EFFECTS OF SMALL-SCALE TAPIOCA PROCESSING UNIT DEVELOPMENT ON EMPLOYMENT AND INCOME GENERATION IN LAMPUNG, INDONESIA[1]

Masdjidin Siregar

Indonesian Center for Agricultural Socio Economic Research and Development
Jl. A. Yani 70 Bogor 16161

INTRODUCTION

Background

It is largely believed that low and fluctuated farm gate prices of cassava in Lampung stemmed from the oligopsonistic power of the existing large-scale tapioca-processing companies. To overcome the problem of low and fluctuated prices of cassava, employment, and to improve rural economy, the Provincial Government of Lampung initiated the development of Farmer's Tapioca Processing Units or ITTARA (abbreviated from *Industri Tepung Tapioka Rakyat*). Depending on the sources of investment, the ITTARA tapioca processing units is divided into three categories: (a) personally financed, (b) financed by private-companies, and (c) financed by local government. A unit of ITTARA is an autonomous business unit of a farmers' cooperative or a farmers' group.

Presently, almost all ITTARA units financed by local government and several ITTARA units financed by private companies collapsed due to managerial incompetence and inadequate monitoring and control from the responsible local government institutions and from related private companies. By contrast, the majority of personally financed ITTARA units are still operating, although they are still depending upon large cassava enterprises, particularly in the drying process of tapioca during wet seasons for the ITTARA units are not equipped with oven or other drying facilities.

Having learned such unsatisfactory achievement, the provincial government has assigned each district to rehabilitate all ITTARA units in their respective administrative authority. It is still believed that the development of small scale-tapioca processing units is crucial to improve competitiveness that leads to better prices of cassava and, therefore, would help cassava farmers to improve their income. The rehabilitation of small-scale tapioca processing units of ITTARA would undoubtedly be costly. It entails the costs of reconstruction, selection and training of managers, and monitoring and supervision. In addition, proper benefit-cost analysis of the rehabilitation

[1] Similar version was presented in the Workshop on Rural Prosperity and Secondary Crops Towards Applied Pro-poor Reseach and Policies in Asia and the Pacific, UNESCAP-CAPSA, Bogor, Indonesia, 6-9 December 2005; and in AGRIDIV In-Country Seminar in Thailand, 16 January 2006.

would also be required. One among many essential aspects of benefit-cost analysis that should be scrutinized in relation to economic development and poverty alleviation is the effect of such rehabilitation on income and rural employment.

Research Issues

Lampung is one of the major cassava-producing regions in Indonesia. Many tapioca and dried cassava processing firms are operating in the region. These processing firms are facing problems of excess capacity in a sense that the total annual production of cassava in this region is lower than the total capacity of all processing units. If this is true, the price of cassava must be escalated during the periods of lean harvest. Yet, secondary data indicates that there is no clear pattern of relationship between monthly price and monthly production of cassava. With regard to this situation, one may ask question concerning market structure that bring about the unclear pattern of such relationship.

The development of small-scale tapioca processing units (ITTARA) was aimed at helping farmers to cope with low and fluctuated prices of cassava by directly linking the processing units to local cassava farming and setting up the ratio of cassava price to tapioca price. Unfortunately, almost all government financed ITTARA units collapsed, while a large proportion of ITTARA units financed by personal funds are able to continue operating until recently. The question is: "what factors make such differences?" If the factors can be identified, will the provincial or district government plan to continue the development of ITTARA units? If yes, what are the sources of funds for the rehabilitation of the existing ITTARA units and the development of new ones? What condition should be contended by each processing unit or farmers' groups to be eligible either in a rehabilitation or development program of new ITTARA units?

Study Objectives

The objectives of this study are: (1) To analyse the effect of small-scale tapioca processing units on financial efficiencies of cassava production, marketing, and processing; (2) To analyse the impact of small-scale tapioca processing units on income and employment generations in cassava farming, marketing, and processing; (3) To identify factors influencing the failure or success of ITTARA units.

RESEARCH METHODS

Analytical Methods

1. Financial Efficiencies of Cassava Farming, Marketing, and Processing

In this paper, profitability and benefit-cost ratio are used to measure the financial efficiencies of cassava farming, cassava marketing and tapioca processing. Each term is clearly defined in tables regarding cost and return in this paper.

2. Income and Employment Generations in Farming, Marketing, and Processing[2]

An important aspect of any government policy that should be analysed is the extent to which it may generate income and employment, particularly in a country where the proportion of population under poverty line is relatively high. Income generation here is defined as the total value of outputs minus the total value of material input[3]. In other words, generated income is nothing but the returns to land, labour, and management in all sub-systems of a particular commodity system (see Kawagoe *et al.*, 1990). Income generation in a commodity system is simply a summation of incomes generated in the three sub-systems (farming, marketing and processing). Since income generation in farming is computed at per hectare basis, income generation in marketing or processing is also computed for the amount of farm production per hectare.

Technique of analysing employment generation in a commodity system is straightforward in a sense that it is just a summation of labours involved in each activity of farming, marketing and processing stages. Since the number of labours in farming is computed at per hectare basis, the number of labours in marketing or processing is also computed for an amount of farm production per hectare when it is marketed or processed.

3. Factors Influencing the Success/ Failure of ITTARA Processing Units

In this study, the only way to identify the factors is to review available results of related studies and to present information gathered from farmers, managers of tapioca processing units, officials in the Office of Food Crops and Food Security and the Office of Cooperatives, Industry and Trade, and local extension workers.

Research sites and Respondents

This study is carried out in Rumbia sub-district of Lampung province. Rumbia is one of sub-districts where several small-scale tapioca processing unit were established since 1997. Two sample villages, Bina Karya and Restu Baru, are selected. The former represents ITTARA sites where most of the cassava farmers sell their cassava directly to a small tapioca-processing unit that formerly called farmers' tapioca processing unit (ITTARA). The latter represent Non-ITTARA sites where most of cassava farmers sell their cassava either through ordinary or *tebasan* system to middlemen who then transport and sell it to large tapioca processing firms (see Figures 1 and 2 in section for marketing channels).

---

[2] The impacts of small-tapioca processing industry on financial efficiency, income, and employment in this study are analysed by comparing two cassava-producing villages that have different scales of tapioca processing units (in or outside the sample villages).

[3] Income generation here is equal to value added (see Hall and Taylor, 1986, p.33).

Although several cropping patterns exist in each study site, the two study sites have one type of cropping pattern in common, which is maize-cassava (see Table 1). The study team randomly selected 20 sample farmers from those who adopted such a cropping pattern in each site. This was intentionally carried out to eliminate as many differences as possible between the sample farmers in the two sites, except differences relating to tapioca processing. Other respondents are 3 middlemen in each site, 2 small tapioca-processing units (ITTARA) and 2 large tapioca-processing companies.

Table 1. Estimated Proportion of Area by Cropping Patterns in the Study Sites

Cropping patterns	Non-ITTARA site	ITTARA site
1. Paddy-Cassava	0	15
2. Cassava-cassava	0	10
3. Maize-maize-vegetables	5	0
4. Maize-cassava*	40	65
5. Paddy-maize	0	5
6. Maize-(Maize+Cassava)	55	5
Total	100	100

Source: Field extension workers' estimation.
* The sample cropping-pattern.

ITTARA PROGRAM

Underlying Concept of ITTARA Program

The development of food crop in Lampung put high priority on cassava after paddy and maize. Cassava can be used for staple food, raw material for industries, feed stuffs, and for export. In this major cassava-producing province, however, cassava farmers possess weak bargaining position vis-à-vis middlemen or large tapioca-processing firms. Moreover, farmers are often unsatisfied with high price-cut imposed by the firms in relation to starch content. Their weak bargaining position arises from the fact that the distance from their farm to the tapioca processing units are considered too far so they are unable to collect necessary information regarding the price and price-cut criteria given by large tapioca-processing units. The majority of cassava farmers obtain such information from middlemen who obtain it from the processing unit where they do the selling.

ITTARA Program, initiated by provincial government in 1997, aims at strengthening farmers' bargaining position by implementing two major policy measures: (1) development of many small-scale tapioca-processing units in cassava producing areas so that market would be more competitive, and (2) establishment of cassava price support without government financial burden by setting up a particular ratio of cassava price to tapioca price (e.g. 9.5%) to prevent farm gate price of cassava from drastically

falling. This level of price support was not rigidly determined because it was still depending upon the agreement between farmers and ITTARA unit in a respective area.

The above description may assume that if the ITTARA Program were properly implemented, it should be able to shorten marketing channel of cassava because the involvement of middlemen would drastically be reduced, and the distance from farmers to tapioca processing units would be closer. In such a case, the ITTARA Program would increase cassava price through price support and reduction of marketing costs, and in turn would improve income of cassava farmers. In addition, many small-scale tapioca-processing units are also expected to increase employment in the rural area.

Policy Actions Designed to Support the ITTARA Program

To develop small-scale tapioca processing units in Lampung's cassava producing areas, the provincial government carried out several policy actions (Asnawi, 2002): (1) Selection of locations for the construction of ITTARA units; (2) Selection of farmers' groups to manage the development and operation of ITTARA units; (3) Providing farmers' groups with funds for investment and operation of ITTARA units; (4) Encouraging the development of supporting institutions such as Village Unit Cooperatives (KUD), ITTARA Cooperatives (KOPITTARA), and ITTARA Marketing Cooperatives (KOPASTARA); (5) Carrying out training relating to management of ITTARA units, capital, technical matters, marketing, and institutional system; (6) Providing guidance for technical aspects and marketing of tapioca; (7) Facilitating cooperation between ITTARA units and private company (e.g. Ajinomoto Indonesia Ltd) that purchases tapioca product from ITTARA units; (8) Encouraging private company (e.g. Bank Muamalat) to participate in developing ITTARA units.

Current Status of ITTARA and Its Impact on Cassava Price

Long before the implementation of ITTARA Program, the Provincial Government of Lampung implemented a policy aimed at solving the problem of low and fluctuated prices of cassava. In 1987, the governor of Lampung chaired a committee of price agreement. The committee members consist of farmer's representatives, the Associations of Indonesian Feed Exporters (ASPEMTI), and the Association of Tapioca Processing Firms (ATTI). It was agreed by the committee that the farm gate price of cassava was 13.6 percent of tapioca price or 70 percent of FOB price of dried cassava (*gaplek*).

Although the agreement brought about the same price level of cassava at the processing units, cassava price transmitted to farm gate level were still below the agreed price level (Asnawi, 2002). Table 2 indicates that the ratio of cassava price to tapioca price was always less than 9.5 percent in the period of 1995-2004. Nevertheless, the growth rates of the ratio increased from -7.3 percent per year before ITTARA program was in effect to –5.0 percent per year after the program. This condition implies that, to

some extent, ITTARA program has positively affected the price of cassava, despite the fact that many tapioca-processing units of ITTARA have been bankrupt except the ones that are personally funded.

In the ITTARA Program, it was stated in the Governor's Directive that cassava area of each ITTARA unit having the capacity of 5 tons/day was 100 Ha and each ITTARA unit were obliged to buy cassava from farmers at Rp85/kg and sold tapioca at Rp900/kg. In other words, the ratio of cassava price to tapioca price is around 9.5 percent. As a matter of fact, Table 2 indicates that this ratio has never been achieved even after ITTARA program was in effect.

Table 2. The Ratio of Cassava Price to Tapioca Price Before and After ITTARA Program in Lampung, 1995-2004

Before ITTARA Program was in effect				After ITTARA Program was in effect			
Year	Cassava (Rp/kg)	Tapioca (Rp/kg)	Price ratio (%)*	Year	Cassava (Rp/kg)	Tapioca (Rp/kg)	Price ratio (%)*
1995	76	841	9.0	2000	112	1480	7.6
1996	44	586	7.5	2001	153	1763	8.7
1997	62	791	7.8	2002	164	1849	8.9
1998	153	2096	7.3	2003	173	1878	9.2
1999	81	1235	6.6	2004	97	1763	5.5
GR (%/yr)	24.6	32.2	-7.3	GR (%/yr)	1.3/8.7	4.9/7.9	-5.0

Source: Office of Food Crops and Food Security,
*Ratio of cassava price to tapioca price; GR = Growth Rates (%/yr)

In 1998, a team was assigned to monitor and evaluate the performance of ITTARA. It was proposed to develop 152 ITTARA units having the capacity of 2.5 tons of tapioca/unit/day with a total investment of Rp 150 million/unit including its working capital. To support this policy, Ajinomoto Indonesia Ltd in collaboration with Lampung's Provincial Government, took part in the development of ITTARA (under a Memorandum of Understanding, 31 March 1998). Ajinomoto Indonesia Ltd is a company that processes tapioca to flavouring products. As the first step, it was planned to build 5 units having capacity of 5 tons of tapioca/day, and if it were successful, the number would be increased to 40 units with an investment of Rp100 mill/unit. The investment loan would be provided to autonomous body in a village cooperative unit (KUD) with 10 years instalment, and the processing unit as its collateral (Zakaria, 2000).

In year 2000, 123 units of ITTARA operated. They are classified into three categories: personally financed (47 units), financed by private-companies (6 units), and financed by local government (70 units). Presently, almost all local government financed units have collapsed due to managerial incompetence and inadequate monitoring as well as lack of control from related local government institutions. On the other hand,

most of personally financed units of ITTARA are still operating, but they are still dependent on large tapioca processing units, particularly in drying tapioca during the wet season due to the case that small units are not equipped with oven.

From the demand site of tapioca, ITTARA has a good prospect in a sense that tapioca produced by ITTARA and its by-product (*onggok*) can be marketed to food processing in Bogor and various industries in Semarang, Puwokerto, Malang and several cities in South Sumatra. Ajinomoto Indonesia Ltd alone needs 300 metric tons of tapioca per day to produce seasoning. The company has planned to expand its capacity by using 1,000 metric tons of tapioca per day. The company prefers tapioca produced by ITTARA units to the one produced by large-tapioca processing firms because ITTARA units use solar heat while large tapioca processing firms use oven facilities in drying cassava. The nature of tapioca dried under solar heat is easier to develop or outstretch. Aside from domestic market, Malaysia, the Philippines, Taiwan, European countries, and USA are also the prospective markets for tapioca produced by ITTARA (Asnawi, 2002).

Although drying cassava using solar heat results in better quality of tapioca than does drying cassava using oven, solar radiation is not always adequately available in rainy seasons. Since ITTARA program did not equip small-processing units with oven facilities, the present small-processing units have their cassava dried by large-processing units in rainy seasons. The custom rate of using ovens owned by large-processing units is around Rp 200 /kg, while the average costs of drying tapioca using solar radiation is only Rp 75/kg. This implies that research and development of small-scale oven that can be used by small-scale tapioca processing units in wet seasons is a necessity.

CASSAVA ECONOMY IN THE STUDY SITES

Cassava Farming

Most farming activity in the study sites consists of two planting seasons, wet and dry season. Wet season occurs from October to January with the average monthly rainfall about 350 mm. In a normal year, the dry season occurs for three months from June to August with an average monthly rainfall of 65 mm. The sample farmers in the study sites cultivate dry land only. The sample farmers grow maize in wet season with a planting distance of 20x70 cm^2. For the second crop season, they grow cassava with a planting distance of 80x100 cm^2.

Farmers in the two sites grow cassava in dry season due to the fact that the plant is still able to provide moderate returns with relatively low cost. Farmers also understand that growing cassava as the only crop may drastically reduce soil fertility. To minimize the impact of low soil fertility, farmers use relatively high quantity of organic fertilizers as manure and compost.

Since landless households are hardly found in the study sites, major sources of hired labourers are neighbours and adjacent villages. There are apparently two types of hiring farm labourers in the study sites; the first arrangement is on daily wage basis, while the second is on task basis. In the first type of arrangement, the rates are Rp 12,500/day for female labourers, Rp15,000/day for male labourers and Rp 25,000/day for draught animals. In the second arrangement, the rates are Rp 250,000/ha for land preparation using draught animals, Rp 150,000/ha for planting or weeding, and Rp 200,000/ha for harvesting. Farmers who choose the second arrangement usually tend to save their time in supervising labourers such that they have more time to do more non-farm activities as the source of additional incomes.

Table 3. The Use of Labours* by Labour Categories in Cassava Production, 2004

Labours categories	Non-ITTARA site	ITTARA site
1. Male (man days)	62.3	60.6
2. Female (man days)	16.1	28.8
3. Drought animal (animal days)	3.1	8.0
4. Total labours*	81.5	97.4
5. Proportion of family labours (%)	34	55
6. Proportion of male labours (%)	79	68
7. Total paid wages (Rp000)	645	600

Source: Field survey. *Including labours guiding the drought animals.

Table 3 shows that sample farmers in the ITTARA site employ more family labours than hired labours, while the opposite occurs in Non-ITTARA site where the sample farmers in the site possess larger average farm size and have more access to non-farm employment than do the sample farmers in the ITTARA site. The sample farmers in Non-ITTARA site have more access to non-farm employment because the site is closer to sub-district centre than is the ITTARA site. Since farm households in ITTARA site have limited non-farm activities, they can intensify the use of family members in crop production.

In both sites the plant materials of cassava used by farmers in dry season are Thailand (80%) and Adira (20%). Farmers in Non-ITTARA site use five types of fertilizers for cassava production while farmers in ITTARA site use only three types. Instead of using urea and KCl, farmers in ITTARA site use seasoning residue (*tetes*) and more manure in cassava production (Table 4).

Yield of cassava in Non-ITTARA site is higher than that in ITTARA site because the sample farmers in the former use more fertilizers than do sample farmers in the latter (see Table 4). Although the yield of cassava in Non-ITTARA site is somewhat higher than in the ITTARA site, the production value per hectare in the two study sites are almost the same because the sample farmers in ITTARA site receive higher price level

of cassava than do the sample farmers in Non-ITTARA site (Table 5). The difference in the price level is caused by the fact that farmers in ITTARA site sell their cassava directly to the tapioca processing units and, therefore, no middlemen took any profit. The reverse is also true in the Non-ITTARA site (see Section cassava marketing for more elaboration).

Table 4. Material Inputs Used in Cassava Production per Hectare in the Study Sites, 2004

Inputs	Unit	Non-ITTARA site			ITTARA site		
		Quantity	Price (Rp/unit)	Value (Rp000)	Quantity	Price (Rp/unit)	Value (Rp000)
Plant material	Kg	53	5,000	267	77	2,911	225
Urea	Kg	183	1,280	234	0	0	0
SP-36	Kg	70	1,550	108	14	1,550	21
KCl	Kg	39	2,378	93	0	0	0
Manure	Packs	4	6,000	26	13	5,000	65
Seas'ng-residue	Lt	0	0	0	4,000	91	383
Herbicides	Lt	2	34,211	57	0.62	37,111	23
Total	na	na	na	784	na	na	718

Source: Field survey; na=not applicable

Although the returns to farm household resources in the two study sites are almost the same, the benefit-cost ratio in the ITTARA site is higher than that in Non-ITTARA site. The main reason identified is the costs of both material inputs and labours in Non-ITTARA site are higher than in the ITTARA site.

Table 5. Costs and Returns of Cassava Production per Hectare, 2004

Items	Non-ITTARA site	ITTARA site
1. Production (kg)	22530	21010
2. Prices (Rp/kg)	175	185
3. Production values (Rp000)	3943 (100)	3887 (100)
4. Material inputs (Rp000)	784 (20)	718 (18)
5. Paid wages (Rp000)	645 (16)	600 (15)
6. Total costs (Rp000): (4)+(5)	1429 (36)	1318 (34)
7. Returns to household resources (Rp000): (3)-(6)	2514 (64)	2569 (66)
8. Returns to costs ratio (R/C): (3)/(6)	2.76	2.95
9. Generated income (Rp000):(3)-(4)	3159 (80)	3169 (82)

Source: Primary data. Notes: Figures in parentheses are percentages to production values.

Cassava Marketing

Cassava farmers sell either fresh or dried cassava (*gaplek*). However, the majority of sample farmers do not sell dried cassava due to low price incentive. For example, since weight conversion factor from fresh cassava to dried-cassava is 46 percent, 100 kg of fresh cassava would become 46 kg of dried cassava. If the price of fresh cassava is Rp 175/Kg, the price of dried cassava is then Rp 390/kg. in such a case, the incentive for farmers to produce 46 kg of dried cassava out of 100 kg fresh cassava is a mere Rp 440, which is (46 x Rp 390)-(100 x Rp 175) or equals to US$0.04 per 46 kg of dried cassava. Note that, depending on solar radiation, farm households need to spend 3-7 days to dry such amount of cassava.

Figure 1 and 2 describes the marketing channel of cassava from Non ITTARA site and from ITTARA site, respectively. These figures show that marketing channel of cassava is relatively simple. In Non-ITTARA site, middlemen buy cassava from farmers through either *tebasan*[4] system or ordinary transaction. They transport and sell it directly to large tapioca processing units. About 80 percent farmers sell their cassava through ordinary system, 10 percent through *tebasan* system, and only about 10 percent of them sell their cassava directly to the nearest tapioca processing unit due to the relative proximity.

In the ITTARA site, the majority of farmers directly sell their cassava to the small tapioca processing unit due to its proximity. Farmers can sell a small amount of cassava (e.g. 50 Kg) to local small processing unit. Only about 5 percent of them sell cassava to middlemen who occasionally visited the site in a situation when they cannot meet a certain quantity of cassava from other places to transport to large tapioca processing units. Most often the prices offered by local small-tapioca processing unit are higher than that offered by the middlemen who transport cassava to large tapioca processing units. This condition is caused by further distance to the large processing than to the local small processing unit.

(*Tebasan* System)

Figure 1. Marketing Channel of Cassava from non- ITTARA site

[4] In *tebasan* system, middlemen buy standing crop of cassava from farmers' field

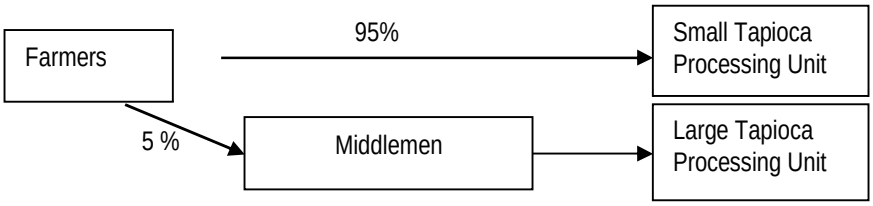

Figure 2. Marketing Channel of Cassava from ITTARA site

There are 58 active tapioca-processing companies in Lampung. Nonetheless, it does not mean that the market is competitive enough since sellers do not know the real weighing procedure and the way of determining starch content of cassava. Note that when a seller is not satisfied with a price offered by a buyer or a tapioca processing firm, it is not easy for a seller to shift to another buyer since it incurs additional transport cost.

In a peak harvest time, a serious problem often arises because middlemen have to wait in a long queue in front of the gates of tapioca-processing units. The waiting time may deteriorate the quality of cassava and in turn reduce the selling price to tapioca producers (see also Pakpahan and Nasution, 1992; Suryana and Daud, 1981).

It is clear from the above description that the market structure facing cassava farmers is oligopsonistic merely because they do not have adequate information concerning the way tapioca producers determine cassava price and starch content. When a farmer is dissatisfied with price deduction imposed by a processing unit, it is unlikely that he/she would go to another processing unit because it would entail additional transportation costs. This implies that tapioca producers are the price makers, while farmers and middlemen are price takers.

Table 6 shows that, in the major cassava marketing channel, a middleman in Non-ITTARA site pays Rp 35/kg on the average for the cost of a truck service to transport cassava from the farms to large tapioca processing units. An additional Rp 25/kg is required to load and unload. Hence, the middlemen profit is Rp 30/kg. It is considered worthwhile to note that processors' buying price for Non-ITTARA site is higher than that for ITTARA site because the middlemen have to get profit.

Because of middlemen's involvement in Non-ITTARA site, marketing margin in this site is higher than that in the ITTARA site. Consequently, marketing efficiency in the ITTARA site is higher than that in Non-ITTARA site. This is indicated by the proportion of farm gate price in ITTARA site which reached 74 percent of processor' buying price, while in the Non-ITTARA site the number is a mere 66 percent.

Table 6. Distribution of Cassava Marketing Margin by the Major Marketing Channels in the Study Sites in Lampung, 2004 (Rp/Kg)

Marketing margin and costs	Study sites			
	Non-ITTARA site		ITTARA site	
	Rp/kg	%	Rp/kg	%
1. Farm gate price	175	66	185	74
2. Processor buying price*	265	100	250	100
3. Marketing margin: (2)-(3)	90	34	65	26
4. Loading/Unloading (*ampera*)	25	9	30	12
5. Truck /oxcart or bicycle	35	13	35	14
6. Profit: (3)-(4)-(5)	30	11	0	0
7. Benefit/cost ratio: (3)/(4)+(5)	1.50	na	na	na
8. Generated income: (3)-(5)	55	21	30	10

Source: Primary data; Figures in parentheses are percentages to processors' prices. See Figures 2 and 3 for the major marketing channels. Na=not applicable.
*After price cut for starch contents (*rafaksi*).

Tapioca Processing Industry

Cassava production in Lampung is used primarily for both tapioca processing industry and *gaplek*/chip/pellet processing industry. Discussion in this section, however, is only confined to the former because the final users of all cassava produced by the sample farmers in this study is tapioca-processing industry. Discussion in this section will focus on the tree important aspects of industrial prospects: demand side of tapioca, supply side of cassava as raw material for tapioca production, and the profitability of tapioca processing industry.

From the demand side, tapioca-processing industry shows promising due to the fact that tapioca is used in many industries such as in food, textile, chemical and pharmaceutical industries. By-product of tapioca-processing industry (*onggok*) is also used for feed. Tapioca production in Indonesia increased from 536.7 thousand tons in 2001 to 629.3 thousand tons in 2002 or increased by 17 percent (Statistic of Medium and Large Industries, 2002). Most of cassava production in Lampung is used for domestic food industries and only 2.3 percent is exported. Table 7 indicates that export demand for tapioca fluctuates but it has a tendency to increase in the future. The export demands for dried cassava chips and tapioca have been drastically increasing since 2004 due to the Free Trade Agreement between Asean and China.

To describe the supply side of cassava for tapioca processing industry, it is worthwhile to scrutinize the relationship between monthly production and monthly prices of cassava in Lampung. The relationship is somewhat complicated in a sense that there

is no clear and consistent relationship between the two variables (see Figure 3). This is also indicated by a weak correlation between monthly production and monthly price of cassava in Lampung with a correlation coefficient of –0.1397.

Table 7. Export of Cassava Products from Lampung Province, 2001-2004

Products	Quantity (tons)				Value (000US$)			
	2001	2002	2003	2004	2001	2002	2003	2004
Dried cassava chips	9,697	9,936	6,686	24,764	582	638	451	3,489
Tapioca	12,809	14,595	13,116	170,541	1,991	2,544	810	30,399
Onggok flour*	19,128	12,874	641	64	871	580	65	8

Source: Office of Cooperatives, Industry and Trade, Lampung Province, Bandar Lampung, 2004.
**Onggok* is a by-product in tapioca processing.

Fluctuated production and price of cassava certainly affect the management of both farming and processing units. Fluctuated price do not encourage farmers to use new, high-yield clones with high starch content and, consequently, the productivity level of cassava remains low or far below its potential, which is expected to be greater than 30 tons/ha. For tapioca processing units, high-fluctuated production of cassava to some extent creates uncertainty in the supply of raw materials.

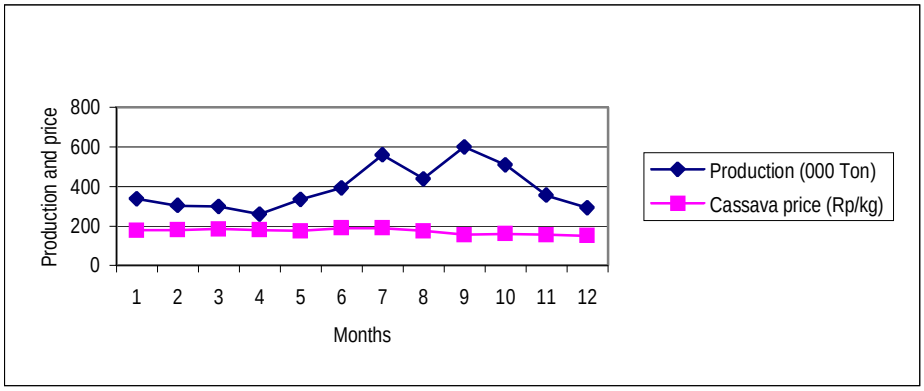

Figure 3. Monthly Production and monthly prices of cassava in Lampung, 2004
(Source of data: Office of Food crops and Food Security)

Tapioca-processing industry in Lampung is facing a problem of excess capacity because cassava production is not only used by tapioca processing industry but also by *gaplek*/chip/pellet processing industry. There are 49 tapioca-processing units and 12 *gaplek*/chip/pellet processing units in the area. The annual capacity of tapioca

processing units vary from 1,000 to 90,000 tons of tapioca per year, while the capacities of *gaplek*/chip/pellet-processing units range from 10,000 to 150,000 metric tons. The total capacity of tapioca-processing units is 1.2 million metric tons of tapioca per year, which requires around 6 million metric tons of cassava per year. The total capacity of *gaplek*/chip/pellet-processing units is 1.5 millions metric tons or equivalent to 4.5 million tons of cassava per year. Hence, the total amount of cassava needed by the two types of processing industry is around 10.5 million metric tons of cassava per year (Office of Food crops and Food Security, 2004). Since the total production of cassava is around 5 million metric tons per year, the two types of industry face an access capacity of 5.5 million metric tons per year. However, depending on the location of tapioca processing units, a few of tapioca-processing units may face excess capacity in particular months but excess supply of cassava in other months.

The aforementioned phenomenon indicates that prices created by the market mechanisms of cassava are unable to optimally coordinate marketing process from cassava farmers to the processing units. Pakpahan *et al.* (1992) found that large processing units may take great advantage from cassava transaction due to their strong networks. Middlemen and truckers may also get more benefit then do farmers because middlemen and truckers have better access to information. Consequently, the problem of excess supply takes place both monthly and yearly, and the production of dried cassava and tapioca is only around 20-50 percent of export quota (500,000 metric tons).

Table 8 shows that a large tapioca processing unit on the average requires 4,500 metric tons of cassava to produce 1,125 metric tons of tapioca, while a small tapioca processing unit requires 375 metric tons of cassava to produce 86 metric tons of tapioca. This implies that conversion factors from cassava to tapioca in large and small tapioca processing units are 0.25 and 0.22, respectively. To produce one ton of tapioca, a large and a small tapioca processing units require 1.37 and 11.6 man-days, respectively. In the other words, employment opportunity per unit of tapioca in small tapioca-processing unit is around 8.5 times as much as that in large tapioca-processing unit.

Summarized from Table 8, Table 9 indicates that the share of cassava in total return is the highest. Since large tapioca processing units use oven in drying tapioca, the share of other inputs (23%) is slightly higher than the share of firm's profit (22%). Conversely, since small tapioca processing units use solar heat in drying tapioca, the share of other inputs (8%) is much lower than the share of firms' profit (30%).

Although the average wage in Non-ITTARA processing units ought to be higher than in the ITTARA processing units, the share of labours in the ITTARA tapioca processing units is higher than that in Non-ITTARA tapioca processing units, either in absolute term or in relative term. This is because labour coefficient in the ITTARA units (0.0212 man-day/kg of tapioca) is much higher than that in Non-ITTARA units (0.0003 man-day/kg of tapioca). In both absolute and relative terms, the shares of labour, profit, and income generation in ITTARA units are higher that in Non-ITTARA units.

Table 8. Costs Structure, Profit and Income Generation of Large and Small Tapioca Production for One Month in Central Lampung, 2004

Items	Unit	Non-ITTARA (Large processing unit)			ITTARA (Small processing unit)		
		Quantity	Price/unit (Rp000)	Value (Rp mill)	Quantity	Price/unit (Rp000)	Value (Rp mill)
1. Output: Tapioca	Ton	1125	2150	2418750	86	2000	172500
By product (*onggok*)	Ton	358	325	116250	27	340	9324
Total returns	Month	1	na	2535000	na	na	181824
2. Raw material (cassava)	Ton	4500	265	1192500	375	250	93750
3. Other current inputs:							0
Diesel fuel	Lt	162800	2.3	374440	3750	2.4	9000
Kerosene	Lt	33100	1.2	39720	0	0	0
Others	Month	1	na	113350	1	na	3120
4. Fixed costs	Month	1	na	45340	1	na	2930
5. Labourers:							
a. Permanent labourers	Mm*	15	6630	99450	6	851	5106
b. Contract labourers	Mm*	47	2500	117500	34	400	13600
6. Profit:(1)-{(2) to (5)}	Month	1	na	552700	1	na	54318
7. B/C ratio: (1)/{(1)-(6)}	Month	1	na	1.28	1	na	1.43
7. Income generation: (5)+(6)	Month	1	na	769650	1	na	73024

Source: Field survey; *Mm=man-months; na=not applicable.

In relation to ecological environment, large-scale tapioca-processing units, particularly the large-scale units, create a problem of waste and waste disposal. Pakpahan and Nasution (1992) quoted that the industry generated 539,909 metric tons of solid waste and 11 million m^3 of liquid waste per year in 1987. The waste certainly reduces the water quality of local rivers and many of which have been already above allowable limit.

Table 9. Factor Shares of Each Input and Profit in Total Returns for Non-ITTARA and ITTARA Tapioca Processing Units per kg of Cassava, 2004

Items	Non-ITTARA (Large processing unit)		ITTARA (Small processing unit)	
	Rp/kg	%*	Rp/kg	%*
1. Total returns	563	100	485	100
2. Raw material (cassava)	265	47	250	52
3. Other inputs	127	23	40	8
4. Labours	48	9	50	10
5. Profit:(1)-(2)-(3)-(4)	123	22	145	30
6. Generated income:(4)+(5)	171	30	195	40

Source: This table is simplified from Table 8.
*Percents in total returns

Generation of Income and Employment in Cassava Commodity System

Economic development is but generating income and employment for the people in an economy and it is particularly essential in a country where poverty incidence is relatively high. It is therefore important that any program or development policy be evaluated on the basis of these criteria. For the purpose of this paper, the impact of small- scale tapioca processing unit development is analyzed by comparing small and large-tapioca processing units in generating income and employment.

To produce cassava per hectare and then market and process it into tapioca generate total income as much as Rp 8.416 in the ITTARA site and Rp 8.252 million in Non-ITTARA site. This implies that income generation in the two sites is not significantly different. Income generation in the ITTARA site is only 2 percent higher than that in Non-ITTARA site. Conversely, employment generation in ITTARA is 60 percent higher than that in Non-ITTARA site. In the other words, further development of small-scale tapioca processing unit would generate significant employment in rural area.

Output per hectare of any crop generates both employment and income not only in farming itself but also in marketing and processing. For cassava commodity systems, employment in farming is much higher than in either marketing or processing of farm output. It is also true in total income generation but the proportion of income generation in farming is lower than the proportion of employment generation in farming.

Table 10. Income and Employment Generation in Production, Marketing and Processing of Cassava Output per Hectare in the Sample sites, 2004

Stages	Employment generation (Man-days)		Income generation (Rp000)	
	Non-ITTARA site	ITTARA site	Non-ITTARA site	ITTARA site
Production	82	97	3159	3169
	(67)	(50)	(38)	(38)
Marketing	32	42	1239	1156
	(26)	(21)	(15)	(14)
Processing	8	56	3853	4091
	(7)	(29)	(47)	(49)
Total	122	195	8252	8416
	(100)	(100)	(100)	(100)

Source: Computed from Tables 5, 6, and 8; Figures in parentheses are percentages to the totals.

Impact of ITTARA Program on Farmers and Local Community

Shorter Marketing Channel and Higher Farm Gate price of Fresh Cassava

Comparison between Figure 2 and Figure 3 in section cassava marketing indicates that the ITTARA program may shorten the marketing channel of cassava and reduce marketing margin due to disappearing involvement of middlemen. Hence, although buying price by tapioca processing unit at the Non-ITTARA site is higher than that in ITTARA site, the farm gate price in ITTARA site is higher than that in Non-ITTARA site (see Table 6).

More Employment Opportunity

Employment generation in the ITTARA site is 60 percent higher than that in Non-ITTARA site. In the other words, further development of small-scale tapioca processing unit would generate significant employment in the rural area (see Table 10). Such significant employment generation would in turn considerably alleviate rural poverty.

Better Environmental Quality

So far, the large-scale tapioca processing units in Lampung have negatively affected the environment. In 1997, for example, from the total of 62 large-scale tapioca-processing units, 27 of them had wastewater treatment that met wastewater quality standards, 30 of them nearly satisfied the standards, while the remaining 5 units were far below the standards. In the ITTARA Program, each unit is equipped with several wastewater treatment units and tube wells such that the discharged wastewater satisfies quality standards (Asnawi, 2002).

Factors Determining the Success or Failure of ITTARA Units

Asnawi (2002) found that factors causing the failure of ITTARA units funded by the local government are numerous. Some of the factors are: (a) inadequate managerial and technical skills of human resources in managing the ITTARA units, (b) Insufficient investment capital and working capital, (c) Selections of location and farmers' groups responsible in managing ITTARA units are not properly planned, (d) the amount of tapioca produced has not been optimal due to insufficient equipment, (e) weak coordination among government institutions in locating ITTARA units, financing, and controlling them, (f) inadequate supervision from responsible government institutions and private companies that provide financial supports to the development of ITTARA units, and (g) many ITTARA units cannot operate optimally because of not having

sufficient working capital (see also anonymous, 2000). Unlike ITTARA units funded by the government and private companies, most of personally-funded ITTARA units can continue operating because they have adequate managerial and technical skills so that the establishment and operation of these units are carefully planned even without supervision from responsible government institutions (see also Hutagalung, 2000).

MAKING PUBLIC POLICIES WORK EFFECTIVELY FOR RURAL POVERTY ALLEVIATION

It has been convincingly demonstrated in this paper that, in terms of benefit-cost ratio and profit per unit of raw material, the operation of the existing small-scale tapioca processing units is financially more efficient than that of the large ones. The small-scale tapioca processing units also generate more income and employment than do the large ones. This implies that had ITTARA Program been successfully planned and implemented, it would have significantly reduced poverty in rural areas. Unfortunately, however, many ITTARA units particularly the ones funded by provincial government have been collapse due to many constraining factors (see section factors determining the success of failure of ITTARA units).

These constraining factors can be reduced considerably if all individuals involved in managing ITTARA units are accountable in a sense that they work in a full time basis in managing the ITTARA units under clear 'rules of the game' with transparent reward and punishment. It is worthwhile to note that local communities in general deem government programs encouraging economic activities to reduce rural poverty as charities such that accountability of those who are involved in management (e.g. management of ITTARA units) is questionable. For example, in several cases of ITTARA units, the managers distribute the profit of ITTARA among management staffs without considering that a part of the profit should be saved for costs of depreciation, equipment parts, and for increasing working capitals. They might expect that the government would provide another new fund if they were running out of working capital. By contrast, the managers of personally funded ITTARA units work carefully day-to-day to improve performance and enhance profit because they are exceptionally concerned with their investment.

To avoid such failures of poverty alleviation programs, the government should apply participatory approach in all stages (planning, implementation, monitoring and control, and evaluation) of the programs. In the case of ITTARA Program, for example, all members of farmers' groups should participate in all stages such that deviations from guidelines and objectives of the program can be minimized as far as possible because the core notion of participatory approach is nothing but transparency. Participatory approach might be more costly than is "centralized approach" because it entails more time, budgets, and human resources from government institutions responsible in

providing guidance and training for local community, but participatory approach would be more effective in achieving the goal of poverty alleviation programs. To rehabilitate the collapsed ITTARA units, the government may offer the rehabilitation to local community through participatory approach or, if it is unlikely, the government may offer the rehabilitation to private companies.

REFERENCES

Anonymous, 2000. Evaluasi Terhadap Pelaksanaan Program Industri Tepung Tapioka Rakyat (ITTARA) di Lampung. Tim Pengelola ITTARA Lampung, Yayasan Pengkajian dan Pemberdayaan Masyarakat Komunitas Hayati Indonesia, Bandar Lampung.

Asnawi, R. 2002. Potensi Pengembangan Ubikayu dan Industri Tepung Tapioka Rakyat (ITTARA) Terhadap Pembangunan Wilayah Lampung. Thesis, Graduate Program, Bogor Agriculture University (IPB), Bogor.

Hutagalung, L. 2000. Analisis Pemecahan Masalah-Masalah dalam Kebijaksanaan Pembangunan Petanian di Propinsi Lampung. Loka Pengkajian Teknologi Pertanian Natar, Lampung.

Kawagoe, T., K. Fujita, S. Yokoyama, W. Sudana, and A.K. Zakaria. 1990. Role of Secondary Crops in Employment Generation: A Study in a Rain-fed Lowland Village in Java. CGPRT No.23, CGPRT Centre, Bogor.

Pakpahan, A., and A. Nasution. 1992. Major Problems in Cassava Marketing in Lampung. *In* Pakpahan, A., M. Gunawan, A. Djauhari, S.M. Pasaribu, A. Nasuiton, and S. Friyatno (eds): Cassava Marketing in Indonesia. Monograph Series No. 2 CASER, Bogor.

Suryana, A., and L.A. Daud, 1981. Telaahan Sistem Produksi dan Tataniaga Ubikayu di Lampung. Centre for Agro-Economic Research, Bogor.

Zakaria, W.A. (2001). Analisis Penawaran dan Permintaan Produk Ubikayu di Propinsi Lampung. Doctorate Dissertation, Program Pascasarjana, Bogor Agriculture University, Bogor.