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Sustainable cassava commodity agribusiness system in East Lampung Regency

Zulkarnain[1*], Soni Isnaini[1], Maryati[1], Rakhmiati[1], Etik Puji Handayani[1], Yatmin[1], Syafiuddin[1], Andre Agasi[1]

[1] Sekolah Tinggi Ilmu Pertanian (STIPER) Dharma Wacana, Metro City, Lampung, Indonesia
*Corespondence Email: zulfadhilalzabir@gmail.com

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ABSTRACT

Introduction: The agribusiness system is a series of sustainable business management from upstream to downstream. Cassava farming is one of the strategic food crops that supports the national economy. Increasing cassava commodities cannot be separated from implementing an effective and efficient agribusiness system. The research aims to examine the sustainable cassava commodity agribusiness system in East Lampung Regency. **Methods**: The total population of cassava farmers in East Lampung Regency is 478 farmers. The sampling technique refers to the Sugiarto formula so 48 cassava farmers were obtained using a simple random sampling technique. Data analysis is 1) procurement of production facilities using a Likert scale, 2) farming using income analysis, 3) processing using added value, 4) marketing using marketing channels, marketing margins, and Farmer Share, and 5) Supporting institutional services. **Results**: Research results 1) Procurement of production facilities are in the category of being used. 2) cassava farming is profitable 3) processing cassava into tiwul products provides added value. 4) marketing of fresh and processed cassava is included in efficient marketing, and 5) supporting institutions have not contributed to cassava commodities. **Conclusion:** The cassava commodity agribusiness system has been established but the supporting services are not yet running well, so it is necessary to develop integrated agribusiness institutions.

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INTRODUCTION

The role of the agricultural sector in national development is very strategic (Zulkarnain *et al.*, 2010). One of the subsectors that supports the agricultural sector is the food crops subsector. The role of the food crop subsector is very much needed to realize national food security, regional development, reduce poverty, reduce unemployment, and increase foreign exchange, as well as stimulate upstream-downstream industrial growth which contributes to national economic growth (Pawlak & Kołodziejczak, 2020). One of the foods crops whose productivity must be increased to meet national food demand is cassava (Zulkarnain *et al.*, 2020).

Cassava is a strategic food that plays a role in ensuring food availability. Food security must be implemented so that food supply can increase so that people's food needs are met (Zakaria *et al.*, 2022; Hakim *et al.*, 2023). Cassava is a tuber plant that comes from food plants that grow in tropical regions and can adapt to the environment but is sensitive to low temperatures (Ramadan N, 2018). Apart from that, cassava has the potential to be developed and is a superior strategic food ingredient (Fitriani *et al.*, 2021). One of the world's main producers of cassava is Indonesia (Zakaria *et al.*, 2020). Indonesia as a cassava-producing country was included in the top five from 2004 to 2019 (Pusdati, 2018). Therefore, cassava contributes to Indonesia's foreign exchange through exports every year (Kristian, 2015).

Agribusiness is a business activity involving procurement of inputs, cultivation, agro-industry, marketing and supporters related to the agricultural sector (Wahyuningsih, 2007). Apart from that, agribusiness plays a role in activities in the agricultural sector that are profit-oriented (Erlangga *et al.*, 2012). The agribusiness system in agricultural companies is interrelated and interdependent starting from 1) procurement of production facilities; 2) farming; 3) agro-industry 4) marketing; and 5) supporting institutions (Siallagan *et al.*, 2016). Therefore, the agribusiness system aims to obtain maximum production results at efficient costs (Haryono *et al.*, 2021). The interrelationship of these subsystems can have a major influence on the economic development of a region (Isbah & Iyan, 2016).

The obstacles in cassava commodities from upstream to downstream are very complex. Upstream constraints relate to the procurement of production facilities and farming. In procuring production facilities, farmers are faced with a supply of production facilities that are not running well. Farming subsystem, farmers do not maximize the use of production facilities and lack maintenance, then the farming subsystem must allocate resources effectively and efficiently to get maximum income (Siallagan *et al.*, 2016). Then downstream obstacles relate to processing, marketing, and supporting institutions. In the processing subsystem, farmers do not utilize cassava raw materials to become products that have added value. Marketing subsystem, farmers are faced with very low selling prices for fresh cassava because factories determine prices, and farmers have not maximized the processing of cassava into high-value products. The supporting subsystem has not played a maximum role in supporting cassava commodities, including finance, market access, research institutions, and even the government.

Most of the cassava plants currently planted by farmers are carried out until harvest and are oriented towards the farming/cultivation subsystem. This is used by buyers/middlemen/collectors to buy cheap cassava, on the other hand, only a small number of farmers process cassava. The role of the marketing subsystem should be carried out by farmer institutions to bargain regarding prices to obtain a good price. Farmers are still faced with limited capital so the upstream subsystem is hampered. If the role of banking services is optimized then capital limitations can be overcome. Therefore, banking services can provide loans without collateral which has been a worry for farmers to obtain farming capital.

Cassava farmers must pay attention to the farming/cultivation subsystem so that they obtain optimal production results. Farmers increase production through good farming patterns by implementing Good Agriculture Practices (GAP) and regular cassava farming assistance. Utilize cassava stem waste at harvest time, don't throw it away or burn it. Utilizing cassava waste can increase the income of cassava farmers. Apart from that, cassava can be processed into a healthy substitute food source. Therefore, the cassava agribusiness subsystem must be integrated in the form of a modern institution that ensures that cassava commodities can be sustainable.

The sustainability of a commodity is based on the paradigm of a sustainable agribusiness system which is an improvement process that requires a transition from an inefficient condition to an efficient condition (Zakaria *et al.*, 2022). The cassava commodity is a potential commodity for development (Zulkarnain *et al.*, 2021b), so it is necessary to study the agribusiness system, from upstream to downstream so that the cassava commodity can be sustainable. Based on the description, the research objective is to examine the sustainable cassava commodity agribusiness system in East Lampung Regency.

METHODS

Time and place of research

Determining the location in Gantiwarno Village, DistrictPekalonganLampung RegencyEastdeliberately (purposively) with consideration: 1) Gantiwarno Village is the central area for cassava production in Pekalongan District, and 2) Gantiwarno Village is an area where there are cassava farming activities from upstream to downstream. The research was conducted from January to February 2022.

Sampling techniques and data

The sampling technique is simple random sampling (the population has the same chance of being sampled) (Taherdoost, 2016). The total population of cassava farmers in Gantiwarno Village is 578 cassava farmers. The sampling technique refers to the formula of Sugiarto *et al.*, (2003) and obtained 50 cassava farmers

Primary data types were obtained from interviews with farmers, collectors, and processors (agro-industry) who support cassava agribusiness activities using questionnaires, while secondary data types were obtained from literature such as books, previous research, the Central Statistics Agency (BPS), and other agencies.

Research data analysis

Data analysis: 1) Production facilities provision subsystem using a Likert scale, 2) Farming subsystem using income analysis, 3) Processing subsystem using added value, 4) Marketing subsystem using marketing channels, marketing margins, and Profit Margin Ratio, and 5) Supporting services subsystem.

Production facilities provision subsystem

The subsystem for providing production facilities uses a Likert scale, which is used to determine the conditions used for cassava farming as follows:

Formula: T x Pn

Information :

Q = Total number of respondents who have

Mr = Choice of Likert score numbers

To know how to use cassava farmers' production facilities, use the 6 right methods, namely: right time, the right type, the right place, the right quality, the right quantity, and the right price. Using the 6 correct methods for using production facilities, can make it easier for cassava farmers to find out whether the use of these production facilities is good or not. Then, to find out the value/score of each cassava production facility in this study, three assessment criteria were used, namely: Good = 3, Medium = 2, and Bad = 1. Then the three assessment criteria were calculated using a Likert scale. The collected data was then analyzed using a descriptive method looking at physical conditions using a Likert scale (Sugiyono, 2014).

According to (Budiaji, 2013) in his research, the Likert scale can be measured as an interval. The Likert scale has three/more questions so that it can form a score that can represent individual characteristics, for example, attitudes/knowledge/behavior.

Farming subsystem

The farming subsystem is a part that can be assessed through farming performance which refers to research (Oni *et al.*, 2019) using income analysis. Income analysis describes the profits of cassava farming. Income formula:

$$\pi = TR - TC$$
$$\pi = Y.\ Py - \sum Xi.Pxi - BT$$

Information :
Π = Income (Rp)
TR = Receipt (Rp)
T.C = Production costs (Rp)
Y = Production (kg)
Py = Old price (Rp)
Xi = Input Factor
Pxi = Input factor price (Rp)
BT = Fixed costs (Rp)

According to Soekartawi (2000), profits from farming can be seen in the R/C ratio analysis

$$R/C = \frac{TR}{TC}$$

Information:
R/C = Comparison*Total revenues* and Total cost
TR =*Total revenues*(Rp)
T.C =*Total cost*(Rp)
Information:

- R/C < 1, unprofitable
- R/C > 1, profitable
- R/C = 1, no profit/no loss (break-even)

Processing subsystem (agroindustry)

The processing subsystem (agro-industry) uses the added value of a product resulting from processing fresh properties of agricultural products does not last long (bulky) so a processing subsystem is needed to overcome this problem (Siallagan *et al.*, 2016). Fresh cassava processed products in the form of tiwul. The calculation for processing fresh cassava uses the Hayami Method.

Table 1 presents the calculations related to the processing of tiwul, a cassava-based product, in the agroindustry sector. The table includes various variables and their corresponding values, as well as the calculation results for outputs, raw materials, labor, conversion factor, labor coefficient, output price, average wages of workers, revenue, profits, raw material price, other input contributions, output value, added value, value added ratio, labor income, labor share (value added and product value), advantages, profit rates (added value and product value), and remuneration for production factors.

Overall, Table 1 provides a comprehensive overview of the various calculations and ratios involved in the tiwul processing in the agroindustry sector, allowing for a better understanding of the financial aspects of this specific cassava-based product. The source of this information is cited as Hayami in Maulidah (2012).

Table 1. Calculation of tiwul processing

No	Variable		Value
1	*Outputs*(kg/year)		A
2	Raw Materials (kg/year)		B
3	Labor (HOK/year)		C
4	Conversion Factor		D = A/B
5	Labor Coefficient		E = C/B
6	Output Price (Rp/kg)		F
7	Average Wages of Workers (Rp/HOK)		G
Revenue and Profits			
8	Raw Material Price (Rp/kg)		H
9	Other Input Contributions (Rp/kg)		I
10	Output Value (4) X (6)		J = D x F
11	**a.**	Added Value (10) – (8) – (9)	K = J – I – H
	b.	Value Added Ratio [(11) : (10)] %	L % = (K/J) x 100%
12	**a.**	Labor Income (5) X (7)	M = E x G
	b.	Labor Share (value added) [(12) : (11)] %	N1% = (M/K) x 100%
	c.	Labor Share (product value) [(12) : (10)] %	N2% = (M : J) X 100%
13	**a.**	Advantages (11a) – (12a)	O = K – M
	b.	Profit Rate (added value) [(13) : (11)]%	P1% = (O : K) x 100%
	c.	Profit rate (product value) [(13) : (10)] %	P2% = (O : J) x 100%
Remuneration for Production Factors			
Margin (10) – (8)			Q = J – H
14	**a.**	Labor income [(12) : (14)] %	R% = (M : Q) x 100%
	b.	Other Input Contribution [(9) : (14)] %	S % = (I : Q) x 100%
	c.	Profit [(13) : (14)] %	T% = (O : Q) x 100%

Source: Hayami in Maulidah, 2012.

Information:
A =*Outputs*/processed cassava (kg)
B =*Inputs*cassava (kg)
C = Labor (HOK)
F = Price of processed cassava (Rp.)
G = The average wage received by workers (Rp.)
H = Price*Inputs*(Rp.)
I = Donations*input*other

Information:
a. NT > 0, provides added value
b. NT < 0, does not provide added value

Marketing subsystem

Marketing analysis includes Marketing Channel Analysis, Marketing Margin and Marketing Margin Ratio/Profit Margin Ratio (RPM), and Farmer's Share.

a) Marketing channel analysis

refers to research (Susanti, Lestari, Kasymir, 2017). According to (Kotler and Armstrong, 2008) marketing channels are groups of organizations that depend on each other to make products or services available for use by final consumers.

b) Marketing margin analysis

Is used to obtain the price difference between producers and final consumers. According to Hasyim (2012), marketing margin calculation:

$$Mji = Psi – Pbi, \text{ or}$$
$$Mji = bti + \pi i, \text{ or}$$
$$\Pi i = Mji – bti$$

Information:
Mji = Marketing margin
Psi = Sales price
Pbi = Purchase price
Bti = Marketing costs
Пi = Marketing agency profits

Marketing margin is obtained from the percentage of profit against marketing costs (Ratio Profit Margin/RPM) (Oni *et al.*, 2019). Calculation of the profit margin ratio can be done using the formula:

$$RPM = \frac{\pi i}{bti}$$

Information:
Пi = Profit
Bti = Marketing costs

The RPM value which is relatively evenly spread across each marketing institution is a reflection of an efficient marketing system.

Information:
RPM = 0, meaning the marketing system is said to be efficient
RPM ≠ 0, meaning the marketing system is inefficient.

c) Farmer's Share Analysis

Marketing channels compare how big a share farmers receive from the price paid by final consumers. According to (Asmarantaka, 2012). Farmer's share formula:

F's = Pr/Pf x 100 %

Information:
Fs = Farmer's share (Rp.)
Pr = Producer price (Rp.)
Pf = Final consumer price (Rp.)

d) Support Subsystem

Supporting analysis uses qualitative descriptive methods to determine the role of supporting services in the agribusiness system. Supporting analysis refers to research on (Susanti *et al.*, 2017). Supporting analysis is used to determine the role and function of supporting services including community groups, farmer groups, cooperatives, research institutions, extension institutions, government policies, transportation, and markets in the smooth running of the cassava agribusiness system to serve, support and develop cassava farming activities.

RESULTS AND DISCUSSION

Analysis of the provision of production facilities

Cassava commodity production facilities provide great potential for farmers to develop their farming businesses. Production facilities include seeds, land, fertilizer, labor, agricultural tools, and pesticides. In general, production facilities are easy to obtain in the research area so that they can support farming activities. Cassava production facilities include seeds, land, fertilizer, labor, agricultural tools, and pesticides. Providing production facilities using the correct 6 criteria, the value/score obtained for the production facilities can be seen in Table 2.

Right price

The suitability of the price for providing production facilities related to seeds, land, fertilizer, pesticides, labor, and agricultural equipment is 4.52, which means that production facilities are in the less fixed price category. Farmers must get a fair price so that it can make it easier for farmers to manage their next farming business (Zulkarnain *et al.*, 2021a). The purchase price of production facilities falls under the criteria of less fixed prices, this is due to farmers' ability to purchase fertilizers, pesticides, and agricultural equipment, as well as labor wages which are sometimes unaffordable. Using seeds, farmers still use previous seeds which are still suitable for use as seeds, but some farmers buy superior seeds at a hefty price. Apart from that, almost all of the land used is owned by themselves and some farmers rent land to increase production yields. Land that is rented sometimes has an inappropriate price, sometimes

it is expensive. Then, regarding fertilizer prices which always fluctuate due to limited fertilizer availability. Farmers still buy this fertilizer so that farmers continue to fertilize according to schedule even though the price of fertilizer at agricultural kiosks/shops is quite expensive. In contrast to fertilizer, not all farmers use pesticides, but farmers who have land areas > 0.5 ha will use pesticides, some farmers do it manually by using a sickle.

Table 2. Suitability of providing production facilities in the facilities procurement subsystem cassava farming production

No	Suitability of provision of production facilities	Score
1	Right price	226
	Suitability of prices for procurement of production facilities	
	Total score	226
	Average	4.52
2	On-time	278
	Suitability of time for procurement of production facilities	
	Total score	278
	Average	5.56
3	Exact amount	348
	Suitability of number of procurement of production facilities	
	Total score	348
	Average	6.96
4	Exact type	432
	Suitability of types of procurement of production facilities	
	Total score	432
	Average	8.64
5	Right place	422
	Suitability of place for procurement of production facilities	
	Total score	422
	Average	8.44
6	Exact quality	350
	Conformity to the quality of procurement of production facilities	
	Total score	350
	Average	7.00
	Total score	2,056
	Average	41.12

Source: Primary data (processed), 2022

On time

The suitability of the time for procuring production facilities is 5.56, which means that production facilities are in the less fixed time category. The availability of production facilities is important for the continuity of farming. Accurate availability of seeds and fertilizer at the start of planting is a priority in starting a farming business. The availability of cassava seeds comes directly from previous harvests, but some farmers are still looking for superior seeds in the hope of getting maximum production results, so farmers have to wait for cassava seeds to be planted. Apart from that, the availability of fertilizer is limited due to the distribution of fertilizer entering the village. Cassava farmers need fertilizer to fertilize their crops but often there is none or it is scarce. Therefore, farmers look for fertilizer outside the village and quite a few farmers buy fertilizer in large quantities to prepare for the next crop but farmers are constrained by capital. Cassava farmers have their land, making it easier for farmers to determine planting and harvesting. Cassava farmers often do not have time to harvest, which will affect the quality of the cassava and thus affect the selling price. Cassava farmers sell their crops immediately because there is an urgent need for life. Farmers have problems in harvesting early due to the availability of labor, where workers are carrying out other activities but farmers have to wait to get enough labor.

Exact amount

The suitability of the procurement amount for production facilities is 6.96, which means that the production facilities are in the fairly fixed quantity category. The use of production facilities is not all by the amount needed to expand cassava farming land. The number of seeds used is appropriate for farmers' use, but the amount of fertilizer is still not by land needs. Farmers still use fertilizer sparingly due to limited capital. Providing fertilizer functions to increase nutrients on agricultural land (Dahlianah, 2014). Fertilizers used by cassava farmers include urea fertilizer, Phonska fertilizer, KCL fertilizer, SP36 fertilizer, and Fertilizer cage. Other production facilities such as pesticides used by farmers are still very minimal, and farmers prioritize maintenance (pulling weeds). The number of workers used is

appropriate according to needs, this is due to different harvest times. Labor is an important production factor in running a farming business. In terms of labor use, cassava farmers have workers outside the family (TKLK) and workers within the family (TKDK). Workers outside the family carry out activities including land cultivation, planting, spraying, and harvesting. According to (Budiawati *et al.*, 2016) the use of cassava labor must be efficient because it can affect the size of the profits obtained. The amount of pesticide used for cassava plants is still sufficient and some farmers still rely on combing.

Exact type

The suitability of the type of procurement of production facilities is worth 8.64, which means that the production facilities are in a good category and remain the type. The use of production facilities related to the type of fertilizer used by cassava farmers is still adjusted to the capital they have, but farmers still provide all types of fertilizer that the plants need. Fertilizer use must be to plant needs (Roidah, 2013), this is done to obtain maximum production results. This type of cassava seed still uses the seeds used by previous farmers which provide maximum production results, but some farmers use superior seeds. This type of superior cassava seed provides great production potential for farmers (Zakaria *et al.*, 2020). Apart from that, the type of pesticide used must be appropriate and function to maintain plants so that they get maximum production results. The type of pesticide that is widely used by cassava farmers is to kill weeds, but some farmers still use the manual method, namely using sickles, so that farmers will get grass for animal feed. The use of herbicides by cassava farmers is usually sprayed twice per planting season. In general, the types of agricultural tools used are the same as pickaxes, sickles, machetes, and tools for cultivating the land using tractors. According to Wulandari & Nauly, (2022); and Rangga *et al.,* (2023), for cassava farming, farmers generally use agricultural tools such as buckets, sprayers, plastic/tarpaulin, and machetes. The use of labor is to their needs, this is because labor takes turns in carrying out farming, so farmers do not lack labor in carrying out farming activities.

Right place

The suitability of the place for procuring production facilities is worth 8.44, which means that the production facilities are in a good category and remain the place. The Land is the main factor in running a farming business, so the land used for planting cassava is in the right place, namely large land located in a rural area. The land used for cassava farming is owned and cultivated. According to (Siallagan *et al.*, 2016), the results of research on good land use, will influence the level of cassava production, so that the land area at the location is still below the minimum limit. In addition, seed production facilities can be obtained in the area where cassava is grown. Farmers get access/information on where to obtain production inputs from previous farmers. Farmers who need fertilizer, farmers go to agricultural kiosks/shops in rural areas or places where farmers cultivate cassava. Apart from that, the availability of labor is very easy, almost all farmers in rural areas can act as farmer laborers cooperatively. Then, the need for agricultural equipment is very easy, as farmers can access tractors in the countryside to carry out land processing.

Exact quality

The suitability of the quality of the procurement of production facilities is worth 7.00, which means that the production facilities are in the sufficient category, namely maintaining quality. Suitability of quality is an indicator of success in farming. By using quality seeds and fertilizer, you can get maximum production results (Sari *et al.*, 2020). The seeds used by farmers for cassava farming are seeds from previous plantings, so they can reduce production costs, but there are weaknesses such as the quantity and quality of cassava have decreased, but there are some farmers who buy/look for superior seeds. In general, the production results obtained are not only the role of superior seeds but also the role of other production facilities. At harvest time, farmers sell their seeds for Rp. 8,000 – Rp. 10,000/bundle and the rest is reused by farmers for replanting who have land. Fertilizer production facilities must be of the right quality, this refers to the authenticity of subsidized fertilizer which has standardized fertilizer quality. Apart from that, some types of subsidized fertilizer sometimes have poor quality when distributed. Apart from that, other production facilities such as pesticides, labor, and agricultural tools are still relevant in their use. This is characterized by pesticides used to exterminate grass, workers who prioritize a cooperation system, and agricultural tools that are easy to obtain when processing land.

Analysis of cassava farming

Cassava farming income consists of cash income and costs and calculated income and costs. Table 3 shows the average income of cassava farming during one planting season.

Table 3 shows that the revenue from cassava farming is IDR. 32,230,980,-/ha. With income from cash costs obtained amounting to Rp. 10,486,677/ha and income over total costs of Rp. 21,744,303/ha. Then the R/C ratio for cash costs obtained is 2.2 (>0), and the R/C ratio for total costs is 2.0 (>0). So it can be concluded that the farming carried out by cassava farmers is classified as profitable and feasible. This is in line with research Zulkarnain *et al.*,

(2021a), Zakaria *et al.*, (2020), Yuliati *et al.*, (2019), Ramadan N, (2018), dan Pramesti *et al.*, (2017) which explains that cassava farming is a profitable venture. These studies have also shown that cassava farming provides a good return on investment, with high R/C ratios indicating that the revenue generated is higher than the costs incurred. Additionally, these findings suggest that cassava farming is a viable option for farmers, as it yields positive financial outcomes and contributes to their overall income. The consistent results from these studies further support the notion that cassava farming is a profitable and feasible agricultural activity.

Table 3. Analysis of cassava farming income in East Lampung Regency per Ha.

	Description	Unit	Amount	Price (Rp)	Value (Rp)
A	Reception				
	Production	Kg	26,529	1,224.00	32,230,980.00
	Cash Fees				
	Urea	kg	388	2,500.00	970,000.00
	Phonska	kg	206.58	3,000.00	619,740.00
	Pen	kg	132.2	10,120.00	1,337,864.00
	SP36	kg	191.67	2,600.00	498.342.00
	KCL	kg	160.34	10,400.00	1,667,536.00
	Pesticide				
	Regent	Ltr	4.85	40,000.00	194,000.00
	Obin	Ltr	4.38	90,000.00	394,200.00
	Bimastar	Ltr	1	50,000.00	50,000.00
	Labor				
	Kindergarten Outside the Family	Rp			2,247,000.00
	Transportation	RP			1,916,520.00
B	Total Cash Costs	Rp			9.895.202.00
C	Calculated Costs				
	Tool Depreciation	Rp			175,731.00
	Kindergarten In family	Rp			415.744.00
D	Total Costs Calculated	Rp			591.475.00
E	Total Cost	Rp			10,486,677.00
F	Income on Cash Fees	Rp			22,335,778.00
G	Revenue Over Total Costs	Rp			21,744,303.00
H	R/C On Cash Charges				2.26
I	R/C Over Total Cost				2.07

Source: Primary data (processed), 2022

Table 4. Calculation of tiwul products using the Hayami method.

No	Output, Input, and Price	Symbol	Results
	Variable		
1	Output (kg/production)	A	25
2	Raw Materials (kg/production)	B	50
3	Labor (HOK/Production)	C	1.00
4	Conversion Factor	D=A / B	0.5
5	Labor Coefficient	E=C / B	0.02
6	Output Price (Rp/kg)	F	12,000
7	Average Wages of Workers (Rp/HOK)	G	50,000
Revenue and Profits			
8	Raw Material Price (Rp/kg)	H	1,100
9	Other Input Contributions (Rp/kg)	I	1,000
10	Output Value (4) X (6)	J=D x F	6,000
11	a. Added Value (10) – (8) – (9)	K=J - I - H	3,900
	b. Value Added Ratio [(11) : (10)] %	L%=(K/J) x 100%	65%
12	a. Labor Income (5) X (7)	M=E x G	1,000
	b. Labor Share (value added) [(12) : (11)] %	N1%=(M / K) x 100%	25.64%
	c. Labor Share (product value) [(12) : (10)]%	N2%=(M/J) x 100%	16.67%
13	a. Profit (11a) - (12a)	O=K - M	2,900
	b. Profit Rate (added value) [(13) : (11)]%	P1%=(O/K) x 100%	74.36%
	c. Profit Rate (product value) [(13) : (10)]%	P2%=(O/J) x 100%	48.33%
Remuneration for Production Factors			
14	Margin (10) - (8)	Q= J – H	4,900
15	Labor income [(12) : (14)]%	R%=(M/Q) x 100%	20.41%
16	Other input contributions [(9) : (14)] %	S%=(I/Q) x 100%	20.41%
17	Profit [(13) : (14)]%	T%=(O/Q) x 100%	59.18%

Source: Primary data (processed), 2022

Processing analysis

Analysis of processing cassava into tiwul provides added value. The processed product is a tiwul product with the raw material being cassava. To determine the added value of tiwul production, the Hayami method is used in Table 4.

Based on Table 4, it is explained as follows:

Output, input, and price

The average tiwul produced is 25 kg with 50 kg of cassava as the raw material. The cassava required for the tiwul production process is added up, to obtain a conversion factor of 0.5. This conversion factor shows that 1 kg of processed cassava can produce 0.5 kg of tiwul. The average labor used for the tiwul processing process is 1.0 HOK, so the labor coefficient used in the production process of 1 kg of tiwul is 0.02 with a labor wage of Rp. 50,000/HOK. Labor wages are obtained by adding up the total labor costs and then dividing by the total labor. So we get an output price of Rp. 12,000/kg. This is in line with research (Zulkarnain, 2017)

Income and profits

Income and profits in the value-added analysis include raw materials, labor, the contribution of other inputs, production costs, revenues, and profits from tiwul processing.

Use of raw materials

Procurement of raw materials is one of the important activities that can influence the tiwul production process. The raw material for processing cassava into tiwul is cassava. Input usage can be presented in Table 5 as follows:

Table 5. Calculation of input and output use, per 2022 production

Use of Input and Output Produced in One Production				
No	Description	Input (kg)	Output (kg)	Creation Frequency (/yr)
1	Tiwul Production	50 kg	25 kg	36 weeks

Source: Primary data (processed), 2022

Table 5 shows that the input used to produce output (tiwul) is 50 kg per production and produces output (tiwul) of 25 kg tiwul per production.

Use of labor

The use of labor is one of the most important means of production because the production process that is carried out is labor, this is because the processing of tiwul at the research location is only on a home scale and is carried out by only one worker. Tiwul production workers per production are presented in Table 6 as follows:

Table 6. Calculation of tiwul production labor usage per 2022 production

Tiwul Production Labor One-Time Production				
Labor (people)	Working Days (days)	Per day (hours)	Daily Wage (Rp)	HOK
1	1	8	50,000	1.0

Source: Primary data (processed), 2022

Table 6 shows that in the production process, there is one worker with 8 hours of work per day, for a labor wage of Rp. 50,000/day. The use of labor for working cost days (HOK) is 1.0 per production.

Other input contributions

The use of inputs is an element that supports the main materials in the production process. Contribution of other inputs such as plastic packaging and steamers. The contribution of other inputs to the processing of cassava into tiwul is in Table 7.

Table 7. Calculation of contribution of other inputs for tiwul processing per 2022 production

Contribution of other inputs to tiwul processing			
No	Description	Amount	Purchase Price (Rp)
1	Steamer	1	35,000
2	Plastic Packaging	1	15,000
Amount			50,000
Input Usage (kg)			50
Other Input Contributions (Rp)			1,000

Source: Primary data (processed), 2022

Table 7 shows that tiwul processing on average incurs supporting costs of IDR. 1,000 for 50kg of cassava per production. Other input contributions in tiwul processing consist of steamers and plastic packaging.

Production costs, revenues, and profits of tiwul processing

Tiwul production costs include all costs incurred by tiwul business actors. These costs include calculated costs and cash costs. The calculated costs include equipment costs, while cash costs include the costs of raw materials and plastic packaging. The calculation of production costs, revenues, and profits for tiwul production in 2022 production can be seen in Table 8.

Table 8. Calculation of Production Costs, Revenue, and Profit per Production 2022

	Tiwul Production in One Production	
No	Description	Tiwul (Rp)
1	Outputs	25 kg
2	Sale	12,000.00/kg
3	Reception	300,000.00
4	Production cost	
	a. Fixed cost	35,000.00
	b. Variable Costs	
	Raw Material Costs	55,000.00
	Other Input Costs	15,000.00
	Labor costs	50,000.00
	Total cost	167,500.00
5	Profit	145,000.00

Source: Primary data (processed), 2022

Table 8 shows that the average tiwul receipt is IDR. 300,000 per production. The average profit from tiwul production obtained from revenues is reduced by total costs, namely IDR. 145,000 per production.

Revenue and profits

The average price of tiwul raw materials at the research location is Rp. 1,100/kg. Meanwhile, the average contribution of other inputs to the tiwul production process is IDR. 1,000/kg. The average output price is IDR. 12,000/kg, then for the average output value, namely Rp. 6,000/kg. It can be seen that the average added value obtained from the tiwul production process is IDR. 3,900/kg obtained from the output value minus the price of input (raw materials) and other input contributions, with a value-added ratio of 65%, meaning that 65% of the output value is the added value obtained from processing cassava into tiwul.

Labor income obtained from the product of the labor coefficient and labor wages is IDR. 1,000/kg with a labor share of added value of 25.6%, and a labor share of product value of 16.6%. The profit obtained from tiwul production is IDR. 2,900/kg, with a profit rate on added value of 74.3%, and a profit rate on product value of 48.3%.

The margin for production factors

From the added value table of the Hayami Method, it can be concluded that for the tiwul production process, the margin obtained from the output value is reduced by the input price, which is IDR. 4,900, with a labor income percentage of 20.4%, a contribution percentage of other inputs of 20.4%, and a profit percentage of 59.1%.

Marketing analytics

Marketing channel

There are 3 marketing channels for cassava farmers as follows:

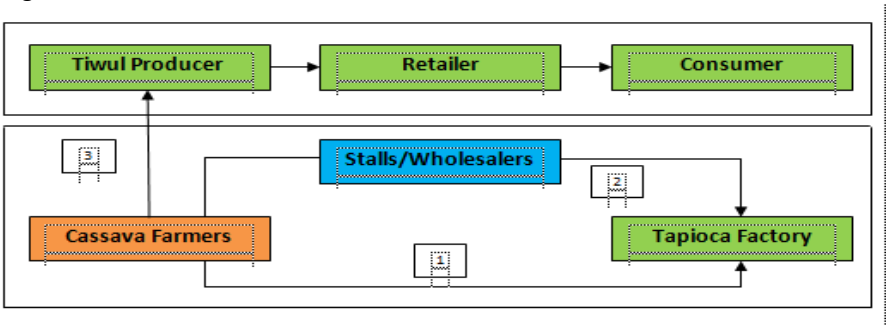

Figure 1. Cassava marketing channels

Based on Figure 1, it is explained as follows:

Marketing channel 1

In marketing channel I, farmers sell fresh cassava to collectors and then the collectors sell cassava to factories. Sales of cassava will be carried out in November – December 2022 with the price for cassava from farmers to stalls/largers being IDR. 1,200/kg, then the stall/big seller sells the cassava to the factory for Rp. 1,300/kg. Marketing channel I1 is the marketing channel used by 48% of cassava farmers. The cassava variety cultivated by farmers is the gani variety, with drying losses ranging from 20-30%.

Marketing channel 2

In marketing channel II, farmers sell fresh cassava directly to the factory for Rp. 1,300/kg. Marketing channel I1 is the marketing channel used by cassava farmers as much as 52%. The cassava variety cultivated by farmers is the gani variety, with dry losses ranging from 20-30%.

Marketing channel 3

In marketing channel III, processed cassava products become tiwul. Farmers sell fresh cassava directly to tiwul processors, then produce tiwul for Rp. 12,000/kg which is sold to stalls (retailers) for Rp. 14,000/kg, then sell it to final consumers. The raw materials needed for each production are 50 kg, with a purchase price of Rp. 1,100/kg. The tiwul production process produces 25 kg of dried tiwul.

Marketing margin, farmer share, and marketing margin ratio/profit margin ratio (RPM)

Marketing margin to obtain the price difference at the producer level to the final consumer so that the percentage of profit to marketing costs (Ratio Profit Margin/RPM) can be determined. Then, Farmer's Share explains the efficiency of marketing channels by comparing how large the share received by farmers is from the price paid by final consumers. The process of distributing cassava requires marketing costs, with marketing costs the product price can increase. To find out the amount of marketing costs, marketing margins and marketing profits in marketing channels I, II, and III can be seen in Table 9 as follows:

Table 9. Marketing costs, marketing margins, and marketing profits

No	Description	Channel I		Channel II		Channel III	
		Value (Rp/kg)	Margin Share (%)	Value (Rp/kg)	Margin Share (%)	Value (Rp/kg)	Margin Share (%)
	Farmer						
1	Farm Level Prices	1,020	75.0	1,360	100.0	12,000	85.7
	Transportation costs	80	5.8	70	5.1	0	0.0
	Operating costs	0	0.0	0	0.0	8,100	578.5
	Total cost	80	5.8	70	5.1	8,100	578.5
	Profit	940	6.7	1,230	0.1	3,900	27.8
	Marketing Margin	340	2	130	9.5	2,000	14.2
2	Collector						
	Cassava Purchase Price	1,020	7.2	0	0	0	0
	Selling price	1,360	9.2	0	0	0	0
3	Factory						
	Factory Level Price	1,360	100.0	1,360	100.0	0	0
4	Retailer						
	Tiwul Purchase Price	0	0	0	0	12,000	85.7
	Profit	0	0	0	0	2,000	14.2
	Tiwul Selling Price	0	0	0	0	14,000	100.0
5	Final Consumer						
	Tiwul Purchase Price	0	0	0	0	14,000	100.0
6	Total Marketing Margin	340	25	130	9.5	2,000	14.2
	Total Marketing Costs	80	5.8	70	5.1	8,100	57.8
	Total Profit	940	69.1	1,230	0.1	5,900	42.1
	Farmer's Share		100		14.7		114.2
	RPM		4.2		0.0		0.2

Source.Primary data (Processed) 2021

Table 9 shows that marketing channel I produces a marketing margin of Rp. 340/kg the margin share obtained is 25%, while for marketing channel II the marketing margin is Rp. 130/kg the margin share obtained is 9.5% and for marketing channel III the marketing margin is IDR 2,000/kg the margin share obtained is 9.6%. The longer the cassava marketing chain, the costs that will be incurred will increase. This will affect consumer price levels.

Analysis of cassava support services

Cassava agribusiness system support services are an institution that supports farmers in running cassava farming businesses. Supporting services are an important factor in every cassava farming activity. The use of supporting services by cassava farmers can be seen in Table 10 as follows:

Table 10. Utilization of supporting services for cassava farmers

No	Supporting Services	Amount	There is/ No	Frequency/ Year	Used/ No	Benefits Provided
1	Financial institutions (Banks)	-	No	-	-	-
2	Research institutions	-	No	-	-	-
3	Agricultural Extension	1	There is	12	Take advantage of	Cultivation methods and information on subsidized fertilizers
4	Government policy	-	No	-	-	-
5	Farmers	30	There is	12	Take advantage of	Subsidized Fertilizer Assistance
6	Cooperative	1	There is	4	Take advantage of	Savings and Loan
7	Road		There is		Take advantage of	Cassava Sales Transportation Platform
8	Market	1	There is	2	Take advantage of	Place to Sell Cassava
9	Production Facilities Shop	2	There is	8	Take advantage of	Availability of Agricultural Tools and Materials
10	Gapoktan	1	There is	12	Take advantage of	Information and distribution of agricultural aid
11	Insurance	-	No	-	-	-
12	NGO coaching	-	No	-	-	-
13	Government Service Development	-	No	-	-	-
14	BUMDES	1	There is	8	No	-

Source: Primary data (processed) 2021

Table 10 shows that 7 institutions can support cassava productivity. This institution is used by cassava farmers to support cassava farming. According to (Mudatsir & Syarif, 2023), institutions that have a relevant relationship with farming activities aim to realize food security. Farmer institutions play an active role in rural economic development which is supported by the role of extension workers. These farmer institutions are farmer groups and GAPOKTAN, some of which are farmers who carry out cassava farming.

CONCLUSION

Based on the results of the discussion, it can be concluded that the agribusiness system for cassava commodities consists of 1) a subsystem for procuring production facilities which is said to be in use. 2) The farming subsystem is assessed from the performance of the farming business, so cassava farming is profitable and worthy of development. 3) the cassava processing subsystem into tiwul products provides considerable added value. 4) the marketing subsystem states that marketing fresh and processed cassava is included in efficient marketing, and 5) the supporting subsystem has not provided a maximum contribution to the cassava commodity. The cassava commodity agribusiness system has been formed but the supporting services are not yet running well, so it is necessary to develop integrated agribusiness institutions.

REFERENCES

Asmarantaka, R. W. (2012). *Pemasaran agribisnis (agrimarketing).* Bogor: Institut Pertanian Bogor.

Budiaji, W. (2013). Skala Pengukuran dan jumlah respon skala likert (the measurement scale and the number of responses in likert scale). *Ilmu Pertanian dan Perikanan*, *2*(2), 127–133.

Budiawati, Y., Perdana, T., & Natawidjaya. (2016). Analisis efisiensi penggunaan faktor-faktor produksi ubi kayu di

Kabupaten Garut. *Jurnal Agribisnis Terpadu*, *9*(1-13). https://doi.org/http://dx.doi.org/10.33512/jat.v9i2.2498

Dahlianah, I. (2014). Pupuk hijau salah satu pupuk organik berbasis ekologi dan berkelanjutan. *Klorofil*, *IX*(2), 54–56.

Erlangga, N., Purwadaria, H. K., & Firdaus, M. (2012). Improvement of mangosteen farming and postharvest handling strategies based on global GAP standard at Kiara Pedes, Purwakarta District. *Jurnal Manajemen Dan Agribisnis*, *9*(2), 69–77.

Fitriani, F., Unteawati, B., Sutarni, S., Fatih, C., & Mutaqin, Z. (2021). Peningkatan daya saing ukm olahan ubikayu: pendekatan rantai nilai. *SEPA: Jurnal Sosial Ekonomi Pertanian Dan Agribisnis*, *17*(2), 185. https://doi.org/10.20961/sepa.v17i2.44423

Hakim, L., Ginting, L. N., & Milla, A. N. (2023). Pemodelan dinamika sistem ketersediaan ubi kayu di kabupaten Aceh Besar. *Agromix*, *14*(1), 48–59.

Haryono, D., Zakaria, W. A., Murniati, K., Zulkarnain, Z., Rakhmiati, R., Handayani, E. P., Syahputra, F., & Vitratin, V. (2021). Biaya transaksi dan pengaruhnya terhadap pendapatan usahatani ubikayu transaction cost and its effect to the income of cassava farming. *Jurnal Penelitian Pertanian Terapan*, *21*(2), 167–183.

Hasyim, A. I. (2012). *Tataniaga pertanian.* Universitas Lampung. Lampung.

Isbah, U., & Iyan, R. Y. (2016). Analisis Peran sektor pertanian dalam perekonomian dan kesempatan kerja di Provinsi Riau. *Jurnal Sosial Ekonomi Pembangunan*, *19*, 45–54.

Kotler, P., & Armstrong, G. (2008). Prinsip-prinsip pemasaran. Edisi 12. Penerbit Erlangga

Kristian, K. (2015). Determinan Produksi konsumsi dan harga ubi kayu Indonesia. *Inovasi Dan Pembangunan -Jurnal Kelitbangan*, *3*(1), 1–23. https://jurnal.balitbangda.lampungprov.go.id/index.php/jip/article/view/72

Mudatsir, R., & Syarif, A. (2023). Peningkatan kapasitas kelembagaan dalam mendukung ketahanan pangan Kabupaten Jeneponto. *Jurnal Galung Tro*, *12*(2), 262–272

Ngongo, Y., Basuki, T., Derosari, B., Mau, Y. S., Noerwijati, K., Dasilva, H., ... & Wisnubroto, E. I. (2022). The roles of cassava in marginal semi-arid farming in East Nusa Tenggara—Indonesia. *Sustainability*, *14*(9), 5439. https://doi.org/10.3390/su14095439

Oni, W., Bahari, & Rosmawaty. (2019). Kajian sistem agribisnis jeruk manis (citrus sinensis) dalam rangka peningkatan pendapatan petani di Desa Konda Satu Kecamatan Konda Kabupaten Konawe Selatan. *Jurnal Ilmiah Agribisnis*, *4*(5), 116–120.

Pawlak, K., & Kołodziejczak, M. (2020). The role of agriculture in ensuring food security in developing countries: Considerations in the context of the problem of sustainable food production. *Sustainability*, *12*(13), 5488.

Pramesti, F. S., Rahayu, E. S., & Agustono, A. (2017). Analisis daya saing ubi kayu indonesia di pasar Internasional. *SEPA: Jurnal Sosial Ekonomi Pertanian Dan Agribisnis*, *14*(1), 1–7. https://doi.org/10.20961/sepa.v14i1.21034

Ramadan N, R. (2018). Analisis daya saing komoditas ubi kayu di Kecamatan Lengkong Kabupaten Sukabumi. *Jurnal Penelitian dan Pengembangan Sains Dan Teknologi*, *12*(2), 55–62. http://eprints.ummi.ac.id/id/eprint/795

Roidah, I. S. (2013). Manfaat penggunaan pupuk organik untuk kesuburan tanah. *Jurnal Bonorowo*, *1*(1), 30–43.

Sari, A. P., Ismono, R. H., & Adawiyah, R. (2020). Analisis pendapatan, persepsi, dan minat petani dalam berusahatani ubi kayu di Kecamatan Sukadana Kabupaten Lampung Timur. *Jurnal Ilmu-Ilmu Agribisnis*, *8*(3), 474. https://doi.org/10.23960/jiia.v8i3.4446

Siallagan, Y. C., Asriani, P. S., & Andani, A. (2016). Kajian sistem agribisnis ubi kayu pada kelompok tani sungai suci di Desa Pasar Pedati Kecamatan Pondok Kelapa Kabupaten Bengkulu Tengah. *Jurnal AGRISEP: Kajian Masalah Sosial Ekonomi Pertanian dan Agribisnis*, 223-236. https://doi.org/10.31186/jagrisep.15.2.223-236

Sugiarto, Siagian, D., Sunaryanto, L. T., & Oetomo, D. S. (2003). *Teknik sampling.* Jakart: PT. Gramedia Pustaka Utama.

Sugiyono, (2014). *Metode penelitian kuantitatif, kualitatif, dan R dan D*. Bandung: Alfabeta.

Susanti, S., Lestari, D. A. H., & Kasymir, E. (2017). Sistem agribisnis ikan patin (Pangasius sp) kelompok budidaya ikan Sekar Mina di kawasan minapolitan patin Kecamatan Kota Gajah Lampung Tengah. *Jurnal Ilmu-Ilmu Agribisnis*, *5*(2), 116–123.

Taherdoost, H. (2016). Sampling methods in research methodology; how to choose a sampling technique for research. *International journal of academic research in management (IJARM)*, *5*(2), 18-27.

Wahyuningsih, S. (2007). Pengembangan agribisnis ditinjau dari kelembagaan. *MEDIAGRO*, *3*(1), 9–20.

Yuliati, L., Nasir, M. A., & Subagiarta, I. W. (2019). Analisis daya saing komoditas singkong Kabupaten Jember Di Jawa Timur. *Prosiding Seminar Nasional Penelitian & Pengabdian Kepada Masyarakat*, 452–457.

Zakaria, W. A., Endaryanto, T., Mas Indah, L. S., Mellya Sari, I. R., & Mutolib, A. (2020). Pendapatan dan kesejahteraan rumah tangga petani ubikayu di Provinsi Lampung. *Jurnal Agribisnis Indonesia*, *8*(1), 83–93. https://doi.org/https://doi.org/10.29244/jai.2020.8.1.83-93

Zakaria, W. A., Indah, L. S. M., Endaryanto, T., Marlina, L., & Ibnu, M. (2022). Rekayasa model kelembagaan kemitraan ubikayu di Provinsi Lampung. *Jurnal Ilmiah Membangun Desa Dan Pertanian*, *7*(5), 177–187. https://doi.org/10.37149/jimdp.v7i5.44

Zulkarnain, Z. (2017). Analisis strategi pengembangan pemasaran dan nilai tambah tiwul instan. *Journal of Food System & Agribusiness*, *1*(1), 1–11. https://doi.org/10.25181/jofsa.v1i1.79

Zulkarnain, Z., Haryono, D., & Kasymir, E. (2010). Keunggulan komparatif dan kompetitif dalam produksi padi di

Kabupaten Lampung Tengah Propinsi Lampung. *Jurnal Penelitian Pertanian Terapan*, *10*(3), 185–199. https://doi.org/https://doi.org/10.25181/jppt.v10i3.262

Zulkarnain, Z., Zakaria, W. A., Haryono, D., & Murniati, K. (2020). Determination of cost of sold goods in tapioca factory of cluster I and Cluster II in Lampung Province. *International Journal of Advanced Science and Technology*, *29*(4), 5227–5234. http://sersc.org/journals/index.php/IJAST/article/view/25947

Zulkarnain, Z., Zakaria, W. A., Haryono, D., & Murniati, K. (2021a). Daya saing komoditas ubi kayu dengan internalisasi biaya transaksi di Kabupaten Lampung Tengah, Lampung, Indonesia. *Agro Bali : Agricultural Journal*, *4*(2), 230–245. https://doi.org/10.37637/ab.v4i2.712

Zulkarnain, Z., Zakaria, W. A., Haryono, D., & Murniati, K. (2021b). Institutional partnership model of cassava sustainable agribusiness in Lampung Province. *Jurnal Ekonomi Pertanian: Kajian Masalah Ekonomi Dan Pembangunan*, *22*(1), 74–89. https://doi.org/10.23917/jep.v22i1.13374