

# COMPARATIVE SOCIOECONOMIC ANALYSIS BETWEEN HAND POUNDING AND MICRO RICE MILL PROCESSING IN MATALOM, LEYTE

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## ABSTRACT

This study was conducted to make comparative evaluations on the socioeconomic aspects of two methods of processing paddy rice, namely: hand pounding and micro rice mill processing. The micro rice mill designed by the International Rice Research Institute (IRRI) was introduced to women's associations in three upland barangays of Matalom, Leyte and was found to be the better alternative to the conventional manual method. It is capable of processing small quantities of paddy rice with certain level of efficiency and standards.

Hand pounding of paddy rice is more time-consuming than processing by the use of a micro rice mill. Since women in the study areas have other productive activities and income opportunities, the use of a micro rice mill gave more free time to women. Milling and head rice recovery were better than in hand pounding. It was found to be economical and practical for women to process paddy rice using the micro rice mill.

In addition, the quality of rice and rice bran was better with the introduced technology. Hence, cooperators preferred the use of the micro rice mill and recommended its use to their friends and relatives.

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**KEY WORDS:** Hand pounding. Head rice recovery. Micro rice mill. Milling recovery. Paddy rice. Rice processing. Socioeconomic analysis.

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## INTRODUCTION

Hand pounding, with the use of a wooden mortar and pestle, is the traditional method of processing paddy rice into clean rice in Matalom, Leyte. It was learned from women and children in the locality that this method is physically demanding and time-consuming. Thus, with the hope

of easing the drudgery of hand pounding, the project on *Integrating Women's Concerns in Upland Farming Systems Research* introduced the micro rice mill in the area. This rice processing unit was designed by the International Rice Research Institute (IRRI) with the aim of meeting the milling needs of the small rice farmers.

Field tests to determine the acceptability and technical performance of the said machine in Ifugao, Isabela, Ilocos and Kalinga-Apayao indicate a good potential for the adoption of the machine by farmers. Majority (93%) of the farmers who observed the machine's performance would like to use it while 79% would like to buy a unit given the financial capability (PhilRice, 1992). The micro rice mill was also evaluated by both researchers and farmers in Matalom, Leyte. Results of the evaluation of its performance indicate that it is capable of processing small quantities of paddy with a certain level of efficiency, quality and standards (Alcober, *et al.*, 1992). Based on the investment analysis, the machine was found to be a worthwhile investment. However, no evaluation was done in terms of its social and economic advantages over the traditional rice processing method, hence this study. Specifically, it aims to determine and compare labor requirements between hand pounding and micro rice mill processing; find out labor time for productive activities and income opportunities of women; analyze and compare percent recovery, taste and quality of rice and rice bran processed by the two methods; and determine respondents' perceptions on the advantages and disadvantages in the use of each processing method.

## METHODOLOGY

This study was conducted among women's associations in Barangays San Salvador, Elevado and Esperanza in Matalom, Leyte (Fig. 1). There were ten women cooperators per barangay, or a total of 30 cooperators for this study. They were randomly selected from among those who availed of the services of the micro rice mill.

Data were gathered through individual interviews using structured interview schedules and actual observations of the processing activities. Data were based on a single-process test (both in micro rice mill processing and hand pounding).

T-test was used to analyze differences in labor requirements, processing recovery, head rice recovery as well as quantity of fine bran obtained, between hand pounding and micro rice mill processing. Descriptive statistics such as frequency counts, means and percentages were also used.

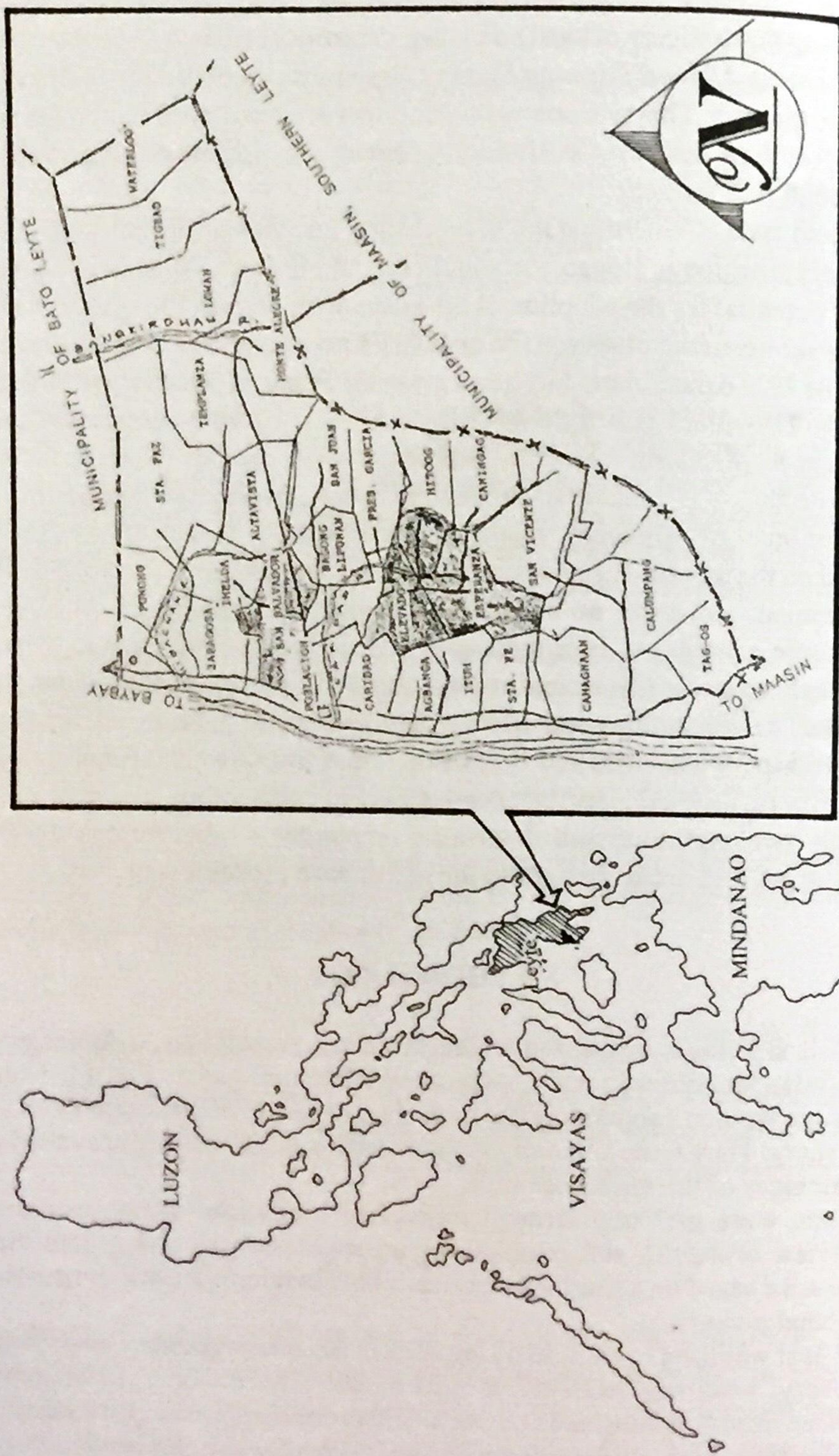


Figure 1. Map of Matalom, Leyte, Philippines, showing the study sites.

## PROJECT BACKGROUND

### *The project site*

The municipality of Matalom is composed of 30 barangays, of which 18 are considered as uplands. It has a total area of about 12,000 ha and is located about 160 km southwest of Tacloban City.

There are two major upland agroecosystems in this municipality: the acid-soil agroecosystem with rice-based farming systems and the calcareous-soil agroecosystem with corn-based farming systems. Thus, farming is considered the main occupation of the residents. The commonly grown crops are rice (upland and lowland), corn, coconut, sweetpotato and peanut.

Rice and corn are grown mainly for home consumption. Processing of paddy rice into clean rice is commonly done through hand pounding especially by women. This system is widely practiced particularly in the uplands due to the considerable distance of the villages to the town proper where rice mills are found, scarce transportation facilities which result in higher fare rates, and the limited quantity of paddy rice for milling.

### *The micro rice mill*

A micro rice mill designed by IRRI was introduced in the study sites through the Women in Rice Farming Systems (WIRFS) Project. This project was undertaken with the hope of easing the problem of the physically demanding and time-consuming process of hand pounding, as expressed by the women during the site diagnosis for this project (Alcober, *et al*, 1992).

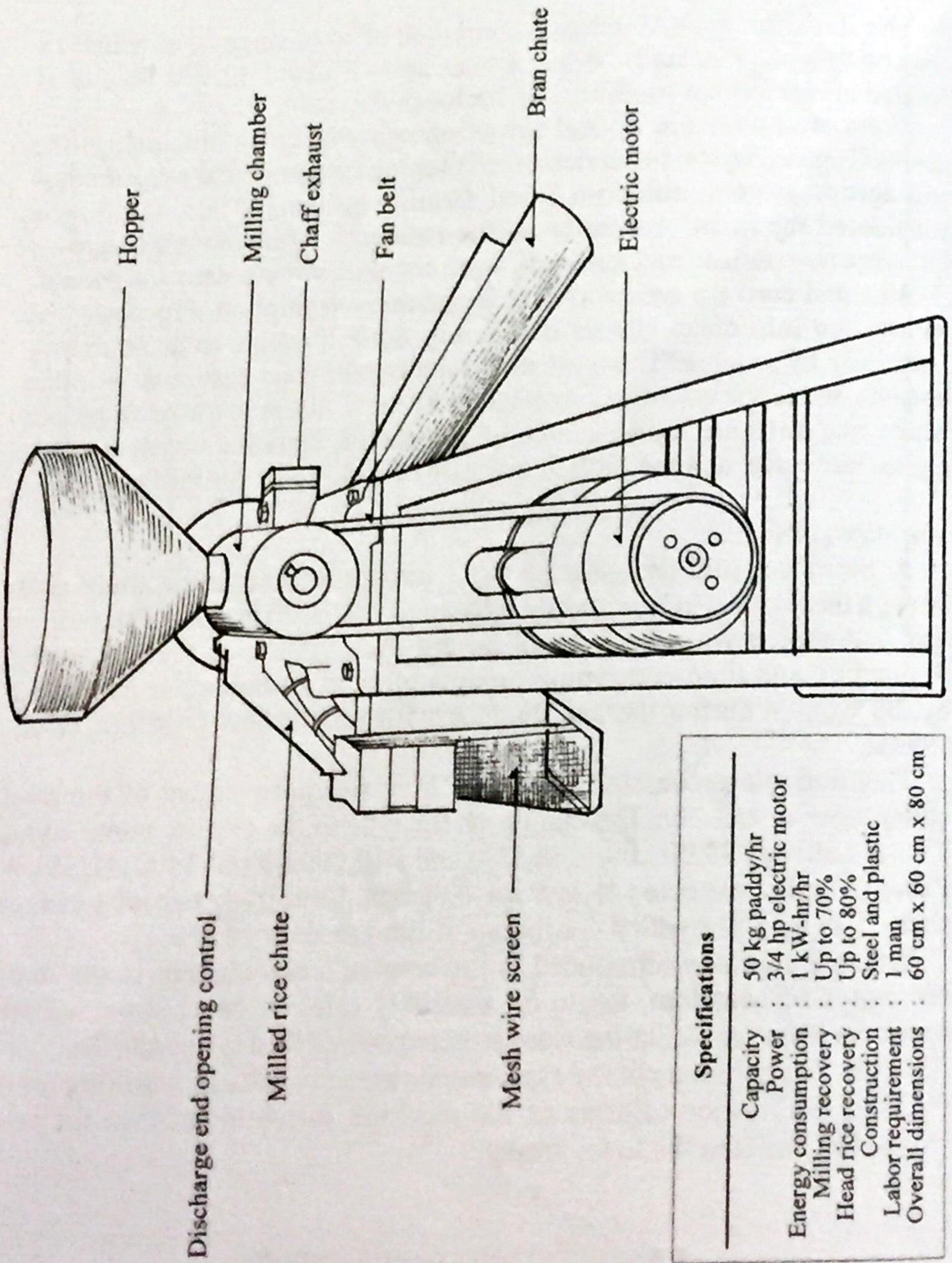
This portable processing unit (Fig. 2) is an improvement of the steel huller types or *kiskisan*. Depending on the type of the electric motor used, it costs between ₱8,000.00 (US\$320) and ₱10,000.00 (US\$400) (US\$1 = ₱25.00), and is expected to last for 10 years. Its milling capacity ranges from 50 to 80 kg/hr with a maximum milling recovery of 70%.

The machine was introduced to the women's associations in the three barangays of Matalom, Leyte on a weekly rotation basis. Two women operators in each association were selected and trained to operate the micro rice mill. The members of the associations agreed to charge a milling fee of ₱0.50/kg paddy rice to users of the machine, ₱0.10 lower than the rate charged by mills in the town proper.

## RESULTS AND DISCUSSION

### *Processing efficiency*

The processing efficiency of the cooperators improved with the use of the micro rice mill. The time spent for processing paddy rice into clean rice



Specifications	
Capacity	: 50 kg paddy/hr
Power	: 3/4 hp electric motor
Energy consumption	: 1 kW-hr/hr
Milling recovery	: Up to 70%
Head rice recovery	: Up to 80%
Construction	: Steel and plastic
Labor requirement	: 1 man
Overall dimensions	: 60 cm x 60 cm x 80 cm

Figure 2. The household-type IRRI micro rice mill.

Table 1. Processing time and processing recovery by method.

	Hand pounding	Micro Rice Mill	Difference <sup>2</sup>
Processing time (min/kg)	26.00 (8.68) <sup>1</sup>	1.00 (0.37)	25.00*** (15.31)
Milling recovery (%)	65.00 (5.00)	68.00 (4.74)	3.00** (-2.45)
Head rice recovery (%)	33.00 (14.17)	48.00 (13.97)	14.00*** (-3.94)
Fine bran recovered (g/kg)	68.00 (25.51)	133.00 (13.45)	65.00*** (-11.26)

<sup>1</sup> Figures in parentheses are standard errors of means and t-values for the test of difference between two means.

<sup>2</sup> Level of significance: (\*\*\*) significant at 1%, (\*\*) significant at 5%.

was reduced by about 52% while the volume processed was increased by 100%.

In hand pounding, the cooperators spent an average of about half an hour (26 min) per kilogram of paddy rice processed. The time used was substantially reduced to only a minute per kilogram of paddy using the micro rice mill (Table 1) and was statistically significant. This implies that processing paddy rice through hand pounding is indeed time-consuming; using the micro rice mill saves time by about 25 min/kg.

#### *Labor time for productive activities and income opportunities*

Majority (60%) of the cooperators identified abaca twining (*bonos*) as an income opportunity from which they earn an income of about ₱1.36 (US\$0.05)/hr. Others were involved in *sinamay* (abaca fiber) weaving and *sasa/lipak* (bamboo split) making, which provide them income of about ₱1.48 (US\$0.06) and ₱1.79 (US\$0.072)/hr, respectively (Table 2).

The average income of cooperators from their productive activities is about ₱2.01 (US\$0.08)/hr. This suggests that if they spend about 26 min (0.43 hr) in hand pounding one kilogram of paddy rice, they lose an opportunity income of about ₱0.86 (US\$ 0.03), whereas in micro rice mill processing, they pay a milling fee of ₱0.50/kg of paddy rice, and save 96% of their time which can be used for other productive activities. Therefore, it would be economical for them to process their paddy rice using the micro rice mill.

Table 2. Productive activities and income opportunities of women cooperators.

Activities	Number	Percent	Income (₱/hr)
Abaca twining ( <i>bonos</i> )	18	60.00	1.36
Buy and sell	3	10.00	6.44
<i>Sinamay</i> (abaca fiber) weaving	2	6.67	1.48
<i>Sasa/lipak</i> (bamboo split) making	2	6.67	1.79
None	5	16.67	-

### *Recovery of processed rice and rice bran*

Both milling and head rice recoveries were statistically higher in micro rice mill processing than in hand pounding (Table 1). Milling recovery was only 65% in hand pounding and 68% in micro rice mill processing. Also, head rice recovery in hand pounding was only one-third (33%), compared to almost one-half (48%) in micro rice mill processing. These were all found to be statistically significant.

In terms of fine rice bran, the recovery was statistically higher in micro rice mill processing than in hand pounding. Fine bran recovered per kilogram of manually processed rice was only 68 g, while about twice (133 g) was recovered in micro rice mill processing. Fine bran is very important for the cooperators, as it is used as feed for their swine.

### *Taste and quality of rice and rice bran*

The taste of cooked rice and the quality of rice differ according to processing method used, as perceived by the cooperators. The cooking quality of rice processed through hand pounding is generally favored by the cooperators because it is sweet and aromatic and tastes good. On the other hand, cooked rice processed through the micro rice mill is less sweet and aromatic and does not taste as good. However, in terms of eating quality texture, rice processed through the mill is favored by cooperators because it is soft when eaten compared to the coarse hand pounded rice.

The overall quality of rice from micro rice mill processing was favored by the cooperators as it appears well-polished and shiny and "expands" when cooked (Table 3).

Meanwhile, the cooperators favored the quality of rice bran obtained through micro rice mill processing since the need to sieve and separate the fine bran from the coarse bran is eliminated. Thus, the bran can be used directly as feed for their swine (Table 3).

Table 3. Favorable and unfavorable characteristics of the taste and quality of rice and rice bran according to processing method.

Characteristics <sup>1</sup>		Frequency	Percent
<b>A. Taste of Cooked Rice</b>			
1. Hand pounding			
<i>Favorable</i>	Tastes good	3	10.00
	Sweet	17	56.67
	Aromatic	7	23.33
<i>Unfavorable</i>	Coarse mouth-feel	6	20.00
2. Micro Rice Mill			
<i>Favorable</i>	Soft mouth-feel	7	23.33
<i>Unfavorable</i>	Less sweet	13	43.33
	Less aromatic	4	13.33
	Does not taste as good	3	10.00
<b>B. Quality of Rice</b>			
1. Hand pounding			
<i>Favorable</i>	More whole grains if dried	11	36.67
	Retains color	2	6.67
<i>Unfavorable</i>	Not well-polished	9	30.00
	Coarse hand-feel	3	10.00
	Does not expand when cooked	1	3.33
<i>No comment</i>		4	13.33
2. Micro Rice Mill			
<i>Favorable</i>	More whole grains if dried	9	30.00
	Well-polished	12	40.00
	Shiny	2	6.67
	Expands when cooked	1	3.33
<i>Unfavorable</i>	Loses inherent color	3	10.00
<i>No comment</i>		4	13.33
<b>C. Quality of Rice Bran</b>			
1. Hand-pounding			
<i>Unfavorable</i>	More coarse/less fine bran	11	36.67
	Needs sieving	13	43.33
	Useless	6	20.00
2. Micro Rice Mill			
<i>Favorable</i>	More fine bran	12	40.00
	Does not need sieving	7	23.33
	Can be directly used as feed	13	43.33

<sup>1</sup> Multiple response.



*Advantages and disadvantages of each processing method*

Both processing methods have advantages and disadvantages as perceived by the cooperators. They revealed that hand pounding is advantageous because it does not need cash or money outlay. Besides, cooked rice processed through hand pounding tastes good. On the other hand, micro rice mill processing opens more opportunities to work on other productive activities, does not require sieving of rice bran, and results in more polished rice.

The cooperators found hand pounding disadvantageous for its being time-consuming and laborious, besides the resulting higher processing losses, delays in cooking and hand fatigue. In micro rice mill processing, the disadvantages include the need for cash to pay for the milling fee and poor taste of cooked rice (Table 4).

*Preferred processing method*

All of the cooperators revealed a preference for the use of the micro rice mill. The reasons include the micro rice mill's time-saving characteristic

Table 4. Perceived advantages and disadvantages of each processing method.

Characteristics <sup>1</sup>		Frequency	Percent	
1. Hand pounding	<i>Advantages</i>	No cash needed	28	93.33
		Cooked rice is good to eat	4	13.33
	<i>Disadvantages</i>	Laborious	18	60.00
		Time-consuming	21	70.00
		More processing losses	1	3.33
		Less quantity processed	2	6.67
		Delays cooking/fatigues hand	2	6.67
2. Micro Rice Mill	<i>Advantages</i>	Time-saving	18	60.00
		Allows work on other productive activities	25	83.33
		No sieving for rice bran	2	6.67
		More polished rice obtained	1	3.33
	<i>Disadvantages</i>	Needs cash	28	93.33
		Poor taste of cooked rice	2	6.67

<sup>1</sup> Multiple response.

Table 5. Reasons for preferring and recommending the use of micro rice mill.

Reasons <sup>1</sup>	Frequency	Percent
A. For Preferring		
Saves time and allows users to work on other productive activities	19	63.33
Not laborious	5	16.67
Produces more polished rice/bran can be directly used	4	13.33
High processing recovery	2	6.67
B. For Recommending		
No need to go to town for milling	13	43.33
Try an easy way of processing	8	26.67
More time to do other productive activities	11	36.67
Can mill small quantities of paddy	5	16.67

<sup>1</sup> Multiple response.

which allows them to work on other productive activities, its not being laborious, its yield of more polished rice which can be directly cooked, and the resulting higher processing recovery.

All of them recommended the use of the machine to their friends and relatives. The women wanted others to try an easy way of processing paddy that does not require trips to the town proper for milling which is more expensive (Table 5).

### IMPLICATIONS

Results of the study indicate that hand pounding requires more labor time than micro rice mill processing. With the women's need to engage in other productive activities for more income opportunities, it is more economical for them to process paddy rice using the micro rice mill.

Moreover, micro rice mill processing produces better quality rice and bran with higher milling and head rice recoveries. Although the quality of cooked rice from hand pounding was perceived to be better than that from micro rice mill processing, the cooperators generally prefer the use of the micro rice mill for the advantages thus mentioned.

Information generated from this study tend to support the recommendation for the use of the micro rice mill in the villages where

electricity is available. The associations may be assisted in procuring their own units; a convenient procurement scheme can be arranged since income can be generated from the operation of the machine.

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