VI. ASSESSMENT OF MILLING RATIO-RELATED TO FOOD SECURITY IN INDONESIA

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Abstract

Indonesia is located between Australia and the Asian continents, which has an area of 1,919,319 km^2. Indonesia has a highly diverse archipelagos structure consisting of 13,667 islands, of which 7 % is inhabited. Indonesia is the world's fourth most populous country, with population of 203 million in 1998. There are 5 main islands of Indonesia, Sumatra, Java, Kalimantan, Sulawesi and Irian Jaya. Java is the most fertile and populous island, which has an area only 7% of the whole land. But the distribution of population among islands is unbalance, which concentrated in Java Island. The population in Java makes up 60.87% of the total population. The population tends to increase as shown in Fig.6.1. From 1971 to 1980 the average growth rate of population is 1.97%. After that time, the average growth up to now rate of population tends to decrease become 1.66%, because of the Family Planning Program. The main food crop in Indonesia is rice and the other is maize and cassava. Rice milling services in Indonesia previously began with large capacity machines (LRM = Large Rice Milling). Such as other agricultural machinery, introduction of rice milling machinery adopted directly from exporter country. Capacity of that rice-milling machine categorizes as big capacity, 1.5 tons/hr. Further, together with people accepted that technology, smaller capacity rice milling machine (SRM = Small Rice Milling) is more preferable.

Shifting in rice milling system was caused by several factors. Politically, the shifting caused by labor concern, where the growing of them need more labor and contribute to increasing working opportunities in villages. Economically, the shifting caused by investment capability of farmer but there is a consequence due to the shifting. There are declining trend of milling ratio during last 40 years, from 71 % in 1950 to 66% in 1985 and then 63.2% in 1996. Milling ratio is important factor, which affects directly to food security. From Table 6.3, where rice production in year 2000 is 511.79 thousand tons, increasing milling ratio 1% will contribute to the national food stock 0.5 million tons which is equal to US$72.5 million (assumption world market price for rice is US$145 tons (Kompas, August 6, 2001). There is interesting phenomenon in the last 5 years especially in East Java, there is the growing of mobile rice milling (MRM). Technically, MRM is the same with SRM; the difference is on its moveable characteristic. MRM gets good response, because it can access directly to consumers. The other factor, which affects to milling ratio, is the configuration of rice milling.

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Improving configuration of SRM, which dominated in rice processing in Indonesia will contribute to the increasing of milling ratio and food security in general.

A. Introduction

1. Background

Demand for food in general tends to increase year by year due to increasing population, although the population growth rate is declining. Increasing food demand is not only caused by the number of population, but also by the increasing income. If the local production of food is unable to satisfy the need of food due to increasing the number of population and income, it will result in imbalance of food supply-demand. Thus to satisfy the need should be substituted by the imported product. The rapid growth rate of the food import (the average annual growth rate of the rice import in 86-96 is 49.9%) could put the country in the dangerous situation such as happening in Indonesia in economy crisis at the last 4 years. So it is clear that the food security plays important role in social, economic and politic sector.

Economy consequences in technology selection for rice milling have been analyzed by Timmer (1973) when government introduced Rice Milling Unit technology previously. In 1971, 80% rice produced by hand pounding, and then change rapidly to mechanic method in 1973 became 50% mechanic and 50% hand pounding. Further in 1976, 96% rice produced by mechanic method (Ditjentan, 1977). Timmer explains that " the wrong choice of technology, whether by government decision or by private investors reacting to inappropriate price signal, can easily cost many thousands, in fact, hundreds of thousands, of job". That statement figure, it will be shifting from labor to machine in rice producing. Even Coillier (1973) stated stronger, it will be not only women labor loosed their job, but also they loosed US$ 72,500/year for their annual income. They are poor hand pounding labor, which are dominated by women.

Demand for efficiency and productivity in rice producing speed the shifting up. Further there are adjusting in technology adapting, the SRM, preferred than the LRM due to re-distribution income and job opportunity issues. But for now, while the global issue is quality competition becoming the main consideration, it is important to assess whether the shifting from Large Rice Milling (LRM) into Small Rice Milling (SRM) for redistribution income and job opportunity concern, is still relevant or not. Handaka (1981), in his study for 24 rice milling units in West Java indicated there are better income re-distribution in SRM than LRM. Incentive system in SRM stimulated machine operator to cheat trough machine adjusting in order to get more by-product (brewer and bran). They adjust the pressure rubber roll and polisher supposes to get additional income from by product. Rice milling services widely accepted, Rice

milling machinery develops more, but the rice-produced quality is not enhancing. Milling ratio and rice quality tends to decrease (Sawit, 1997). The problem becomes more complex related to food safety issue such as import value, stagnant in rice production, drought, flood and decreasing land capacity. While for 10 years, post-harvest handling does not show good figure, during year 1985-1995, total post harvest losses only reduce 0.6 % (21.3 % in 1985 to 20.7 % in 1995).

2. Objective

The objective of this assessment is to identify the factors, which affect the milling ratio in terms of food security in Indonesia.

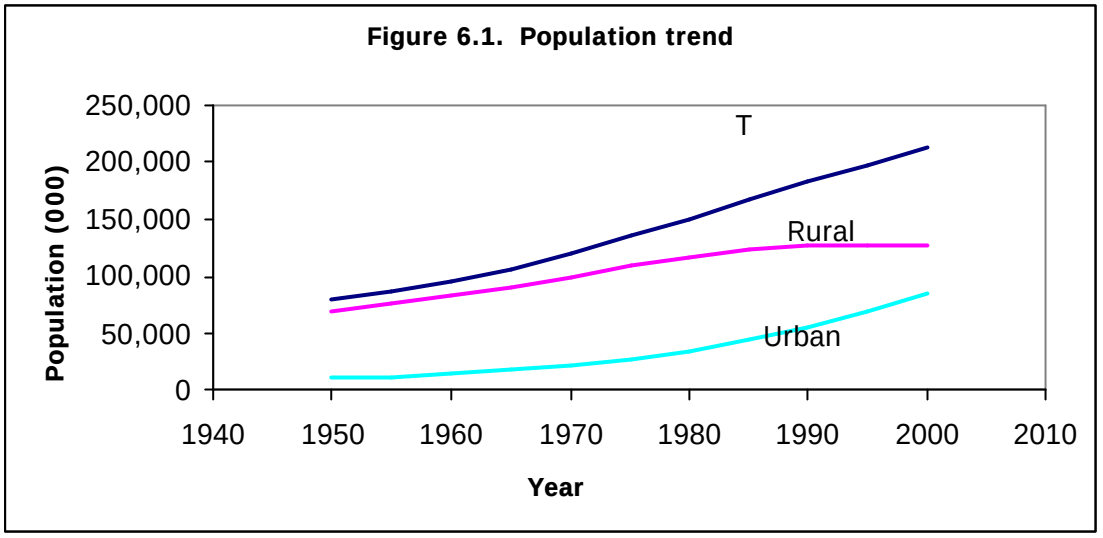
3. Data collection

There are two cases which are discussed in this paper, they are: 1) Shifting in rice milling system with special case - mobile rice milling; and 2) configuration of rice milling system. Both points are indicated influence to the milling ratio. Data collection for the research of shifting in rice milling system conducted in Jombang district in East Java province. Data collection for the research of configuration of rice milling system was conducted in Demak district in central Java province.

B. General situation of agriculture in Indonesia

1. Land and population

There are 5 main islands of Indonesia, Sumatra, Java, Kalimantan, Sulawesi and Irian Jaya. Java is the most fertile and populous island, which has an area only 7% of the whole land, but the population makes up 60.87% of the total population. The population tends to increase as shown in Fig. 6.1. From 1971 to 1980 the average growth rate of population is 1.97%. Since then, average growth rate of population decreased to 1.66%, because of the Family Planning Program. The distribution of population among islands is unbalanced, which concentrated in Java Island as shown in Table 6.1.



Source: FAO.

Table 6. 1. Land and population distribution by major islands, 1995

Major Island	Land Area (km^2)	Population	Density (Person/km^2)
1. Java and Bali	137,700	108,428,135	833
2. Sumatera	473,600	40,830,343	86
3. Kalimantan	539,500	10,470,843	19
4. Sulawesi	189,200	13,732,449	73
5. Irian Jaya	421,900	1,942,627	5

Source: BPS (Indonesian Central Bureau of Statistics).

2. Crops

The main food crops in Indonesia are rice and cassava. Based on agricultural census in 1983, the ratio of agricultural land use as follows: upland (39%), small holder (21%), dry rice field (15%), irrigated rice field (20%), tidal (2%), ponds (1%), and others (1.3%).

Table 6.2. Land use in agriculture

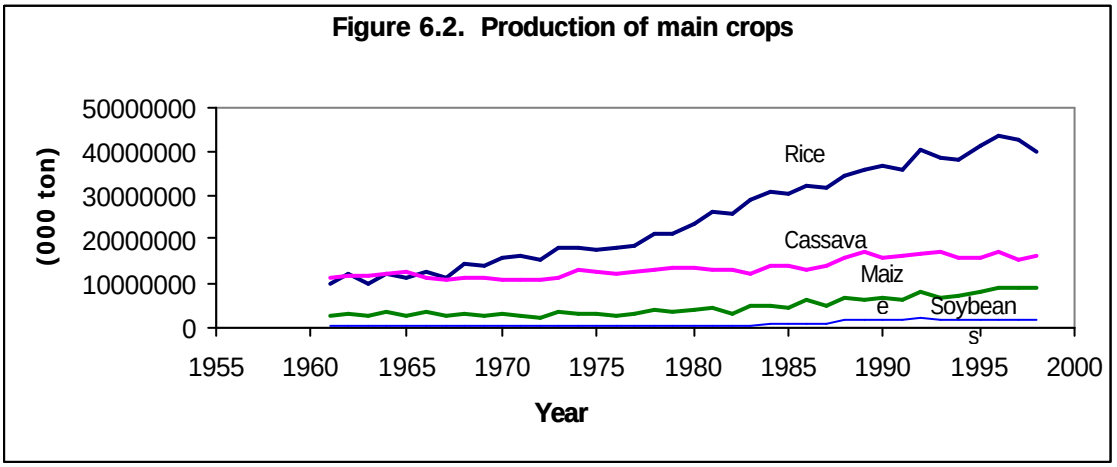
Type of land usage	Area	
	Ha	%
1. Wet land (twice a year)	1,971,470.35	13.61
2. Wet land (once a year)	930,301.30	6.24
3. Tidal	335,043.01	2.31
4. Raifed	2,222,221.20	15.34
5. Upland	5,670,851.70	39.15
6. Pond	125,249.14	0.86
7. Small holder estate (manage by society)	3,052,655.34	21.08
8. Forage	54,008.38	0.37
9. Others	148,480.57	1.03
Total	14,483,280.99	100

Source: Agricultural Census, 1983.

The harvested area, yield rate and production of main crops shown in Table 6.3. As mentioned in previous part, that Java is the most fertile land, its harvested area, production and yield is the biggest among other islands. On Java, agriculture is very intensive, this is made possible due to the greater availability of water than other islands. Although Java land is only 7% of total land, its contribution of rice production is more than 50% of the national production.

The most farmland of Java is managed as wetland farming. On the other hand, most of outer islands managed as shifting cultivation or small estate holder. Wetland consists of 41% raifed, 36% irrigated, 17% rural irrigation, and 6% swampy or tidal farmlands. Fig. 6.2 shows development of main crops production from 1961 to 1998. Increase in production are mainly due to the implementation of government policies on intensification, diversification, expansion of cultivation lands, and rehabilitation.

Figure 6.2. Production of main crops



Source: FAO.

The average annual growth rate of main crops is presented in Figure 6.2. The largest contribution to the growth rate came from rice production were annual was 6.6% in 1979-1983. The government program to expand rice production in 1970's and 1980's included research to adapt high yield rice varieties to Indonesian conditions, strengthening and improving extension services to facilitate dissemination of new technology, investment in rural infrastructure, development of farmer organization, and improved coordination of national and local agencies.

The adoption of modern technology such as the application of fertilizer and pesticides, high yield seed, and better management of irrigation water were the main reason for increasing agricultural productivity. This technique is introduced through the Special Rice Intensification program called by INSUS. More recently this program was improved through the introduction of a larger group farming approach called SUPRA INSUS. Hence, rice production increases significantly during 1980s up to 1984. This changed Indonesia from the largest rice importing country to a self-sufficient country.

C. Shifting in rice milling system

Special case: Mobile rice milling

(a) Factors influencing the shifting

Rice milling services in Indonesia previously began with large capacity machines (LRM = Large Rice Milling). Such as other agricultural machinery, introduction of rice milling machinery adopted directly from exporter country. Capacity of that rice-milling machine categorizes as big capacity, 1.5 tons/hr. Further, together with people accepted that technology, smaller capacity rice milling machine (SRM = Small Rice Milling) is more preferable. Shifting in rice milling system caused by several factors. Politically, the shifting caused by labor concern, where the growing of them need more labor and contribute to increasing working opportunities in villages. Economically, the shifting caused by investment capability of farmer. There is interesting phenomenon in the last 5 years especially in east java; there is the growing of mobile rice milling (MRM). Technically, MRM is the same with SRM; the difference is on its moveable characteristic. MRM gets good response, because it can access directly to consumers. Usually farmers keep some of their paddy for their consumption, and existing of MRM makes rice processing easier for them. The existing of MRM should be perceived as declining trend of milling ratio and rice quality, if the MRM population growth extends to other provinces.

(b) Consequences of the shifting

There is a consequence, however, due to the shifting. There are declining trend of milling ratio during the last 40 years, from 71 % in 1950 to 66% in 1985 and down to 63.2% in 1996. Milling ratio is important factor, which affect directly to food security. From Table 5.3, where rice production in year 2000 is 51,179,000 tons, increasing milling ratio 1 % will contribute to the national food stock 0.5 million ton which is equal to US$ 72.5 million with an assumption of the world market price for rice is US$145 per ton (Kompas, August 6, 2001).

Table 6.3. Harvest area, production and rice imports

Year	Harvest Area (thousand ha)	Production (thousand ton)	Growth (percent)	Rice imports (thousand ton)
1990	10.502	45.179	1.0	29
1991	10.282	44.689	-1.1	178
1992	11.103	48.240	7.9	634
1993	11.013	48.181	-0.1	0
1994	10.734	46.641	-3.2	876
1995	11.439	49.744	6.7	3.014
1996	11.569	51.101	2.7	1.090
1997	11.141	49.377	-3.7	406
1998	11.613	48.472	-4.9	5.765
1999	11.963	50.866	1.8	4.183
2000	11.793	51.898	3.9	1.513
2001	11.415	50.181	-3.4	1.400*)

Source: Kompas, 6 August 2001.

*) Forecast.

(c) Survey results

A survey was conducted in some districts in East Java, they are Jombang, Mojokerto and Pasuruan. Data collected from SRM and MRM. The result shows that milling ratio for SRM is 59-65 %, and for MRM is 60-63 %. Range in SRM milling ratio than MRM due to the age of the machines. The age of SRM is usually older than MRM, which is 20-30 years for SRM compare to MRM is 1- 4 years. But the rice quality produced by SRM is better than MRM. This is due to lower skill of the MRM operators than its of the SRM and also usually SRM has sun drying space, so it can maintain proper paddy moisture content before it processes the paddy.

Table 6.4. Comparison of the rice quality from SRM and MRM

No.	Parameters	SRM	MRM
1.	% Whole rice	73.75	66.4
2.	% Broken rice	23.25	26.9
3.	% Brewer	3	6.7
4.	Milling ratio (%)	59 - 65	60 - 63

Source: Survey conducted in Jombang district, East Java, 2001.

D. Configuration of rice milling system

Milling ratio affected by several factors, such as maturity, moisture content, variety of paddy and condition of rice milling. Technically, the ratio is affected by machine settings, milling system (one or two pass) and configuration of rice milling. Low pressure for bending moment in friction mill and abrasive machine may crack the rice which is potent to produce more broken rice and brewer, and further reduce milling ratio. Thus polishing in milling process should reduce cracking rice (Outrey et al., 1955). Paddy cleaner and separator in rice milling configuration plays important role in increasing milling ratio (Yamashita, 1979). High rice quality and milling ratio should be maintained by quality control, which analyzes of quality of paddy, machinery management, standard procedure for machinery operations and operators skill. Rice milling quality depends on several factors and the main is polishing process. Poor polishing will reduce product price, on the other hand over polishing will decrease milling ratio and owner income. Thus combination of technology and operators skill play important role in rice milling. As mention before, that the configuration of rice milling affects to milling ratio and rice quality as shown from the survey result (Table 6.5), where conducted in central Java in September 2003.

Table 6.5. Rice milling configuration vs. milling quality

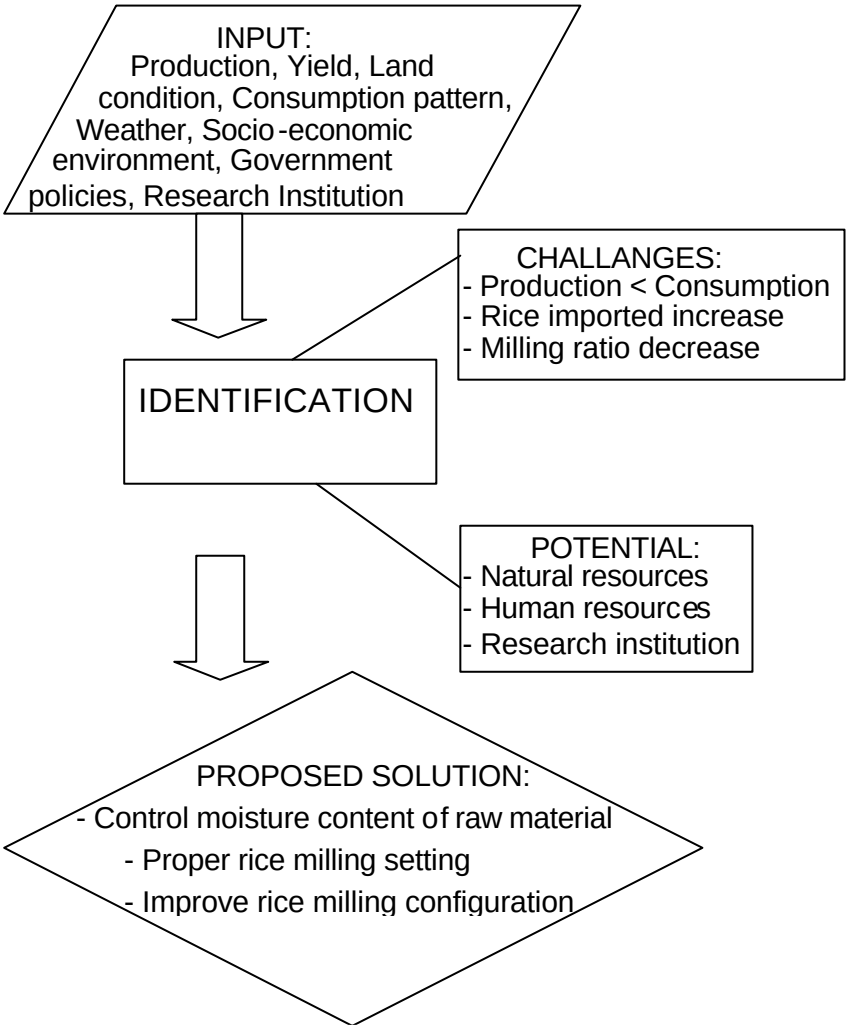
Rice Milling Categorize	Configuration	Milling ratio (%)	Rice quality (%)		
			Whole	Broken	Brewer
LRM	1. Paddy cleaner 2. Husker 3. Separator 4. Destoner 5. Polisher	65 %	86	9	5
SRM	1. Husker 2. Polisher	58 %	75	17	8

Source: Survey results conducted in Demak district, central Java, September 2003.

E. Conclusions

With respect to food security, milling ratio is an important factor because it affects the national food stock. Changes in the rice milling system, is strongly influenced to milling ratio. The growing of MRM gets good response from the consumers due to their accessibility. Technically, MRM is the same with SRM. Proper moisture content of paddy and proper setting of machine are important factors in order to improve milling ratio and rice quality of rice produced by MRM. It is evident that configuration of rice milling system affects directly the milling ratio and rice quality. Improving paddy handling in SRM will contribute to the increase in food stock.

Chart 6.3. Flowchart of Assessment of Milling Ratio



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