Proceeding of the 3rd International Conference on Poverty and Sustainable Development, Vol. 3, 2016, pp. 44-53

ISSN: 2362-1028 online
DOI: https://doi.org/10.17501/icpsd.2016.3105

ROLE OF CASSAVA FORRURAL HOUSEHOLD'S ECONOMY IN SOUTH KALIMANTAN

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Abstract: Cassava has a prospect to be developed in marginal land of South Kalimantan. Farmers still use local variety with simple production technique. They cultivate cassava as an intercropping crop of oil palm or rubber plants. With 'surjan' system, cassava production was 4-5 tonnes/ha. It has a prospect to be increased with the use of superior variety and improved production technique. Study aims to determine the role of cassava for rural household's economy. Data obtained from study literatures (desk study) and survey then be analyzed descriptively quantitative and qualitative. The use of local variety with simple production technique resulted profit IDR 13 million/ha with B/C ratio 1.8. Cassava farming was contributed 18.18% to household's total income. In small amount, businness on cassava cuttings and cassava-based traditional food products processing has added income for some households. There are some homescale cassava-based agroindustries in South Kalimantan for instance crackers, chips, and modified cassava flour. Eventhough cassava farming's contribution to household total income is categorized as low contribution value, its role for household's economy is still important particularly when it is developed into cassava processing agroindustriesin centers of cassava production due to the agroindustries provide high added value, high profit, efficient, and feasibility to be done.

Keywords: Cassava, Rural Community, Economy, Agroindustry, South Kalimantan

Introduction

Along with the increase of population, livestock population, and the development of primary and secondary agroindustries in the future, demand of various tuber crops particularly cassava and sweet potato as raw materials of bioindustries increase up to 30 – 35% a year (Indonesia Directorate General of Food Crops, 2012). In 2025, domestic demand of cassava is predicted will increase up to 30 million tonnes fresh cassava, therefore it needs production increase around 27% per year, but on the other hand cassava planting areas decrease 0,5% per year (Suryana, 2006). Indonesia can export fresh cassava and some products of cassava (flour, shredded, and pellets), but at the same time still import the same and other products of cassava, and evensince 2010 Indonesia became a net importer country of cassava (Simatupang, 2012). This condition should be responsed with cassava production improvement through intentification as well as extentification.

A lack of adequate arable land induced the extending cassava planting areas to marginal land such as tidal land and acid dry land. Tidal land is potential for cassava development yet it still faces several inhibiting factors in form of physico-chemical properties namely soil waterlogging, soil physical condition, high soil acidity, toxic substances (Al, Fe, and H_2S) present, salt water intrution, and low soil fertility as well as biological property such as weeds (Sarwani, et al., 1994; Adimihardja et al.1998; Mubekti, 2010). The lack condition of tidal land however cassava productivity has a prospect to be increased (Notohadiprawiro and Maas, 2006) with improvement on production techniques physically as well as chemically due to cassava has an acidity resistent characteristic (Howeler, 2002).

In South Kalimantan, cassava planting areas in tidal land are mainly in C and D type. Mostly farmers use 'surjan' system where they make 'balur' as the upper

side of land and planting cassava there, while the lower sideis planted with local paddy. 'Surjan' system as can be seen in Figure 1. Period of cassava planting in South Kalimantanis October to August. Farmers use local varieties for instance Kristal, Papah Merah, Mentik, Tahunan, Bali, and Merado. All varieties have low HCN content (14-18%) with high total sugar content (30-37%) therefore they are suitable for consumption.With 'surjan' system, cassava production was 4-5 tonnes per hectare (Saleh, et al., 2011). The production was very low compared to the average national casssava production was 20.2 tonnes per hectare (Prasetiaswati and Elisabeth, 2016). Beside 'surjan' system (intercropping with local paddy), farmers also cultivate cassava as an intercropping crop of young oil palm and rubber plants (1-3 years old).

Figure 1 'Surjan' system of cassava planting (Source: Yanti, 2015)

The largest area of tidal land in South Kalimantan is in Barito Koala Regency (Saleh, et al., 2011).The regency is the biggest paddy producer in South Kalimantan and contributes around 16.23 percents of South Kalimantan's paddy demand. Almost all sub-regency in Barito Koala are centrals of paddy. In 2009, data of other food crops production in Barito Koala were maize 89 tonnes, groundnut 38 tonnes, and cassava 4,555 tonnes.

Analysis on land suitability resulted that mostly land in Barito Koala categorized as marginal suitable for food crops cultivation i.e. 198,012 hectares for paddy and 156,344 ha for cassava (Mubekti, 2010); while for horticultures, citrus, rambutan tree and pineapple as well as plantation crops of palm oil, coconut, and rubber were categorized as rather suitable in Barito Koala. Some areas in Barito Koala produced cassava are Wanaraya (21.19%), Barambai (21.19%), Mekarsari (14.34%), Rantau Badauh (14.03%), Anjir Pasar (7.79%), Belawang (7.16%), Mandastana (6.54%), Marabahan (4.04%), Alalak (3.12%), Tamban (0.31%) and Tabunganen (0,31%) [http://bappeda.baritokualakab.go.id/index.php/data/sda/pertanian].

The use of superior varieties with high yield potency, combined with good cropping technique as well as effective and efficient pest and disease controlling technique can improve cassava production. For instance, in 2015, Iletri has introduced CMM 2048-6 strain and Ketan Jabung variety with high yield potency. Based on sensory characteristics, farmers like Ketan Jabung variety, but due to a custom factor where they used to use local variety for a long time, farmers still most prefer to the local one. Farmers mentioned that Ketan Jabung could be a second choice after the local variety in consideration to its high productivity and the shorter age in harvesting compared to local variety (Sudaryono et al., 2015). In their traditional cropping technique, farmers did not use inorganic fertilizer for cassava, eventhough some of them still use 200 kgs Phonska and 200 kgs SP36

per hectare.The combination of the use of recommendation fertilizer application (200 kgs Urea, 100 kgs SP36, and 100 kgs KCl per hectare) and superior strain of CMM 2048-6 resulted higher production up to 30-35 tonnes/ha. With total profit was IDR 32-40 milllions per hectar and B/C ratio was 2.6-3.3, cassava farming was feasible to be done.

The study aims to determine the role of cassava for rural household's economy in South, particularly in Barito Koala Regency.

Methodology

Location of study was in Barito Koala Regency in South Kalimantan. Study was conducted in 2016.. Data used were secondary data from previous research and related literatures as well as from primary data (interviews result). Research method used were desk study and survey. Survey used semi-structured interviews method using interviews guidance and involving 28 cassava farmers were selected by simple random method. The survey was used for analysis of total income distribution.

Some data obtained were: (1) characteristics of cassava farmers and cassava farming in Barito Koala; (2) LQ analysis for cassava commodity; (3) economic feasibility of cassava farming (4) contribution of cassava farming to households' total income; (5) Lorenz curve and Gini coefficient for distribution of household total income; and (6) homescale cassava-based agroindustries in Barito Koala. Data obtained then will be analyzed descriptively quantitative and qualitative.

Analysis of superior agricultural commodities using Location Quotient (LQ) Analysis (Miller and Wright, 1991 in Darmawansyah, 2003)

LQ = $\frac{pi\,/pt}{Pi\,/Pt}$, where:

pi = GDRP of commodity i in regency level
pt = GDRP pf food crops commodities in regency level
Pi = GDRP of commodity i in province level
Pt = GDRP of food crops commodities in province level

Indicator:
- LQ < 1 = bases sector (commodity has comparative advantage in region)
- LQ = 1 atau LQ < 1 = non-bases sector

Analysis of total income distribution (using Lorenz curve and Gini coefficient)

Model of Gini coefficient analysis: (Widodo, 1990 in Suharyanto et al., 2004)

$GC = 1 - \sum_1^n . f1(Yi\text{-}1 + Y1)$, where:

GC= Gini coefficient (0 < GC < 1)
Yi = cumulative proportion of farmer's income in class i
Yi-1 = cumulative proportion of farmer's income before class i
f1 = Proportion of number of farmers in class i
n = number of class

Criteria of Gini coefficient (World Bank in Hananto, 1980):
- 0.50 – 0.70 = high inequality
- 0.36 – 0.49 = medium inequality
- 0.20 – 0.35 = low inequality

Result and Discussion

Characterictics of cassava farmers and cassava farming in Barito Koala Regency

Table 1 and 2 present characteristics of cassava farmers and cassava farming in Barito Koala Regency. In average, only one fifth land owned by farmers was used for cassava farming (Table 2). Farmers implement intercropping system for their cassava farming. For fresh cassava marketing, farmers used to sell cassava to middlemen than directly to consumers due to mostly cassava from Barito Koala was distributed to supply cassava-based home industry demand for instance crackers and chips homeindustries.

Table 1 General characteristics of cassava farmers in Barito Koala Regency (Prasetiaswati and Elisabeth, 2016; Elisabeth and Prasetiaswati, 2016)

Description	
Age (average)	45,6 years old
Education level (average)	7,7 years
Side job	Animal breeders, labours, enterpreneurs, small traders
Number of family member (average)	3,6 people
Cassava farming experience (average)	13,2 years

Table 2 General characteristics of cassava farming in Barito Koala Regency (Prasetiaswati and Elisabeth, 2016; Elisabeth and Prasetiaswati, 2016)

Description	
Average of land ownership	2.05 ha
Type of land	plantation (45.0%), paddy field (38.33%), moor (1.67%), yard (15.00%)
Status of land tenure	Own by themselves
Average of cassava harvested area	0.37 ha
Average of cassava planting area	0.41 ha
Average of intercropping area for	
a. Palm oil plants	0.55 ha
b. Rubber plants	0.40 ha
c. Others (involving 'surjan' system)	0.69 ha
Average of cassava production	4.61 tonnes
Average of cassava productivity	12.37 tonnes/ha
Fresh cassava selling price	1,000-2,000 IDR/kg (7-15 cents/kg)
Fresh cassava marketing	
a. Middleman ('tengkulak')	92.59%
b. Consumer	7.41%
Location of selling	
a. Buyer come to the planting area	92.59%
b. Traditional market	7.41%

For cassava farming, farmers prefer to use local varieties of Kristal (96.43%) and Papa Merah (3.57%). The need of cassava cuttings was 20,000-24,000 cuttings/ha with 90-95% growth viability. Farmers obtained the cuttings from their previous own production or bought from other farmers with price of IDR 25 per cutting. Farmers prefer to use local varieties in consideration that the local cuttings were easily to get, it should be a custom for them to cultivate the local, and the yield of local was easily to be marketed. Characteristics of local cassava are white-fleshed cassava with brown outer skin and easy to peel. However, the local cassava has some weaknesses in term of low productivity, small-size tubers, and lengthy time for harvesting (11 months) (Prasetiaswati and Elisabeth, 2016).

Moreover, based on study of Prasetiaswati and Elisabeth (2016), some purposes of cassava farming in Barito Koala Regency were for (1) food supply only (9.4%); (2) food and income (33.8%); (3) income only (31.2%); (4) cropping pattern annualy (6.7%); and (5) utilizing vacant land (18.9%). It impplies that farmers still depend on cassava farming particularly as an income source.

L/Q analysis for cassava commodity

Table 3 showed GDRP of cassava commodity and GDRP of food crops in Barito Koala Regency and South Kalimantan from the period of 2009 up to 2012 (4 years). Data in Table 4 then be used to identify superior agricultural commodity with L/Q analysis. Based on LQ analysis for cassava commodity, the value which is less then 1 (Table 4)implied that cassava is categorized as non-bases commodity. Cassava does not have a comparative advantage in Barito Koala Regency.

However, cassava still has a prospect to be developed.Barito Koala which the area mostly is tidal land with acid soil in some considerations that (1) mostly land in Barito Koala are categorized as marginal suitable for food crops cultivation (paddy and cassava) (Mubekti, 2010); (2) in tidal land, cassava productivity can be increased with improvement on production techniques physically and chemically (Notohadiprawiro and Maas, 2006); and cassava has a characteristic resistent to high acidity (Howeler, 2002). Those conditions indicated there is still a chance for cassava productivity improvement as well as cassava farmers' income improvement.

Table 3 Cassava production and GDRP in South Kalimantan and Barito Koala Regency (Wulan et al., 2014)

Commodity/ Year	2009	2010	2011	2012
Barito Koala Regency				
Production of cassava (tonnes)	4,551	4,855	4,084	4,187
GDRP of cassava (x IDR 1,000,000)	4,224.83	4,507.04	3,791.30	3,886.92
GDRP of food crops (x IDR 1,000,000)	885,245.51	869,153.80	903,994.95	964,074.87
South Kalimantan				
Productiom of cassava (tonnes)	121,656	76,202	86,504	90,043
GDRP of cassava (x IDR 1,000,000)	112,936.91	70,740.60	80,301.26	83,589.62
GDRP of food crops (x IDR 1,000,000)	5,509,088.21	5,158,338.06	5,652,764.85	5,789,018.98

Table 4 Identification of superior agricultural commodity with LQ analysis in Barito Koala Regency

Commodity	Period of 2009 up to 2012
Barito Koala Regency	
Average GDRP of cassava (x IDR 1,000,000)	4,102.523
Average GDRP of food crops (x IDR 1,000,000)	905,617.283
South Kalimantan	
Average GDRP of cassava (x IDR 1,000,000)	86,892.098
Average GDRP of food crops (x IDR 1,000,000)	5,527,302.525
LQ value	0.29
Indication	Non-bases commodity

Economic feasibility of cassava farming

Almost 85% component of cassava farming production cost was released for labor cost (Table 5) due to for existing cassava farming in Barito Koala, farmers usually just paid input cost for local cassava cuttings buying purpose and only some farmers also paid for inorganic fertilizers or it can be said that the use of inorganic fertilizers for cassava farming was not a common for farmers in Barito Koala. By this very simple or traditional cassava farming implementation, it was no doubt that the production of cassava is very low. With the production of 13.50 tonnes/ha, the profit IDR 13,078,750, and B/C ratio 1.8 meant that existing cassava farming is feasible to be done, however, compared to improvement technique in cassava farming of Sudaryono et al. (2015) which was combined the use of superior strain and recommendation fertilizer application, the production as well as the profit of existing one was very low. By Sudaryono et al. (2015) research, cassava production could be increased up to 30-35 tonnes/ha, with total profit was IDR 32-40 milllions per hectar and B/C ratio was 2.6-3.3.

Table 5 Economic feasibility of cassava farming (per ha) (Prasetiaswati and Elisabeth, 2016 - data processed)

Description	
Input (cuttings, fertilizer)	IDR 1,081,250

Labor (land preparation up to harvesting)	IDR 6,090,000
Production cost	IDR 7,171,250
Production	13.50 tonnes/ha
Price	1,500 IDR/kg
Revenue	IDR 20,250,000
Profit	IDR 13,078,750
R/C ratio	2.8
B/C ratio	1.8

Contribution of cassava farming to households' total income in Barito Koala Regency

Based on Milasari et al. (2015), contribution value of cassava farming incomewas calculated by comparing income from cassava farming with household's total income. There are five categories of contribution value, i.e. (1) very low (< 20%); (2) low (20-40%); (3) medium (41-60%); (4) high (61-80%); and (5) very high (> 80%). With total income from cassava farming, both from on-farm and off-farm sectors was IDR 7,335,900 (Table 6), the contribution of cassava farming to household total income was categorized as very low (Table 7) implied that farmers can rely their income not only on cassava farming, but also on other farming activities in on-farm sector, as well as on off-farm and non-farm sectors.

Data of poverty line for South Kalimantan Province issued by Indonesia Central Bureau of Statistics (2015) was IDR 352,972/capita/month for rural and IDR 371,793 per capita per month for urban. With total income IDR 11,016,420 per capita per year (Table 7) or IDR 918,035 per month, it was indicated that farmers in Barito Koala Regency actually live in a very good level of welfare.

Table 6 Average household's income from cassava farming (Elisabeth and Prasetiaswati, 2016)

Description	IDR
On-farm sector (average harvested area = 0.37 ha per farmer)	7,210,100
Off-farm sector	
a. Cassava cuttings	74,290
b. Home-industry cassava-based traditional food products	71,430
Total	7,335,900

Table 7 Contribution of cassava farming to households' total income (Elisabeth and Prasetiaswati, 2016)

Description	IDR	Percent of contribution
On-farm sector		

a. Cassava farming		7,210,180	18.18
b. Non-cassava farming		6,030,710	15.21
1. Palm oil	1,285,710		
2. Rubber	2,695,000		
3. Others	2,050,000		
c. Livestock		2,292,860	5.78
Off-farm sector		12,568,220	31.69
Non-farm sector		11,557,140	29.14
Total income per farmer's household		39,659,110	per year
Total income per capita		11,016,420	per year

Lorenz curve and Gini coefficient for distribution of household total income

Based on Lorenz curve (Fig 2), Gini coefficient obtained was 0.32. The coefficient was involved in

low inequality criteria with coefficient range 0.20 up to 0.35 (World Bank in Hananto, 1980; Todaro 1981 in Mantau, 2011).

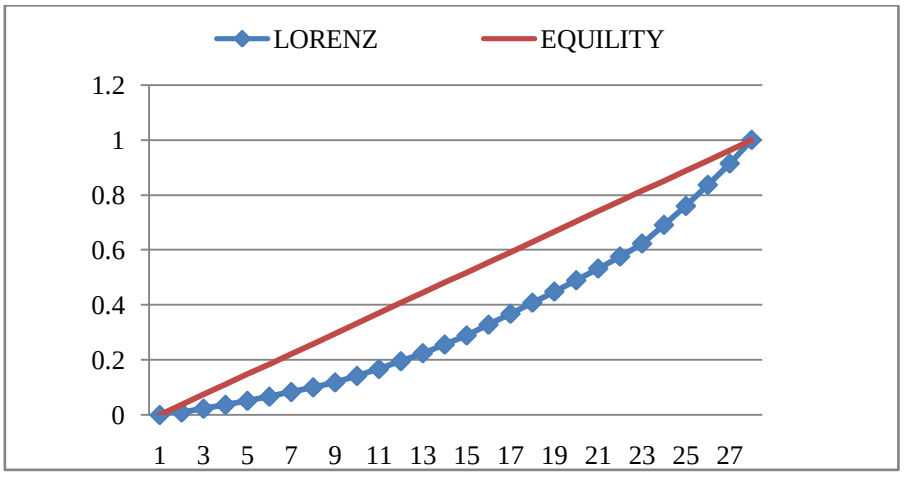

Figure 2 Lorenz curve of distribution of household total income (Source: Primary data analysis)

Inequility on cassava farmer households income could be happened due to low income from on-farm sector. Mostly farmers in Barito Koala cultivate cassava as an intercropping crop with young plantation tree of palm oil and rubber. Farmers prefer to plant cassava as intercropping crop because it does not need intensive care. Besides, nowadays, the price of palm oil and rubber commodities are falling therefore farmers prefer to find out additional income from outside on-farm sector as labors, traders, entrepeneurs or employees instead of manage their land. For farmers who still focus on on-fam sector, they will shift their preference to horticultures considering that horticultures are more profitable and fast money maker.However, there was an exceptional for farmers with large cassava-planted area. They usually will conduct more intensive cassava cropping pattern so they can obtain higher income from cassava farming.

Homescale cassava-based agroindustries in Barito Koala Regency

Rukmana (2007) stated that the minimum use of superior varieties and simple cropping techniques in farmers level resulted the low cassava production and productivity. Therefore, the growth of agribusiness in form of cassava processing in centers of cassava production can be taken to increase added value and encourage product diversification as well as price stability. Homescale industries are necessary to provide employment and income distribution (Todaro, 1994).

There are three cassava-based agroindustries are being developed in Barito Koala Regency, namely: (1) cassava crackers in Rantau Badauh; (2) cassava chips in Barambai; and (3) modified cassava flour in Alalak.

(1) Cassava crackers home-industry in Rantau Badauh

In Sungai Gampak village of Rantau Badauh, cassava crackers home-industry involved 50 households with the need of cassava was 120 tonnes/month. Fresh cassava was obtained not only from village own production, but also from outside such as from Barambai Regency. Yield of cassava crackers was 30% meant that 1 ton fresh cassava equal to 300 kgs raw crackers.

As a home-industry, cassava crackers producers in sungai Gampak had simple marketing chain, that is raw materials came from cassava farmers in Barambai through cassava traders in village, then the cassava bought by crackers producers and after processed into raw crackers, the product was bought by marketeer from Banjar that furthermore sold the product to retailers from Sampit, Samarinda, Palangkaraya, Batulicin, and Kapuas (outside South Kalimantan).

Based on Elisabeth and Prasetiaswati (2016[b]) study, cassava crackers home-industry in Sungai Gampak provide rather high added value with added value ratio 35.75%, efficient, profitable with rate of profit 75.91%, and has good prospect for development with R/C ratio 1.38. Hubeis in Hermawatie (1998) categorized added value ratio into three criterias i.e. (1) low (<15%), (2) medium (15-40%), and (3) high(>40%) therefore cassava crackers home-industry in Sungai Gampak was categorized as medium added value industry.

(2) Cassava chips home-industry in Barambai

Chips home-industry in Barambai was located in Barambai Kolam Kiri village. Yield of cassava chips was 25-30% and the home-industry produced ready-to-eat cassava chips. Fresh cassava was supplied by farmers around village. As small industry, there are some constraints faced by producers such as limitation in marketing reach and a lot of competitors for the product

Cassava chips home-industry provide high added value, efficient, profitable, and has good prospect for development with added value ratio 63.13% (high category), rate of profit 90.79%, and R/C ratio 2.67 (Elisabeth and Prasetiaswati, 2016[b]).

(3) Modified cassava flour home-industry in Alalak

Modified cassava flour is a modification of traditional cassava flour using microorganisms (lactic acid bacteria). By doing the modification, characteristics of cassava flour will look like characteristics of wheat flour therefore the modified cassava flour can substitute the use of wheat flour in food products processing. Yield of modified cassava flour was 22-33%.

Modified cassava flour home-industry in Alalak was located in Berangas Tengah village. This kind of home-industry was relatively new in South Kalimantan and there was still a fe competitors. The home-industry was built since 2014 and managed by women farmers group. Fresh cassava was supplied by farmers among Barito Koala Regency. The home-industry not only produced flour, but also food products based on modified cassava flour such as brownies, bakery, snacks and cookies. The production of both flour and food productsstill depends on order from food producers, catering, and local government office. However, in small capacity, flour, brownies, and snacks have been sold continuously at minimarkets in capital of regency and capital of province.

As two previous cassava-based home-industries, modified cassava flour home-industry provide high added value, efficient, profitable, and has good prospect for development with added value ratio 42.78% (high category), rate of profit 67.53%, and

R/C ratio 1.36 (Elisabeth and Prasetiaswati, 2016[b]). However, based on R/C ratio, it can be seen that cassava chips home-industry is more prospective and profitable than crackers and modified cassava flour industries.

Conclusion

1. When marketed in form of fresh tuber, cassava has very low conribution to farmer household's total income (18.18%) and involved in non-bases sector (LQ = 0.2), meant that cassava does not have a comparative advantage in Barito Koala Regency, South Kalimantan although cassava farming is feasible to be done (B/C ratio = 1.8).

2. However, cassava still has a prospect to be developed in tidal land with acid soil due to (1) cassava has an acidity resistent characteristic; (2) mostly land in Barito Koala are categorized as marginal suitable for food crops (paddy and cassava); (3) its productivity can be increased with the improvement of production techniques (use superior varieties and improvement on fertilizer application which is resulted B/C ratio 2.6-3.3); and (4) farmers still depend on cassava farming for income (31.2%) and both for food supply and income (33.8%).

3. Due to farmers still prefer cultivate local variety of cassava (customfactor), cassava production in farmers level is still low. And due to low cassava production and productivity, agribusiness in form of cassava processing in centers of cassava production can be taken to increase cassava added value and encourage product diversification and price stability. Cassava-based food agroindustries developed in Barito Koala are crackers, chips, and modified cassava flour. These agroindustries have prospect to be developed due to they provide high added value, profitable, efficient, and feasible to be done.

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