

## Land, Labor and Livelihood in a Frontier Rice Village in the Philippines during the Green Revolution Period

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### Abstract

This paper summarizes the results of a survey conducted in 1978 in a rice village situated at the frontier of Laguna rice growing area with special reference to land tenancy, labor employment, rice production and income distribution. The study village shared characteristics common to the rice villages in Laguna and in the Philippines in general. In terms of land tenure systems, labor hiring institutions, labor absorption, technology adopted, and production structure as observed by the relative factor shares and production function, there were few differences in rice farming between this village and other typical rice villages in the country. A distinct feature as a frontier village is observed in its low share of landless farm laborers in the total village households. It is also found that the functional share of land in rice production was lower and that of labor higher in this marginal village than in villages at the center of the Laguna rice belt.

### I. Introduction

The 1970s was the decade of radical changes for rice farming in the Philippines. [3] [6] [7] First of all, the new seed-fertilizer technology diffused rapidly, particularly in well-irrigated rice growing areas, resulting in significant increases in rice yield. Second, the Land Reform Program based on the PD Nos. 2 and 27 in 1972 was implemented, resulting at least in the conversion of share tenants to leaseholders in major rice growing areas of the country. Third, a rapid increase in population in rural areas, coupled with the virtual disappearance of land frontier, resulted in a marked increase in the number of landless worker households in rural villages in the rice growing areas; the percentage share of landless households exceeded 50% in most of these villages and reached 70 to 80% in some cases. Fourth, induced by the changes in rice technology, tenure status of rice farmers, and population pressure, labor migration increased substantially between rural areas where the new technology was introduced successfully and areas where it was not, and the traditional systems of hiring labor in

rice production in major rice growing areas underwent major transformations.

There have been many controversies as to the impacts these changes gave on the class structure of rural villages and the welfare of rural population. Particularly controversial have been the impacts of the new rice technology: whether it improved the welfare of rural poor or not. Growing evidences suggest that the adoption of the new technology, which is of labor using nature, has contributed to improving the lot of rural poor whose income depends heavily on the income from hired labor works in rice farming. [1] [3] However, there have been various studies which insist contrary. [2] [8] A difficulty in drawing a definite conclusion in this regard is that various changes were occurring simultaneously together with the technological change. Moreover, a factor could generate different impacts under different environments, social as well as natural.

In view of the fact that the past studies conducted in the Philippines intending to clarify this point tended to concentrate their attention to rice villages located at the center of major rice growing areas, in this paper, we present the results of a survey conducted in a rice

village located in a frontier area. Since the information gathered in the survey, conducted in 1978, covers all the important aspects of the village economy, from demographic aspects to rice production, and further to income distribution, it is expected that this paper provides additional information in shedding light on the processes and impacts of changes undergone in the rice sector of the Philippines during the 1970s.

## II. The Study Village and Data Collection

The study village is a *barangay* (*barrio*) in the Municipality of Santa Maria situated at the north-western corner of Laguna Province, bordering to Rizal Province in the west and Quezon Province in the north and the east with the steep Sierra Madre mountain range in between [Fig. 1]. It is far away from such commercial centers in Laguna as San Pablo City and Sta. Cruz. Its town proper (*poblacion*) is located more than five kilometers away from the national highway running around the coast of the Laguna de Bay; a provincial road stretches from the

highway to the poblacion only. Altogether, the municipality is a small, remote, and isolated town.

The village is also isolated within the town. Being at the foot of the Sierra Madre, the village land is wide open toward the mountain, and villagers' houses are scattered over the wide village territory, except two *sitios* (sub-sections of a village) where many houses are clustered along a municipal road stretching a few kilometers. The end of one of the sitios is only one kilometer from the poblacion, but the villagers in the sitios always have to make a long detour along a muddy path (about five kilometers) when going out of the barrio, because whenever heavy rain comes the bridge along the municipal road connecting the village with the poblacion is washed away. Electric power, as the municipal road, is often cut. In the two sitios, there was only one source of water, the hand-operated water pump; all the households in the sitios had to come to this pump to fetch water for domestic uses.

Rice was the major agricultural crop in the village. Most of the rice farmers were practicing rice double-cropping by virtue of a small communal gravity irrigation system. A communal pump irrigation system was also available for the areas the gravity system could not cover, but farmers tilling these areas could not plant rice in the dry season because of the high cost of fuel and oil for the pumps. The National Irrigation Administration (NIA) had begun new construction of irrigation canals, laterals and farm ditches along the lowland parts of the barrio, but it was not completed in 1978.

A survey was conducted in the village by the Department of Agricultural Economics of the International Rice Research Institute (IRRI) in June 1978, covering all the households in these two sitios. In what follows, the term, 'the village,' is used to represent these two sitios, and it will be called North Laguna Village. When appropriate, data from the village will be compared to those of East Laguna Village and South Laguna Village, both situated at the center of the Laguna rice belt, based on the study conducted at around the same time by Hayami and Kikuchi. [3]

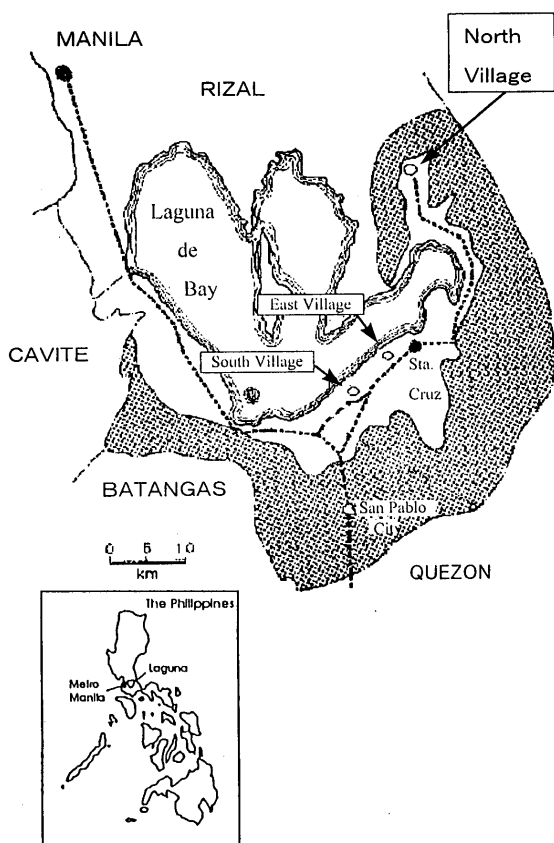


Fig. 1 Laguna Province and the study village

### III. Population and Households

The total population of the village was 469 at the time of survey [Fig. 2]. The wide base of the population pyramid indicates a high reproduction capacity of the village population, though it shows an exceptionally small population for the female 0-4 age class.

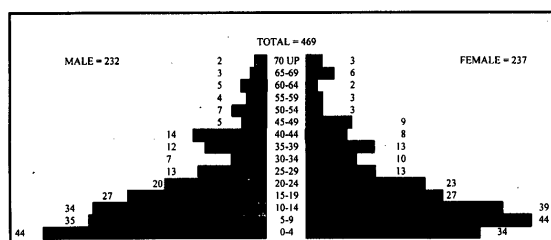


Fig. 2 Age distribution of population in 1978

They were living in 81 households, with the average family size of 5.8 [Table 1]. The village households are categorized into three major groups according to their major source of income: rice farmer, upland farmers and landless worker. To fully grasp the characteristics of landless workers, this group was further classified into farm and non-farm workers. Farm workers were those households whose major income was derived from both farm and non-farm activities while non-farm workers were those whose income was derived solely from non-farm works. It should be noted that the existence of the upland farmers represents the nature of this frontier village with its land area open toward marginal hilly and mountainous virgin land. It is also worth mentioning that the share of landless workers depending on farm

Table 1 Profile of households in the village, 1978

	Rice farmers	Upland farmers	Landless worker			Total
			Fram	Non-farm	Total	
Population: Male	125	28	66	13	79	232
Female	128	22	70	17	87	237
Total	253	50	136	30	166	469
Households: Number	39	8	27	7	34	81
%	48	10	33	9	42	100
Av. family size: Male	3.2	3.5	2.4	2.5	1.9	2.9
Female	3.3	2.8	2.9	2.4	2.5	2.9
Total	6.5	6.3	5.3	4.9	4.4	5.8
% of nuclear family	94	94	92	100	94	94
Av. age of family head	45	39	39	34	38	41
Head's av. educational level (years)	4.2	3.8	3.3	6.1	3.9	4.0
Year settled in the village: Before 1930	4	1	1	0	1	6
1930s	14	1	5	0	5	20
1940s	7	1	2	0	2	10
1950s	4	1	2	3	5	10
1960s	5	2	5	1	6	13
1970s	2	1	12	2	14	17
Unknown	3	1		1	1	5
Average year	1943	1950	1961	1965	1961	1951
Who settled: Head	14	2	17	4	21	37
Parents	24	6	9	2	11	41
Grand parents	1	0	1	0	1	2
Unknown	0	0	0	1	1	1
From where: Within the municipality	5	0	7	2	9	14
Within Laguna	2	0	1	2	3	5
Batangas	17	5	9	0	9	31
Quezon	10	3	7	1	8	21
Others	4	0	3	1	4	8
Unknown	1	0	0	1	1	2

hired works was 33%, which was much lower as compared to rice villages at the center of the rice growing area in Laguna. [3]

As other areas of the country, the percentage of nuclear family was high. The non-farm workers have the smallest family size, indicating that they were at an earlier stage of their life cycle. Except non-farm workers, the educational level of household heads was generally low, less than four years on average.

The village is relatively new, having been settled since sometime in the 1920s [Table 1]. Rice farmers were the original settlers in the village. The majority of them came to the village before the end of World War II. The non-farm workers, whose average year of settlement was 1965, were predominantly new comers in the village. Correspondingly, the oldest in terms of the age of family heads was the rice farmers and the youngest was the non-farm workers.

A salient feature as a frontier village can best be observed in its migration pattern. There was a massive influx of immigrants to the village for the last 30

years. Except for the 1930s, the rate of immigration was highest in the 1970s. Most of them came to the village because they got land to till (32%) or had brighter work opportunities (45%). The majority of them were from the upland areas of Batangas or the coconut areas of Quezon. None of them came from nearby Rizal Province which is closer to the Metro Manila area. Because of rice farmers' early settlement, they or their parents acquired some piece of land to cultivate.

Self-employed and hired combined, rice farming provided 63% of major employment opportunities for the male labor force in the village, while upland farming contributed next, but only by 8%. For the female labor force, housekeeping was the major occupation, accounting for as much as 64%. More than 70% of the male labor force in rice farmer households had rice farming as the major occupation, while hired labor works in rice farming were the major occupation for 71% of active male population in landless farm workers. Similarly, most of the active

Table 2 Percentage of labor force by occupation, 1978

	Male (N=133)				Female (N=127)					
	Rice farmer	Upland farmer	Landless worker		Total	Rice farmer	Upland farmer	Landless worker		Total
			Farm	Non-farm				Farm	Non-farm	
Major occupation:										
Self-employed										
Farming: Rice	71				41	5				3
Upland		63		17	8					
Non-farm: Commerce			3	17	2	4		3	25	5
Transport	1	13			2					
Manufacturing			9		2					
Hired										
Farm	3	13	71		22	3	14	17		7
Non-farm	3	6	8	67	8	5		3		4
Schooling	13	6	9		11	25		3	25	17
None/housekeeping	9				5	58	86	74	50	64
Total	100	100	100	100	100	100	100	100	100	100
Minor occupation:										
Self-employed										
Farming: Rice	13				8	9				6
Upland	1	13	3		3		14			1
Non-farm: Commerce	1			17	2	1				1
Transport	5				3					
Manufacturing	1		3		2			3		1
Hired										
Farm	20	50	14		21	13	29	34		19
Non-farm	1		3		2					

Table 3 Land area (ha) cultivated by the villagers, 1968 and 1978

	Within village			Outside village				Total
	Owned	Rented	Total	Owned	Rented	Kaingin	Total	
1968								
Lowland paddy	2.25	29.15	31.40	1.87	16.80	0.00	18.67	50.07
Upland	2.00	0.00	2.00	39.00	7.80	1.00	46.80	48.80
Total	4.25	29.15	33.40	40.87	24.60	1.00	65.47	98.87
1978								
Lowland paddy	2.25	31.10	33.35	2.37	22.60	0.00	24.97	58.32
Upland	2.00	3.50	5.50	55.00	11.60	23.50	90.10	95.60
Total	4.25	34.60	38.85	57.37	34.20	23.50	115.07	153.92

Note: Kaingin=slush and burn cultivation.

male population of upland farmers engaged in upland farming as their major occupation, though they depended more on hired farm works. Some had non-farm employment opportunities; tricycle operation (transport), carpentry (manufacturing), *sari-sari* (small grocery) store (commerce) as self-employed and factory workers and government employees as employed opportunities. The percentage of working age population who were studying was relatively high. Of 36 students in the village, however, 29 belonged to the rice farmer class.

Aside from rice and upland crops, backyard poultry and piggery raising were popular self-employed farm activities for supplementing the household income (see Table 6 shown later). Cattle raising was also common, and many raised cattle under a sharing arrangement called " *iwi*," in which cattle caretakers were entitled to the 50% share of total sales or one calf for every two delivered by the cow.

#### IV. Land Holding and Land Tenure

The land area cultivated by village farmers in 1978 was about 150 ha, consisting of 60 ha of lowland paddy field and 90 ha of upland field [Table 3]. It is remarkable that, comparing to 1968, the area had increased by more than 50%. While paddy fields had increased by less than 20%, the largest increase had been brought about by the expansion of the *kaingin* (slush-and-burn cultivation) area.

As in other rice growing areas in the country, the paddy fields cultivated by the rice farmers in the village were mostly owned by absentee landlords, but

Table 4 Land owners and methods of land acquisition, 1978

	Landowner		Area	
	No.	%	ha	%
I. Landowners of paddy fields cultivated by village farmers				
1. Distribution by residence:				
This village	5	19	6.62	11
This municipality (except the village)	6	22	9.50	16
Laguna (except the municipality)	8	30	30.45	52
Batangas	1	4	0.50	1
Rizal	1	4	1.00	2
Manila	6	22	10.25	18
Total	27	100	58.32	100
2. Distribution by ownership size:				
Less than 1 ha	6	22	2.87	5
1.0-2.9ha	15	56	24.00	41
3.0-6.9ha	5	19	16.65	29
More than 7.0ha	1	4	14.80	25
Total	27	100	58.32	100
II. Method of land acquisition by village farmers				
	Farmers		Area	
Rice field:	No.	%	ha	%
Inheritance	19	49	26.17	45
Purchase	15	38	23.25	40
Clearing	5	13	8.90	15
Total	39	100	58.32	100
Upland:				
Purchase	4	15	6.50	7
Lease	9	35	11.60	12
Homestead	8	31	54.00	56
Kaingin	5	19	23.50	25
Total	26	100	95.60	100

the size of ownership was small and fragmented [Table 4]. Fifty percent of rice land was owned by two family clans, but the size of ownership was not so large partly because of the subdivision among family

Table 5 Size and tenure of village farmers

	Farmer		Area		Farmer		Area	
	No.	%	ha	%	No.	%	ha	%
I. Size distribution of operational land holding, 1978								
	Lowland paddy				Lowland+upland			
None	42	52	0.00	0	34	42	0.00	0
Less than 1 ha	10	12	4.82	8	7	9	3.20	2
1.00-1.99	11	14	12.50	21	14	17	16.55	11
2.00-2.99	15	19	32.00	55	10	12	22.20	14
3.00-4.99	3	4	9.00	15	6	7	22.60	15
5.00-9.99	0	0	0.00	0	7	9	45.37	29
10ha or more	0	0	0.00	0	3	4	44.00	29
Total	81	100	58.32	100	81	100	153.92	100
Average per farm			1.50				3.27	
Average per household			0.72				1.90	
Gini coefficient			0.67				0.72	
II. Distribution of rice farms by tenure status								
	1978				1968			
Owner-Operator	4	10	4.12	7	4	14	4.12	8
Part-Owner	1	3	1.00	2				
Leaseholder	27	69	42.20	72	11	39	21.45	43
Share Tenant	6	15	10.00	17	13	46	24.50	49
Sub-Tenant	1	3	1.00	2				
Total	39	100	58.32	100	28	100	50.07	10

heirs. The villagers owned about 8% of the lowland paddy and nearly 60% of upland they cultivated in 1978. For lowland, inheritance and purchase of ownership and/or cultivating (tenancy) right were major methods of land acquisition, though 15% was acquired by clearing new land. For upland, more than 50% of land was acquired through the government homestead program and 25% through unauthorized kaingin operation. Land leasing was also not rare for upland.

Forty eight percent of village households cultivated paddy fields in 1978, with the average size of 1.5 ha [Table 5]. The cultivating size of lowland varied among the rice farmers, but most of them belonged to the size classes between 1 and 3 ha. While about 10% of rice farmers were small-sized cultivating less than 1 ha, there were only a few who operated paddy fields of more than 3 ha. Because 52% of the households are without paddy field to till, however, the size distribution of operational lowland paddy was rather skewed; as high as 0.67 in terms of Gini coefficient. Combining lowland and upland, the share of 'landless' became 42%. But, since some farmers cultivate large upland

areas under kaingin, the inequality of the size distribution was much more pronounced for the combined case.

Rapid population growth due to natural increase within the village as well as to high inflow of migrants to the village (40% increase for the decade before 1978) had outpaced the opening of new lands for cultivation, as far as lowland paddy is concerned. The size of rice farms in the village decreased from about 1.8 ha in 1968 to 1.5 ha in 1978. The sign of increasing population pressure in the village is thus observed on one hand in the declining trend of the size of rice farms, and on the other in the expansion of marginal upland fields. The latter is a distinct feature of this village with the land frontier, as compared to other villages without it where increasing population pressure results in a rapid increase in landless worker households.

For rice farming, the incidence of tenancy was common in the village accounting for about 90% of the total rice farmers [Table 5]. The predominant form of tenancy in 1978 was leasehold. This is due in large part to the Operation Leasehold under the Land

Reform Program implemented in the early 1970s, as indicated by a decline in share tenancy from 1968 to 1978. It should be remarked, however, that there were some owner operators and many leaseholders in the village even prior to the land reform. Though not popular, one subtenancy arrangement through mortgage was reported in 1978. The tenancy arrangements in this village were essentially the same as in other villages in the Laguna rice belt. [3]

### V. Rice Farming

The rice farming was by far the most important source of employment and income in the village. In 1978, the majority of farmers planted modern varieties in both wet and dry seasons. The most popular varieties then were IR-36 (adopted by 85% of rice farmers in 1977/78 dry season), IR-32 (6%), IR-42 (6%) and C-4 (3%). Second, the use of inorganic fertilizer, pesticide and weedicide was also a well-established practice: All the farmers regardless of

tenure status used at least some fertilizer and chemical. Though the majority of the farmers do not own hand tractor [Table 6], borrowing and custom-hiring were readily available. Most of the rice farmers used either tractor or the combination of tractor and carabao, and 16% used only carabao for land preparation. A portable thresher had just been introduced by a rice farmer after the 1977/78 dry season.

The total labor requirement per ha of rice production was 103 person-days in 1977/78 dry season [Table 7]; the same level of labor intensity as in other rice villages in the region. [3] In terms of heavy dependence on hired labor and negligible use of exchange labor, the village shared the same characteristics as other rice villages in the region. The major tasks, such as transplanting, weeding, harvesting, and threshing, were mostly carried out by hired laborers, except for land preparation for which the share of family labor was relatively high. The remaining minor tasks, such as seedbed preparation, fertilizer and chemical application, irrigation control and

Table 6 Asset holding of the village households, 1978

	Rice farmer		Upland farmer		Landless worker		Total	
	No.	%	No.	%	No.	%	No.	%
<b>Machines and Implements:</b>								
Hand Tractor	13	33	0	0	0	0	13	16
Animal Plow	14	36	0	0	0	0	14	17
Animal Harrow	8	21	0	0	0	0	8	10
Chemical Sprayer	13	33	0	0	0	0	13	16
Rotary Hand Weeder	36	92	13	88	26	65	75	80
Thresher	1	3	0	0	0	0	1	1
Ricemill	0	0	0	0	1	3	1	1
<b>Livestock/Animals:</b>								
Carabao	23	38	1	13	1	3	25	21
Cattle	27	41	3	25	9	21	39	31
Pigs	40	51	4	38	6	15	50	35
Chicken	385	79	61	63	153	68	599	73
Ducks	42	21	0	0	11	6	53	12
Goats	34	23	1	13	3	3	38	14
<b>Major Consumer Durables:</b>								
Television	1	3	0	0	0	0	1	1
Radio	27	69	7	88	17	50	51	63
Refrigerator	2	5	0	0	0	0	2	2
Sewing Machine	14	36	0	0	2	6	16	20
Gas Stove	2	5	0	0	1	3	3	4
Motorcycle	1	3	0	0	0	0	1	1
Bicycle	4	10	0	0	0	0	4	5
Tricycle	6	13	1	13	0	0	7	7
Jeepney	1	3	0	0	0	0	1	1

Table 7 Labor input per ha for rice production by operation and type of labor, 1977/78 dry season

	Land preparation		Transplanting		Weeding		Harvesting & threshing		Others		Total	
	days/ha	%	days/ha	%	days/ha	%	days/ha	%	days/ha	%	days/ha	%
Family labor	11.0	68	0.1	1	1.6	5	1.68	5	10.3	78	24.7	24
Exchange labor	1.4	9	0.1	0	0	0	0	0	0.3	3	1.8	2
Hired labor	3.8	23	11.5	99	29.6	95	29.4	95	2.5	19	76.7	74
Of which by gama					29.6	95	29.4	95	0		58.9	57
Total	16.2	100	11.6	100	31.2	100	31.0	100	13.2	100	103.3	100

Table 8 Factor payments and factor shares in rice production

	North Laguna Village (1977/78 dry)										East Village (1979/80 dry)		South Village (1976/77 dry)	
	Factor Payment (kg/ha)					Factor shares (%)					Factor payments kg/ha	Factor shares %	Factor payments kg/ha	Factor shares %
	Owned	Leashold tenancy	Share tenancy	Sub- tenancy	Average	Owned	Leashold tenancy	Share tenancy	Sub- tenancy	Average				
Rice Output	4,423	3,249	3,848	3,855	3,261	100	100	100	100	100	3,436	100	3,866	100
Current Inputs	531	593	686	754	574	12	18	18	20	18	480	14	544	14
Capital	272	247	280	223	240	6	8	7	6	7	390	11	383	10
Owned	272	158	142	0	154	6	5	4	0	5				
Rent	0	88	138	223	86	0	3	4	6	3				
Labor	1,304	1,032	1,067	1,275	1,013	29	32	28	33	31	892	26	1,215	31
Family	480	324	258	319	313	11	10	7	8	10				
Hired	824	708	809	956	700	19	22	21	25	21				
Land	0	612	1,146	1,347	613	0	19	30	35	19	1,374	40	1,742	45
Paid to sub-lessor				797	19				21	1	447	13	1,080	28
Paid to Landlord		612	1,146	550	594		19	30	14	18	927	27	662	17
Operator's Surplus	2,315	764	669	255	821	52	24	17	7	25	300	9	-18	0

Note: Prices used for imputation are: Paddy price = P 1.15/kg, wages; for land preparation = P 16.2/day, transplanting/weeding = P 11.4/day, and capital rentals (without operator's wage); tractor = P 85/day = P 400/ha, carabao = P 20/day.

maintenance, and drying of *palay* (rough rice), were mainly done by family labor.

All the rice farmers, except a 0.1 ha farmer, adopted the *gama* system which was then the typical labor hiring arrangement for weeding, harvesting, and threshing in the region. The traditional harvesting system in the region used to be the *hunusan* system under which hired harvesters were given a certain share of total harvest as wage in kind for rice cutting and manual threshing. The *gama* system is similar to the *hunusan* system except that employment for harvesting and threshing is limited to workers who do weeding without receiving wages. In other words, labor for weeding in this system is a free-service to establish a right to participate in harvesting and threshing. With this system which had begun to spread in the region since the mid-1960s [3] [7], harvesters continued to receive a certain share, one-sixth in the case of this village in 1978, of the total volume they harvested and threshed. Because of this

labor hiring system, not only farmers but also landless workers owned rotary weeders [Table 6], and nearly 60% of total labor requirement in rice farming was supplied by *gama* workers [Table 7].

The structure of rice production can be analyzed through its factor shares, the estimates of which in terms of paddy equivalent are shown in Table 8. The level of rice output were slightly different among different tenure classes, with an overall average of 3.3 mt/ha. The operators' surplus of owner-operators was largest, because it included the whole returns to land. In contrast, it was quite small for the sub-tenant, suggesting that the sub-tenant was operating at the near long-run equilibrium. Since the number of samples are very small for each tenure classes except for leasehold tenancy, we must be cautious in interpreting the estimated factor payments and factor shares. The conformity across the tenure classes in the factor shares of current inputs, capital, and labor, however, seems to indicate that these



Table 9 Estimation of Cobb-Douglas production function for rice production, North and South Laguna Village

	North Laguna Village (1977/78 dry)		South Laguna Village (1976/77 dry)
	(1)	(2)	(3)
Current inputs	0.17 (0.11)	0.25* (0.11)	0.19 (0.11)
Capital	0.19 (0.16)	0.06 (0.15)	0.08 (0.11)
Labor	0.31* (0.15)	0.44** (0.14)	0.24* (0.12)
Land	0.37 (0.23)	0.32 (0.21)	0.46** (0.13)
Owner dummy		0.38* (0.14)	
Share tenancy dummy		0.14 (0.11)	
Sub-tenancy dummy		-0.05 (0.20)	
Intercept	4.55 (1.30)	4.11 (1.21)	1.23 (0.23)
Sum of conventional coefficients	1.03 (0.09)	1.07 (0.08)	0.96 (0.04)
R-squared (Adjusted)	0.939	0.950	0.931
Degree of freedom	24	21	38

Note: Figures in parenthesis are standard errors. \* and \*\* indicate the estimated coefficient is statistically significant at 5% and 1%, respectively.

factor shares represent the functional shares of respective factor inputs in rice production and that the factor share of land can roughly be approximated by the sum of the shares of land and operators' surplus.

A statistical support for this statement may be given by estimating the rice production function of Cobb-Douglas form. The results of estimation applying the ordinary least squares method to the same data set as for the factor share estimation are summarized in Table 9. For the regression (1), the estimated production elasticities, except for capital, are remarkably similar to respective factor shares, though they are not significant at conventional significance levels except for labor. Under the assumption of market equilibrium, the production elasticities are equivalent to the functional shares of factor inputs. This result may seem to indicate such was the case for the village.

However, the addition of dummy variables for different tenure classes changes the picture rather substantially, while improving the performance of regression analysis (regression (2)). In particular,

the order of magnitude of production elasticity for land and labor is reversed: the production elasticity of labor becomes larger than that of land. It is interesting to compare this result with the production function of South Laguna Village (regression (3)). The production elasticities for this village, particularly of labor and land, are in close conformity with respective factor shares [Table 8], and the elasticity of land is much larger than that of labor. Comparing the two villages, the land elasticity is much higher in South Laguna Village than in North Laguna Village. These results are consistent with what is expected from the Ricardian theory of land rent: the economic rent of land was lower in North Laguna Village situated at a marginal area with an open land frontier than in South Laguna Village situated at the center of a productive rice growing area with no room for land expansion.

The regression results also confirm that there was no scale economy in rice production in North as well as South Laguna Village. In regression (2), owner operator dummy has a highly significant positive

coefficient, indicating that owner operators' productivity in rice production was higher than leaseholders'. This may be due to the fact that the owner operators who settled in North Laguna Village earlier than others occupied relatively fertile land in the village area. In fact, there is a tendency that the earlier the farmers' settlement in the village the higher their rice yield per ha. Between leaseholders and share tenants, however, there was no significant difference in productivity.

### VI. Income Level and Income Distribution

The household's annual income is estimated by type of household [Table 10]. It should be noted that the estimation of income, particularly from self-employed sources, is made with various assumptions. The annual income from rice farming is obtained by doubling the dry season income, assuming that the income ratio of rice production in the wet season is the same as in the dry season. For non-rice farm enterprise, the total output values are taken as income from these sources. This is nothing but to assume the income ratio of 100% for these enterprises. To the extent that the actual income ratio is lower than 100%, the income is overestimated. Income from non-farm enterprise and from hired labor

works are according to respondents' estimation. Such processes give only rough estimates of household income, but they would be sufficient to judge the level of income and distribution among the different groups in the village.

The rice farmers obtained highest income. Next followed the upland farmers, but a bulk of their income was derived from farm hired work. In terms of income sources too, they were far closer to the landless farm workers than to the rice farmers. The availability of upland in this frontier village enabled them to augment income through upland farming. Otherwise, they would have had to make their living as landless farm workers. The household income of the landless farm workers was at about the same level as that of the landless non-farm workers. In terms of per capita income, however, the landless farm workers were the poorest. For the village as a whole, rice farming provided 60% of income, self-employed and hired wage earnings combined, which roughly corresponded to the share of rice farming as employment opportunities.

Compared to East Laguna Village, the income level of this village was lower on average by nearly 30%, for both household and per capita income [Table 11]. It is worth noting that the weights of income from non-farm enterprises and non-farm wage earnings in the

Table 10 Average household income by type of household, 1978

	Average income (Peso)				Percentage share (%)					
	Rice Farmer	Upland Farmer	Landless worker		Total	Rice Farmer	Upland Farmer	Landless worker		Total
			Farm	Non-farm				Farm	Non-farm	
Self employed										
Rice	3,553				1,710	59				37
Non-rice agriculture	769	655	161	56	494	13	14	5	2	11
Non farm enterprise	616	769	748	144	634	10	17	25	5	14
Commerce	140	300	128	144	152	2	7	4	5	3
Transport	436	469			256	7	10			6
Manufacturing	41		619		226	1		21		5
Hired wage earnings										
Farm work	585	2,414	1,661		1,074	10	53	56		23
Nonfarm work	533	708	385	2,528	673	9	16	13	89	15
Casual	186	188	385	1,068	329	3	4	13	38	7
Salaried	347	520		1,460	345	6	11		51	7
Grant	16		9	112	21	0		0	4	0
Total	6,072	4,546	2,964	2,840	4,606	100	100	100	100	100
Income per capita	934	722	579	645	794					

Table 11 Average household income (in paddy rice equivalent), income distribution, and distribution of house by type, North Laguna Village in comparison with East Laguna Village

	North Laguna Village		East Laguna Village	
	1978		1976	
1. Average household income:				
Self employed	kg of paddy	%	kg of paddy	%
Rice	1,487	37	2,721	49
Non-rice agriculture	429	11	839	15
Non farm enterprise	551	14	330	6
Hired wage earnings				
Farm work	934	23	944	17
Nonfarm work	585	15	726	13
Grant	18	0	0	0
Total	4,005	100	5,560	100
Income per capita	691		941	
2. Distribution of house by type:	Share of households (%)			
	1978		1974	
Permanent	9		17	
Semi-permanent	14		36	
Temporary	78		47	
Total	100		100	
3. Distribution of household income:	Share of income (%)			
Income quintile	1978	1974	1983	
I (Top 20%)	47	54	52	
II	22	19	21	
III	16	15	14	
IV	10	8	9	
V (Bottom 20%)	6	5	4	
Gini coefficient	0.429	0.467	0.444	

total household income were higher in North Laguna Village in spite of its more remote location than East Laguna Village. This does not mean that non-farm income earning opportunities were more abundant in the frontier village. Rather, it would mean that the people in North Laguna Village had to struggle to supplement their less favorable farm income by seeking various non-farm income opportunities. The lower income position of North Laguna Village can be confirmed by a visual measure of the distribution of house by type [Table 11]; nearly 80% of the houses in the village were of temporary nature using such materials as bamboo and leaf with the minimum use of lumber and no concrete, whereas its share in East Laguna Village was less than 50% in 1974.

The degree of income inequality in this village in 1978, measured by the Gini coefficient, was 0.43; much more equal than the distribution of land holding

[Table 11]. Its level is comparable to, or slightly less than that of East Laguna Village. It is also comparable to the Gini coefficient reported by David and Otsuka [1] of 0.44 and 0.42 for two rice villages in the rice bowl in Central Luzon for the mid 1980s.

## VII. Concluding Remarks

In this paper, we have summarized the results of a survey conducted in a rice village in 1978 situated at the frontier of Laguna rice growing area with special reference to land tenancy, labor employment, rice production and income distribution.

It has been shown that the study village, in spite of its relatively new settlement history, shared characteristics common to the rice villages in Laguna and in the Philippines in general. In terms of land tenure systems, labor hiring institutions, labor absorption,

technology adopted, and production structure, there were few differences in rice farming between this village and other typical rice villages in the country. The income distribution in the village was as skewed, or as equal as in other rice villages in Laguna and Central Luzon, though the level of income was slightly lower.

A distinct feature as a frontier village is observed in the share of landless farm workers in the total village households; as compared to other villages situated deep inside the rice growing areas in Laguna and Central Luzon, where the share of landless was as high as 50% to 70% in the late 1970s and early 80s, the share in the study village was much less. This was due to the frontier existed in the village area; instead of becoming a landless farm worker, one still had opportunities to become an upland farmer acquiring land either through the homestead program or kaingin practice on an open frontier. It is also suggested that the existence of the land frontier found its reflection in the higher functional share of land in rice production compared to a village at the center of the Laguna rice belt.

Since the time of survey in 1978, rice villages in Laguna, including the study village, have been experiencing significant changes. For instance, the diffusion of the Green Revolution technology seem to have reached its plateau by the mid-1980s in the Laguna rice belt as well as other areas in the Philippines, with a result of stagnant rice yield. The recovery of the Philippine economy since the late 1980s has given rise to rapid development of the industry, the growing impacts of which have been observed widely even in rural villages in Laguna. To identify how these factors have been affecting the rice farming and the life of villagers in this frontier village is a research agenda

to be pursued in the future.

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## フィリピン・ラグナ州耕境稲作農村の 「緑の革命」期における土地・労働・生計

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### 摘 要

本稿は「緑の革命」技術普及期にあたる1978年にフィリピン・ラグナ州の稲作地帯の耕境に位置する稲作農村で実施された調査結果をまとめたものである。調査村は、土地保有制度、労働雇用制度、労働集約度、適用技術、生産構造の面で、ラグナ州およびフィリピンの一般的な

稲作農村が典型的に持つ性格の多くを共有している。耕境村としての性格の一端は農業労働者世帯の析出率の低さに表れている。人口増大に伴い山岳部における定地畑作や焼畑耕作の余地が残されていたのである。またこのような耕境の存在が、ラグナ州稲作地帯中心部の農村との比較において、稲作生産における土地の機能的分配を低め、労働のそれを高めていることが観察された。