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ANALYSIS OF FACTORS AFFECTING THE PRODUCTION LEVEL OF VIRGIN COCONUT OIL (VCO) ENTREPRENEURS IN KARANGASEM REGENCY

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Abstract: This study aims to analyze the effect of capital, raw materials, and labor on the production levels of virgin coconut oil (VCO) entrepreneurs in Karangasem Regency. This regency was chosen because it is one of the largest VCO production centers in Bali Province; however, its productivity level has not yet reached its optimal potential. This research adopts a quantitative approach with an associative causal design using a semi-log regression analysis method to examine the relationship between the independent variables (capital, raw materials, and labor) and the dependent variable (production level). Data were collected from 31 VCO entrepreneurs using a census technique, questionnaires, interviews, and secondary data from the local agriculture office. The results show that both capital and raw materials have a significant effect on the production levels of VCO entrepreneurs in Karangasem Regency. Furthermore, capital and raw materials were found to have a positive and significant partial effect, while labor showed a positive but not statistically significant partial effect on production levels.

Keywords: VCO production, capital, raw materials, labor

INTRODUCTION

Economic activity refers to efforts aimed at improving the standard of living of society. As economic growth increases, the needs of the population can be better fulfilled. To meet these needs, employment opportunities are essential to absorb the available labor force. According to the Ministry of Energy and Mineral Resources of the Republic of Indonesia (2019), Indonesia is a country rich in natural resources, yet it has not fully optimized its potential—both individual and regional. If this potential can be maximized, it will help fulfill the needs of the population. People are therefore encouraged to be self-reliant and to develop their skills and potentials to achieve prosperity. Those who are capable and aware of their personal strengths, and who can identify environmental opportunities, are more likely to find and create entrepreneurial opportunities (Rahman et al., 2021).

The existence of business opportunities is expected to support the economic growth of surrounding communities and reduce high levels of urbanization. Economic systems evolve alongside human development and societal advancement. In this competitive economic landscape, companies are required to reevaluate their business missions and marketing strategies to improve performance and ensure long-term sustainability.

In general, Indonesia has a promising agro-industrial sector with several advantages that can be developed. This sector benefits from the country's abundant supply of raw materials, which has led a significant portion of the population to rely on agriculture and plantations for their livelihoods (Lantarsih, 2011). The plantation subsector, in particular, provides opportunities for rural human resources—often limited in knowledge, technology, and skills—to improve their income, as it opens up many employment prospects (Triyanti, 2021).

In the agriculture and plantation sectors, the coconut tree is one of the most versatile plants, with nearly every part being usable, making it known as a multi-purpose plant (FAO, 2018). According to the Indonesian Ministry of Agriculture (2020), coconuts (Cocos nucifera) are an essential commodity for the Indonesian people and can act as a driver of the local economy. Coconuts have been known in Indonesia since the 19th century and thrive in tropical regions located along the equator.

Indonesia, as a tropical country, is recognized as the world's largest coconut producer, with a plantation area of approximately 3.6 million hectares and an annual production of 2.8 million tons (BPS, 2021). Most coconut plantations in Indonesia are managed by farming households, with approximately 96.60% being cultivated by smallholder farmers who own an average of one hectare per household (Allorerung et al., 2005). This enormous potential opens up opportunities for the development of various coconut-based products, one of which is Virgin Coconut Oil (VCO). According to Wahyu Ari (2019), the best coconut oil is fresh oil produced without chemical additives and without the use of high temperatures.

The Virgin Coconut Oil (VCO) industry is experiencing consistent growth, driven by increasing public awareness of its health benefits. Data from Global Market Insights indicates that the VCO market was valued at USD 2.7 billion in 2022 and is projected to grow at a CAGR of 5.8% until 2028. The highest demand for VCO comes from developed countries such as the United States, Germany, and Japan, highlighting the immense market potential of this product. However, only around 5% of total coconut production is currently processed into VCO. The main challenges facing the VCO industry include low production levels, reliance on traditional processing technologies, and limited access to international markets (Silalahi et al., 2021).

One Indonesian province known for its well-integrated agricultural systems is Bali. Bali possesses abundant natural resources and is guided by the concept of Tri Hita Karana, which emphasizes harmony among people, nature, and God. This philosophy serves as a foundation for resource management, including in agriculture and plantations (Sari, 2020). Bali's agricultural system is closely tied to its local culture, which means that agricultural practices consider not only economic aspects but also social and environmental values (Rethinam, 2019). Research by Triyanti (2021) indicates that the presence of farmer groups in Bali can improve farmers' access to information and technology, ultimately enhancing productivity and the quality of agricultural products. Bali also features diverse plantation commodities, including coconut, coffee, cocoa, and spices, all of which present valuable opportunities for the development of beneficial products for the community.

Bali, as one of Indonesia's provinces with diverse tourism destinations, presents a potential market for agricultural products, including Virgin Coconut Oil

(VCO). The high influx of tourists creates opportunities to expand the market for local products, especially through integration with the rapidly growing spa and wellness tourism industry in Bali (Sari et al., 2024). Traditional spa centers and wellness clinics in Bali frequently use VCO in various treatments, ensuring stable demand for the product (Ariyani et al., 2021).

According to the Bali Province Central Bureau of Statistics, in 2021 there were 85 VCO business units across the province employing a total of 280 workers. Buleleng and Gianyar regencies had the highest numbers of VCO enterprises, with 15 and 12 units employing 48 and 28 workers, respectively. Badung had 7 units with 25 workers. Other regencies, such as Karangasem, Klungkung, Tabanan, and Denpasar, each had 6 to 10 business units employing 24 to 52 workers. By 2022, the number of VCO business units increased to 88, employing around 290 workers. This growth was especially notable in Buleleng, Klungkung, and Karangasem, while Denpasar remained stable. In 2023, Bali's VCO industry continued to grow, supported by post-pandemic economic recovery policies and government initiatives to promote small and medium enterprises (Ministry of Cooperatives and SMEs, 2023). The data for 2023 regarding the number of VCO entrepreneurs in Bali Province is presented below.

VCO businesses in Karangasem Regency are generally classified as small and medium industries (SMIs) that utilize local resources, primarily coconuts. These businesses are characterized by their production scale, capital structure, production technology, and marketing strategies. Most VCO businesses still rely on traditional or semi-modern production methods, making productivity and efficiency highly dependent on the availability of raw materials, labor, and capital. Key challenges include fluctuating coconut prices, limited market access, and competition from larger commercial VCO brands.

The profile of VCO entrepreneurs in Karangasem shows that most come from agricultural or coconut farming backgrounds. In terms of education, many have completed secondary education, though some possess higher education, particularly those adopting modern and innovative business models. Most entrepreneurs rely on personal capital or support from the government and financial institutions. Labor in VCO businesses primarily consists of family members or local community members, highlighting the potential for further development if given greater access to capital, production technology, and marketing support.

Despite these strengths, the VCO industry in Bali still faces significant challenges, particularly in capital and technology. Most entrepreneurs continue to use traditional methods, which affect production efficiency and consistency. Supriyadi et al. (2021) found that modern technology can significantly improve both productivity and product quality, but many entrepreneurs struggle with limited access to capital needed for such investments. Moreover, VCO productivity in Bali remains below its optimal potential. The average coconut yield in Indonesia is only 1.1 tons per hectare, far below the global standard of 2–3 tons per hectare (FAO, 2020).

This untapped potential has encouraged stakeholders to reevaluate coconut processing strategies, particularly for VCO production. Given this potential, the issue warrants further research to determine how the sector can be better optimized. As demand for VCO increases—particularly in export markets and beauty product

segments—the number of entrepreneurs in Karangasem's VCO industry has grown significantly. Data from the Bali Provincial Office of Trade and Industry (2022) show that around 40% of coconut entrepreneurs in Karangasem have shifted toward VCO processing. This transition illustrates the industry's potential to create economic opportunities and jobs, with local entrepreneurs increasingly recognizing the added value of VCO compared to raw coconuts.

However, despite the rising number of entrepreneurs and workers, several challenges hinder optimal production. The quality of VCO products often varies, and problems persist in distribution and limited access to modern processing technology. Nurwati et al. (2021) reported that around 60% of VCO entrepreneurs in Karangasem still rely on traditional processing methods, which reduces efficiency and product quality. This highlights the importance of exploring factors that influence production efficiency and product quality while identifying solutions to existing barriers to enable the VCO industry in Karangasem to thrive.

Lantarsih (2011) found considerable disparities in productivity among regions, suggesting uneven resource management. At the institutional level, coordination among stakeholders remains suboptimal. A lack of standardization and certification further limits the industry's competitiveness in international markets. Prasetyo and Widiastuti (2022) emphasized the need for stronger institutions and improved stakeholder collaboration to enhance the competitiveness of the VCO industry. Given its applications in spa, hair care, and oral health, VCO has high market potential as a valuable agro-industrial commodity (Mankiw et al., 2019).

Karangasem Regency is largely populated by farmers. Its agriculture and plantation sectors play vital roles in the local economy. Increasing demand for food and other coconut-based products has pushed farmers to increase production to meet market needs (Antara & Yono, 2013). The contribution of agriculture to Karangasem's Gross Regional Domestic Product (GRDP) has steadily increased, from 27.40% in 2021 to 28.56% in 2022, and to 30.51% in 2023, making agriculture a consistent driver of the local economy with over 25% contribution annually.

Employment in Karangasem's agricultural sector also rose steadily between 2021 and 2023. In 2021, the sector employed 62,900 workers, which increased to 64,700 in 2022 (up 2.86%), and grew again in 2023 by 3.25%. This upward trend shows that agriculture remains a key employment provider and a major contributor to the district's GRDP growth.

Karangasem was chosen as the study location for several reasons related to natural resource potential, economic opportunity, and social impact. First, Karangasem has significant natural potential, with 7,425 hectares of coconut plantations producing 7,123 tons of coconuts in 2023 (BPS, 2023). Second, economically, the regency relies heavily on agriculture, particularly coconut farming, making VCO production a promising economic opportunity. Third, socially, VCO industry development could improve local welfare by shifting communities from raw coconut sales to higher-value processed products.

Data from the Karangasem Office of Industry and Trade indicate approximately 31 VCO enterprises are spread across various sub-districts. However, production remains suboptimal, with average outputs of only 500–600 liters per month per unit,

below the potential capacity of 800–1,000 liters. Factors contributing to this gap include limited working capital, outdated technology, lack of skilled labor, and weak institutional support (Triyanti, 2021). Furthermore, about 60% of the production capacity is being utilized, according to 2023 data.

In addition to technological constraints, marketing poses challenges. Many entrepreneurs lack access to broader distribution networks, making it difficult to enter larger markets. Export market quality standards are also a barrier due to limited facilities and lack of product certification. The Karangasem Office of Industry and Trade (2023) emphasized that increasing VCO production capacity and quality requires government support in training, equipment provision, and export access.

Several key factors influence VCO production: raw material availability, processing technology, labor, market access, and government policy. The supply of coconuts is crucial, and yield fluctuations due to climate or pests can disrupt production (Rahayu et al., 2021). Modern extraction technologies improve efficiency and product quality (Suryani & Putra, 2022), while labor plays a role depending on workers' hygiene standards and technical knowledge. Government regulations, subsidies, and training also significantly influence production (Yulianto, 2020).

Studies by Octavia (2015), Wenagama (2022), and Wahyu (2020) confirm that capital, raw materials, and labor significantly impact production. Sufficient capital enables procurement of quality raw materials and expanded labor capacity. Prior studies (Pratiwi, 2021; Kusuma, 2022; Wijaya, 2023) focused on individual factors or medium-scale enterprises, while this study addresses the combined impact of all three variables in micro- and small-scale VCO businesses in Karangasem.

Research by Turner et al. (2022) and the Journal of Development and Agricultural Economics (2022) emphasized capital as a crucial enabler of modern equipment investment and cost-efficiency. Raw materials must be high-quality and stable in supply (White et al., 2024; Rahayu et al., 2021). Labor competency directly affects productivity and sustainability (Renewable and Sustainable Energy Reviews, 2023; Journal of Rural Studies, 2022). Despite Karangasem's potential, prior research has focused on other coconut-producing regions, such as North Sulawesi, East Java, and West Sumatra.

Production in VCO and other creative industries must be comprehensively planned to provide social and economic benefits. Zainul et al. (2024) highlighted the importance of sustainable practices aligned with SDG 12 (Responsible Consumption and Production) and the health benefits of high-quality VCO aligned with SDG 3 (Good Health and Well-being).

Given these complexities, this research aims to explore the factors influencing VCO production in Karangasem Regency. Understanding these factors is critical not only for evaluating production effectiveness but also for forming more targeted development strategies. Previous research (Sunada, 2021; Najla et al., 2024) supports the importance of labor quality and raw material selection in achieving better VCO volume and quality. Therefore, this study is titled: "Analysis of the Factors Influencing the Production Levels of Virgin Coconut Oil (VCO) Entrepreneurs in Karangasem Regency."

METHOD

This study employs a quantitative associative approach to examine the influence of capital (X1), raw materials (X2), and labor (X3) on the production of virgin coconut oil (VCO) in Karangasem Regency. The study was conducted in this region due to its relatively high poverty rate and significant potential for developing the VCO industry, although current productivity remains low. The research subjects were VCO entrepreneurs, comprising a population of 31 business units, all of which were included as samples using a census or saturated sampling method (Sugiyono, 2012).

The variables in this study consist of a dependent variable, namely production (Y), and three independent variables: capital, raw materials, and labor. The operational definitions of the variables are as follows: production is measured in liters, capital in million rupiah, raw materials in the number of coconuts, and labor in working hours per month. Data were collected through questionnaires and direct interviews with VCO business actors, using both quantitative and qualitative data obtained from primary and secondary sources (Khotimah, 2020; Sugiyono, 2019).

Data analysis was carried out using multiple linear regression to determine the influence of each independent variable on VCO production, supported by t-tests and F-tests to assess the significance of partial and simultaneous effects. Prior to regression analysis, classical assumption tests were conducted, including tests for normality, multicollinearity, and heteroscedasticity, to ensure the validity of the regression model. All analytical processes were performed using statistical software to ensure valid and reliable interpretations (Suyana Utama, 2007; Sugiyono, 2017).

RESULTS AND DISCUSSION

Descriptive Analysis

Table 1. Descriptive Analysis

	N	Minimum	Maximum	Mean	Std. Deviation
X1	31	36670.00	66900.00	55218.0645	6690.25793
X2	31	600.00	2000.00	1048.3871	327.23179
X3	31	2.00	4.00	2.7742	.61696
Y	31	50.00	195.00	106.0645	30.79712
Valid N (listwise)	31				

Source: Data processing, 2025

Based on Table 1, it shows that the capital variable (X1) has a minimum value of 36,670 thousand rupiah, a maximum value of 66,900 thousand rupiah, an average

value of 55,218 thousand rupiah and a standard deviation of 6,690. This shows that the data has the lowest capital value of 36,670 thousand rupiah and the highest of 66,900 thousand rupiah, with an average capital level of 55,218 thousand rupiah and with a standard deviation of 6,690 which means that the capital for VCO production can be higher or lower than the average of 6,690.

The raw material variable (X2) has a minimum value of 600 pieces, a maximum value of 2,000 pieces, an average value of 1,048 pieces and a standard deviation of 327.23. This shows that the data has the lowest raw material value of 600 pieces and the highest of 2,000 pieces, with an average raw material level of 1,048 pieces and a standard deviation of 327.23, which means that the raw materials for VCO production can be higher or lower than the average of 327.23.

The labor variable (X3) has a minimum value of 2 people, a maximum value of 4 people, an average value of 2.7 people and a standard deviation of 0.616. This shows that the data has the lowest labor value of 2 people and the highest of 4 people, with an average labor level of 2.7 people and a standard deviation of 0.616, meaning that the labor for VCO production could be higher or lower than the average of 0.616.

The variable of VCO Production Amount (Y) has a minimum value of 50 liters, a maximum value of 195 liters, an average value of 106 liters and a standard deviation of 30.79. This shows that the data has the lowest VCO production amount of 50 liters and the highest of 195 liters, with an average level of VCO production amount of 106 liters and with a standard deviation of 30.79 which means that the amount of VCO production could be higher or lower than the average of 30.79.

Virgin Coconut Oil (VCO) production in Karangasem Regency, Bali, has grown in various villages, with community support and initiatives such as those carried out by residents of Antiga Village (Bali Tribune, 2022). Although production shows a positive trend, VCO's contribution to total coconut oil consumption in the region is still relatively small. With a population of around 536,477 people and an average per capita coconut oil consumption of 5 liters per year, the total coconut oil consumption in Karangasem is estimated to reach around 2.6 million liters per year (BPS Karangasem, 2023). Meanwhile, if there are around 30 villages actively producing VCO with an average production of 1,000 liters per village per year, then the total VCO production is only around 78,000 liters per year, or equivalent to around 2.91% of the total domestic coconut oil consumption. This figure shows that VCO is still a special product with limited use, usually for health, cosmetic, or export purposes, and not as a main daily consumption ingredient like regular coconut oil (Yuliarahma, 2014). This is also due to the relatively higher price of VCO compared to conventional coconut oil, so that access and demand are still limited among local communities.

Classical Assumption Test Results

1) Normality Test

Table 2. Normality Test Results

		Unstandardized Residual
N		31
Normal Parametersa,b	Mean	.0000000
	Std. Deviation	.08354314
Most Extreme Differences	Absolute	.138
	Positive	.138
	Negative	-.108
Test Statistics		.138
Asymp. Sig. (2-tailed)		.140c

a. Test distribution is Normal.

b. Calculated from data.

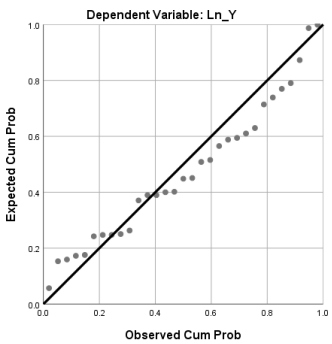
c. Lilliefors Significance Correction.

Source: Data processing, 2025

Based on the results of the normality test in Table 2, it shows that the data is normally distributed. This is indicated by the value of the Kolmogorov-Smirnov Test of 0.140, which is greater than 0.05.

In addition, the PP Plot results in Figure 1 also support this conclusion, where the residual points are spread along the diagonal line. This indicates that the residual distribution does not deviate significantly from the normal distribution. Thus, the assumption of normality in multiple linear regression has been met, so that the regression model used can be considered valid and can be used for further analysis.

Figure 1. Normal P-Plot Graph



Source: Data processing, 2025

2) Multicollinearity Test

Table 3. Multicollinearity Test Results

No	Variables	Tolerance	VIF	Information
1.	Capital (X1)	0.532	1,879	There is no multicollinearity
2.	Raw Materials (X2)	0.225	4,440	There is no multicollinearity
3.	Labor (X3)	0.265	3,774	There is no multicollinearity

Source: Data processing, 2025

Based on Table 3 shows that the tolerance value for each independent variable is capital with a tolerance value of 0.532, raw materials of 0.225 and labor of 0.265. All independent variables in this study have a tolerance value > 0.10. The VIF value for each independent variable is capital of 1.879, raw materials of 4.44 and labor of 3.774. All independent variables in this study have a VIF value <10. Based on this, it can be concluded that in the regression model of this study there is no correlation problem between the variables

3) Heteroscedasticity Test

Table 4. Results of Heteroscedasticity Test

No	Variables	Sig	Information
1.	Capital (X1)	0.727	There is no heteroscedasticity
2.	Raw Materials (X2)	0.094	There is no heteroscedasticity
3.	Labor (X3)	0.555	There is no heteroscedasticity

Source: Data processing, 2025

Based on the results of the heteroscedasticity test in Table 4, it shows that the significance value of each independent variable, namely the capital variable is 0.727, the raw material variable is 0.094 and the labor is 0.555. From these results, each variable has a significance value greater than 0.05, so the regression equation model used in this study does not have a heteroscedasticity problem.

Determinant Coefficient (R2)

Table 5. Results of the Determinant Coefficient (R2)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate

1	0.952a	0.906	0.895	0.088

a. Predictors: (Constant), X3, Ln_X1 , X2

b. Dependent Variable: Ln_Y

Source: Data processing, 2025

The coefficient of determination is a measure of the goodness of fit of a regression equation, indicating the extent to which the variation in the dependent variable can be explained by the independent variables. The coefficient of determination (R^2) is used to assess the proportion of the total variation in the dependent variable that is simultaneously explained by the independent variables in the regression model.

The Adjusted R-Square value in this study is 0.895, indicating that 89.5% of the variation in the production level of Virgin Coconut Oil (VCO) entrepreneurs in Karangasem Regency is explained by capital, raw materials, and labor. The remaining 10.5% is influenced by other factors outside the regression model.

Results of Simultaneous Regression Coefficient Significance Test (F Test)

Table 6. Simultaneous Regression Results (F Test)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2,011	3	0.670	86,431	0.000b
	Residual	0.209	27	0.008		
	Total	2,220	30			

a. Dependent Variable: Ln_Y

b. Predictors: (Constant), X3, Ln_X1 , X2

Source: Data processing, 2025

Based on the test results that have been carried out in Table 6 shows that the significant value of the variable 0.000 < 0.05 and 86.431 > 2.98, it can be concluded that it is rejected and accepted. This shows that capital, raw materials, and local labor simultaneously have a significant effect on the production level of Virgin coconut oil (VCO) entrepreneurs in Karangasem Regency.$\mathrm{F_{hitung}F_{tabel}H_0H_1}$

Semi Log Regression Analysis

Table 7. Semi-Log Regression Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-50,171	1,818		-2,845	0.008

Ln_X1	0.846	0.171	0.401	4,944	0,000
X2	0.001	0,000	0.608	4,886	0,000
X3	0.012	0.051	0.027	0.238	0.814

a. Dependent Variable: Ln_Y

Source: Data processing, 2025

Based on the results of the semi-log regression analysis presented in Table 7, the following equation is obtained:

$Y = \propto + \beta_1 LnX_1 + \beta_2 X_2 + \beta_3 X_3 + e$

$Y = -50.171 + 0.846\ LnX_1 + 0.001\ X_2 + 0.012\ X_3$

From this equation, it can be interpreted that capital (LnX_1) and raw materials (X_2) have a significant influence, while labor (X_3) does not significantly affect the production level of Virgin Coconut Oil (VCO) entrepreneurs in Karangasem Regency.

The constant value ($\propto$) is -50.171, which indicates that when all independent variables (capital, raw materials, and labor) are held constant at zero, the production level (Y) would be -50.171, suggesting that in the absence of these inputs, no production activity can occur.

The regression coefficient for capital (LnX_1) is 0.846, which is positive, implying that a 1% increase in capital, while holding raw materials and labor constant, would result in an increase in VCO production by 0.00846 thousand rupiahs. Conversely, a 1% decrease in capital under the same conditions would reduce production by 0.00846 thousand rupiahs.

The regression coefficient for raw materials (X_2) is 0.001, indicating that if raw materials increase by one unit (one coconut), assuming capital and labor are constant, the VCO production would increase by 0.001 thousand rupiahs. Likewise, a decrease in one unit of raw materials would reduce production by the same amount.

The regression coefficient for labor (X_3) is 0.012. This suggests that if labor increases by one unit (one working hour), while capital and raw materials remain constant, the production would increase by 0.012 thousand rupiahs. Conversely, a one-unit decrease in labor would result in a production decrease of 0.012 thousand rupiahs. However, this effect is not statistically significant.

Partial Significance Test of Coefficients (t-Test)

Effect of Capital (X_1) on VCO Production (Y)

Based on the t-test results shown in Table 7, the calculated t-value for capital is **t_h = 4.944**, which is greater than the critical t-value of **1.699**, and the significance value is **0.000 < 0.05**. Therefore, the null hypothesis (H_0) is rejected, and the alternative

hypothesis (H_1) is accepted. This indicates that capital has a positive and statistically significant partial effect on the production level of VCO entrepreneurs in Karangasem Regency.

Effect of Raw Materials (X_2) on VCO Production (Y)

The t-test results show a calculated t-value of $\mathbf{t_h = 4.886}$, which exceeds the t-table value of **1.699**, with a significance value of **0.000 < 0.05**. Hence, the null hypothesis is rejected, confirming that raw materials have a positive and significant partial effect on VCO production in Karangasem Regency.

Effect of Labor (X_3) on VCO Production (Y)

The t-test results indicate a calculated t-value of $\mathbf{t_h = 0.238}$, which is less than the critical value of **1.699**, and a significance value of **0.814 > 0.05**. As a result, the null hypothesis is accepted, and the alternative hypothesis is rejected. This means that labor does not have a statistically significant partial effect on the production level of VCO entrepreneurs in Karangasem Regency.

Results and Discussion

The Simultaneous Influence of Capital, Raw Materials, and Labor on the Production Level of Virgin Coconut Oil (VCO) Entrepreneurs in Karangasem Regency

The results of the multiple linear regression analysis indicate that capital, raw materials, and labor simultaneously have a significant influence on the production level of Virgin Coconut Oil (VCO) entrepreneurs in Karangasem Regency. This is evidenced by the F-statistic value of 86.431 with a significance level of 0.000, which is well below the threshold of 0.05 (α = 5%). Therefore, the null hypothesis (H_0), which states that there is no simultaneous effect of capital, raw materials, and labor on production level, is rejected, and the alternative hypothesis (H_1) is accepted.

The high F-value demonstrates that the regression model has strong explanatory power in accounting for the variation in the dependent variable, namely the production level. This implies that the three independent variables—capital, raw materials, and labor—jointly exert a significant and crucial influence on how much VCO can be produced by entrepreneurs in the region.

Theoretically, this aligns with the production theory which posits that production inputs such as capital, raw materials, and labor are essential determinants of output. Capital is required to finance machinery, tools, and operational needs; raw materials form the core of the final product; and labor performs the direct production process. According to Sukirno (2006), production is an activity that adds value to goods and services. In classical economics, the production function is generally represented as: Q = f(K, L, R, T)

Where Q is output, K is capital, L is labor, R is natural resources (including raw materials), and T is technology. In the context of VCO businesses, the more optimally these inputs are utilized, the higher the production level.

The research findings are consistent with those of Winangun and Wenagama (2024) on the woodcraft industry in Tabanan and Usman & Karmini (2021) on the stone carving industry in Gianyar, which also found that capital, raw materials, and labor simultaneously influence production significantly.

The Effect of Capital on the Production Level of VCO Entrepreneurs in Karangasem Regency

The t-test results show that capital has a positive and significant partial effect on the production level of VCO entrepreneurs in Karangasem Regency. The t-statistic value (4.944) exceeds the critical value (1.699), and the significance value of 0.000 is below 0.05. Hence, H_0 is rejected and H_1 is accepted.

A positive regression coefficient indicates that increasing capital leads to higher production capacity. Capital includes investment in machinery, packaging, equipment, and other operational costs, which are crucial to maintaining smooth production processes. This is in line with Sukirno's (2004) theory that capital—being the result of prior production—can be reinvested to generate further goods and services. Sufficient capital also enables the purchase of raw materials in bulk, acquisition of efficient equipment, and expansion of production capacity.

These findings are supported by previous research, including Solikun et al. (2023) which shows that capital and raw material management positively and significantly impact VCO income in Purworejo.

The Effect of Raw Materials on the Production Level of VCO Entrepreneurs in Karangasem Regency

The t-test results also reveal that raw materials have a positive and significant partial effect on the production level of VCO entrepreneurs in Karangasem Regency. The t-statistic (4.886) > t-table (1.699) and the significance level is 0.000 < 0.05, leading to the rejection of H_0 and acceptance of H_1.

High-quality and consistent raw material availability is essential for sustainable VCO production. Heizer and Render (2005) emphasized that the efficiency of the supply chain directly influences production rhythm and product quality. Kusuma et al. (2022) further highlight that the selection of fermentation methods and yeast strains significantly affect VCO quality.

Interview findings from May 15, 2025, with Mr. I Made Rutana Dwi Putra, a VCO entrepreneur in Selumbung Village, Manggi Sub-district, reinforce these conclusions. He stated that raw material availability—particularly during the rainy season—remains the greatest challenge, affecting both quantity and quality of production.

Effective supply chain management is thus vital. Collaborations with coconut farmers, farmer empowerment through training, and upstream-downstream integration are necessary strategies. Theoretical support from Harland (1996) and Marimin's supply chain resilience principles emphasize the need for robust, adaptive systems to sustain production despite seasonal disruptions.

The Effect of Labor on the Production Level of VCO Entrepreneurs in Karangasem Regency

Unlike capital and raw materials, labor was found to have no significant partial effect on production. The t-statistic (0.238) is below the critical value (1.699), and the significance value is 0.814 > 0.05, thus H_0 is accepted and H_1 is rejected.

This insignificance may stem from factors such as low labor productivity, insufficient training, or a greater reliance on technology in the production process. This result suggests that improvements in human resource quality—such as skill enhancement, training programs, and better workforce management—are needed to boost labor effectiveness in VCO production in Karangasem.

CONCLUSION

1. Simultaneously, capital, raw materials, and labor have a significant influence on the production level of Virgin Coconut Oil (VCO) entrepreneurs in Karangasem Regency.
2. Partially, capital and raw materials have a positive and significant effect on the production level of VCO entrepreneurs in Karangasem Regency, whereas labor does not have a significant effect on the production level of VCO entrepreneurs in the region.

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