

# Policies and Models of Agribusiness Development of Cassava in North Sumatera

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**Abstract.** North Sumatera is one of cassava production center areas in Indonesia which produces 30 t ha<sup>-1</sup> in average, planted by farmers by simple way. The cassava is used mostly for materials of starch industry, while certain cassava is used for processed food products in household industry. In order to optimize the role of cassava commodity in economics, it is required strategic planning which examines policy and development model of cassava agribusiness in North Sumatera. The research method used in this study is Rapid Rural Appraisal (RRA) and Focus Group Discussion (FGD) to farmers, traders/collectors, craftsman, and factories and household industry. It was held in 2016 and 2018 in Simalungun, Pematang Siantar, and Toba Samosir district. The result shows that implementation of policy related to utilization of superior varieties cassava as industrial raw materials for starch, cassava varieties for food materials, and utilization of cassava production technology is required. Afterwards, agroindustry sector requires implementation of policies such as policy of business scale optimization, maximization of business profit, effective technology utilization for processing industry, promotion, and product dissemination. Cassava agribusiness development model requires implementation of industrial types classification (upstream and downstream) in a linked partnership system which sustainable and continuous.

**Keywords:** Agro-industrial businesses, farmer participative research, *Manihot esculenta* Crantz, opportunity - threat factor, strength - weakness factor.

## 1 Introduction

The dynamics of the globalization of the world economy will certainly influence and color the system and condition of the Indonesian economy. All these external dynamics will in

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turn engage the Indonesian economy in a more competitive free trade. This condition implies that commodities produced by Indonesia (especially agricultural products for consumption or as industrial raw materials) are required to have highly competitive and comparative advantages. This means that these products must be able to compete in both the domestic and foreign markets.

In connection with this problem, an agribusiness-oriented approach as a policy in agricultural development in order to increase farmers' income and welfare is an absolute requirement to be implemented. In Asia, Indonesia is one of the largest cassavas (*Manihot esculenta* Crantz) producers after Thailand [1]. In addition to domestic needs, cassava is also exported in the form of raw materials and semi-finished products (intermediate products).

The government's role in supporting agricultural development in North Sumatra has not been fully effective. This can be seen from the lack of farmer's welfare, impartial marketing of farmer products, unsustainable extension programs [2]. Cassava farming in Simalungun Regency, North Sumatra has comparative and competitive advantages, cassava can be cultivated more widely so that it can meet domestic needs rather than importing [3, 4].

One of the centers for cassava production in Indonesia is North Sumatra, apart from Lampung and East Java. In the last 5 yr (2014 to 2018) in this area, the harvested area for cassava has reached 35.551 ha and production has reached  $1.2 \times 10^6$  t the average production has reached 30 t ha<sup>-1</sup> [5]. Cassava in this area has actually been planted by farmers for a long time, which is generally grown in monoculture with simple technology. The impact is that the yield levels that can be achieved are still far below the yield levels for superior varieties. Cassava production in North Sumatra is mostly used as raw material for large industries that produce starch, as well as for processed food products (small/household industries). Cassava plants can be grown in various places, but the government's attention on the commodity of cassava is not yet available, it is still focused on priority food crops (rice, maize, and soybean). Cassava is a future commodity that can meet the needs of food, feed and industry, and also bioenergy [6, 7].

Based on this background, a study was conducted on "Policies and Development Models of Cassava Agribusiness in North Sumatra". In this study, the discussion will focus on the aspects of the production sub-system and agro-industry related to the sustainable partnership aspect. Given that in the era of the global economy agricultural commodities (especially cassava) as industrial raw materials, most of them are economic activities of rural communities. On the other hand, the commodity of cassava is demanded to have high competitiveness so that it is able to host the domestic market which will compete with imported products. This is because Indonesia also has to open up markets for other countries' products.

## 2 Methodology

The research was conducted in cassava production centers in North Sumatra, Indonesia, in the districts of Simalungun, Pematang Siantar, and Toba Samosir. The method used is the Rapid Rural Appraisal (RRA) in 2016, which is to find out information on local conditions quickly and completely. This activity involves farmers, traders, collectors, factories (processors/craftsmen). Furthermore, a Focus Group Discussion (FGD) activity was carried out in 2018, which is to determine the roles and activities of each actor involved in cassava farming. This activity involves farmers, traders, collectors, factories (processors/craftsmen), researchers, Universities, the Province Government of Agriculture Division.

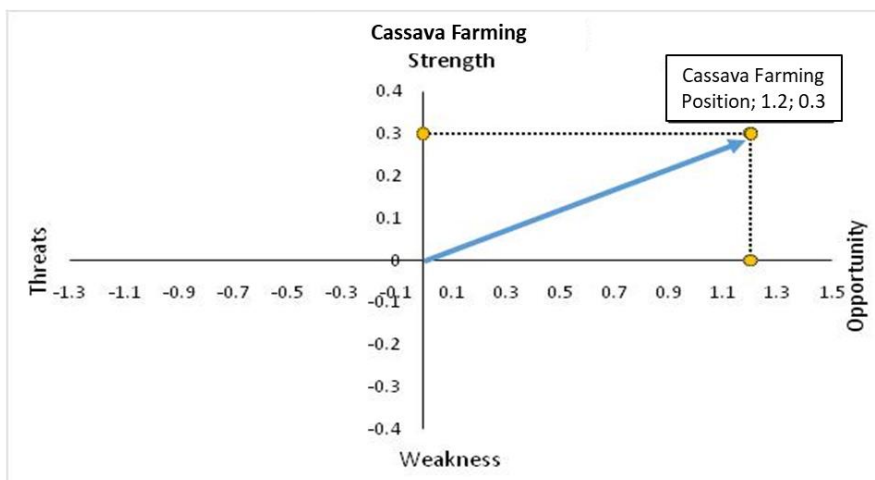
One indicator of agricultural growth is an increase in production, productivity and area [8]. However, the constraints on area width that tend to decline in the development of

cassava farming in North Sumatra Province can still be overcome by the opportunity factor. This means that the opportunity factor is still able to overcome the obstacle factor (the difference in score is + 1.2). Based on the evaluation above, it can be understood that the effort to develop cassava farming in North Sumatra Province is in the quadrant of the relationship between strength and opportunity; the meaning is that these efforts can be operationalized or still bring profit. When mapped, the position of the cassava development can be seen in Figure 1.

### 3 Results and discussion

#### 3.1 Agribusiness development policy on cassava based

Based on the research results of Krisdiana *et al.* [9] on opportunities and strategies for developing cassava farming, the matrix analysis of the relationship between internal and external factors, the efforts to develop a cassava business in North Sumatra Province (Pemantang Siatar, Simalungun, and Toba Samosir) can finally be seen: (i) the magnitude of the strengths and weaknesses of internal factors, and (ii) the magnitude of the value of opportunities and constraints of external factors in the development of cassava farming in North Sumatra Province. When viewed from the internal factors of cassava development efforts; the strength score score is 3.1 and the weakness score score is 2.8. This shows that the strength factor is still relatively greater than the weakness factor. This means that in the effort to develop cassava farming, it turns out that the strength factor is relatively still able to overcome the weakness factor (the difference in score is + 0.3). From the external factors, the probability score is 3.2 and the obstacle score is 2.0. This condition indicates that the opportunity factor for the development of cassava farming in this area is still greater than the obstacle factor. This means that the opportunity factor for the development of cassava farming is still greater than the obstacle factor. This means that the opportunity factor is still able to overcome the obstacle factor (the difference in score is + 1.2). Based on the evaluation above, it can be understood that the effort to develop cassava farming in North Sumatra Province is in the quadrant of the relationship between strength and opportunity; the meaning is that these efforts can be operationalized or still bring profit. When mapped, the position of the cassava development can be seen in Figure 1.



**Fig. 1.** The results of a SWOT analysis in a map of the four quadrants of effort development of cassava farming in North Sumatra.

The highest Total Weight Value (TWV) of each internal and external factor shows the highest urgency and influence so that it is chosen as a basis for developing strategies for developing cassava farming. The factors that are very influential or urgent and important for developing this strategy can be seen in Table 1.

**Table 1.** Internal and external factors selected to determine cassava farming development strategy in North Sumatra Province.

No.	Internal and external factors	Description	Total weight value
1	Strengths	Supporting land and climate	1.1
2	Weaknesses	The competitiveness of the cassava commodity is low	1.1
3	Opportunities	The market is available and in high demand	1.5
4	Threats	The land availability tends to decrease	0.9

Based on the results of the SWOT analysis in the four quadrant map (Figure 1), it shows that the effort to develop cassava farming in North Sumatra Province is feasible to be recommended. This is due to internal factors of strength and possible external factors (in S-O ordinate). The formulation of the policy for the development of cassava agribusiness-based farming in North Sumatra Province can be seen in Table 2.

**Table 2.** Strategies for developing cassava farming in North Sumatra Province.

	<b>Strengths (S):</b> <i>Supporting land and climate</i>	<b>Weaknesses (W):</b> <i>The competitiveness of the cassava commodity is low</i>
<b>Opportunities (O):</b> <i>The market is available and in high demand</i>	-Use superior varieties of cassava. -Application of cassava farming cultivation technology	
<b>Threats (T):</b> <i>The land availability tends to decrease</i>		

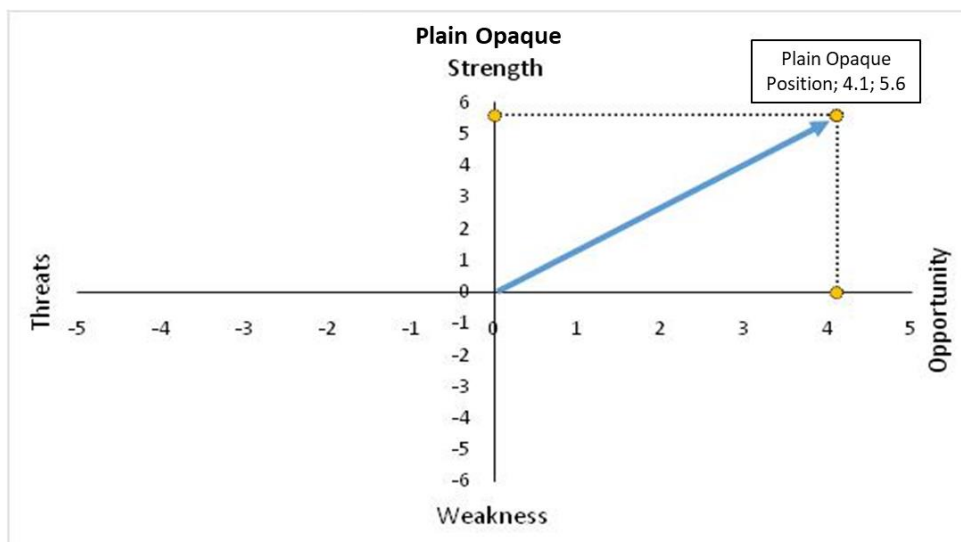
The meaning of Table 2 is the effort to develop cassava farming in North Sumatra by which the policy that must be implemented is the use of superior varieties for home industries, for example the superior variety Malang-4 which contains high starch and is suitable for raw materials for the flour industry, yields can reach 40 t ha<sup>-1</sup> and 9 mo of harvest. The superior varieties of Malang-1 with delicious and sweet taste are suitable for the food industry, yield reaches 36 t ha<sup>-1</sup>, and harvest age 9 mo to 10 mo. In order to optimize the yield of cassava farming, it also needs to be balanced with the application of cassava farming cultivation technology.

This is in line with what was conveyed by Irawanto *et al.* [10] that to increase cassava farming must be accompanied by the use of superior varieties and cassava cultivation technology. Meanwhile, Yuniwati *et al.* [11] stated that technology development is based on the wishes and willingness of farmers and is carried out by farmers themselves or what is known as the Farmer's Participative Research method. This method has promising prospects for developing sustainable cassava production technology. The technology introduced spreads rapidly and adoption can last for a long time. After 5 yr, 65 % of farmers have planted UB 477-2 cultivars and 76 % of cassava farmers have used cow dung for their cassava plants. Amount of 10 yr after the project, apart from UB 477-2 cultivar,

several farmers planted Malang 6 cultivar and Markonah varieties. The number of farmers using manure has also increased and some farmers are using compost technology. This opinion is also reinforced by Dendi *et al.* [12] that in developing countries participatory approaches in agricultural development strategies to achieve sustainable goals are more effective.

In North Sumatra, Indonesian exports contribute up to 40 % of GRDP. About 75 % of the export value is obtained from agro-based products [13]. Whereas in Central Lampung, which is the highest cassava producing area in Lampung, it has contributed more than 34 % of the production since 2011. This finding is supported by the large number of medium-high-scale cassava factories that have developed in this region [14].

In North Sumatra, there are cassava agro-industrial businesses, both household industries in the downstream area and large industries in the downstream areas. Based on the analysis of the relationship between internal and external factors in the development of the home food industry made from cassava flour namely “opaque”), the development of the opaque household industry has a score of 6.1 strengths and a weakness of 0.5. This condition means that the strength factor of the development of the opaque household industry in North Sumatra, the strength factor is still relatively greater than the weakness factor. This means that in the effort to develop the home industry, it turns out that the strength factor is still able to overcome the weakness factor (difference in score is + 5.6). Meanwhile, when examined from the aspect of external factors, the score of the opportunity value is 4.5 and the score of the resistance value is 0.4. This also shows that the factor of opportunity score is still greater than the obstacles that will be encountered in the development of the opaque household industry. This means that the opportunity factor is still able to overcome the obstacle factor (the difference in score is + 4.1). The results of this study indicate that the efforts to develop the home industry in North Sumatra are opaque in the quadrant of the relationship between strength and opportunity. So, in principle it can be operationalized or recommended because it is still profitable. If mapped, the position can be seen in Figure 2.



**Fig 2.** SWOT analysis results in a map of the four quadrants of effort plain opaque home industry development in North Sumatra Province.

Based on the highest total weight value (TNB) of foreign internal and external factors, it shows the highest urgency and influence to be chosen as the basis for formulating a business development strategy. The selected factors can be seen in Table 3.

**Table 3.** Selected internal and external factors to determine the strategy development of home industry (opaque) based on cassava farming in North Sumatra Province.

No.	Internal and external factors	Description	Total weight value
1	Strengths	Easy and inexpensive processing technique.	1.7
2	Weaknesses	Less hygienic due to conventional drying.	0.3
3	Opporrunities	There is additional income from skin waste for feed.	2.0
4	Threats	The price of cassava fluctuates sharply	0.4

After the internal and external factors have been selected, the next stage is to determine the strategy for the development of an opaque household industry which must also take into account its position (Figure 2). Where the development position lies in the ordinate of strength and opportunity (S-O), the meaning is feasible to be operationalized or developed. In detail, the strategy for developing the plain opaque household industry in North Sumatra can be formulated in Table 4.

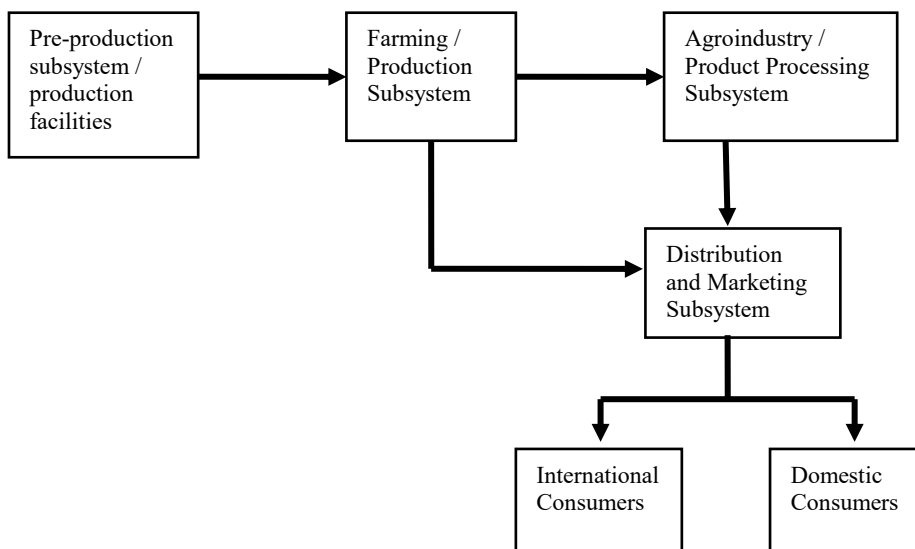
**Table 4.** Policy strategies for home industry development efforts (plain opaque) in North Sumatra Province

	<b>Strengths (S):</b> <i>Easy processing technique and cheap.</i>	<b>Weaknesses (W):</b> <i>Less hygienic due to conventional drying</i>
<b>Opportunities (O):</b> <i>There is additional income from skin waste for feed.</i>	-Optimization of household industry scale. -Maximization of business profits, by optimizing the use of cassava raw materials. -Looking for appropriate processing technology to be able to process the main product and leather waste materials efficiently. -Increasing the promotion or dissemination of plain opaque products.	
<b>Threats (T):</b> <i>The price of cassava fluctuates sharply</i>		

The meaning of Table 4 that can be drawn for efforts to develop a cassava-based agro-industry in North Sumatra is that support for the implementation of policies is needed, among others: (i) optimizing the scale of small household industries and large industries (flouring and starch); (ii) maximization of business profits, by optimizing the use of cassava raw materials; (iii) application of appropriate technology for efficient processing of main products and waste (sweet potato skins), and (iv) increasing product promotion and dissemination.

### 3.2 Agribusiness development model of cassava based

When understood in detail, the agribusiness system actually has four sub-systems which are interrelated with one another in a chain. The four sub-systems are: (i) production input supply sub-system; (ii) farming/production sub-system; (iii) sub-system of agro-industry/product processing; and (iv) distribution and marketing sub-system. These four sub-systems constitute a continuous chain of activities, starting from upstream to downstream activities. This means that the success of this agribusiness system depends on the progress achieved by each sub-system as a link in a chain that is interrelated. In brief, the description of the agribusiness system can be seen in Figure 3.

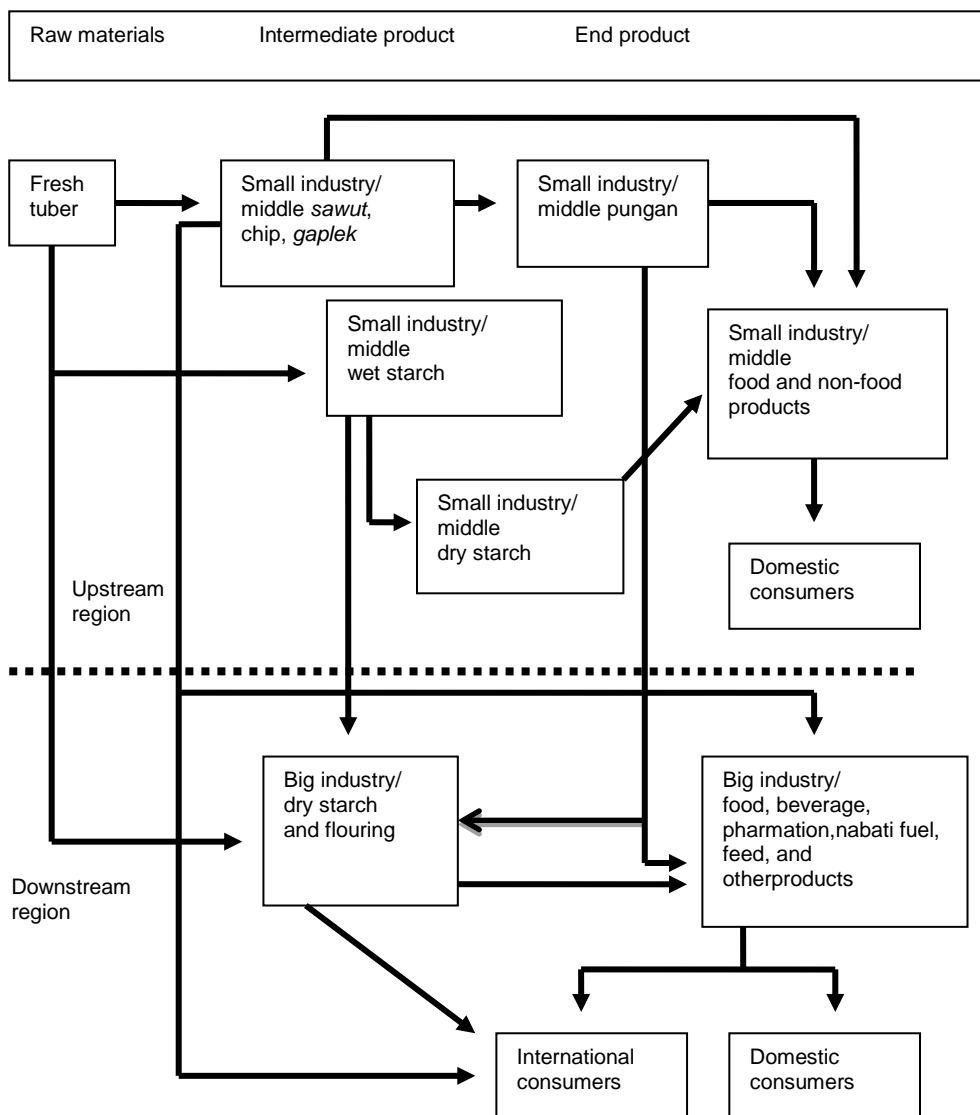


**Fig 3.** The relationship between subsystems in the agribusiness model.

One of the meanings of Figure 3 is that agro-industrial activity is a part of agribusiness which aims to increase the added value of agricultural commodities (cassava). The impact is that the economic value of agricultural commodities/cassava can be increased, so that the regional/rural and national economy can develop dynamically. Based on the understanding of agribusiness activities, the cassava commodity through the agro-industry will produce intermediate products and final products. The next problem is what is the right model for efforts to increase the role of cassava in the global economic system that is able to empower farming or rural communities. In detail, the flow of cassava starting as raw material (raw material) to intermediate product to the final product can be seen as in Figure 4.

Figure 4 shows that the development of cassava-based agro-industries can be carried out by household/small-medium industries in the upstream area to large industries in the downstream area. Thus, a lasting adhesive tool is needed to connect the two regions in a solid and unified economic system, namely a system of agro-industrial partnerships that is oriented towards cassava-based agribusiness insights. From fresh cassava, the initial products can be made in the form of chips, “*sawut*” and cassava. These products can be carried out by small and medium sized industries in the upstream area. These industries can enter into partnerships with farmers who produce cassava. Likewise with the starch small-medium industry. This partnership will stimulate farmers to increase the quality and quantity of fresh cassava production. Large-scale industries both starch and flour, which use mechanical equipment should operate downstream, to get closer to the end product

industries (processed food, pharmaceutical and chemical industries). This downstream industry needs to partner with upstream industries that provide intermediate products as raw materials.



**Fig 4.** Empowerment model of cassava commodity in an agro-industrial system agribusiness perspective.

The distance to the source of raw materials and the availability of cassava for business are the main determinants of maximizing income in cassava agro-business in Nigeria [15]. The partnership that is realized will certainly have an impact on these activities which will become a complete, solid, mutually beneficial, necessary, strengthening, and sustainable economic activity if the ethical and moral principles of business are used as the main basis for establishing a business partnership relationship. The impact is that there will be a link in the chain of economic activities that need and depend on one another. This means that the benefits arising regionally and nationally can be explained as follows: (i) the dynamics of



the rural economy will increase, due to opportunities for stimulation of economic activity that are mutually beneficial, requiring and strengthening; (ii) cassava producer farmers will be stimulated to improve the quality and quantity of production per unit area and time, due to market and price guarantees; (iii) big industries in the downstream area can reduce production costs; and (iv) the state can save foreign exchange from import efforts and generate foreign exchange due to the export activities of intermediate and final products.

The results of the study by Sugino and Mayrowani [16] conducted in the Sukadana area, East Lampung, Indonesia show that the harvesting age is an important factor in determining the yield and price of cassava in the study area. Farmers who collaborate with cassava processing companies will receive technical support and increased demand for cassava. This will contribute to the welfare of farmers and increase the profitability of cassava production. The results of the study by Soukhamthat and Wong [17] conducted in Vientiane, Laos showed that the determinants of technical efficiency for planting cassava were good land preparation, plant age, and young farmers played an important role in increasing the technical efficiency of cassava farming.

## 4 Conclusion

Efforts to increase the income of farmers and industries made from cassava in North Sumatra require the application of cassava agribusiness development. The development of upstream and downstream agro-industries requires a strong, interrelated, profitable, requiring, strengthening, and sustainable partnership chain. Cassava farming policy needs to be carried out by using superior varieties and applying the cultivation technology of cassava farming. The upstream and downstream industrial development policies are carried out by implementing optimization of business scale, maximizing profits, appropriate technology, and increasing promotion or product dissemination. The cassava agribusiness development model needs to be firmly applied to the upstream and downstream industries in a partnership that is interconnected and sustainable. This upstream and downstream agro-industrial partnership model will become a complete, strong, and sustainable economic activity if ethical principles and business morals are used as the main basis for establishing a business partnership relationship.

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