

# **A SURVEY ON CURRENT STATUS OF RICE PROCESSING FACILITIES**

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## **ABSTRACT**

A survey on the rice processing facilities scattered in the country was conducted in order to collect some basic data for the facilities upgrading and renovation plans. Thirty RPC and 287 custom rice mills were randomly selected among 30 cities and counties in eight provinces where the present status of facilities, management practices and other matters were monitored and evaluated. Following are the major findings of this survey.

Key words : Realities of utilization, Rice processing , Agricultural Machinery

## **INTRODUCTION**

The number of rice mill reached 10,820 units in 1998, five fold milling capacity than the total domestic yield. Since its launching in 1991, as one of the governmental subsidy programs the Rice Processing Complex (RPC) has established a total 301 units as of 1998. However, its drying and storage capacity, ranging from 3,447 and 2,340 tons, are just 13.5 to 9.4% of the total rice yield. The number of RPC will be 360 in 2004 which can process 40% of rice yield, but the milling capacity (20,170tons) based on the statistics of 1998 are far greater than the drying and storage capacity. This means an excess investment. Consequently, the government supplemented the program by installing drying and storage facilities in custom mills and government rice mills as well. Presently, areas without RPC but with only custom mills are processing rice using dilapidated facilities and with a small capacity. There is a need to upgrade and modernize the facilities in order to process quality rice. In this study, some recommendations are made in order to upgrade the existing rice facilities by monitoring the status of rice processing in RPCs and custom mills spread out nation wide.

## **SURVEY METHOD**

Table 1 shows the specific areas investigated in this survey. The total number of mills(which includes 30 RPCs, 287 custom mills) was 317. There are scattered in 30 cities of 8 provinces and are classified into plain area (94), mountainous area (90) and mixed area (103). The surveyed mills were selected randomly, and interviewers visited the places and met the owners of the selected mills survey questions covered general information of the respondents, facilities and machines, management and its problems.

Table 1. List of surveyed regions

Province	Plain area		Mixed		Mountainous	
	RPC	Custom mill	RPC	Custom mill	RPC	Custom mill
Kyonggi	Kimpo Ichon	Kimpo Pyongtaek Ichon	Yongin Yoju		Yangpyong	
Kangwon	Kangnung Hoengsung	Hoengsung	Hongchon		Yanggu	Yanggu Yangyang
Chungbuk	Chungju		Chongwon		Koesan	
Chungnam	-		Yongi		Kongju	
Chonbuk	Kimje		Kochang		Imshil	
Chonnam	Hampyung		Posung		Gurye	
Kyungpook	Sangju Yecheon		Kyongju Kumi		Youngduk	
Kyungnam	Chinju		Hadong		Hamyang	

## RESULTS AND DISCUSSIONS

### Demographic Information /Data

#### a) Age groups distribution of the laborers employed in the rice mills

Table 2 shows that the age groups of the RPC laborers are more evenly distributed while a grain number (35.7%) of custom mill laborers are already over the 60yrs age bracket and only 8.2% are under 30yrs old.

Table 2. Age distribution of workers in the two facilities

Age group Facility	Under 30 Years	31~40	41~50	51~60	Over 60 years	Total
	RPC	16.6%	27.1	26.6	19.0	10.7
Custom Mill	8.2%	12.7	17.8	25.6	35.7	100

\* Percentage mean ratio of thirty RPC's and one hundred sixty custom mills

#### b) Processing Volume

Processing volume of the mills are tabulated in Table 3. About 77% of RPCs processed 5000 tons or more in a year but 80% of custom mills processed only 10 to 200 tons, indicating a big difference in the processing volume between two facilities.

Table 3. Rice processing volume/year in the two facilities

Facility	Processing volume							Total
RPC	Under 5000 ton/yr	5,000~7,000	7,001~8,000	8,001~9,000	9,001~10,000	10,001~11,000	Over 11,000	
	23.3	43.3	13.3	6.8	-	3.3	10.0	100
Custom Mill	Under 10ton/yr	10~100	101~200	201~300	301~400	410~500	Over 500	Total
	4.4	62.4	15.3	4.4	4.4	1.5	7.6	100

\* Processing volume are based from the 1998 data

c) Length of period for operation of dryer and mill

The number of days of dryer operation are showed in Table 4, where 70% of RPCs took about 40 days or more however, 88% of custom mills took about 30 days or less.

Table 4. Number of days of drying in the two facilities

Facility	Operation days						Total
RPC	Under 10	11~ 20	21~ 30	31~ 40	41~50	Over 50	
	-	-	10.0	20.0	33.3	36.7	100
Custom Mill	20.6	35.3	32.4	2.9	-	8.8	100

\* Percentage mean ratio of thirty RPC's and thirty-four custom mills

The number of days for mill operation are showed in Table 5, where 90% of RPCs took about 200 days or more, but 87% of custom mills took less than 100 days.

Table 5. Operation days of mill in the two facilities

Facility	Operation days							Total
RPC	Under 180	180~200	210~ 230	240~ 270	280~300	Over300		
	6.7	3.3	13.3	10.0	56.7	10.0	100	
Custom mill	Under20	20~40	41~60	61~100	101~150	151~200	Over200	Total
	10.6	25.0	19.7	31.8	7.9	0.6	4.4	100

\* Percentage mean ratio of thirty RPC's and thirty-four custom mills

**Status of facilities and machines in use**

a) Dryer and Storage facility

Every RPC in the 30 rites, has a dryer of which 73.3% are circulation type and 16.7 % had both circulation and continuous type. However, only 20.4 % of custom mills have circulation type dryer, as shown in Table 6. As to the storage facilities, all RPCs have round bin of flat type (56.7%) hopper type (33.3%) and in-between (3.3%). And, 76.7% of RPCs also have square bin but two custom mills have round bin and 2.5% of them own square bin.

Table 6. Status of drying and storage in the two facilities

Facility	Dryer(%)			Storage(%)					
	Circulating Type	Continuous Type	Mixed Type	Round bin				Square bin	Conventional Storage House
				Flat Type	Hopper type	F+H	Blend type		
RPC	73.3	10.0	16.7	56.7	33.3	6.7	3.3	76.7	33.3
Custom Mill	20.4	-	-	0.6	0.6			2.5	19.1

\* Percentage mean ratio of thirty RPC's and thirty-four custom mills

### b) Processing capacity of rice polisher

According to Table 7, 85.7% of RPCs has rice polisher, processing capacity of three tons/hr, but 88% of custom mills could process only 2 tons of rice or less in a hour. This shows significant difference between the two facilities.

Table 7. Milling capacity of the two facilities

Facility	Distribution of milling capacity (%)									
	Under 0.5ton	0.6~ 1.0	1.1~ 1.5	1.6~ 2.0	2.1~ 2.5	2.6~ 3.0	3.1~ 3.5	3.6~ 4.0	Over 4.1	Total
RPC	-	-	-	-	14.3	26.5	12.2	28.6	18.4	100
Custom mill	10.0	13.1	45.0	20.0	9.4	2.5	-	-	-	100

\* Percentage mean ratio of thirty RPC's and one hundred sixty custom mills

### c) Placement type of rice mills and rice quality

Eighty seven percent of RPCs has 3 ~4 array of polisher including wet type polisher, and some RPCs operate 6 set polishers. But, 78.6% of custom mills has two set polisher as shown in Table 8. In Table 9, rice whiteness is a little bit better in RPC rice, (36.8) than that of custom mills (35.8). Percentage of broken kernel, 11.8%, in custom mills is higher than that of RPCs, (7.5%), which indicates that at least 4 array polishers are needed in order to produce quality rice.

Table 8. Number of mill array in the two facilities

Facility	Number of mill array (%)					
	2	3	4	5	6	Total
RPC	-	17.4	69.6	8.7	4.3	100
Custom mill	78.6	21.4	-	-	-	100

\* Percentage mean ratio of twenty-three RPC's and fourteen custom mills

Table 9. Whiteness and Broken kernel ratio of rice processed by the two facilities

Facility	Broken kernel (%)	Whiteness (%)
RPC	7.5	36.8
Custom mill	11.8	35.8

## Status of management

### a) Business analysis for custom mills

Closing and quitting rate of custom mills is 12% in plain regions, 15% in mountainous and 17% in mixed. About 43.9% has stopped business, and another 12.8% would stop business in the near future. Only 43.3% of current custom mills remains active in business. The custom mills located nearer RPC and plainer regions are likely to stop business as shown in Table 10.

Table 10. Management of the custom mills in the different regions

Region	Operation (%)						Distance from RPC (km)
	Quitting	Close	Sub-total	Quitting soon	Continue	Total	
Plain	8.3 (24)	3.8 (11)	12.1 (35)	3.8 (11)	17.0 (48)	32.8 (94)	2.8
Mixed	14.6 (42)	2.4 (7)	17.0 (49)	4.5 (13)	14.3 (41)	35.9 (103)	6.6
Mountainous	12.1 (35)	2.7 (8)	14.8 (43)	4.5 (13)	12.0 (34)	31.3 (90)	18.9
Total	35.0 (101)	8.9 (26)	43.9 (127)	12.8 (37)	43.3 (123)	100 (287)	-

\* - ( ) mean number of custom mills.

- Quitting soon ratio mean in plain areas within two~three years.

### b) Reasons of out of business

Several reasons for business are in the Table 11. Difficulty in securing grain is the biggest problem (11.9%) in plain regions, but propagation of household polisher is the number one reason in the mountainous and mixed regions (21.9%). In general the reasons for quitting are in the falling order of household polisher (48.7%), lower profitability by aged facilities and excess investment(26.8%), difficulty in securing enough grain (15.7%).

Table 11. Reason of close the custom mill

Reason Region	Lack of operating funds	Inferion machines	Difficulty in secury grain	Fierce competition between custom mills	Propagation of house- hold rice polisher	Others	Total
Plain	-	6.0 (6)	11.9 (12)	-	4.9 (5)	1.0 (1)	23.8 (24)
Mixed	-	13.9 (14)	1.9 (2)	1.0 (1)	21.9 (22)	2.9 (3)	41.6 (42)
Mountainous	1.0 (1)	6.9 (7)	1.9 (2)	-	21.9 (22)	2.9 (3)	34.6 (35)
Total	1.0 (1)	26.8 (27)	15.7 (16)	1.0 (1)	48.7 (49)	6.8 (7)	100 (101)

\* - ( ) mean number of close custom mills

### c) Building large scale rice processing center

Nineteen custom mills, (about 6.6 %) of 287 mills responded positively on the prepared construction of large scale rice processing center including drying and storage facilities, The ideal number of rice processing center is 700 units and its processing capacity is 1000tons for plain region, 500 tons for mountainous and 800 tons for mixed region, as shown in Table 12.

Table 12. Size of large scale rice processing center to be built in the three regions

Region	Processing amount (ton)	Amounts by calculated			Capacity (ton)	
		Paddy area (ha)	Yield (ton)	Undried amount (ton)	Drying	Storage
Plain	1,000	651	4,557	1,367	1,000	1,000
Mixed	857	489	3,423	1,026	800	800
Mountainous	625	275	1,925	578	600	600

## CONCLUSIONS

Followings are the findings of this survey on the current status of rice processing facilities.

1. Age ranges of workers in RPCs are relatively evenly distributed from 30s to 60s but that is not true for those of custom mills where 35.7% are older than 60 years.
2. Greater difference is noted in yearly rice processing volume between RPCs, 5000 tons or above, and custom mills, (10 to 200 tons), and length of period for dryers operation day 70% of RPCs took only 40 days or more but 88% of custom mills took less than 30

days. This trend applies to the number of days of mill operation; 90% of RPCs for 200 days and 87% of custom mills for less than 100 days.

3. As to the drying facility, all RPCs have a dryer while only 20.4% of custom mills have this facility. All RPCs have round bin but only 2 custom mills have.

4. Most of RPCs' polisher could treat 3 tons of rice or more, however, 88% of polishers in custom mills could process less than 2 tons in a hour. This showed significant difference in rice polishing capacity between the two facilities. As to the whiteness and broken kernel ratio between RPC and custom mill processed rice grains, the farmer have whites grains and less broken kernels. It is than recomendid that custom mills shed. Be upgraded and equipped with modern polishing machines, and at least 4 array polishers should be installed to improve rice quality.

5. On the management status, 56.7% of custom mills closed because most household have already processed their own rice polisher .

6. Six point six percent of custom mills wish to build large scale rice processing facilities of about which 700 units satisfy the needs that the processing capacity shall be 1000 tons in plain, 600 tons in mountainous and 800 tons in mixed region.

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