Measuring the competitiveness of cassava in East Java, Indonesia: evidence in Jember regency

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Abstract. The development of cassava is vitally important in the effort to supply non-rice carbohydrate foodstuffs, diversify local food consumption, develop food processing industries and agro-industries, source foreign exchange through exports, and support increased food security and food self-sufficiency. The problem of cassava production and productivity in the management of cassava farming in Jember Regency has strong implications about the specification and response estimation of the production function. If productivity is one component of increasing the competitiveness of cassava, there will be a discontinuity in responding to incentives in the market. The purpose of this study was to measure the competitiveness of cassava in Jember Regency using revealed comparative advantage (RCA) analysis techniques. The results show that the cassava commodity has a value of 17.23 or above one, which means cassava has a comparative advantage compared to other regions with the same commodity. The high RCA value can occur due to several things, for example, the influence of the need for dried cassava to the industry so the cassava production is prioritized to meet the needs of dry cassava outside the region (exports), or the domestic dry cassava flour industry is developing, efficient, or attractive for investors to engage in the agro-industry because of the large profits. This value has increased when compared to the previous year which was 16.31. This can occur because the demand for cassava from outside the region has also increased as a raw material for bioethanol and its derivative products as well as improved prices at the farm level and the average price of cassava in the national market.

1. Introduction
One of the food crop commodities that is superior and has potential in Indonesia's economic growth is cassava. Indonesia is one of the main producers and exporters of cassava in the world. Indonesia was included in the top five cassava producing countries from 2004 until the latest data was 2015 [1]. Indonesia still has the opportunity to increase exports. The potential for Indonesian cassava production is supported by the positive and increasing productivity of cassava even though the production and land area have fluctuated [2].

For a long time, cassava was considered a subsistence crop for small farmers, but cassava has the opportunity to be cultivated on a large scale to produce raw materials for industrial processing. Today cassava is the basic ingredient of various types of products such as various processed foods, flour, feed, alcohol, paper and textile materials, sweeteners, and other products that can be biodegradable. The types of cassava derivative products mentioned above are opportunities for market development. The supply chain for cassava products tends to start with a small-scale production unit, followed by a small-scale product processing unit through the drying and milling processes of cassava. As products move through the supply chain, activities such as marketing, processing, and packaging are carried out by several larger-scale units which then distribute the final product to consumers in bulk. The supply chain for cassava products has an hourglass structure that is different from the supply chains of other established agricultural commodities. The existence of this hourglass supply chain shows that the growth and development of the market for cassava products can benefit a large number of poor farmers who are in poor land and in local processing units [3].

The challenge in developing the cassava industry from upstream to downstream is how to equip farmers with the knowledge and tools needed to produce products that meet market growth requirements
Second, how to deal with market growth that leads to changing supply chains. Thus, changes to the supply chain structure must be evaluated when assessing market opportunities [6]. Institutionally is an important factor driving the performance of agricultural resource management. Institutions produce regulations or policies which are the rules of the game in resource management. Each party has different roles and activities in managing agricultural resources. Conflict between farmers and high transaction costs that tend to be inefficient are the problems faced by farmers in the agricultural sector. The implication is that transaction costs are problems that affect industrial decisions in production, labor allocation and consumption decisions [7]. The amount of transaction fee determined unilaterally by the buyer is not known by the farmer resulting in an imperfect market.

Jember Regency is one of the districts in the East Java Province, Indonesia, which is located in the east of Java Island which has quite extensive agricultural and plantation land, namely 9,907,755 ha [8]. The harvested area for cassava in Indonesia in 2018 is 959,926 thousand hectares and the production achieved is 32.8 million tons with a productivity of 21.85 tons/ha. The opportunity for developing cassava is very wide, this is considering the availability of a large area, based on data from [8] showing that there is a potential for dry land covering an area of 28.61 million hectares consisting of 12.02 million ha of non-irrigated dry field, 5 fields of land. 03 ha and 11.56 million ha of untapped temporary land. These lands are the potential available for the development of cassava cultivation/farming areas. In addition to the availability of a large enough area, location-specific cassava cultivation technology packages are also available.

Jember Regency has various potential commodities in the agricultural sector, one of which is cassava. This can be seen from the high productivity and amount of cassava production in Jember Regency. Based on data from the Central Statistics Agency of Jember Regency, it is known that the productivity and amount of cassava production in 2017 were 174.40 kW / ha and 478,030 kW, respectively, with a total harvest area of 2,471 ha [9]. The distribution of potential for cassava in Jember Regency is quite evenly distributed, namely in 28 sub-districts from 31 sub-districts in the regency, including: Kencong, Gumukmas, Puger, Wuluhan, Ambulu, Tempurejo, Silo, Mayang, Mumbulsari, Ajung, Rambipuji, Balung, Semboro, Jombang, Sumberbaru, Tanggul, Bangsalsari, Panti, Sukorambi, Arjasa, Pakusari, Kalisat, Ledokombo, Sumberjambe, Sukowono, Jelbuk, Kaliwates, Sumberjarrai, Patrang [9].

Based on its potential and capabilities, Jember Regency is actually able to face increasingly fierce competition in the international market, especially in the face of trade liberalization where there are no barriers to trade, but this must be followed by the existence of good quality and quality of traded commodities so that they can play a role. important in international trade. This large potential can determine the advantages and capabilities of the Indonesian cassava commodity in facing trade liberalization. Therefore, research on the competitiveness of cassava in Jember Regency needs to be carried out to determine the competitive position of Jember Regency in cassava commodity trade in regional and national markets.

2. Methods
The basic method used in this research is the descriptive analytical method, namely the research method by discussing a problem by researching, describing, analyzing, and interpreting things that are written with an orderly and systematic discussion [10].

The data used in this study are secondary data in 2018 and secondary data conducted in 2019. Revealed Comparative Advantage (RCA) is based on the concept that trade between regions actually shows the comparative advantage of a region [10]. The comparative advantage of certain commodities in a country can be used which aims to compare the export market share of certain sectors of a country with the market share of certain sectors of the country or other producers and to show the industrial competitiveness of a country. The RCA formula is formulated as follows:

$$RCA = \frac{(X_{ij}(\Sigma_i X_{ij}))/((\Sigma_j X_{ij})(\Sigma_i X_{ij} X_{ij}))}$$
Where: \( X_{ij} \) is the export value of Indonesian cassava commodities, \( \Sigma_i X_{ij} \) is the total export value of all agricultural commodities from Indonesia, \( \Sigma_j X_{ij} \) is the total world export value of cassava commodities, \( \Sigma_i \Sigma_j X_{ij} \) is the total world export value for all agricultural commodities, the higher the value \( \text{RCA} \) then the competitiveness of a country will be even stronger [11].

The next method is the private cost ratio, which is the ratio between the private costs of non-tradable inputs and the difference between private revenues and private costs of private tradable inputs. The value of the private cost ratio (PCR) indicates the ability of the system to pay domestic costs at the private or actual price. The private cost ratio (PCR) is formulated as follows:

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\text{PCR} = \frac{C}{(A - B)}
\]

Where is \( \text{PCR} \): Private Cost Ratio; \( A \): Private Admission; \( B \): Private Tradable input fees; and \( C \): Private non-tradable input costs. If \( \text{PCR} < 1 \), it means that the commodity system is able to finance its domestic factors at private prices, in other words, the commodity has a competitive advantage. The lower the \( \text{PCR} \) value, the more competitive the commodity. \( \text{PCR} > 1 \), means that the commodity system is unable to finance its domestic factors at private prices, in other words, the commodity does not have a competitive advantage [12].

3. Results and Discussion

Jember Regency is one of the storage areas for food commodities in East Java [8]. The main food crop commodities in Jember Regency include rice, corn, soybeans, peanuts, and cassava. Cassava is one of the agricultural commodities which is considered to have the potential as a leading agro-industry with various processed products that can be produced. Various opinions and opinions emerged on the surface, both at the conceptual and practical levels. At least many community leaders and practitioners in the field of agriculture and economic development think that cassava is very potential in an effort to achieve national food security and is a food varies based on local resources. Given the importance of the contribution of agribusiness and agriculture, a breakthrough is needed to create a better impression for agriculture in line with efforts to maintain food security and sovereignty, especially in Indonesia [13]. Therefore, cassava-based agro-industry began to develop in Jember Regency.

From a statistical perspective, it can be illustrated that the proportion of rice land is the highest among the five other commodities, namely corn, soybeans, peanuts, cassava, and sweet potatoes. The area of agricultural land for cassava crops was around 1279 hectares in 2016, much smaller than rice farming land. This condition confirms the low interest of farmers in cassava cultivation. Policies related to product development based on local resources and providing incentives to support the upstream to
downstream agricultural industries in order to drive the business climate in Jember Regency, especially for cassava agricultural commodities, have not been optimal.

Policies to increase food availability tend to focus on rice, corn, and soybean commodities as the main food commodities. Meanwhile, the policy of increasing food availability for cassava commodities, increasing production growth is more tailored to the ability of farmers and market absorption [14]. In other words, the rate of increase in cassava production varies depending on the ability of farmers and market absorption. So far, market access is one of the main obstacles in increasing the productivity of cassava plants. Farmers have difficulty distributing their crops, especially in areas far from market reach.

Policies related to the management of cassava plants carried out by the Jember Regency Agriculture Service and the Jember Regency Industry and Trade Office are only based on the 2011–2015 Strategic Plan. Meanwhile, there is no policy in the form of statutory regulations or regional regulations related to the management or cultivation of cassava plants and the protection of farmers. The implementation of the policies stated in the Strategic Plan above depends on the situation and conditions, where the implementation has not been optimal in some areas in Jember Regency. The implementation of post-park policies at the industrial and trade levels has also not been optimal. At the industrial level, the provision of non-military assistance such as production-style assistance to process cassava into quality derivative products with a sale value has so far not been implemented due to administrative constraints at the local government level. On the other hand, at the trade level, policies for the distribution process and market penetration have not been implemented, causing the selling value of the cassava commodity to decrease. Delay in distribution as a result of low market absorption has an impact on the lower selling value which encourages farmers to switch to other food crop commodities.

Based on Jember's cassava export data and regional cassava exports in several districts in East Java until 2017 which were obtained from several related agencies, it was found that the variables of Jember cassava export value, the total export value of Jember agricultural commodities, the value of East Java cassava exports, and the total export value of agricultural commodities in East Java. From these variables, it can be processed to obtain competitiveness variables through the RCA method. The results of the RCA calculation (Figure 2). The results of Figure 2, in the 2017 period, it can be seen that the Revealed Comparative Advantage (RCA) value for Jember cassava commodity has a value of 17.23 or above one, which means that in that period Jember cassava has a comparative advantage compared to other regions with the same commodity. The high Revealed Comparative Advantage (RCA) value can occur due to several things, for example, the influence of the need for dry cassava for the industry in
smaller areas so that cassava production is prioritized to meet the needs of dry cassava outside the region (exports), or the domestic dry cassava flour industry, which is underdeveloped, inefficient, or unattractive for investors to move in the agro-industry because the profits are small. However, this value has increased compared to the previous year, which was 18.31 in 2016. This can occur because the demand for cassava outside the region has also increased as a raw material for bioethanol and derivative products as well as improved prices at the farm level and average prices. average of cassava in the national market.

Furthermore, competitive advantage is measured using the private cost ratio (Private Cost Ratio). Competitive advantage shows the extent to which cassava farming is able to finance its domestic factors at private or actual prices. The lower the PCR value, the more competitive the commodity. Competitive advantage reflects efficiency in the use of domestic resources, in other words, the extent to which domestic resources can be saved to generate one unit of income. To find out the PCR value, data is needed in the form of fixed costs and variable costs of cassava farming in Jember Regency. PCR is the ratio between the private costs of non-tradable inputs and the difference between private revenues and private costs of private tradable inputs. The PCR value indicates the system's ability to pay domestic costs at the private or actual price. So in this study, it is necessary to separate tradable and non-tradable input costs based on private prices. Private price or financial price is the real price level received by farmers in selling their products. Tradable inputs are inputs that are traded so that they have a national market price. Tradeable inputs include fertilizers, seeds, and pesticides. Meanwhile, non-tradable inputs are inputs that are not traded internationally so that they do not have international market prices, which are included in non-tradable inputs, namely land, labor, agricultural tools, and capital. Based on the results of the PCR analysis in Table 1, cassava farming in Jember has a competitive advantage because it has a Private Cost Ratio (PCR) value of 0.51 or less than one, which means that to get an added value of one unit of cassava farming output, additional domestic factor costs are required. from one unit which is equal to 0.51. Meanwhile, the private profit is positive (D> 0), this indicates that the indication of Jember cassava farming is supernormal and should lead to expansion or expansion in the future unless the agricultural area in Jember cannot be expanded or there are more profitable substitute crops. private.

### Table 1. PCR calculation of cassava farming costs in Jember Regency based on price

| Description | Output Reception | Input Costs | Profit | PCR |
|-------------|-----------------|-------------|--------|-----|
|             | (A)             | (B)         | (C)    | (D = A - B - C) | (C/(A-B)) |
| Privat Price| 12,375,000      | 2,150,000   | 5,225,000 | 5,000,000 | 0.51 |
|             |                 |             |        |                 |         |

Source: Primary data, processed, 2019

The results of the PCR analysis showed that the Jember cassava commodity had a competitive advantage. A PCR value of less than one indicates that to produce a one-unit value-added output of cassava at the private price it takes less than one unit of domestic resource cost. It can also be argued that to save one-unit foreign exchange at the private price it is necessary to sacrifice less than the one-unit cost of domestic resources. The condition of cassava farming which has a competitive advantage is one of the reasons why cassava farming is always cultivated and developed in the field. Currently, farmers are planting cassava because the current price of cassava is still better than other commodities that are often grown by farmers such as corn and kale. In addition, cassava cultivation also does not require seeding costs because farmers prepare their own seeds that are easily obtained from the previous planting.

The demand for cassava also continues to increase, especially for industrial needs, so that Jember cassava production is constantly being increased by optimizing its domestic resources. The results of this study reinforce the results of previous studies regarding the competitiveness of cassava which states that the commodity of cassava has a competitive advantage. One of the causes of this condition is that
the farming system used in the research location has started to apply the technology provided by agricultural extension agents. If done intensively, the cassava farming system can increase the competitive advantage of cassava commodities. The intensive cassava farming system has a higher competitive advantage compared to the conventional farming system.

The use of appropriate inputs can also help increase the competitive advantage of cassava farming, which means that an efficient farming system is one of the keys to increasing competitive advantage. This is evidenced by the high competitive advantage of cassava farming in other regions as the largest national-level exporter of cassava. The use of appropriate inputs makes cassava farmers get a competitive advantage and high profits in cassava farming activities.

4. Conclusion
Based on the research results, the value of the Revealed Comparative Advantage (RCA) value for Jember cassava commodity has a value of 17.23 or above one, which means that in that period Jember cassava has a comparative advantage compared to other regions with the same commodity. The value of the Private Cost Ratio (PCR) for Indonesian cassava commodity is 0.51 or less than one, which means that during that period Jember cassava has a competitive advantage. Based on the results, the policy recommendations are stabilizing cassava prices at the farm level and providing cassava farming needs so that it can maintain the quantity of cassava production, the development program cassava-based processed products and marketing supplies, and expansion policies to increase comparative advantage such as stabilization of cassava prices at the farm level and supply of the needs of cassava farming so as to maintain the quantity of cassava production.

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