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The Income Difference of Credited and Uncredited Cocoa Farming in Central Sulawesi, Indonesia

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Abstract. Cocoa plantations in Central Sulawesi have experienced a decline in productivity due to many plants starting to age, pest and disease attacks, and minimal application of technology. Limited capital causes these problems to be challenging to solve, so the solution is to take credit loan capital. However, many farmers still need to be convinced to take credit. Therefore, this study aims to analyze the differences in cocoa farming income with and without credit and the factors influencing farmers' decisions to take credit. The data used is secondary data from the 2013 Agricultural Census: 2014 Plantation Household Survey. Descriptive analysis is used to describe the characteristics of cocoa farmers in Central Sulawesi. Quantitative analysis is used for farm income analysis, propensity score matching, and logistic regression. The research found that credit positively influenced the income of cocoa farmers in Central Sulawesi. However, it was insignificant because credit was not entirely used to finance productive farming. Factors influencing cocoa farmers' decision to take credit in Central Sulawesi are participation in extension services, cooperative membership, farmer group membership, farmer education level, and land area.

Keywords: cocoa; credit; income; logistic regression; propensity score matching

INTRODUCTION

Central Sulawesi is one of the cocoa production centers in Indonesia. Cocoa is the leading commodity in Central Sulawesi and one of the province's economic drivers. From 2011 to 2020, Central Sulawesi had the highest cocoa dry bean production in Indonesia eight times **(Figure 1)**. Central Sulawesi's average cocoa dry bean production from 2011 to 2020 was 128,696 tons, with an average contribution to national cocoa dry bean production of 18.47%.

Central Sulawesi's highest production was in 2014, with 161,500 tons of cocoa beans. However, production decreased by 37.65% the following year, or 60,800 tons. Until 2020, Central Sulawesi never touched its highest point again. This is due to several factors faced by cocoa farmers in Central Sulawesi.

The decline in cocoa dry bean production in Central Sulawesi is also due to the reduction in cocoa plantation area since 2014 **(Figure 2)**. Cocoa plantation area in Central Sulawesi has decreased by 13,141 hectares or about 4.51% from 2014 to 2020. This happened because farmers felt that cultivating other commodities, such as rubber or oil palm, was more profitable than cultivating cocoa (Witjaksono & Asmin, 2016).

Pest and disease attacks are also a factor in the decline of cocoa production in Central Sulawesi. Pest and disease attacks can cause a 50% to 72% decrease in production (Pratama et al., 2021). The vulnerability of cocoa plants to pests and diseases means that the plants need intensive care. However, farmers have yet to be able to apply good agricultural practices (GAP) due to low knowledge and skills (Meilia, 2020; Sitorus & Zasari, 2022). The adoption of agricultural technology, such as modern equipment, has also yet to be widely practiced by farmers due to their limited capital. Limited capital also causes farmers to be unable to buy fertilizers and pesticides for intensive plant care (Effendy et al., 2019; Jaweng et al., 2015).

Therefore, more capital is needed to solve the problems cocoa farmers face. If capital is available, farmers can rejuvenate and replant aging cocoa plants. In addition, farmers can also afford to buy fertilizers and pesticides so that the plants receive intensive care. The availability of capital also encourages the adoption of technology that can increase productivity. Mentioned that farmers' limited capital can be overcome by taking credit capital loans.

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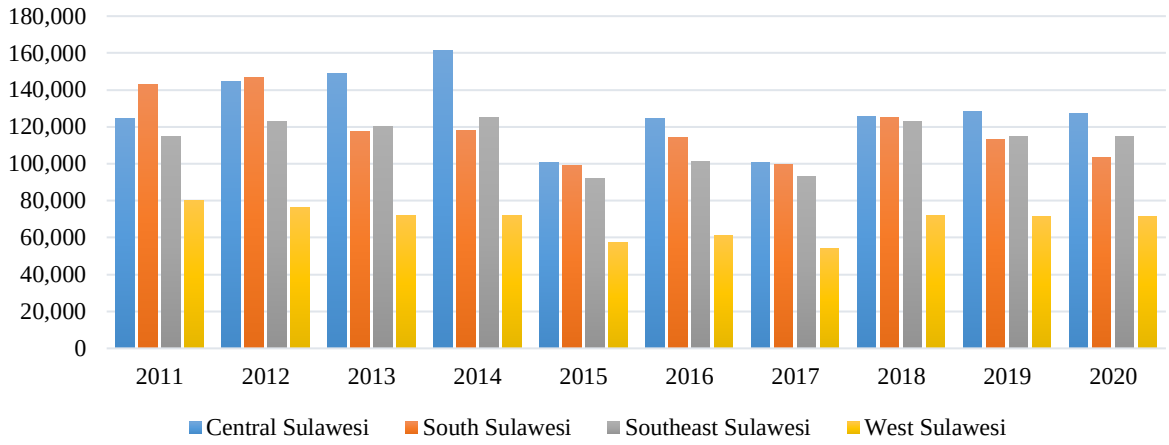

Figure 1. Cocoa production in several production centers in Indonesia in 2011 - 2020 (tons) (Processed from BPS 2020)

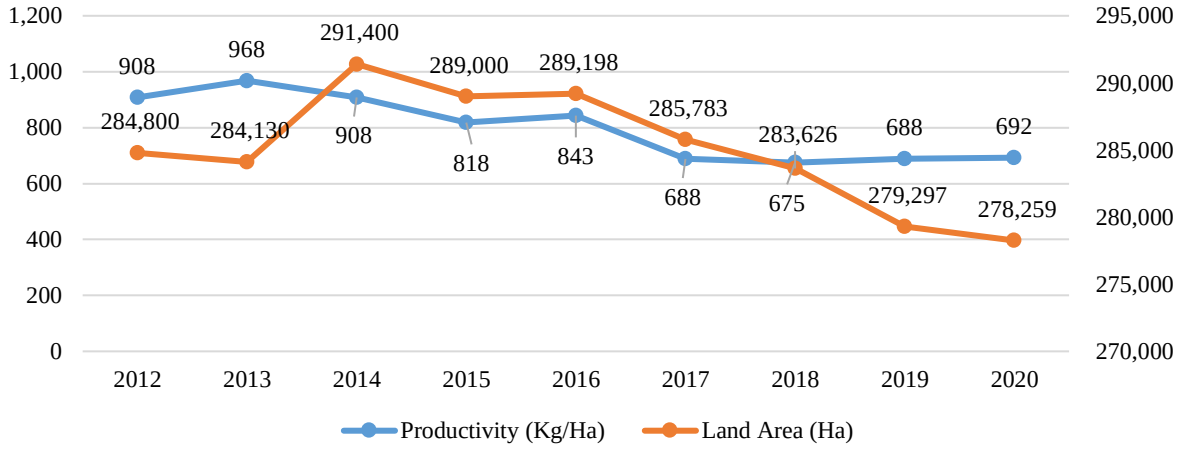

Figure 2. Productivity and land area of Central Sulawesi cocoa plantation in 2012 - 2020 (Processed from BPS 2020)

However, cocoa farmers in Central Sulawesi need more access to financing institutions, which needs to be improved. Based on a survey conducted by Badan Pusat Statistik (2014), only 3.5% of cocoa farmers use credit. Around 59.25% of farmers find it difficult to obtain loans. Farmers find it difficult to fulfill the requirements, such as collateral, to access capital from formal financial institutions. Therefore, farmers mainly access capital from non-bank financial institutions. A survey by Badan Pusat Statistik (2014) found that 57.72% of farmers borrow capital from non-bank financial institutions such as cooperatives and Gapoktan. The reasons for this are the complicated process at banks, the location of banks that are relatively far from home, needing to know the lending procedures at banks, and the absence of collateral as a guarantee for financing. Credit at non-bank financial institutions has interest rates that tend to be higher (Maharani, 2023).

In addition, Sari (2017b) found that 58% of cocoa farmers were reluctant to take out credit loans due to the fear of being unable to repay the loan. Farmers have uncertain incomes due to the risk of crop failure, which can lead to loan defaults. There is also the possibility that farmers' income may be lower because even if there is an increase in production or revenue, there are interest payments that must be made on the loan. Low

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access to financial institutions and farmer reluctance make the problems cocoa farmers face in Central Sulawesi even more challenging to solve.

Based on the description above, this study aims to analyze the difference in income between cocoa farmers in Central Sulawesi who use credit and those who do not use credit and analyze what factors influence the decision of cocoa farmers in Central Sulawesi to take credit.

Research on the effect of credit on farmer income has been conducted by Husna (2019) on cocoa commodities and also according to Ismi (2017) and Puspitasari et al. (2021) on other commodities. In previous studies, the T-test was used to test the difference between the income of farmers who used credit and those who did not.

The T-test has a weakness, namely the bias from the incompatibility of the samples being compared due to differences in social and economic characteristics (Khandker et al., 2010). Therefore, this study conducted a difference test with propensity score matching (PSM) so that the impact of credit use on farmers' income is protected from bias caused by the influence of other factors. This study aims to analyze the differences in cocoa farming income with and without credit and the factors influencing farmers' decisions to take credit.

METHODS

The data used in this study are secondary data sourced from the 2013 Agricultural Census: 2014 Plantation Household Survey conducted by Badan Pusat Statistik (BPS) in Central Sulawesi Province. Central Sulawesi Province was selected as the research location purposively because it is Indonesia's largest cocoa-producing region eight times from 2011 to 2020.

The number of cocoa farmer samples in this study was 2,996 respondents derived from screening 3519 farmers in the 2013 Agricultural Census: Survey of Plantation Business Households in 2014. The screening of respondents was done based on regular cultivation methods. The primary production form is cocoa dry beans, with no other products. There was also the elimination of respondents who were outliers in the data. The sample size of farmers without credit is 2893 farmers, while those with credit are 103 farmers. Farmers were grouped based on their source of farm financing, where farmers with credit obtained loans with interest.

The secondary data used in this study were processed using Microsoft Excel 2019 and Stata 15. Data processing was carried out qualitatively and quantitatively.

Farm income can be mathematically written as follows (Soekartawi, 1995):

$$TR = Y.Py \quad \text{.....(1)}$$

Description:
TR = Cocoa farm revenue (Rp)
Y = Total cocoa dry bean production (Kg)
Py = Cocoa dry bean selling price (Rp)

The cost concept used in this study is cash and non-cash (imputed costs), categorizing fixed and variable costs. The total cost of farming can be formulated as follows (Hernanto, 2018):

$$TC = BT + BD \quad \text{.....(2)}$$

Description:
TC = Total cost of cocoa farming (Rp)
BT = Cash cost of cocoa farming (Rp)
BD = Non-cash cost of cocoa farming (Rp)

Farm income analysis calculates the services received by production factors used in the production process (Soekartawi, 1995). The concept used to calculate income in cocoa farming can be seen in **Table 1**.

The effect of credit on cocoa farm income in Central Sulawesi was estimated using propensity score matching (PSM) with the nearest neighbour matching method. The model used is logit regression with dependent variables, including total cost, revenue, and income. While the independent variables used are based on demographic and socio-economic groups of farmers (Khandker et al., 2010). The independent variables in the PSM logit model were also used in the binary logistic regression to analyze the factors influencing the decision of cocoa farmers in

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Central Sulawesi to take credit. The binary logistic model is described as follows:

$g(x) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \beta_7 x_7 + \beta_8 x_8 + \varepsilon$ .....(3)

Note:

g(x) = Chance of Farmer Taking Creding (Y = 0|x): Not Taking, (Y = 1|x): Taking

β_0 = Constant/Intersep

$\beta_{1,2,..8}$ = Regression Coefficient

x_1 = Household Members (Person)

x_2 = Farmer Age (Years)

x_3 = Farmer Education Level (Years)

x_4 = Land Area (Ha)

x_5 = Land Ownership Status *(Dummy)*

x_6 = Extension Participation *(Dummy)*

x_7 = Cooperative Membership *(Dummy)*

x_8 = Farmer Group Membership *(Dummy)*

Table 1. Cocoa farm income analysis

No	Description	Calculations
1	Cash Revenue	Price (Rp) x Yield sold (kg)
2	Non-Cash Revenue	Price (Rp) x Yield consumed or stored (kg)
3	Gross Farm Income	Total cash revenue and non-cash revenue
4	Cash Cost	I. Fixed Cost a. Land and equipment rental costs b. nterest on loans, taxes, levies, fuel and transportation costs II. Variable Cost a. Cost of purchased production facilities b. Cost of agricultural services c. Cost of labor outside the family
5	Non-Cash Cost	I. Fixed Cost a. Own land and equipment rental costs b. Depreciation costs II. Variable Cost a. Cost of non-purchased means of production b. Family labor costs
6	Total Farm Expense	Cash Cost (excluding interest) + Non-Cash Cost (exluding family labor)
7	Cash Income	(1) – (4)
8	Net Farm Income	(3) – (6)
9	Net Farm Earning	(8) – Loan interest

Thus, to estimate the effect of credit, the following equation is used:

$Y_i = \beta_0 + \beta_i x_i + \mu$.....(4)

Note:

Yi = Outcome that will be seen impact

β_0 = Constant/Intersep

$\beta_{1,...n}$ = Regression Coefficient

$x_{1,...n}$ = Independent Variable

μ = Error Term

The difference in the outcome variable is obtained by looking at the average difference between the treatment group and the control group. The difference reflects the impact of the treatment given. In this study, the treatment given is credit, so the treatment group is farmers with credit, and the control group is farmers without credit. The estimation of the impact of credit on the income of cocoa farmers in Central Sulawesi using the PSM method is formulated in Equation 5.

$E(\Delta|D = 1) = E(Y_1|X, D = 1) - E(Y_0|X, D = 0)$ ..... (5)

Equation $E(\Delta|D = 1)$ is the average treatment effect on treated (ATT), which is suitable for analyzing the impact on cross-section data. ATT can answer how much output (Y) is produced if farmers use credit (D=1) but, in reality, do not use credit (D=0). However, there is a selection bias in the

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model equation because $E(Y_0|X, D = 1)$ is unobservable, which can be formulated as shown in Equation 6.

$Bias = E(Y_1|X, D = 1) - E(Y_0|X, D = 0)$ ... (6)

Therefore, the equation will be estimated using maximum likelihood estimation so that the PSM estimate of ATT is free from selection bias. After propensity score matching, the outcome of treatment group and control group observations are compared. PSM estimation is formulated as shown in Equation 7.

$E(\Delta|P(X), D = 1) = E(Y_1|P(X), D = 1) - E(Y_0|P(X), D = 0)$ ..... (7)

RESULTS AND DISCUSSION

Characteristics of Respondent Farmers

Most were male farmers in both groups, indicating male dominance in farming activities. Most farmers are in the age interval of 36-55 years in both groups, so they are categorized as productive age. The majority of farmers in both groups had only completed primary school. Most farmers with credit cultivated land with an area of 0.5-1 ha, while farmers without credit cultivated land with less than 0.5 ha. Almost all farmers in both groups cultivate their land due to the characteristics of cocoa as an annual crop. The majority of farmer households in both groups are classified as small families, i.e., families with 1-4 members in a household.

Farmers with credit are likelier to belong to farmer groups and cooperatives than those without credit. This is because cooperatives provide capital for credit loans, while membership in a farmer groups is required to obtain credit. Farmers with credit also participated in more extension activities than farmers without credit. The extension activities attended by respondent farmers were not only from the government but also from companies, drug distributors, and universities. Counseling provided by the government is related to cultivation techniques, pest control, marketing/sale of produce, efforts to reduce harvest/post-harvest losses, and others.

Almost all of the seeds used by farmers are not purchased, with the percentage of non-purchased seeds among farmers without credit being 93% and 91% among farmers with credit. Non-purchased seedlings can be obtained from seed sowing or vegetative means such as grafting and shoot grafting. The use of certified seeds among respondent farmers is still low, even though certified seeds have high productivity and are resistant to pests and diseases, because the level of trust of farmers in local seeds is still high (Ginting et al., 2021; Listyati et al., 2015). The percentage of farmers who did not use certified seeds among farmers without credit was 93%, and farmers with credit was 95%.

In cocoa farming in Central Sulawesi, the shade crops include gamal, dadap, coconut, banana, and green bamboo. Almost all of the shade plants used by farmers are non-purchased, with the percentage of non-purchased shade plants for farmers without credit at 98% and for farmers with credit at 91%. Non-purchased plants can be obtained through vegetative propagation, such as cuttings.

Cost Structure Analysis of Cocoa Farming

The cocoa farming cost structure was calculated per hectare per year for both farmer groups. The cash and non-cash cost components and their categorization into variable and fixed costs can be seen in **Table 2**.

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Table 2. Cost structure of cocoa farming in Central Sulawesi per hectare per year

Cost Component	Without Credit		With Credit	
	Value (Rp)	(%)	Value (Rp)	(%)
Cash Cost				
Fixed Cost				
Land Rent	39,642	0.21	-	-
Equipment Rent	12,597	0.07	5,096	0.03
Interest	-	-	1,732,385	9.79
Taxes	117,071	0.63	52,838	0.30
Retribution	12,089	0.07	16,177	0.09
Fuel	429,469	2.33	549,469	3.11
Transportation	271,909	1.47	205,666	1.16
Variable Cost				
Seedlings	4,806	0.03	5,882	0.03
Shelter Crops	465	0.00	859	0.00
Fertilizer	650,262	3.52	1,417,112	8.01
Stimulants	157,310	0.85	303,211	1.71
Pesticides	727,559	3.94	636,035	3.59
Non-family labor	1.355,761	7.35	1,370,588	7.75
Agricultural Services	15,002	0.08	-	-
Total Cash Cost	**3,793,941**	**20.56**	**6,295,318**	**35.58**
Non-Cash Cost				
Fixed Cost				
Land Rent (Owned)	4,459,732	24.17	3,024,185	17.09
Equipment Rent (Owned)	525,857	2.85	210,942	1.19
Depreciation	685,588	3.72	689,366	3.90
Variable Cost				
Seedlings	68,728	0.37	65,532	0.37
Shelter Crops	32,227	0.17	9,311	0.05
Family labor	8,884,619	48.15	7,401,004	41.82
Total Non-Cash Cost	**14,656,750**	**79.44**	**11,400,340**	**64.42**
Total Cost	**18,450,692**	**100**	**17,695,658**	**100**

Based on the study's results, it was found that the cash costs of farmers with credit are higher than farmers without credit. The main factor causing this is the cost of loan interest that must be paid. In addition, the fertilizer cost for farmers with credit is also higher by about 118% than for farmers without credit. However, the greater use of fertilizer led to a reduction in the use of pesticides due to a decrease in pest and disease attacks (Aisyawati & Azis, 2020; Azri, 2015; Izzatin et al., 2023). The pesticide costs of farmers show this without credit, being about 14% higher than farmers with credit. The non-cash costs of cocoa farmers with and without credit are higher than the cash costs. TKDK is the most significant cost component in total cash costs.

Based on total costs, labor costs are the most significant cost incurred by cocoa farmers in Central Sulawesi. Labor in cocoa farming is used for land cultivation, planting protective plants, planting, maintaining, fertilizing, pest/OPT control, harvesting, and drying cocoa products. The percentage of total labor costs to total costs for farmers without credit is 55.5%, and for farmers with credit is 49.57%. The second largest cost

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cocoa farmers incur in Central Sulawesi is rent for their own land.

The total cost of cocoa farmers without credit is higher than that of farmers with credit, with a difference of Rp755.034. One of the reasons for this difference is that farmers without credit give a higher value to the rental price of their land because the value is the result of their perception. Meanwhile, the value of the rental price of land owned by farmers with credit is the estimated result of the financing institution using the liquidation value criteria, which tends to be smaller than the value of the landowner's perception (Fahmi, 2014).

Cocoa Farming Revenue Analysis

The analysis found that the average cocoa dry bean price of the two groups is similar, namely Rp23.090/kg for farmers without credit and Rp22.970/kg for farmers with credit. However, the average dry bean production of farmers with credit is higher than that of farmers without credit, with a difference of 74,51 kg per hectare per year. Farmers with credit produce 888,63 kg per hectare per year of cocoa dry beans, while farmers without credit produce 814,12 kg per hectare per year. Higher production implies higher revenue for farmers with credit than farmers without credit, with a difference in revenue of 919,438 IDR per hectare per year **(Table 3)**.

One of the factors leading to the high production of farmers with credit is the higher use of fertilizer compared to farmers without credit. The use of fertilizer can reduce pest and disease attacks on cocoa plants that cause damage to crop yields and a decrease in the amount of cocoa production (Azri, 2015).

Table 3. Average cocoa farm income in Central Sulawesi per hectare per year

Component	Without Credit (Rp000)		With Credit (Rp000)	
	Mean	St. Dev	Mean	St. Dev
Cash Revenue	18,565.03	12,989.69	19,595.70	10,512.92
Non-Cash Revenue	111.23	1,744.26	-	-
Total Revenue	18,676.26	12,948.58	19,595.70	10,512.92
Cash Cost	3,795.06	4,660.17	5,905.42	4,404.50
Non-Cash Cost	14,555.80	13,837.67	11,325.50	7,337.58
Total Cost	18,350.85	15,916.91	17,230.92	9,482.28
Farm Expense	9,466.23	8,889.31	8,097.53	4,710.10
Gross Farm Income	18,676.26	12,948.58	19,595.70	10,512.92
Cash Income	14,769.97	12,144.28	13,690.27	9,160.72
Net Farm Income	9,210.03	12,115.33	11,498.16	9,510.60
Net Farm Earning	9,210.03	12,115.33	9,765.78	8,866.75

In addition, the difference in production is because many non-credit farmers do not control pest attacks. About 96% of non-credit farmers experience pest attacks, but 19% of farmers do not do anything about it. The reasons for this were that 57% of the farmers did not have the money, 18% did not know how to deal with it, 13% complained about the high cost of pesticides, and the rest said it was challenging to get pesticides.

Cocoa Farm Income Analysis

Table 3 shows that farmers with credit earn higher gross farm income, net farm income, and net farm earnings than farmers without credit. So, cocoa farming with credit in Central Sulawesi is more profitable.

This is because the productivity of farmers with credit is higher than that of farmers without credit. However, this productivity is still lower than the national productivity potential of 2000 kg/ha/year (Masitah & Hasbiadi, 2022; Wijaya, 2020). Therefore, several policies are needed to increase the productivity of cocoa farming so that it becomes more profitable.

One way to increase the productivity of cocoa farmers in Central Sulawesi is by using superior cocoa seeds or clones (Ariningsih et al., 2021). Superior cocoa clones such as ICCRI and MCC have a potential yield of 1.800 kg to 3.670 kg of dry cocoa beans per hectare per year. Superior clones are also

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resistant to fruit rot, VSD, and PBK, which, when attacked, can cause a substantial decrease in production (Pratama et al., 2021).

In addition, increased productivity can be achieved by improving the skills of cocoa farmers through agricultural extension activities (Ariningsih et al., 2021; Dosa et al., 2023). Through extension activities, farmers can obtain information and training to implement excellent and correct cultivation techniques and solve problems faced in their farming activities (Susanti & Tangkesalu, 2019). Agricultural extension workers can also encourage farmers to apply GAP in cocoa farming, according to Permentan 48/2014, to increase productivity and improve the quality of cocoa beans produced.

Analysis of the Effect of Credit Use on Cocoa Farm Income

In **Table 4**, the effect of credit use is measured on total income, total costs, total revenue, and cocoa farm production. Significant differences between farmers with and without credit are only found in cocoa dry bean production, with a T-test value more significant than the T-table at 10% after matching. The difference in production between farmers with credit and without credit after matching is 131,9 kg.

Table 4. Effect of credit on income of cocoa farmers with and without credit in Central Sulawesi

Variable	Sample	With Credit	Without Credited	Difference	T-test
Production	*Unmatched*	888.7	814.1	74.5	1.41
(Kg)	ATT	888.7	756.7	131.9	1.94*
Total Revenue	*Unmatched*	19,595.7	18.676.3	919.4	0.71
(Rp000)	ATT	19,595.7	17.519.6	2.076.1	1.33
Total Cost	*Unmatched*	17,230.9	18.350.9	-1,119.9	-0.71
(Rp000)	ATT	17,230.9	16.159.8	1,071.2	0.58
Total Income	*Unmatched*	2,364.7	325.4	2,039.3	1.44
(Rp000)	ATT	2,364.7	1.359.8	1,004.9	0.58

Description : * significant at α=10%

Credit has an insignificant effect on farmers' income because the capital obtained from credit it is not fully used for productive farming financing, namely buying agricultural inputs (Lebe, 2016). This is indicated by the insignificant increase in farmers' total costs after using credit **(Table 4)**. The credit obtained was instead used to finance the daily needs of farmer households and pay for children's school fees.

Table 5. Results of Analysis of Factors Affecting Cocoa Farmers' Decision to Take Credit

Variabel	Keterangan	Coef	Std. Err	Odds Ratio
ART	Household Members (Person)	0.054	0.063	1.056
UMR	Farmer Age (Years)	-0.004	0.010	0.996
TPP	Farmer Education Level (Years)	0.083**	0.036	1.087
LLHN	Land Area (Ha)	0.211*	0.125	1.235
DSKL	Land Ownership Status *(Dummy)*	0.851	1.017	2.343
DPLYH	Extension Participation *(Dummy)*	0.772***	0.249	2.165
DKRPS	Cooperative Membership *(Dummy)*	2.935***	0.352	1.830
DPKTN	Farmer Group Membership *(Dummy)*	0.785***	0.241	2.193

Description : * significant at α=10%
: ** significant at α=5%
: *** significant at α=1%

This is because farmers have been unable to harvest or sell their crops while spending on daily living needs is urgent. This finding is consistent with the findings of Feryanto (2020) where the agricultural credit program has a positive but statistically insignificant effect. The cocoa agribusiness system in Kabupaten Bireuen was not well integrated, while in general, the role of cooperatives in the development of the cocoa agribusiness

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system is large, with an index value of 69.92% (Jamil & Budi, 2022). Therefore, it is necessary to assist farmers in managing capital from credit loans so that their use is appropriate and targeted. These mentoring activities can be organized by the government and lending financial institutions. In addition to mentoring, increasing financial literacy through counseling activities can also encourage farmers to be wiser in using the capital obtained from their credit loans.

Factors Influencing Cocoa Farmers' Decision to Take Credit

Table 5 shows the analysis results of factors influencing cocoa farmers' decision to take credit. The P-value obtained from the Stata 15 processing is 0.000, indicating that our model is significant at 1%. The Pseudo R2 value of 0.1459 suggests that the eight independent variables we used play a crucial role, explaining 14.59% of the dependent variable of credit use, with the remaining 85.41% being influenced by factors outside the model.

Farmers' education level has a positive and significant effect because a person's mindset in accepting innovations and implementing new ideas is generally influenced by his or her education (Soekartawi, 1995). Rachmawati (2017) found that farmers' education level will affect the adoption of innovations and the level of knowledge of credit. Farmers with low education tend to be reluctant to use credit because they are still afraid of dealing with banks and choose first to observe the results of applying innovations to other farmers.

The land area has a positive and significant effect because the larger the land area cultivated by farmers, the greater the need for capital. In other words, the scale of farmers' businesses is directly influenced by the size of the land they cultivate (Soekartawi, 2016). The larger the land area cultivated, the more production facilities are required to achieve optimal production. This means that larger farms not only produce more, but also require more investment in labor and other resources (Azrani et al., 2023).

Farmer participation, in extension, has a positive and significant effect because farmer participation can change the attitudes and behavior of farmers when applying technology and information so that farmers can make the right decisions for their businesses. Susanti & Tangkesalu (2019) also stated that extension activities can encourage farmers to apply innovations to solve their problems. Extension activities are also included in non-formal education so that farmers have the same effect as the farmers' education level. Cocoa farmers with credit in Central Sulawesi participate more in extension activities than farmers without credit.

Cooperative membership is significant because cooperatives can provide farm credit to their members. There are 11,65% of farmers with credit whose loan capital comes from the cooperative. In addition, cooperatives develop their members through training and education and serve as a forum for discussion among members, enabling members to make the right decisions for their farms. Wossen et al. (2017) also found that farmers who are members of cooperatives have higher levels of technology adoption and household welfare. Cooperative membership also allows farmers to participate in extension activities initiated by the cooperative.

Farmer group membership is instrumental in the financial stability of farmers, as farmer groups provide credit loan capital to their members. Notably, 17,48% of farmers with credit source their loan capital from farmer groups. Some credit lending institutions also consider farmer group membership status as a prerequisite for obtaining credit (Kiros & Meshesha, 2022). This implies that joining a farmer group can streamline the process of farmers securing loans. Furthermore, farmer groups serve as a platform for member farmers to learn and apply the latest agricultural technologies. The farmer group also provides inputs and

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production units for member farmers using a credit payment method (Pramono & Yuliawati, 2019).

The number of household members positively affects the farmer's decision to take credit but is not significant. The increase in farm household members will increase the needs of farm households but household members can be used as labor in farming. More importantly, household members are only sometimes dependents in the family. Those who have worked can significantly contribute to the family's income, thereby reducing the need for credit.

Age has a negative effect on farmers' decision to take credit but is not significant. This is because young farmers have a higher level of knowledge, so it is easy to understand and absorb the latest information (Gusti et al., 2021). Farmers at a young age are also active in meetings or socialization at the local agricultural office. In contrast, farmers at an older age find it difficult to understand the latest information and refuse to apply innovations. In addition, the older a person is, the more careful he or she is in financial management, so age does not affect the decision to take credit. However, farmers at a young age only have a little experience, so they sometimes make mistakes (Ehiakpor et al., 2015).

Land status has little effect because most cocoa farmers, with or without credit, conduct farming activities on their land. Cocoa farmers are not accustomed to renting land because cocoa is an annual crop with a lifespan of 25 to 40 years.

CONCLUSION

Based on the results of the study, it can be concluded that credit has a positive influence on the income of cocoa farmers in Central Sulawesi. However, its impact is insignificant due to the underutilization of productive financing. Therefore, it is crucial to provide assistance and increase financial literacy. This will empower farmers to make informed decisions about how to use the capital obtained from credit loans, thereby maximizing its potential. Factors influencing cocoa farmers' decision to take credit in Central Sulawesi are participation in extension services, cooperative membership, farmer group membership, farmer education level, and land size.

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