Indonesia on March 9, 1944. He attended public schools in this regency and was graduated from junior high school in July 1960. He entered the Agricultural High School in Bogor and graduated in July 1963. The following September he entered the undergraduate study at Faculty of Agriculture, Padjadjaran University. On February 21, 1967 he received a Bachelor of Science degree in Agriculture. He continued his graduate study at the same university and received a Master of Science degree in Agricultural Economics (Agricultural Engineer, Ir) on December 6, 1969.

He was a teaching assistant at the Padjadjaran University from October 1967 to October 1973, and has been a faculty member since then. From February to December 1971, he attended Post Graduate Study in Agricultural Economics at Gajah Mada University, Indonesia.

He attended Summer Program 1976 at the Economics Institute, Colorado University in Boulder. In Fall 1976 he entered graduate school of the University of Tennessee, Knoxville. He received the Doctor of Philosophy degree in Agricultural Economics in June 1980.

He is married to the former Tien Kurniatin of Subang, Indonesia. They have two daughters, Yenni Rismayanti and Poppi Purnama, and son, Yoga Andriana.