Journal of Sustainable Development; Vol. 8, No. 1; 2015
ISSN 1913-9063 E-ISSN 1913-9071
Published by Canadian Center of Science and Education

Profitability and Value Addition in Cassava Processing in Buton District of Southeast Sulawesi Province, Indonesia

Haji Saediman[1], Asmiati Amini[2], Rosmawaty Basiru[1] & La Ode Nafiu[3]

[1] Dept of Agribusiness, Faculty of Agriculture, Halu Oleo University, Kendari, Indonesia

[2] Batauga Subdistrict Extension Office, Batauga, Sulawesi Tenggara, Indonesia

[3] Dept of Animal Production, Faculty of Animal Husbandry, Halu Oleo University, Kendari, Indonesia

Correspondence: Haji Saediman. Dept of Agribusiness, Faculty of Agriculture, Halu Oleo University, Kampus Bumi Tridarma Anduonohu, Kendari 93232 Sulawesi Tenggara, Indonesia. Tel: 62-813-5632-0088. E-mail: saediman@yahoo.com

Received: December 9, 2014   Accepted: December 19, 2014   Online Published: January 29, 2015

doi:10.5539/jsd.v8n1p226   URL: http://dx.doi.org/10.5539/jsd.v8n1p226

Abstract

This study was carried out to examine profitability of and value addition from cassava processing into *kaopi* based on the type of graters being used. A two-stage random sampling technique was employed to obtain primary data from 53 respondents selected for this study. Data were analyzed using cost and return analysis, R/C ratio, Break Even Point, and production structure. The study revealed that cassava processing into *kaopi* is profitable and a significant value adding process, but the level of profitability and value addition is higher for processors using mechanized grater than those using manual one because the former can reduce processing costs, process higher volume of raw materials, and produce more output with greater efficiency. In view of its potential for attainment of food security, and income and employment generation, it is recommended that processors who currently use manual grater shift to mechanized grater since the time and money saved can be put into other economic use and family welfare.

Keywords: cassava, cassava processing, Indonesia, profitability, value addition

1. Introduction

Cassava is a major calorie source, especially for poor people, and is a staple food for many in Indonesia. It is grown in all provinces in Indonesia with the main producing areas being in Java and Sumatera. With the issuance of Law on Energy No 30/2007, the new role of cassava as an alternative source of energy has led to competition in the use of cassava for food, feed, and fuel (Salim & Nuryanti, 2011; Simatupang, 2012). Dixon (1982) estimated that in Java approximately 65% of cassava production was used for human consumption, which is mainly in the form of fresh tuber, *gaplek* (dried cassava) and *oyek* (mixed with rice). In West Java, about 80% of cassava was consumed in the form of fresh boiled tuber.

Cassava is the third important staple after rice and corn (Darwis, Muslim, & Askin, 2009). In general, Indonesian people preferred rice over other staples, and increasing average income led to decreasing cassava consumption (Dixon, 1982; Eng, 1998). Kuntjoro, Kusnadi & Sayogyo (1989) and Simatupang (2012) stated that cassava is regarded as an inferior food. As staple, cassava is consumed as a substitute for rice, such as when rice price is high during pre-harvest period (Suprapti, 2005). Nevertheless, because poor people consume more non-rice carbohydrate food staples compared to non-poor, and rural people consume more carbohydrate staples than urban people, cassava plays a substantial role in increasing food availability in rural areas in many districts. At the same time, considering the likely reduced rice supplies in the long run due to leveling off of rice production and productivity in the face of high population number of 260 million people, the government of Indonesia has taken measures to reduce dependence on rice through a food diversification program focusing on non-rice staples, especially cassava. Despite the low performance of food diversification program (Widyanti, Sunaryo, & Kumalasari, 2014), the implementation of the program itself has basically acknowledged the significant role of cassava in promoting food security in the country, particularly in areas where it has been planted and consumed for a long time.

In Buton and Wakatobi districts in the province of Southeast Sulawesi, cassava has become the main subsistence crop for generations. In Buton district, cassava is grown in subsistence farming with a rotation with corn and legumes. Cassava fits well into farming systems because the area has low soil fertility and little irrigated land. It suits with the condition of the smallholder farmers because it is available all year round and more resistant to drought, pests and diseases. Compared to other food crops especially rice, cassava production itself is much simpler, requires less labor, and does not require much attention during growth (Eng, 1998). For this reason, despite wide availability of rice due to emphasis of food policy on rice and distribution of *raskin* (subsidized rice for the poor) program, cassava remains a major staple food in rural areas in Buton.

With respect to cassava consumption, people in Buton processed cassava first into *kaopi*. Processing of cassava into *kaopi* is done through peeling, washing, grating, pressing, dewatering and fermenting, which are similar to the first several steps in *gari* making in Africa (Okorji, Eze, & Eze, 2003; Oti et al*.,* 2010; James et al., 2012). At the end of dewatering and fermenting stage, the dewatered cassava mash will become a solid cake, which is called *kaopi. Kaopi* can be stored for some time until needed for use. For consumption, *kaopi* is broken up and *kaopi* granules are steamed in a cone-shaped basket made of coconut leaf that is put in a pot containing a small amount of water. The steamed food is called *kasoami*, and is the most popular staple food consumed from cassava. In the study area food dishes are usually prepared using *kasoami* as the basic ingredient to which is added fish, vegetables, or other protein sources.

Kaopi processing reduces cassava perishability and toxicity, improves the storage life of the product, and enhances its value (Okorji et al., 2003). In addition, *kaopi* processing could actually be one of the answers for measures to develop new food forms of cassava consumption that do not have negative images and negative expenditure elasticities. At the same time, *kaopi* potential as a source of income and food supply is in line with efforts of ensuring food security, promoting food diversification, and contributing positively to poverty alleviation. Unfortunately, Indonesia has yet to tap this full potential. Descriptions of the traditional methods used to prepare foods from the cassava roots are mostly based in and oriented to areas in Java and Sumatera. Documentation and studies regarding *kaopi* processing are absent and empirical data on its value addition are lacking. This study was done to fill this gap with the main objective being to evaluate the economic potentials of cassava processing into *kaopi*. Specifically, the study aims to analyze the cost and return of, and the value addition from, cassava processing into *kaopi*.

2. Method

The study was carried out in April-June 2012 in Batauga subdistrict of Buton District in Southeast Sulawesi Province, Indonesia. Buton district is located between the coordinates 4°56' – 6°25' of south latitudes and longitudes 122°0' - 123°34' east. Batauga subdistrict is located in the southern part of Buton Island, and has a size of 68.83 km^2. The average temperature varies between 29^{o}C and 32^{o}C, while mean annual rainfall is between 1,411 mm and 2,000 mm. The major economic activity of the inhabitants is agriculture. The main food crops grown are cassava, upland rice, corn, and sweet potato. Like any other areas in Indonesia, the subdistrict has a tropical climate marked by dry and rainy reasons. The subdistrict consists of 12 villages. It has 15,672 inhabitants, consisting of 3,858 households. All these villages produce cassava and process it into *kaopi* for human consumption.

Data and information were collected using interview method based on the questionnaire. Data collected in the interview schedule included socio-economic characteristics of processors, processing operations, price, inputs, output, and revenue of processing operation. Interviews were done with processors supported by direct observations of processing techniques and local markets.

The data were mainly from primary sources collected from 53 processors selected using two stage sampling technique. In the first stage, out of 12 villages six (6) cassava processing villages were randomly selected. The second stage involved the random selection of cassava processor from each of the villages, making a total of 53 respondents. Subdistrict Extension Office provided the sampling frame from the list of 234 cassava processors residing in the subdistrict.

Data were analysed using cost and return analysis, R/C ratio, Break Even Point (BEP), and value addition analysis. The analysis was made on the basis of the type of grater used in the study area, namely mechanized and manual graters.

(1) Cost and return analysis was performed as follows:

a. Revenue: TR = P x Q, where TR = Total Revenue, P = Price of output and Q = Quantity of output

b. Cost: TC = FC + VC, where TC = Total cost, FC = Fixed cost; and VC = Variable cost

c. Profit: NP = TR – TC, where NP = net profit

(2) R/C ratio; R/C ratio is a ratio of total revenue to total cost used to understand the profitability of processing operation. The criteria are as follows: R/C > 1 = profitable, R/C = 1 = neither profitable nor loss, and R/C < 1 = not profitable

(3) Break Even Point (BEP)

Break-even Point is the point at which cost and revenue are equal: the processor or the enterprise generates neither a profit nor a loss on operating activities. BEP in units is calculated by dividing the BEP in sales rupiah by the selling price of output per unit. BEP in sales rupiah was calculated using the following formula:

$$Break\ Even\ Point\ (Rp) = \frac{Fixed\ Cost}{\left(1 - \frac{Total\ Variable\ Cost)}{Total\ Revenue}\right)}$$

(4) Value addition

Analysis of value addition was done using the following production structure of processing operation (Hayami, Kawagoe, Morooka, & Siregar, 1987).

Table 1. Production structure of cassava processing operation

		Cassava roots to *kaopi*
	Output, Input and Price	
1	Output (kg/month)	
2	Raw material input (kg/month)	
3	Labor input (day/month)	
4	Conversion factor (1)/(2)	
5	Labor coefficient (3)/(2)	
6	Product price (Rp/kg)	
7	Wage rate (Rp/day)	
	Income and Profit	
8	Raw material input	
9	Other current input	
10	Product (4) x (6)	
11	a. Value added (10) – (8) – (9)	
	b. Value added ratio % (11a)/(10)	
12	a. Labor income (5) x (7)	
	b. Labor share % (12a)/(11a)	
13	a. Processor profit (11a) – (12a)	
	b. Profit rate % (13a)/(10)	

3. Results and Discussion

3.1 Characteristics of Respondents

All of the households interviewed are farmer-processors, using their own cassava harvest to produce *kaopi*. Table 2 indicates that most respondents (96.2%) fell within the age bracket of 15-55 years (with a mean of 42.6 years), while the group of 56 years and above is 3.8%. This implies that most processors were in their productive stage. Most cassava processing families (69.8%) had household size of 4-6 members, with an average of 5 persons. Households with less than 4 members and with more than 6 members constituted 16.1% each. A large family size tends to suggest that more family labour could be made available for cassava processing, consequently reducing the amount spent on hired labour. However, higher number of family members also means more people to feed, thus putting pressure on the availability of food.

Table 2 also indicates that cassava value addition was carried out by the processors with various educational backgrounds. Majority of the processors (41.5%) had junior high school education, 34.0% had primary education, and 22.6% had senior high school education, while only 1.9% acquired university education. These figures show that none are in the level of illiteracy. A greater proportion of respondents (47.2%) had more than 10 years experience in cassava processing. Those with 5-10 years experience were 35.8%, while those with experience of less than 5 years were only 17.0%. Generally, it implies that respondents in the study area had sufficient experience in cassava processing. As many as 64.2% of cassava processors used mechanized grater for grating operation, and 35.8% carried out grating operation manually.

Table 2. Characteristics of respondent processors

Characteristics	Frequency	Percentage
Age		
15 – 55	51	96.2
> 55	2	3.8
Education		
Elementary School	18	34.0
Junior High School	22	41.5
Senior High School	12	22.6
University	1	1.9
Household size		
<4	8	15.1
4 – 6	37	69.8
> 6	8	15.1
Years of processing experience		
< 5	9	17.0
5 – 10	19	35.8
>10	25	47.2
Grating method		
Manual	19	35.8
Mechanized	34	64.2

Source: Field survey, 2012

3.2 Cost of Cassava Processing

Cassava processing cost can be divided into two parts, namely fixed and variable costs. Fixed costs include depreciation of tools and equipment used, namely knife, basin, brush, grater, bucket, bamboo sieve, sack, and presser. Variable costs include the cost of raw materials (cassava tubers), labor, fuel for mechanized grater, and supporting materials.

The cost components were calculated according to the type of expenses. An estimation of costs was made using the following assumptions. Unpaid family labor was included in the cost component (Fujimoto, 1976; Aurangzeb, Nigar and Shah, 2007; Zwald, Kohlman, Gunderson, Hoffman, & Kriegl, 2007) which was estimated according to the predominating wage rate in the study villages. Costs for water and gasolines were the actual expenses paid by processors. Cassava roots were obtained from own farming but were included in the cost based on the price prevailing at the village at the processors' house. Therefore, the calculation of labor tasks started from peeling and did not include harvesting and transporting cassava roots from farm to the house. Costs for depreciation were calculated based on straight line method.

Unpaid family labor was included in the cost component because (i) it was not always easy to distinguish family and exchange labor, and (ii) the use of hired labor in cassava processing was not yet common in the study area, so specifity of hired labor was not yet established. In other word, the study used the concept of opportunity cost which was calculated according to market wage rate (IRRI, 1991; Zwald et al., 2007). Valuing family labor is considered essential to evaluate the profitability of cassava processing in the context of cassava commercialization. This is because an economically successful business should be able to pay for all costs including realistic opportunity costs (IRRI, 1991). However, the concept of family labor earnings is also introduced in the analysis to represent the net return to family labor devoted to cassava processing.

Average monthly depreciation costs are presented in Table 3. Tools and equipment used consisted of knife, plastic bowl, brush, grater, bucket, bamboo sieve, sack, and presser. Depreciation cost for each processor was Rp22 513 for mechanized grater and Rp8435 for manual grater. In the mechanized grater category, depreciation of grater occupied the highest percentage (57.0%); in the manual grater category, depreciation of sacks had the highest percentage (37.7%). Both categories, however, had the same three components with the highest percentage, namely grater, sacks and presser. The sum of the costs for these three items was 89.5% and 73.9% for mechanized grater and manual grater, respectively.

Table 3. Average monthly depreciation costs for each processor

No	Item	Mechanized grater (Rp)	%	Manual grater (Rp)	%
1.	Knife	332	1.5	305	3.6
2.	Plastic bowl	768	3.4	630	7.5
3.	Brush	295	1.3	229	2.7
4.	Grater	12 836	57.0	1274	15.1
5.	Bucket	457	2.0	471	5.6
6.	Bamboo sieve	520	2.3	567	6.7
7.	Sack	4479	19.9	3179	37.7
8.	Presser	2826	12.6	1780	21.1
	Jumlah	22 513	100	8435	100

Notes: US$1 = Rp9399

Source: Field survey, 2012

Table 4 presents average monthly costs per processor in cassava processing. Variable costs amounted to 98.8% and 99.5% of the total cost for mechanized grater and manual grater, respectively. This means that the value of depreciation was actually negligible. On average, the total cost for each processor was Rp1 873 030 for mechanized grater and Rp1 544 157 for manual grater.

Table 4. Average monthly cost per processor according to type of grater

No	Item	Mechanized grater (Rp)	%	Manual grater (Rp)	%
1.	Variable cost	1 850 517	98.8	1 535 722	99.5
	Cassava roots	1 241 541	66.3	837 108	54.2
	Family labor	549 507	29.3	688 216	44.6
	Gasoline	42 750	2.3	0	0.0
	Polythene sack	16 719	0.9	10 398	0.7
2.	Fixed cost (depreciation)	22 513	1.2	8435	0.5
3.	Total cost	1 873 030	100.0	1 544 157	100.0

Notes: US$1 = Rp9399

Source: Field survey, 2012

The cost structure indicates that the highest *kaopi* processing cost item was the cost of the raw material supply, amounting to 66.3% for mechanized grater and 54.2% for manual grater. About 29.3% of the total cost in mechanized grater was attributed to unpaid family labor, which is 44.6% in manual grater. Costs for gasoline and polythene sacks constituted only 3.2% of the total cost in mechanized grater, while costs for polythene sacks were only 0.7% in manual grater.

For *kaopi* processing, respondents obtained the raw materials (cassava tubers) from their own farming. The average price of cassava roots was Rp838 per kg. Supporting materials consisted of gasoline (for those using mechanized grater) and sack for packaging. Gasoline was obtained with the price of Rp4500 per litre, and sack for packaging with the price of Rp100-Rp160 per sheet. The amount spent for these supporting materials was much affected by the number of *kaopi* being produced.

3.3 Profitability of Cassava Processing

Table 5 presents net profit, family labour earnings, BEP, and R/C ratio of cassava processing in 2012. The total revenue for mechanized grater (Rp2 745 529) was much higher than manual grater (Rp1 890 547). Processors recorded a positive net profit from processing operations, averaging Rp872 499 and Rp346 390 for mechanized grater and manual grater, respectively. The R/C ratio of 1.5 for mechanized grater and 1.2 for manual grater indicates that cassava processing into *kaopi* is profitable in the study area as every Rp1000 invested in the enterprise yields additional Rp500 and Rp200, respectively, over and above the amount invested. This value of R/C ratio is slightly lower compared to that of 1.55 for making instant *gaplek* reported by Supriadi (2007) but slightly higher than 1.1 for making cassava chips reported by Asmara R. and A. E. Pradana (2011) and 1.1 for making chips, pellets, and native starch reported by Roonnaphai (2006). The value of R/C ratio will be higher if family labor is not included in the cost component. In this regard, processors obtained family labor earnings of Rp1 422 006 for mechanized grater and Rp1 034 606 for manual grater per month on the average, respectively, indicating that cassava processing provided relatively high net return to family labor engaged in processing operations.

Table 5. Net Profit, BEP and R/C ratio of cassava processing according to type of grater used

No	Item	Mechanized grater (Rp/month)	Manual grater (Rp/month)
1.	Total Revenue	2 745 529	1 890 547
2.	Total Cost	1 873 030	1 544 157
3.	Net Profit	872 499	346 390
4.	Family labor earnings[a]	1 422 006	1 034 606
5.	BEP (Rupiah)	69 061	44 943
	BEP (Unit)	13.9	9.1
6.	R-C Ratio[b]	1.5	1.2

Notes: [a] Family labor earnings = Net profit + Family labor cost

[b] Including an imputed cost of family labor

(US$1 = Rp9399)

Source: Field survey, 2012

Another tool used to assess the economic feasibility of cassava processing enterprise is Break-Even Point (BEP). As shown in Table 5, BEP in rupiah sales is Rp69 061 and Rp44 943, and in unit sales 13.9 kg and 9.1 kg for mechanized grater and manual grater, respectively. Break-even units indicate the level of sales that are required to cover costs, whereas break-even sales indicate the rupiah of gross sales required to break-even. As the average amount of revenue obtained and average number of units of output produced are above those break-even figures, it can be said that cassava processing in the study area is profitable.

In spite of the fact that cassava processing in the study area has been done for generations mainly as part of regular activity of farmers to secure staple for their own consumption, data in Table 5 confirm that cassava processing into *kaopi* is profitable for both types of respondents. This result corroborates previous reports that in Nigeria and other African countries processing of cassava into *gari* (Amao, Adesiyan, & Salako, 2007; Oluwasola, 2010; Lawal, Omotesho, & Oyodemi, 2013; Effiong, Aligbe, Albert, & Ohazuruike, 2014), *fufu*

(Lawal et al., 2013), dried *fufu* (Ayinde et al, 2004) and *lafun* (*Lawal* et al, 2013), is profitable. Similar to cassava processing in African countries, profitable operation of cassava processing in the study area means that in addition to strengthening food security, cassava processing into *kaopi* has high potential for income generation, especially because cassava can be harvested throughout the year.

3.4 Value Addition

Production structures of the processing of cassava are summarized in Table 6. Labor coefficient for respondents with mechanized grater is 0.009, and that with manual grater is 0.017, which means that 9 man-days and 17 man-days are needed to process 1 ton of cassava, respectively. The labor coefficient indicates that the amount of cassava that can be processed by respondents in mechanized grater category is almost double compared to that in manual grater category. This finding is in line with that reported by Okorji (2003) that in *gari* processing the use of modern and traditional techniques resulted in 37% reduction in time of operation in *gari* production. In the study area, such reduction is clearly attributed to the more efficient operation of mechanized grater, which can reduce the time needed to grate 100 kg of cassava from 6 hours to 0.5 hour. Nevertheless, conversion factor and product value are almost the same for both categories of respondents. Conversion factor for mechanized grater is 0.378, and that for manual grater is 0.374 which means that 378 g and 374 g of *kaopi* is produced from 1 kg of cassava root, respectively. With this conversion factor, the value of *kaopi* produced from 1 kg of cassava root is estimated as Rp1875 and Rp1852, respectively.

Gross value added from the processing of cassava is obtained by substracting the costs of raw material and other current inputs from the product value (Hayami et al., 1987). This gross value amounts to Rp996/kg for mechanized grater and Rp1004/kg for manual grater, respectively. The value added ratio is 53.1% and 54.2%, respectively, implying that 53.1% and 54.2% of the market value of *kaopi* is processors' income from processing. Income share for labors is 37.6% and 67.2%, reflecting the more labor-intensive nature of cassava processing with manual grater. On the other hand, the processor profit is Rp622 with the profit rate of 33.2% for mechanized grater, and Rp329 with the profit rate of 17.8% for manual grater.

Tabel 6. Production structure of cassava processing into *kaopi*

	Output, Input and Price	**Mechanized grater**	**Manual grater**
1	Output (kg/month)	554	381
2	Raw material input (kg/month)	1465	1020
3	Labor input (man-day/month)	13.7	17.2
4	Conversion factor = (1)/(2)	0.378	0.374
5	Labor coefficient = (3)/(2)	0.009	0.017
6	Product price (Rp/kg)	4958	4958
7	Wage rate (Rp/man-day)	40 000	40 000
	Income and Profit	Rp/kg of raw material	
8	Raw material input	838	838
9	Other current input	41	10
10	Product (4) x (6)	1875	1852
11	a. Value added (10) – (8) – (9)	996	1004
	b. Value added ratio % (11a)/(10)	53.1	54.2
12	a. Labor income (5) x (7)	374	675
	b. Labor share % (12a)/(11a)	37.6	67.2
13	a. Processor profit (11a) – (12a)	622	329
	b. Profit rate % (13a)/(10)	33.2	17.8

Notes: US$1 = Rp9399

Source: Field survey, 2012

As can be seen from the amount of value added and value added ratio, *kaopi* processing is a significant value adding process for both types of respondents. However, while labor income and labor share are significantly higher for manual grater than mechanized grater, processor profit and profit rate are significantly higher for mechanized grater than manual grater. This means that the use of manual grater is more time consuming and laborious, but still provides positive net profit and fairly high family labor earning. The use of mechanized grater clearly reduces the drudgery of processing, and as expected, it can produce more output, process more raw materials, and have higher labor coefficient than traditional grater. This explains the result of the cost and return analysis that the net profit is higher for mechanized grater than for manual grater. Therefore, the use of manual grater is more suitable in a small-scale operation, so more commercialized or larger scale operations of cassava processing should attempt to use mechanized grater. At the same time, the use of mechanized grater will yield maximum benefits if combined with the use of other labor-saving tools and equipment, such as hydraulic press in dewatering and fermentation stage. Overall, processors are recommended to use mechanized grater as it would release more time to them for investment in other economic ventures that could enhance family living condition.

The value added ratio and profit rate of *kaopi* processing are higher than that for making *gaplek* and even *opak* reported by Hayami et al. (1987) who had found that processor profit and profit rate was low for *opak* making and even zero for *gaplek* making. It was argued that characteristics of the *gaplek* production process, which is simple and requires little capital or special skill are the reason for low value added ratio and a labor share of 100%. The high value added ratio and profit rate in *kaopi* processing despite its similar characteristics of the production process may be related to other factors, such as the wide consumption of *kasoami*, high demand of *kaopi*, and positive image of *kasoami* in the diet of villagers. In other word, the findings in rural Java that cassava is inferior goods may not be true for the case of *kasoami* in the study area, although this needs further study.

It can be said from the study results that, being profitable and as a significant value adding process, cassava processing into *kaopi* using mechanized grater is more feasible to be made into more commercialized or larger scale operation. At the same time, advancement in cassava processing will in turn support promotion of cassava production and utilization (Mutuku, Wanda, Olubandwa, Maling'a, & Nyakeyo, 2013). In this regard, mechanized grater based cassava processing has high potential for employment creation and income generation, and for promotion of food diversification, enhancement of food security, and poverty alleviation, which will lead to increased attainment of sustainable development.

4. Conclusion

The study results revealed that cassava processing into *kaopi* is profitable and a significant value adding process, and hence has high potential for the attainment of food security and income and employment generation. However, the level of profitability and value added is higher for processors using mechanized grater than those using manual one because the former can reduce processing costs, process higher volume of raw materials, and produce more output with greater efficiency. As cassava forms a major part of the household diet and livelihood strategy of most households in the selected villages, interventions targeted at improving the cassava processing sector are likely to have a large impact on the villagers. Processors are recommended to use mechanized grater since the time and money saved can be put into other economic use and family welfare. Future researches need to focus on marketing and value chain of cassava processed products to help processors seize the opportunities for commercialization and income diversification from cassava processing.

References

Amao, J. O., Adesiyan, O. I., & Salako, B. A. (2007). Economic analysis of cassava processing into gari in Ogo Oluwa Local Government Area of Oyo State Nigeria. *Pakistan Journal of Social Sciences, 4*(2), 266-270. http://dx.doi.org/pjssci.2007.266.270

Asmara, R., & Pradana, A. E. (2011). Analisis efisiensi alokatif agroindustri chips ubi kayu sebagai bahan baku mocaf di Kabupaten Trenggalek. *Agrise, 11*(3), 206-218.

Aurangzeb, M., Nigar, S., & Shah, M. K. (2007). Benefit Cost Analysis of the Maize Crop Under Mechanized and Traditional Farming Systems in the NWFP. *Sarhad J. Agric., 23*(1), 169-176.

Ayinde, I. A., Dipeolu, A. O., Adebayo, K., Oyewole, O. B., Sanni, L. O., Jumah, A., & Westby, A. (2004). *A cost benefit analysis of the processing of a shelf stable cassava fufu in Nigeria.* Poster Presented at Sixth International Scientific Meeting of the Cassava Biotechnology Network, March 8-14. Cali, Colombia.

Darwis, W., Muslim, C., & Askin, A. (2009). *Analisa usahatani dan pemasaran ubi kayu serta teknologi pengolahan tapioka di Kabupaten Pati Provinsi Jawa Tengah*. Paper presented in National Seminar on October 14 in Bogor, West Java.

Dixon, J. A. (1982). Cassava in Indonesia: its economic role and use as food. *Contemporary Southeast Asia, 3*(4), 361-373. http://dx.doi.org/10.1355/CS3-4C

Effiong, J. A. L., Aligbe, J. O., Albert, C. O., & Ohazuruike, K. I. (2014). Cost and return analysis of gari processing in Owerri West Local Government Area of Imo State, Nigeria. *J. Chem. Bio. Phy. Sci. Sec.D., 4*(2), 1646-1653. Retrieved from http://www.jcbsc.org

Eng, P. V. D. (1998) Cassava in Indonesia: a historical re-appraisal of an enigmatic food crop. *Southeast Asian Studies, 36*(1), 3-31.

Fujimoto, A. (1976). An economic analysis of peasant rice farming in Kelantan, Malaysia. *Southeast Asian Studies, 14*(2), 159-176.

Hayami, Y., Kawagoe, T., Morooka, Y., & Siregar, M. (1987). *Agricultural marketing and processing in upland Java: perspectives from a Sunda village*. Bogor: CGPRT Centre.

IRRI. (1991). *Basic Procedures for Agroeconomic Research*. Manila: IRRI.

James, B., Okechukwu, R., Abass, A., Fannah, S., Maziya-Dixon, B., Sanni, L., ... Lukombo, S. (2012) *Producing gari from cassava: an illustrated guide for smallholder cassava processors*. International Institute of Tropical Agriculture (IITA). Ibadan. Nigeria.

Kuntjoro, S. U., Kusnadi, N., & Sayogyo. (1989). *Demand for corn, cassava and soybean in human consumption: a case study in Java, Indonesia*. Bogor: CGPRT Centre.

Lawal, A. M., Omotesho, O. A., & Oyedemi, F. A. (2013). *An assessment of the economics of cassava processing in Kwara State, Nigeria*, paper presented at the 4th International Conference of the African Association of Agricultural Economists, September 22-25, Hammamet, Tunisia.

Mutuku, M. W. M., Wanda, D. A. O., Olubandwa, A. M. A., Maling'a, J., & Nyakeyo, A. (2013). Commercialization of Traditional Crops: Are Cassava Production and Utilization Promotion Efforts Bearing Fruit in Kenya? *Journal of Sustainable Development, 6*(7), 48-58. http://dx.doi.org/10.5539/jsd.v6n7p48

Okorji, E. C., Eze, C. C., & Eze, V. C. (2003). Efficiency of cassava processing techniques among rural women in Owerri, Imo State, Nigeria. *JASR, 3*(2), 84-96. http://dx.doi.org/10.4314/jasr.v3i2.2797

Oluwasola, O. (2010). Stimulating rural employment and income for cassava processing among farming households in Oyo State, Nigeria through Policy Initiative. *J. Dev. Agric. Econ., 2*(2) 18-25. Retrieved from http://www.academicjournals.org/jdae

Oti, E., Olapeju, O., Dohou, S., Moutairou, E., Nankagninou, D., Komlaga, G. A., & Loueke, G. M. (2010). *Processing of cassava into gari and high quality cassava flour in West Africa*. Draft Manual. Retrieved from http://www.coraf.org/database/publication/publication/cassavatrainingmanual.pdf

Roonnaphai, N. (2006). *Pathways out of poverty through cassava, maize and soybean in Thailand.* CAPSA Working Paper No. 93.

Salim, H., & Nuryanti, S. (2011). *Perspektif ekonomi global kedelai dan ubi kayu mendukung swasembada*. Paper presented at National Seminar on Legume and Tuber Crops in Malang, November 15.

Simatupang, P. (2012). Meningkatkan daya saing ubi kayu, kedelai, dan kacang tanah untuk meningkatkan pendapatan petani, ketahanan pangan, nilai tambah dan penerimaan devisa. *Prosiding Seminar Hasil Penelitian Tanaman Aneka Kacang dan Umbi.*

Suprapti, M. L. (2005). *Tepung tapioka: pembuatan dan pemanfaatannya*. Yogyakarta: Kanisius.

Supriadi, H. (2007). Potensi, kendala dan peluang pengembangan agroindustri berbasis pangan lokal ubi kayu. *Prosiding Seminar Nasional 22-27 July*.

Widyanti, A., Sunaryo, I., & Kumalasari, A. D. (2014). Reducing the dependency of rice as staple food in Indonesia – a behavior intervention approach. *J. ISSAAS, 20*(1), 93-103. Retrieved from http://www.issaas.org/journal/v20/01/

Zwald, A., Kohlman, T. L., Gunderson, S. L., Hoffman, P. C., & Kriegl, T. (2007). *Economic Costs and Labor Efficiencies Associated with Raising Dairy Herd Replacements on Wisconsin Dairy Farms and Custom Heifer Raising Operations*. Madison: University of Wisconsin-Extension. Retrieved from http://www.uwex.edu/ces/heifermgmt/documents/ ICPAfinalreport.pdf