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Value Chain Analysis of Corn Commodity Supply Chain

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Abstract

This research aims to analyze the supply chain, value chain and added value obtained from corn supply chain actors. This research was conducted in Taluditi District, Pohuwato Regency, Gorontalo Province using qualitative and quantitative analysis. The results of this study indicate that the supply chain value of corn commodities in the sub-district consists of supply chain actors. The supply chain actors involved are the main actors and supporting actors. The supply chain has a dynamic nature but involves three constant flows, namely the flow of products or goods, the flow of information and the flow of money. The value chain is a value activity divided into two types, namely the main activity and the supporting activity. The main actors in the corn value chain analysis include farmers, local traders and companies. The added value of corn commodity is the added value of a commodity because it undergoes processing, storage, transportation in a production process. The added value calculated in the value chain analysis is the added value obtained from each value chain actor involved in the corn harvest, namely the value added analysis of corn farmers, analysis of the added value of local traders or large collections and analysis of company value added. The results of this study are the corn value chain based on quantitative analysis, the highest margin from value chain actors is local traders of 377,500 Kg or 36.17%, the added value based on the hayami method on value chain actors shows that the main value chain actors who obtain the greatest added value are farmers and companies because it is classified as a value added ratio of >50%.

Keywords
value chain analysis; supply chain; corn commodity

I. Introduction

Corn is a strategic commodity that is needed for many industries. In addition to animal feed, corn is widely needed for the food industry, both for processed corn and for food complementary materials. In addition, corn also has an important role in the national economy and has become a contributor to the Gross Domestic Product (GDP) for cereal crops, therefore it can be understood that the need for corn is very high (Aceng Hidayat et al 2017).

Agriculture is a series of activities from upstream to downstream that have links between actors. Various agricultural products ranging from food crops, fruits, etc. make this activity has a lot of potential that can be developed because it can provide benefits at every level starting from the production level whose role is the farmer as well as the marketing of product distribution to consumers. Optimal and targeted utilization of agriculture will directly impact regional income. (Eka Widayat Julianto 2015).

Pohuwato Regency has an area of 4,244.31 or 34.75 percent of the total area of Gorontalo Province so that the agricultural land in this Regency is also still wide consisting of technical land and forest land with the existence of diverse lands allowing for the diversity

of agricultural products, one of which is which is quite reliable is corn. The majority of the population of Pohuwato Regency are farmers so that the main income of the Pohuwato Regency's economy is contributed by the agricultural sector. Farming activities in the Pohuwato Regency area have become the main focus for the community because it has become a hereditary job. Besides that, the amount of agricultural land (technical land, rainfed land, forest land) is an added value to be able to support agricultural products in the area.km^2

Pohuwato Regency Pohuwato Regency is one of the largest corn producing areas in Gorontalo Province because it has several potentials in agriculture, namely agriculture and animal husbandry. The main agricultural products in Pohuwato Regency are rice and corn even though in reality there are other products ranging from livestock and fisheries. This district has corn fields along the trans-Sulawesi road which is the economic capital and even makes this district a producer of shelled corn on a provincial scale. According to the Department of Agriculture and food security of Pohuwato Regency, the data on land area and corn harvested area in Pohuwato Regency in 2020. According to Ferdy in Hasibuan (2019), in the world of agriculture and in the sub sciences of plant breeding in particular there is something called the castration. Agricultural land is increasingly narrow due to the shifting of the function of agricultural land into industrial areas (Zailani, 2019).

The value chain is all activities carried out until its distribution to the final consumer (Campbell 2008 in Sukayana 2013). Kaplinsky and Morris (2000) in Dzanjal (2013) define the value chain as the various activities needed to bring a product or service from conception, through the phases of different from production, delivery to the final consumer.

Added value is the added value of a commodity because it undergoes processing, storage, transportation in a production process (Mutmaini Hamidah et al. 2015). With the existence of an industry that changes the primary form into a new product with higher economic value after going through the processing process, it will be able to provide added value because of the costs incurred so that a new higher price is formed and the profit is greater when compared to without going through the processing process.

II. Research Methods

The location of this research is Taluditi District, Pohuwato Regency, and Gorontalo Province. The determination of this area is based on data obtained by Taluditi District, which is one of the largest corn producing areas and has the largest harvested area in Pohuwato Regency. The research time is September 2020 to December 2020.

Method of collecting data:

1. Interview
2. Literature review
3. Observation

III. Discussion

3.1 Overview of the Research Site

Taluditi District is a sub-district which is included in the central area of Pohuwato Regency. Based on its geographical position, Taluditi District borders Buol Regency, Central Sulawesi Province in the north, and Randangan District in the south, Wanggarasi District in the west and Buntulia District, Patilanggio District in the east. Taluditi District consists of 7 villages, namely:

Table 1. Largest Village Area in Taluditi

No	village	Area (km^2)	Percentage (%)
1	Panca Karsa I	26.10	16.30
2	Panca Karsa II	20.87	13.05
3	Malango	5.65	3.50
4	Mekarti jaya	9.07	5.70
5	Tirto Asri	30.00	18.75
6	Kalimas	30.88	19.30
7	Puncak Jaya	37.4	23.40
TOTAL		**159.97**	**100**

Table 2. Land Use in Taluditi District, Pohuwato Regency

No	village	Land area (Ha)	Percentage %
1	Panca Karsa I	395	10.33
2	Panca Karsa II	195	5.10
3	Malango	437	11.43
4	Mekarti jaya	1500	39.24
5	Tirto Asri	198	5.18
6	Kalimas	183	4.79
7	Puncak Jaya	915	23.93
Amount		**3823**	**100**

Table 2. Shows that the land use in Mekarti Jaya Village has a wider plantation area of 1500 Ha with a percentage of 39.24%, while in Kalimas Village the area of plantation land use is smaller, namely 183 Ha with a percentage of 4.79%. The rest is Pucak Jaya village with a land area of 915 Ha with a percentage of 23.93%. Panca Karsa Village I 395 Ha with a percentage of 10.33%. Malango Village 437 Ha with a percentage of 11.43%. Tirto Asri Village with an area of 198 Ha with a percentage of 5.18%. Post Karsa Village with a land area of 195 Ha with a percentage of 5.10%.

Table 3. Characteristics of Corn Farmers in Taluditi District, Pohuwato Regency 2020

No	Farmer Characteristics	Amount	Percentage (%)
1	Age (Years)		
	16 – 25	5	2.66
	26 – 35	25	13.30
	36 – 45	47	25.00
	> 46	111	59.04
2	Number of Dependents (Persons)		
	1 – 3	92	48.94
	4 – 6	79	42.02
	>7	17	9.04
3	Last education		
	Elementary School/Equivalent	142	75.53
	Middle School/Equivalent	43	22.87
	High School/Equivalent	3	1.60
4	Land Area (Ha)		
	1 – 3	175	93.90
	4 – 6	13	6.10
	>7	0	0
5	Length of Farming (Years)		
	2 – 7	32	17.02
	8 – 12	59	31.38
	13 – 17	50	26.60
	>18	47	25.00

Table 3. Shows that the characteristics of corn farmers, age group > 46 years there are 111 people with a percentage of 59.04%, age group 36-45

47 people with a percentage of 25.00%, in the age group of 26-35 years there are 25 people with a percentage of 13.30%. And the age group of 16-25 years there are 5 people with a percentage of 2.66%. This shows that the age of the respondent farmers is still categorized in the productive age in farming.

The number of dependents of the respondent's farmer families are 1-3 people with the number of farmers 92 people with a percentage of 48.94%, the number of dependents 4-6 people with a number of farmers 79 people with a percentage of 42.02%, and the least

number of dependents, namely dependents > 7 people with 17 farmers with a percentage of 9.04%. The large number of dependents will encourage farmers to carry out activities, especially in finding and increasing their family income so that the needs of family members can be met.

Education will generally affect the way farmers think and also affect the success in managing their farm. Table 6 shows that the highest level of education of farmers is at the SD/Equivalent level as many as 142 people with a percentage of 75.53%, at the SMP/Equivalent level as many as 43 people with a percentage of 22.87%, and at the SMA/Equivalent level as many as 3 people with a percentage of 1, 60%. This shows that there are still many respondents whose education level is still low. The low level of education of these respondents is due to limited funds to continue their higher education, so they prefer to work or earn a living for their families.

Basically, the area of land managed by the respondent farmers is very influential on their farming activities, both on the type of commodity and on the farming pattern itself. The area of land owned by respondent farmers ranges from 1 - 3 Ha as many as 175 people with a percentage of 93.90%, farmers' land area 4-6 Ha as many as 13 people with a percentage of 6.10%, and land area > 7 Ha is not owned by farmers. This shows that the level of land tenure of farmers is still relatively narrow. The narrow area of farming land is the low level of farmers' income.

The farming experience in question is from the time he started farming corn. Farmer's life experience is a big lesson to get to the level of farming development. Farmers who have been farming the longest about 8-12 years are 59 people with a percentage of 31.38%, 13-17 years old are 50 people with a percentage of 26.60%, farming years >18 years are 47 people with a percentage of 25, 00%. And the length of farming is 2-7 years as many as 32 people with a percentage of 17.02%. With the long experience of farming, it is hoped that farmers will be able to optimize the application of their farming activities, so as to increase the yield of corn produced.

Table 4. Characteristics of Local Traders/Big Collectors in Taluditi District, Pohuwato Regency 2020

No	Farmer Characteristics	Amount	Percentage (%)
1	Age (Years)		
	16 – 25	0	0.00
	26 – 35	0	0.00
	36 – 45	3	30.00
	> 46	7	70.00
2	The number of dependents		
	1 – 3	4	40.00
	4 – 6	6	60.00
	>7	0	0.00
3	Last education		
	Elementary School/Equivalent	0	0.00
	Middle	6	60.00

No	Farmer Characteristics	Amount	Percentage (%)
	School/Equivalent		
	High School/Equivalent	4	40.00
4	Length of Collector/Worker		
	2 – 7	2	20.00
	8 – 12	7	70.00
	13 – 17	1	10.00
	>18	0	0.00

Table 4. shows the age group of collectors ranging from >46 years, totaling 7 people with a percentage of 70.00%, in the range of 36-45 years, there are 3 people with a percentage of 30.00%. The age range of corn collectors based on the results of the research is classified as productive at work. The productivity of an age affects activities in carrying out an effective and efficient business.

The number of dependents in a family of 4-6 people there are 6 collectors with a percentage of 60.00%, and the number of dependents 1-3 people there are 4 collectors with a percentage of 40.00%. The number of dependents will affect the amount of expenditure for family needs that must be met, so that he is driven by responsibility so that the income obtained can meet the needs of his family.

The level of education of SMP/Equivalent to the collectors is 6 people with a percentage of 60.00% and the level of education is SMA/Equivalent totaling 4 people with a percentage of 40.00%. The level of education of collectors is not sufficient, because the highest education of collectors can provide a good mindset in managing their trading business and the income they get.

The length of business experience that corn collectors have about 8-12 years is 7 with a percentage of 70.00% and about 2-7 years is 2 with a percentage of 20.00% and 13-17 years is 1 with a percentage of 10.00%. With the long experience of collecting business, it is hoped that it will increase its business income.

Table 5. Characteristics of Companies in Pohuwato Regency 2020

No	Characteristics of Corn End Consumers	Score
1	Age	31 years
2	Position	QZ manager
3	The number of dependents	1 person
4	last education	High School/Equivalent
5	Length of work/service	8 years

Table 5. Shows that the age of the respondent is still classified as productive, namely 31 years so that it can increase productivity. Likewise with the number of dependents, the more the number of dependents in the family, the more expenses incurred to meet their needs. The

number of dependents of the respondent's family is 1 person. The education level of the respondent is at the high school/equivalent level. The education level of the respondents affects the management system, both regarding income so that the expected results are achieved and smart in making decisions in their business.

The respondent's work experience is 4 years. With this experience, it is expected to be able to maintain a business with a fierce level of competition supported by the right business strategy in marketing corn products.

3.2 Corn Supply Chain Flow in Taluditi District, Pohuwato Regency 2020

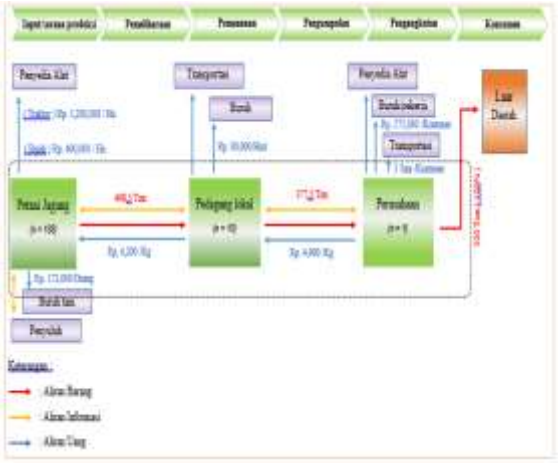

Figure 1. *Actors in the Corn Supply Chain*

Figure 1 shows that there are two main actors in the corn supply chain in the study area consisting of corn farmers, local traders or large collectors, while the supporting actors in the corn supply chain consist of consumers/companies, consumers outside the region, equipment providers, extension workers, farm workers , harvest workers, labor / transport, transportation.

The corn supply chain also explains that there are three streams, namely:

1. Goods Flow

The flow of goods or materials involves the flow of physical products from suppliers to consumers through the chain, as well as the backflow of product returns, services, recycling and disposal. The corn flow starts from farmers as producers as well as the first main actors in the corn supply chain. Corn is supplied by farmers who are the main actors in the supply chain, namely farmer's as much as 499.5 tons and local traders or large collectors as much as 377.5 tons, and companies as much as 300 tons and then sent out of the region.

2. Information Flow

The flow of information that occurs in the corn supply chain at the research location shows that the flow of information or communication is well integrated. Communication activities are carried out via telephone or when both parties meet face-to-face.

The information from farmers to local traders or big collectors includes corn ready to be harvested and transported by workers from local traders or big collectors. Information for local traders or big collectors to farmers is the quantity of corn to farmers and information on price agreements that are mutually communicated between the two parties.

Extension workers are government officials assigned to inform about the cultivation of corn plants in accordance with standard operating procedures because corn is a superior product at the research site and provides technical training for each actor of corn farming.

3. Money Flow

Money flow is a picture of the flow of money/capital that starts from the consumer as a buyer, then flows through each link and will eventually arrive at the producer to be used as production costs.

The flow of money starts from farmers buying production facilities in the form of fertilizers and pesticides, and to support the process of maintaining corn plants, farmers spend Rp. 172,000 per person for labor costs in spraying, fertilizing until harvesting. Tractor rental is Rp. 1,200,000 per hectare, plow is Rp. 400,000 per hectare, in mountainous areas, farmers do not need tractors and plows, so farmers immediately plant corn.

Local traders or large collectors pay wages of Rp. 80,000 per day, for transportation, local traders only pay for fuel prices of Rp. 7,650 (pertalite), and Rp. 9,400 (diesel). The selling price of corn for large collectors to farmers is Rp. 4,200 per kg with a total production of 499.5 tons, the selling price of corn to large collectors is Rp. 4,900 per kg with a total production of 300 tons. The company pays workers/workers of IDR 275,000 per container, for transportation used when shipping corn the company uses containers with a rental fee of 3 million per container.

3.3 Corn Value Chain Based on the Margin Obtained by the Main Actors in Taluditi Sub-District, Pohuwato District 2020

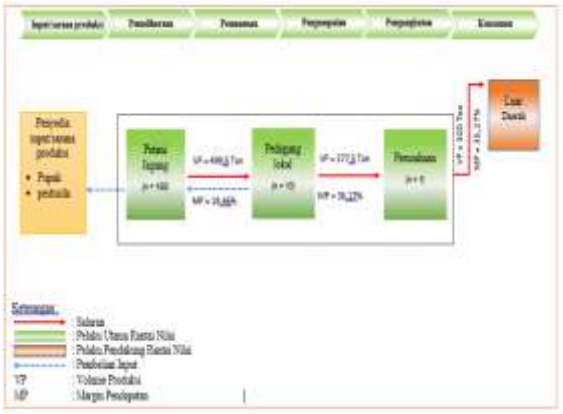

Figure 2. *Margins of the Main Actors*

Figure 2 shows that the margins of the main actors on the channel show the diversity of the received margins obtained. From these results, the largest margin was obtained by local traders in the value chain channel with a production volume of 377.5 tons with a revenue margin of 36.17%. This is because local traders buy corn directly from farmers. In addition, the company also obtains a high margin from the purchase of corn to local traders on the value chain channel, namely with a production volume of 300 tons with an income margin of 35.27%. Farmers with an income margin of 28.56%. This is because the total income of local traders and companies is greater than that of farmers.

According to Porter in ACIAR (2012:9-10) that the value chain sorts companies into nine strategically relevant activities in order to understand cost behavior. Value activities are divided into two types, namely: primary activities, which means activities that are directly involved in the creation of physical products, sales and delivery to buyers, including after-sales. Support activities, which means supporting activities for primary activities in carrying out their operations so that they run better. The main actors in the maize value chain analysis in Taluditi District, Pohuwato Regency, among others; farmers, local traders, and companies.

3.4 Added Value of Corn Commodity in Taluditi Sub-District, Pohuwato District

Added value is the additional value of a commodity because it undergoes processing, storage, transportation in a production process. The added value that is calculated from the value chain analysis is the added value obtained from each value chain actor involved in the corn harvest in the taluditi sub-district, pohuwato district.

The results of the added value analysis of each value chain actor used according to the Hayami method can be seen as follows.

a. Analysis of the Added Value of Corn Farmers

Added value to corn farmers is calculated from the result of subtracting the value of corn output minus the contribution of other inputs and the price of raw materials for corn farmers. Corn farmer value added chain analysis for more details can be seen in Table 6.

Table 6. Corn Farmer Value added Chain Analysis

No	Variabel	Nilai
Output, Input dan Harga		
1	Output (Kg/Panen)	499.500
2	Bahan baku (Kg)	7807.3
3	Tenaga kerja (HOK)	10869.0
4	Faktor konversi (1/2)	63.979
5	Koefisien tenaga kerja (3/2)	1.39
6	Harga produk (Rp/Kg)	3,157
7	Upah rata-rata	80,000
Pendapatan dan Keuntungan		
8	Harga bahan baku (Rp/Kg)	75,368
9	Sumbangan input lain (Rp/Kg)	8,500
10	Nilai output (Rp/Kg) (4x6)	201,958
11	a. Nilai tambah (10-9-8)	118,089
	b. Rasio nilai tambah ((11a/10)x100%)	58.47%
12	a. Imbalan tenaga kerja (5x7)	111,373
	b. Bagian tenaga kerja (%) (12a / 11a) x 100%	94.31%
13	a. Keuntungan (Rp/Kg) (11a – 12a)	6,717
	b. Tingkat keuntungan (%) (13a / 11a) x 100%	5.69%

Table 6. Shows that the output is 499,500 kg with a selling price to consumers of Rp. 3,157 per Kg. The conversion factor of corn is 63,979. This labor coefficient has a value of 1.39 where this value is the value of the outpouring of labor obtained from the comparison between labor input and raw material input.

Farmers sell corn to local traders at a price of IDR 3,157 pe Kg. The contribution of other inputs issued by farmers is Rp. 8,500 per Kg. The added value of farmer's corn with an output value of Rp. 201,958 per Kg obtained an added value of Rp. 118.089 per Kg. The result of employee benefits is obtained from the multiplication between the coefficient of labor and the wages of workers, which is Rp. 111.373. The profit obtained by farmers is Rp6,717 per Kg for corn sales of 499,500 Kg.

b. Value Analysis plus Local Traders or Big Collectors

The added value to local corn traders is calculated from the result of subtracting the corn output value minus the contribution of other inputs and the price of raw materials for local corn traders. Analysis of the value added chain of local corn traders for more details can be seen in Table 7.

Table 7. Value added chain of local corn traders

No	Variabel	Nilai
Output, Input dan Harga		
1	Output (Kg/Panen)	377,500
2	Bahan baku (Kg)	7807.3
3	Tenaga kerja (HOK)	303.4
4	Faktor konversi (1/2)	48.352
5	Koefisien tenaga kerja (3/2)	0.04
6	Harga produk Rata-Rata (Rp/Kg)	4,200
7	Upah rata-rata	80,000
Pendapatan dan Keuntungan		
8	Harga bahan baku (Rp/Kg)	75,368
9	Sumbangan input lain (Rp/Kg)	80,000
10	Nilai output (Rp/Kg) (4x6)	203,079
11	a. Nilai tambah (10-9-8)	47,711
	b. Rasio nilai tambah ((11a/10)x100%)	23.49%
12	a. Imbalan tenaga kerja (5x7)	3,109
	b. Bagian tenaga kerja (%) (12a / 11a) x 100%	6.52%
13	a. Keuntungan (Rp/Kg) (11a – 12a)	44,601
	b. Tingkat keuntungan (%) (13a / 11a) x 100%	93.48%

Table 7. Shows that the output is 377,500 Kg with a corn selling price of Rp 4,200 per Kg. The conversion factor of corn is 48,352. This labor coefficient has a value of 0.04 where this value is the value of the outpouring of labor obtained from the comparison between labor input and raw material input.

Local traders buy corn from farmers at an average price of IDR 3,175 per kg. Other input contributions from local traders are IDR 80,000 per kg. The output value of local traders is IDR 203,079 per Kg.

The added value of local traders' corn for corn with a value of 47,711 obtained a value added ratio of 23.49%. The result of employee benefits is obtained from the multiplication between the coefficient of labor and the wages of workers, which is Rp. 3,109. The profit obtained by local traders is Rp. 44,601 per kg for the sale of corn as much as 377,500 Kg.

c. Company Value Added Analysis

The added value to the company is calculated from the result of subtracting the value of corn output minus the contribution of other inputs and the price of raw materials. The company's value added chain analysis for more details can be seen in Table 8

Table 8. The Company's Value added Chain Analysis

No	Variabel	Nilai
Output, Input dan Harga		
1	Output (Kg/Panen)	300,000
2	Bahan baku (Kg)	7807.3
3	Tenaga kerja (HOK)	8.0
4	Faktor konversi (1/2)	38.426
5	Koefisien tenaga kerja (3/2)	0.001
6	Harga produk Rata-Rata (Rp/Kg)	4,900
7	Upah rata-rata	337,500
Pendapatan dan Keuntungan		
8	Harga bahan baku (Rp/Kg)	4,200
9	Sumbangan input lain (Rp/Kg)	0
10	Nilai output (Rp/Kg) (4x6)	188,285
11	a. Nilai tambah (10-9-8)	184,085
	b. Rasio nilai tambah ((11a/10)x100%)	97.77%
12	a. Imbalan tenaga kerja (5x7)	346
	b. Bagian tenaga kerja (%) (12a / 11a) x 100%	0.19%
13	a. Keuntungan (Rp/Kg) (11a – 12a)	183,739
	b. Tingkat keuntungan (%) (13a / 11a) x 100%	99.81%

Table 8. Shows that the output is 300,000 Kg with the purchase price of corn from local traders of Rp. 4,900 per Kg. The conversion factor for the company is38,426. The labor

coefficient has a value of 0.001 where this value is the value of the outpouring of labor obtained from the comparison between labor input and raw material input. The company's other input contribution is 0 because the company has no other inputs in corn farming.

The added value of the company's corn for corn with an output value of Rp. 188,285 per Kg, obtained an added value of Rp. 184,085 per Kg. The result of employee benefits is 346 which is the product of the multiplication of the labor coefficient with the average wage. The profit obtained by the company is Rp. 183,739 per Kg which is obtained from the results of corn farming

IV. Conclusion

Based on the description of the research results, the following conclusions can be drawn:

1. The corn commodity supply chain in Taluditi District, Pohuwato Regency consists of the main actors and supporting actors. The three supply chain flows at the study site looked good, including the timely arrival of corn according to demand. Corn flow is 499.5 tons with a percentage of 100%. Farmers supply corn to local traders or big collectors only, local traders supply corn to companies. the information flow of the corn supply chain has been well integrated between supply chain actors and the flow of money is in accordance with the agreement of supply chain actors.
2. Corn value chain analyzes based on quantitative analysis and Porter's concept as follows:

a. Corn value chain based on quantitative analysis, the highest margin from value chain actors is local traders of 377,500 Kg or 36.17%.
b. Each of the main value chain actors carries out the main activities and supporting activities although the main actors in the value chain of corn farmers in supporting activities, namely infrastructure activities of the main value chain actors are still less organized. In addition, weaknesses are also found in the main activities of the main actors in the corn value chain in operating activities, in the plant maintenance process which causes corn production results to be less than optimal.

3. Value added based on the Hayami Method, the main players in the value chain are farmers at Rp. 118.089 per Kg with a value added ratio of 58.47%, local traders at Rp. 47.711 per Kg with a value added ratio of 23.49%, companies by Rp. 184.085 per Kg with a value added ratio of 97.77%. . Thus, the main actors in the value chain that obtain the greatest added value are farmers and companies because they are classified as a value added ratio of >50%.

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