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## Added value of robusta coffee products of “dwi tunggal” farmer group in bromo mountain slope

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**Abstract.** Indonesia is among the four largest of coffee beans producing country in the world with production reaching more than half a million tons per year. Pasuruan Regency, located on the slopes of Mount Bromo, has a coffee plantation area of 4,458.20 hectares with a coffee production yield of 1,283.13 tons which has a very high potential of producing good quality Robusta coffee. This potential is used by farmer groups, mainly those under “Dwi Tunggal” farmer group association (*Gapoktan*) to produce Robusta roasted coffee beans and ground coffee (powder). This study aims to determine the added value of the process of Robusta coffee grinding and roasting and provide recommendations to the farmer groups to face global competition. The research area selection is done purposively considering the potential of the. This study uses value added analysis with the Hayami method. The results showed that the added value of Robusta coffee products in both the milling and roasting process was high and had a positive impact on the welfare of farmer group members. Added value for roasted coffee was Rp. 33,871.08 with a value-added ratio of 48.11%. Added value for ground coffee was Rp. 67,341.15 with the value-added ratio of 64.7%

### 1. Introduction

Plantation sub-sector is one of the sub-sectors that experienced the most consistent growth both in planted area and production in Indonesia. The estate crops subsector also had the largest contribution to the Indonesian agricultural GDP during the 2012-2016 period with an average of 27.24% [1]. Coffee is one of the plantation commodities that has a high economic value and plays an important role as a source of foreign exchange for the country. This is not surprising since Indonesia is among the fourth largest coffee producing country in the world [2]–[4]. Robusta coffee is the most developed and best-selling type of coffee particularly in the Indonesian domestic market. Meanwhile, about 83% of the total coffee farms in Pasuruan or around 3,700.31 hectares are planted to Robusta [5].

Dwi Tunggal farmer group (association) which is one of the farmer groups dealing with coffee cultivation. Dwi Tunggal farmer group is resided in Kalipucang Village, Tukur District, Pasuruan Regency Village. Kalipucang is a mountainous region located on the northern slopes of Mount Bromo. The village area of Kalipucang is located on a plateau region with cordon between 800-900 m above sea level, with an area of about 671.18 ha. The type of coffee produced in Kalipucang is predominantly Robusta variety.

Dwi Tunggal farmer group has sought to innovate products for coffee produced with the aim of increasing the income and welfare of farmers. Several methods carried out by the Dwi Tunggal Farmer



Group include producing several kinds of Robusta coffee products. Dwi Tunggal farmer group is one of the farmer institutions that successfully develops business by processing Robusta coffee produce into roasted coffee and ground coffee (coffee powder). The processed coffee of the Dwi Tunggal farmer group has obtained a legal permit from the Trade and Industry Agency of Pasuruan Regency and obtained Robusta coffee certification from the Indonesian Coffee and Cocoa Research Institute (ICCRI or *Puslitkoka*). Processed coffee by Dwi Tunggal farmer group can meet the needs of the Domestic market of some regions in East Java Province with a production capacity of 400 kg of green beans in 1 (one) month.

Every business basically wants to get maximum profits with low production costs and an efficient level of production efficiency by calculating added value. Added value is a very important concept which reflects the value of profits derived from the value of processed products (finished materials) minus the value of raw materials and production costs in addition to the intermediate costs used in the process in kilograms of raw materials. The labour factor only functions as an intermediary from raw materials to processed products and the size of the labour force used in the production process is considered not to affect the value of the processed products produced. In this regard, the author was interested in conducting research to seek to identify added value of processed Robusta coffee products made by the Dwi Tunggal farmer group on the slopes of Mount Bromo. The involvement of farmer groups and inclusion of smallholder coffee farmer in the value chain is an interesting phenomenon which has encouraged this research to be carried out.

## 2. Review of literature

Particularly in Indonesia, Robusta coffee has a better environmental adaptation when compared to Arabica coffee. Robusta coffee can grow well at lower altitudes compared to Arabica coffee. Robusta coffee has advantages in terms of higher production compared to Arabica and Liberika coffee types [6]. Robusta coffee is one type of coffee that is widely cultivated in Indonesia. Robusta coffee can grow well with temperatures around 24-30° Celsius and a minimum rainfall of 1,250 mm /year and optimum between 1,550-2,000 mm/year [7].

According to Budidarsono, Kuncoro, and Tomich [8] coffee-farming typology in Indonesia can be categorised based on three categories: (a) the structure of vegetation complexity; (b) management intensity, and (c) tenurial security of coffee farmland. Based on the vegetation structure complexity varies between two extremes: simple-monocrop coffee system and complex agroforestry coffee farming or multi-strata coffee system. Meanwhile, based on the way the farm managed, coffee farm management varies from (a) traditional -pioneer system, (b) semi intensive system and (c) intensive coffee farming system mainly due to the variation of technology and management adopted by farmers. In the perspective of land tenurial security, coffee farming may vary between coffee farming on privately ownerships land and coffee farming on state forestland. Surprisingly, both kinds of ownerships can be transferred to other farmers through a leasing or pawning system.

Farmer group is an institution that unites farmers horizontally and can be formed several units in one village, can be based on commodities, agricultural planting areas and gender [9]. Farmer groups are essentially to mobilize the human resources of farmers. The formation of farmer groups plays a role in improving farmers' knowledge, attitudes and skills [10]. Farmer groups will assist farmers who are members of the group to facilitate all needs from the purchase of production facilities to post-harvest handling and marketing [11]. According to Syahyuti [9] a joint farmer group or a farmer group association, like "Dwi Tunggal" farmer group, is a combination of several farmer groups that may conduct agribusiness efforts on the principle of togetherness and partnership so as to achieve increased production and farm income for its members and other farmers.

One of business that is often run by a farmer group association is agroindustry processing agricultural commodity from the farm they are planted or managed. Agroindustry refers to a broad concept of the establishment of enterprises and supply chains for developing, transforming and distributing specific inputs and products in the agricultural sector. However, agroindustry is also a commercialization process



and value addition in the agricultural sector with a focus on pre- and post-production enterprises and building linkages among enterprises [12].

Added value in an agroindustry is the value added to a commodity because it undergoes processing, transportation, storage in a production process. Hayami et al. [13] states that value added is the difference between commodities that are treated at a certain stage with the value of the sacrifice used during the process. The sources of added value are from the utilization of factors such as labour, capital, human resources and management. From the amount of added value generated, it can be estimated the amount of remuneration received by the owner of the production factors used in the treatment process.

### 3. Research methods

The determination of the research area was determined based on the purposive method [14]. The chosen research area was Cikur Hamlet, Kalipucang Village, Tukur District, Pasuruan Regency where the “Dwi Tunggal” farmer group and the coffee agroindustry is located. This study used a descriptive approach with the methods of data collection consisting of observation and interviews to collect primary and secondary data from the Dwi Tunggal Farmer Group. Secondary data were also collected from related institutions such as Plantation and Forestry Agency and Trade and Industry Agency of Pasuruan Regency. The sampling method used in this study was purposive (judgmental) sampling, with a total of 3 respondents consisting of the head of farmer group, the secretary of farmer group and the coffee agroindustry (processing) manager. Data processing was carried out using value added analysis using the Hayami Method [13], [15], [16]. The value of Robusta coffee on the Bromo Slope was calculated using value added analysis with the following formulation:

$$VA = VP - IC$$

Description:

VA : *Value Added* (Rp/Kg raw material).

VP : *Value of Production*, sales of production (Rp/Kg raw material).

IC : *Intermediate Cost* namely costs that support the production process in addition to labor costs (Rp/Kg raw material)

Decision Making Criteria:

- $VA > 0$ , processed superior commodities provide positive value added from processed raw materials.
- $VA \leq 0$ , processed superior commodities provide negative value added from processed raw materials.

The procedure for calculating added value with the Hayami method in the roasting and grinding process of coffee is described on Table 1.

**Table 1.** The procedure for calculating the added value of processing coffee beans becomes roasted coffee and coffee grounds by the Hayami Method

Nu.	Output, Input, Price	Unit	Formulation
1.	Output	(kg/day)	
2.	Raw Material Input	(kg/day)	
3.	Labour input	(Hour/day)	
4.	Conversion Factor		(1) / (2)
5.	Labour Coefficient	(Work hour/kg)	(2) / (2)
6.	Product Price	(Rp/kg)	
7.	Wage Rate	(Rp/hour)	
<b>Revenues and profits</b>			
8.	Raw Material Input	(Rp/kg)	
9.	Other Current Input	(Rp/kg)	



10.	Product	(Rp/kg)	(4) x (6)
11.	<b>a. Value Added</b>	(Rp/kg)	(10) – (8) – (9)
	<b>b. Value Added Ratio</b>	(%)	$\frac{((11a) / (10)) \times 100\%}{100\%}$
12.	a. Labour Income	(Rp/kg)	(5) x (7)
	b. Labour Share	(%)	$\frac{((12a) / (11a)) \times 100\%}{100\%}$
13.	a. Profit	(Rp/kg)	(11a) – (12a)
	b. Profit Ratio	(%)	$\frac{((13a) / (10)) \times 100\%}{100\%}$

Source: Hayami *et al.* (1987)

**Table 2** Value added processing of green coffee beans into roasted coffee beans during one production process with units per kilogram in the dwi tunggal farmer group

No.	Value Added Analysis	Unit	Formula	Value
1.	Output Roasted Bean	Kg/production process		26,40
2.	Input Green Bean	Kg/production process		30,00
3.	Labour Input	hour/production process		17,00
4.	Conversion Factor		(1) / (2)	0,88
5.	Labour Coefficient	hour/kg	(3) / (2)	0,57
6.	Roasted Bean Price	Rp/kg		80.000,00
7.	Wage Rate	Rp/hour		23.809,52
8.	Green Bean Price	Rp/kg		35.000,00
9.	Other Current Input			
	• electric	Rp/kg		400,98
	• package	Rp/kg		550,00
	• Cost of Depreciation	Rp/kg		577,94
	Total of Other Current Input	Rp/kg		1.528,92
10.	Roasted Bean Product	Rp/kg	(4) x (6)	70.400,00
11.	<b>a. Value Added</b>	<b>Rp/kg</b>	<b>(10) - (9) - (8)</b>	<b>33.871,08</b>
	<b>b. Value Added Ratio</b>	<b>%</b>	<b><math>\frac{(11a) / (10) \times 100}{100}</math></b>	<b>48,11</b>
12.	a. Labour Income	Rp/kg	(5) x (7)	13.492,06
	b. Labour Share	%	$\frac{(12a) / (11a) \times 100}{100}$	39,83
13.	a. Profit	Rp/kg	(11a) - (12a)	20.379,02
	b. Profit Ratio	%	$\frac{(13a) / (10) \times 100}{100}$	28,95

Source: Primary Data, Processed in 2020



The raw materials for making Robusta roasted coffee consist of Robusta green coffee beans as the main raw material and packaging, gas and electricity content as supporting requirements used to process Robusta roasted coffee. Robusta coffee that is processed for one production process is 30 kg purchased at a price of Rp. 35,000.00 per kilogram. Processing Robusta coffee beans into Robusta roasted coffee gives a positive added value as shown by positive and greater than 1 (one) rupiah added value of Rp. 33,871.08 per kilogram of raw material, which means that the revenue of the Dwi Tunggal farmer group each time processing one kilogram of Robusta coffee into Robusta coffee powder is Rp. 33,871.08. Meanwhile, the benefits obtained when Robusta roasted coffee has been sold on the market is Rp. 20,370.02 per kilogram of raw material, which means that with the total costs incurred during the production process, the use of Robusta coffee in the production of Robusta roasted coffee is profitable. In this case, the Dwi Tunggal Farmer Group that produces Robusta roasted coffee prioritizes group profits over the management income or labour gains.

**Table 3** Added value of processing roasted coffee beans into ground coffee during one production process with units per kilogram in the dwi tunggal farmers group

No.	Value Added Analysis	Unit	Formula	Value
1.	Roasted Bean Output	Kg/production process		99,00
2.	Green Bean Input	Kg/production process		100,00
3.	Labour Input	Hour/production process		24,00
4.	Conversion Factor		(1) / (2)	0,99
5.	Labour Coefficient	hour/kg	(3) / (2)	0,24
6.	Ground Coffee Price	Rp/kg		105.000,00
7.	Wage Rate	Rp/hour		54.000,00
8.	Green Bean Price	Rp/kg		35.000,00
9.	Other Current Input			
	• electric	Rp/kg		419,56
	• package	Rp/kg		550,00
	• Cost of Depreciation	Rp/kg		639,28
	Total of Other Current Input	Rp/kg		1.608,85
10.	Ground Bean Product	Rp/kg	(4) x (6)	103.950,00
<b>11.</b>	<b>a. Value Added</b>	<b>Rp/kg</b>	<b>(9) - (8)</b> <b>(11a) / (10) x 100</b>	<b>67.341,15</b>
	<b>b. Value Added Ratio</b>	<b>%</b>	<b>100</b>	<b>64,78</b>
12.	a. Labour Income	Rp/kg	(5) x (7) (12a) / (11a) x 100	12.960,00
	b. Labour Share	%	100	19,25
13.	a. Profit	Rp/kg	(11a) - (12a) (13a) / (10) x 100	54.381,15
	b. Profit Ratio	%	100	<b>52,31</b>

Source: Primary Data, Processed in 2020

The main raw material for making Robusta coffee powder consists of Robusta green coffee beans as the main raw material and packaging, gas and electricity content as supporting materials used to process Robusta coffee powder. Robusta coffee that is processed for one production process is 100 kg purchased at a price of Rp. 35,000.00 per kilogram. Processing Robusta coffee into Robusta coffee powder gives positive added value as shown by positive and greater than 1 (one) rupiah added value of Rp. 67,341.15 per kilogram of raw material, which means that the receipt of the Dwi Tunggal Farmer Group each time processing one kilogram of Robusta coffee into Robusta coffee powder is Rp. 67,341.15. Meanwhile, the benefits gained when Robusta coffee powder has been sold on the market is Rp. 54,381.15 per kilogram of raw material, which means that with the total costs incurred during the production process, the use of Robusta coffee in making Robusta coffee powder is profitable. In this case, the Dwi Tunggal Farmer Group that manufactures Robusta coffee powder prioritizes the profit of the group or organization over the management income or labour gains.

Relatively high added value created by Dwi Tunggal farmer group is a result of a good management performance. While theoretically in the one hand high added value are initiated by innovation, on the other hand, added value can also be developed due to great coordination within or between the organisation involved in the chain [17]. As the Robusta coffee agroindustry is managed by the farmer group, it is observed that apart from product and marketing innovation, high value added of Dwi Tunggal farmer group's coffee is also a result of a collaborative and solid management within the group which is developed by good leaderships and high commitment of management supported by group members' adherence and solidarity.

The added value of the Robusta coffee processing products of the Dwi Tunggal farmer group has provided benefits for the farmers who are members of the group. With the relatively high added value, the benefits received by farmers become greater. With this, it is expected that it will improve the welfare of farmers members of the Dwi Tunggal farmer group. Nevertheless, to produce high added value, the prolonged participation and support of member farmers is needed to strengthen the institution. Furthermore, as product and market develop further and competition becomes more intensified, it is observed that in the long term, the farmer's group institution probably is not sufficient, upgrading the institution from a farmer group to be a business institution and developing collaboration with value chain members are necessary. Step by step efforts that can be made are by (1) increasing extension capacity, (2) improving the Statutes and Bylaws (AD/ART) of farmer groups, (3) establishing joint cooperatives, and (4.) collaborating with companies or relevant stakeholders.

#### 4. Conclusion and recommendations

Based on the results of value-added analysis, it is known that the amount of added value of Robusta coffee to Robusta roasted coffee in one production process is Rp. 33,871.08, - with a value-added ratio of 48.11% at one-time production process. Whereas Robusta ground coffee has an added value of Rp. 67,341.15, - with a value-added ratio of 64.78%. Recommendations that can be given are

- Farmers are expected to be able to improve the quality of coffee raw materials by harvesting red pickers, Red cherry coffee harvests can improve the taste and aroma of coffee.
- For farmer groups. or business actors are advised to be able to innovate products and marketing and increase coordination activities with coffee farmers who act as producers of cherry coffee as the raw materials.
- For the government it is necessary to encourage and support any coffee agroindustry business actor that has the potential to improve the welfare of small farmers and increase the involvement of farmers in the value chain.

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