

# Factors affecting coffee use income: a case study in the province of South Sulawesi, Indonesia

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## ABSTRACT

The coffee commodity is one of the plantation sub-sector commodities which is widely cultivated by Indonesians and has a large contribution to the national economy, especially as a source of foreign exchange. This study aims to analyze the factors that influence the income of coffee farmers in South Sulawesi Province. The analytical method used is multiple regression analysis. The results showed that the factors of land area, number of productive plants, labor, age, education level, and farming experience simultaneously significantly affected the income of coffee farmers in South Sulawesi Province. Factors in the number of productive plants, labor, and farming experience partially have a significant effect on the income of coffee farmers while the factors of land area, age, and level of education do not significantly influence the income of coffee farmers in South Sulawesi Province.

*Key words: Coffee, Income, Multiple linear regression*

## Introduction

Many biotic and abiotic factors affect agriculture production worldwide (Al-Tawaha, 2008; Abu-Darwish *et al.*, 2009; Al-Ajlouni *et al.*, 2009; Al-Tawaha *et al.*, 2010; Tawaha and Odat 2010; Al-Tawaha 2011; Al-Tawaha and Al-Ghzawi 2013; Al-Tawaha *et al.*, 2017ab; Kumar *et al.*, 2017; Abu Obaid *et al.*, 2018; Al-Tawaha *et al.*, 2018a; Al-Tawaha *et al.* 2018c; Bashabsheh *et al.*, 2018; Sirajuddin *et al.*, 2018; Tawaha *et al.*, 2018b; Al-Ghzawi *et al.*, 2019). On the other hand, the agricultural sector is one of the sectors that have a significant role in the Indonesian economy because, as a source of foreign exchange

income, it encourages economic growth and provides employment. Besides, the agricultural sector is also an essential provider of raw materials for the industry, especially the food and beverage processing industry or agro-industry and is also the main pillar in sustaining the country's food security because of its contribution to the fulfillment of consumption needs or the food needs of most Indonesians.

Another advantage of the agricultural sector compared to other sectors in the economy is agricultural production based on domestic resources. Besides, the import content is low because the raw materials or inputs used are generally from within

the country, relatively more resilient in facing economic turmoil such as monetary, exchange rate and fiscal turmoil. The resilience of the agricultural sector was proven during the monetary crisis where this sector was the largest foreign exchange contributor. The large contribution of the agricultural sector to national GDP is inseparable from the food crop sub-sector, the plantation sub-sector, the livestock subsector, the forestry sub-sector, and the fisheries subsector.

Coffee commodities are one of the plantation sub-sector commodities that are quite widely cultivated by Indonesians and have a large contribution to the national economy, especially as a source of foreign exchange. Based on Indonesia's statistical data, the value of exports in 2014 for coffee commodities reached US \$ 1,030,716,400 but decreased compared to 2013 which reached the US \$ 1,166,179,900, a decline of 28% against the number of Indonesian coffee commodity exports. Coffee prices also fluctuate due to an imbalance between demand and coffee supply on the world market. In addition, coffee commodities also have an important role in providing employment and as a source of income for farmers or other economic actors.

One area that has the potential for coffee production in South Sulawesi, which has been known by various names (one of which is Toraja Coffee). Based on the topography of South Sulawesi, with a diverse climate and altitude, it will certainly provide a variety of coffee with flavors based on the place of cultivation. The results of previous studies, South Sulawesi has kalosicoffee sourced from Enrekang Regency and with a variety of flavors. Although the potential produced is able to reach 1.2 tons/ha, the reality is that the farmers are only able to produce 750 kg/ha annually, thus affecting coffee farming income.

Efforts to increase the income and welfare of coffee farmers often face obstacles. These constraints include limited capital, narrow land, relatively low levels of knowledge, lack of skills and natural conditions (Istianah *et al.*, 2015). These constraints greatly affect coffee production and productivity and have an impact on the level of income of coffee farmers. The condition also occurs in several coffee production centers in South Sulawesi Province. This study aims to determine the factors that influence the income of coffee farmers in South Sulawesi Province.

## Material and Methods

This research method is a survey method that acts in four districts in the province of South Sulawesi, namely Enrekang, North Toraja, Sinjai, and Bantaeng. Data were obtained from interviews with coffee farmers as many as 400 respondents who were chosen simply randomly. The data obtained are tabulated and analyzed based on the research objectives. Data analysis used is:

a. Cost analysis (Sukartawi, 2002) with the formula:

$$TC = VC + FC \quad \dots (1)$$

Where TC = Total Cost (total cost) in Rp / year

VC = Variable Cost (Variable cost) in Rp / year

FC = Fixed Cost (Fixed Cost) in IDR / year

b. Analysis of revenue by the formula:

$$TR = Py.Y \quad \dots (2)$$

Where TR = *Total Revenue* (Total revenue) in IDR / year

Py = Price Y (IDR / kg)

Y = Total production (Kg / year)

c. Analysis Income with the formula:

$$Rv = TR - TC \quad \dots (3)$$

Where Pd = Revenue

TR= Total Revenue (Total Revenue) in Rp / year

TC = Total Cost (total cost) in Rp / year

d. Multiple linear regression analysis with the following equation (Priyatno, 2013):

$$Y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + e \dots (4)$$

Where is Y = income level (Rp)

X1 = land area (ha)

X2 = number of productive plants (trees)

X3 = Labor (HOK)

X4 = age of farmer (year)

X5 = education level of farmer (year)

X6 = coffee farming experience (year)

$\alpha$  = constant

$\sigma$  = error

## Results and Discussion

### Profile of Respondent Farmer

This research was carried out in the four districts that became coffee production centers in South Sulawesi Province, namely Enrekang Regency, North Toraja Regency, Sinjai Regency, and Bantaeng Regency. The profile of farmers that will be elabo-

rated is (1) Age structure of respondent farmers, (2) Education level of respondent farmers, (3) Experiences of farmer respondents and (4) Number of family members of respondent farmers.

**Age of Respondent Farmers**

According to Nurhapsa, *et al* (2015), age is one of the factors that influence one’s productivity and workability. The more a person ages, the productivity and ability to work also increases, and they will experience a decrease in productivity and the ability to work at a certain age. Age also affects the physical ability and maturity of fiction and the physical ability of respondents in managing a business. The distribution of respondents based on age is shown in Table 1.

**Table 1.** Distribution of Respondent Farmers by Age on Coffee Farming in South Sulawesi Province.

Age (years)	Number (person)	Percentage (%)
21 - 25	5	1.25
26 - 30	35	8.75
31 - 35	27	6.75
36 - 40	55	13.75
41 - 45	73	18.25
46 - 50	75	18.75
51 - 55	76	19.00
56 - 60	27	6.75
> 60	27	6.75
Total	400	100

Sources: Primary Data Processed, 2018

Based on Table 1 it can be explained that in general the respondent farmers are still in the range of productive age that is 93.25 percent and the remaining 6.75 percent is classified as unproductive age. This shows that the respondent farmers still have the physical ability to strive optimally in managing their business so that they can obtain higher returns and profits. The results of this study are in line with the results of research conducted by Istianah, *et al* (2015) which shows that the age of coffee farmers in Jambu District, Semarang Regency is generally classified as productive age so that they are still strong and still eager to develop their business and can obtain maximum results.

**Level of Farmer Education of Respondents**

The ability of farmers to respond to innovation and information depends on the level of education they

have. The higher the level of knowledge of a person, the easier it is to understand and accept new innovations. In addition, the level of education can be considered as an investment tool because it is considered to be able to help increase the knowledge, skills, and expertise of the workforce that is the capital in managing their farms and can be more productive so that they can increase their income (Nurhapsa *et al.*, 2015). Table 2 shows the distribution of respondents based on their level of education.

The level of education is the length of the respondent’s farmers in taking formal education (years). Based on Table 2 it can be explained that the level of education of farmers is generally still low, namely elementary school as many as 182 people (45.50%), junior high school as many as 111 people (27.75%), high school as many as 77 people (19.25%) and Diploma / Bachelor as many as 24 people (6.00%). This shows that generally, respondent farmers have a low level of education. With a low level of education, it will influence the acceptance of information or innovations related to its farming. Research conducted by Istianah *et al.* (2015) showed that generally coffee farmers in Jambu District, Semarang District had a low level of education, namely elementary school as much as 73.91 percent (51 people) from 69 respondents.

**Table 2.** Distribution of Respondent Farmers Based on Level of Education in Coffee Farming in South Sulawesi Province.

Level of Education (years)	Number (people)	Percentage (%)
Not Elementary	6	1.50
Elementary School	182	45.50
School Middle	111	27.75
High School	77	19.25
Diploma/ Bachelor	24	6.00
Total	400	100

Source: Primary Data Processed, 2018

**The Experience of the Coffee Farming**

experience of coffee farming in question is the length of time the farmer responds to cultivating coffee farming. Nurhapsa *et al.* (2015) stated that farming experience is one of the determining factors in the success of a farm. There is a tendency that the longer a farmer manages a farm, the more experience gained is related to the good or badness of the

farm. The distribution of respondent farmers based on coffee farming experience is shown in Table 3.

Table 3 shows that most respondents have coffee farming experience over 5 years, which is 97.5 percent. This shows that the respondent farmers have a long-standing coffee farming experience. With this experience, it is easier for farmers to accept and choose the innovations they need in coffee cultivation.

**Table 3.** Distribution of Respondent Farmers Based on Farming Experience in Coffee Farming in South Sulawesi Province.

Farming Experience (years)	Number (person)	Percentage (%)
1 - 5	11	2.75
6 - 10	44	11.00
11 - 15	35	8.75
16 - 20	101	25.25
> 20	209	52.25
Total	400	100

Source: Processed Primary Data, 2018

### Land Size of Land Coffee Farming

is one of the important production factors in conducting farming activities. Distribution of respondent farmers based on the coffee land area cultivated is shown in Table 4.

Table 4 shows that as many as 85.50 percents of respondents were farmers who had a land area of 0.10 - 1.00 hectares. This shows that the area of coffee land owned by respondents is relatively narrow so that it can be one of the obstacles to increasing coffee production capacity. Besides that, another obstacle in increasing production capacity is the number of plants that are less productive relative to quite a lot.

**Table 4.** Distribution of Respondent Farmers Based on Land Area in Coffee Farming in South Sulawesi Province.

Land Area (hectares)	Amount (people)	Percentage (%)
0.10 - 0.50	182	45.50
0.51 - 1.00	159	39.75
1.10 - 1.50	41	10.25
1.51 - 2.00	14	3.50
> 2.00	4	1.00
Total	400	100

Sources: Primary Data Processed, 2018

### Acceptance of Coffee Farming

acceptance is the amount of coffee production produced by the respondent farmers in one year multiplied by the price of coffee. The average income of respondents from coffee farming is Rp. 6,071,881.5 per year. This shows that the average income of respondents is still very low. One of the causes of the low acceptance of respondent farmers is because many coffee plants are old, so their production is low. The results of research conducted by Istianha, *et al.* (2015) showed that the acceptance of coffee farmers in Jambu District, Semarang Regency was higher than the acceptance of coffee farmers in South Sulawesi Province, which amounted to Rp. 12,205,000 per year.

### Coffee Farming

Costs in coffee farming consist of *variable costs* and *fixed costs*. Variable costs are costs incurred in the production process and vary according to the size of production. While the fixed costs are the costs incurred by the respondent farmers that are not related to the size of the product produced. Variable costs in coffee farming in South Sulawesi Province are the cost of production facilities (inputs such as fertilizers, labor herbicides), harvest costs, milling costs, transportation costs. Fixed costs consist of UN fees and depreciation costs. The average variable costs incurred by the respondent farmers in one harvest season amounted to Rp1,168,232.5 and the average fixed cost was Rp. 857,080.2. Total costs incurred by the farmer respondents is shown in Table 5.

Based on Table 5 it can be explained that as much as 57.68 percent of the costs incurred by the respondent farmers are variable costs while the average fixed cost is 42.32 percent. The high average variable costs incurred by the respondent farmers is due to variable costs associated with the size of the production while the fixed costs are not related to the size of the production.

### Revenue

The average income obtained by the respondent farmers from coffee farming is Rp. 4 466,568.8. Income obtained by respondents is still very low compared to the income obtained by coffee farmers in Jambu District, Semarang Regency, which is Rp. 11,435,180. The low income earned by coffee farmers in the province of South Sulawesi is caused by,

among others, low production obtained per harvest season, the number of coffee plants that are old and the less favorable natural conditions.

**Factors Affecting Coffee Farmer’s Income**

To determine the effect of factors of production, land area, a number of crops that produce, labor, age, farming experience, the level of education is used multiple linear regression analysis. The results of multiple linear analysis using SPSS 21.0 program are shown in Table 6.

**Determination Coefficient (R<sup>2</sup>)**

The coefficient of determination is a value that shows how much change or variation in the dependent variable can be explained by changes or variations in the independent variables. The results of regression analysis show that the coefficient of determination is 0.435 which means that as much as 43.7 percent changes or variations in the rise and fall of income of the respondent farmers are explained by variations in land area, number of productive plants, labor, age, level of education and farming experience. While the remaining 56, 3 percent is determined by other variables not included in this research variable.

Based on the results of multiple regression analy-

sis using SPSS 21.0 program then the farming income can be formulated with the following equation:

$$Y = - 1289708,607 + 1015259,293x_1 + 5382,119X_2 - 13422,071X_3 - 16300,500X + 57189,564x_5 + 64513,529x_6$$

**F-Test Statistics**

Test F test is used to determine the independent effect variables together as ma (simultaneous) to the dependent variable. The F test value shows a significance level of 0,000. This shows that the variables of land area, number of productive plants, labor, age, education level and farming experience together (simultaneously) have a very significant effect on the income of coffee farmers in South Sulawesi Province. The results of this study are in line with the results of Istianah research *et al.* (2015) which showed that the variables of land area, number of workers, number of trees, experience, age, education level simultaneously had a very significant effect on the income of coffee farmers in Jambu District, Semarang Regency. Furthermore, the results of research conducted by Harwati *et al.* (2015) which showed that simultaneously (together) variables of age, education, length of cultivation, land area and amount of fertilizer had a very significant effect on

**Table 5.** Average total fee on coffee farming in South Sulawesi

Description	Amount (Rp)	Percentage (%)
Variable Cost ( <i>Variable Cost</i> )	1,168,232,5	57,68
Fixed Costs ( <i>Fixed Cost</i> )	857,080,2	42,32
Total Cost ( <i>Total Cost</i> )	2,025,312,7	100

Source: Primary Data Processed, 2018

**Table 6.** Results of Regression Analysis Factors Affecting the Income of Coffee Farming in South Sulawesi Province

Variable	Regression Coefficients	t-count	Significance
Constants	-1289708,607	-1,277	0,202
Land area (X1)	1015259,293	1,490	0,137
Number of productive plants (X2)	5382,119	7,983	0,000
Labor (X3)	-13422,071	-2,436	0,015
Age (X4)	-16300,500	-0,879	0,380
Educational level (X5 )	57189,564	1,075	0,283
Farming Experience (X6)	64513,529	2,732	0,007
R <sup>2</sup> (coefficient of determination)	0.437		
F-count	50,879		0,000

Source: Processed Primary Data, 2018

Ket: \*\*\*\* significant at 1%

\*\*\* confidence level significant at 5% confidence level

the income of corn farmers in Sidodadi Village, Patean District, Kendal Regency.

### T-Test Statistics

the test is used to determine the effect of independent variables partially on the dependent variable assuming other variables remain. Partial variable test results are as follows:

### Variable Land Area

Based on the results of multiple linear regression analysis shows that the land area variable t-count is 1.490 with a significance of 0.137. These results indicate that the land area variable does not significantly affect the income of coffee farmers in South Sulawesi Province. Field conditions indicate that the area of land owned by coffee farmers is relatively narrow and many coffee plants owned by farmers are less productive. The results of this study are in line with the results of research conducted by Istianah *et al.*, 2015 which showed that the land area variable did not significantly affect the income of coffee farmers in Jambu District, Semarang Regency. The regression coefficient value is 1015259,293 which means that every additional unit of land area will increase the income of coffee farmers by Rp1,015,259,293.

### Variable Number of Productive Plants

The value of the variable regression coefficient of the number of plants is 5382,119. These results indicate that each addition of one unit of productive plants will increase farmers' income by Rp. 5,382,119. A variable number of productive plants has a significance level of 0,000. This shows that the variable number of productive plants has a very real effect on the income of coffee farmers in South Sulawesi Province. The results of this study are in line with the research conducted by Istianah, et al. (2015) showed that the number of trees had a very significant effect on the income of coffee farmers in Jambu District, Semarang Regency. The more the number of productive crops cultivated by coffee farmers, the greater the amount of products produced will have an impact on the amount of income received by coffee farmers.

### Labor

Value The variable regression coefficient for labor is -13422,071. These results indicate that each addition of one unit of labor will reduce the amount of in-

come by Rp. 13,422,071. This result is in accordance with the laws of *The Law of Diminishing Return* which means that if the number of production factors can be changed such as continuous labor plus one unit, initial production will increase, but after reaching a certain level additional production will decrease and eventually will reach a negative value and cause total production to slow down and finally reach the level the maximum then decreases (Rahardja and Mandala, 2004). Labor variables significantly influence the income of coffee farmers in South Sulawesi Province.

### Age

variables have no significant effect on the income of coffee farmers in South Sulawesi Province. This is shown from the significance value of 0.380. The regression coefficient value of the age variable is -16300,500, meaning that each addition of one age unit will reduce the level of coffee farmers' income by Rp. 16,300,500. The more a person ages, the productivity and ability to work also increases, and they will experience a decrease in productivity and the ability to work at a certain age. Research conducted by Istianah *et al.* (2015) showed that the age of coffee farmers did not significantly affect the income of coffee farmers in Jambu District, Semarang Regency. According to Castle *et al.* (2016) that increasing age affects the application of technology, it does not guarantee the development of farming. Amran (2017) found that age is a very decisive factor in influencing farmers' decisions.

### The Levels Education

Results of multiple linear regression were obtained by the level of education regression coefficient level 57189,564. This means that each additional one level of education unit will increase farmers' income by Rp57,189,564. Variable levels of education do not significantly affect the income of coffee farmers in South Sulawesi Province. Based on the data obtained shows that as many as 73.25 percents of farmers have a level of education SD - SMP. The results of this study are in line with the research conducted by Harwati *et al.* (2015) which showed that the education variables did not significantly influence the income of corn farmers in Sidodadi Village, Patean District, Kendal Regency. Unlike the case with Amran's research (2017) that education greatly influences farmers' decisions. Farmers who have a higher level of education are ready to take risks (Chi and Yamada, 2002).

## Farming

experience Variable farming experience has a significant effect on the income of coffee farmers in South Sulawesi Province. This is shown from the significance value of 0.007. The value of the regression coefficient variable coffee farming experience is 64513,529 this means that each addition of one unit of coffee farming experience will increase the income of coffee farmers by Rp. 64513,529. Coffee farming experience variables significantly affect the income of coffee farmers in South Sulawesi Province. Based on the data obtained in the field, it shows that 77.50 percent of farmers have coffee farming experience 16 years and above. With a long farming experience, it will be easier to understand and understand the constraints faced by the coffee business and to overcome these obstacles. The results of research conducted by Harwati *et al.* (2015) showed that farming experience variables significantly affected the income of corn farmers in Sidodadi Village, Patean District, Kendal Regency). The study carried out is obtained if the experience is technically superior and efficient, and can increase farm income (Illukpitiya and Yanagida, 2004; Ho *et al.*, 2017). Differences in demographic and socio-economic factors influence the knowledge and character of farmers in each region (Ho, 2011; Wulandari *et al.*, 2017) regional differences that tend to differ in specific agricultural characteristics

## Conclusion

The results of the study were obtained if factors affecting the level of coffee farming income in South Sulawesi Province simultaneously are a land area, a number of productive trees, labor, age, education level, coffee farming experience. Factors in the number of productive crops, labor and farming experience have a significant effect on the level of coffee farming income in South Sulawesi Province

## Suggestions

The need for certified coffee seedlings to farmers is to rejuvenate unproductive coffee plants to increase coffee production and productivity which has an impact on the income of coffee farmers in South Sulawesi Province

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