

ANALYSIS OF FACTORS AFFECTING LABOR PRODUCTIVITY PALM OIL HARVESTERS AT PT. PERKEBUNAN NUSANTARA IV REGIONAL II BAH BIRUNG ULU GARDEN

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Abstract

The productivity of oil palm harvesters is an important factor in supporting the achievement of production targets of plantation companies. This study aims to analyze the effect of premiums, work experience, age, and number of dependents on the productivity of oil palm harvesters in Afdeling III Kebun Bah Birung Ulu PT Perkebunan Nusantara IV Region II. The study used a quantitative method with a saturated sample of 35 harvesters. Data were analyzed using multiple linear regression through the classical assumption test, t-test, F-test, and coefficient of determination (R^2). The results showed that partially premiums and work experience had a positive and significant effect on labor productivity, while age had a negative and significant effect. The number of dependents did not have a significant effect on labor productivity. Simultaneously, premiums, work experience, age, and number of dependents had a significant effect on labor productivity. The coefficient of determination (R^2) value of 0.737 indicates that 73.7% of the variation in labor productivity can be explained by the research variables, while the remaining 26.3% is influenced by other factors outside the model. The research results confirm that increasing premiums and work experience are the main factors that can increase the productivity of palm oil harvesting workers.

Keywords: Number of Dependents; Work Experience; Premium; Labor Productivity; Age.

INTRODUCTION

Human resources (HR) are a vital organizational asset, serving as planners, implementers, and decision-makers in achieving organizational goals. Organizational success is largely determined by the ability of HR to effectively carry out their duties and responsibilities. Therefore, sound HR management is necessary to increase productivity and support the achievement of organizational goals (Samsuni, 2017). The palm oil industry plays a strategic role in the Indonesian economy as a provider of foreign exchange and employment. One of the industry's primary activities is the harvesting of Fresh Fruit Bunches (FFB), which directly impacts the quantity and quality of palm oil production. Harvester productivity is a crucial factor in achieving production targets and ensuring company operational efficiency (Nainggolan et al., 2012).

Various studies have shown that harvester productivity is influenced by several factors. Premium levels and harvest incentives have been shown to significantly impact productivity by increasing harvester motivation (Lestari et al., 2024). Furthermore, effective harvesting practices, such as shorter harvest intervals, can improve oil quality and reduce yield losses, although their implementation is often hampered by labor availability and operational costs (de Vos et al., 2023). Research by Hasibuan (2020) also shows that premiums, age, work experience, and the number of dependents significantly influence harvester productivity.

However, information on the factors influencing harvester productivity at PT Perkebunan Nusantara IV Regional II Kebun Bah Birung Ulu remains limited. Field observations revealed differences in productivity levels among harvesters, with some workers achieving company targets while others fell short. This situation has the potential to impact production and operational efficiency at the plantation. Based on these problems, this study was conducted to analyze the factors that influence the productivity of oil palm harvesters at PT Perkebunan Nusantara

IV Regional II Kebun Bah Birung Ulu, with a focus on the variables of premium, work experience, age, and number of family dependents.

THEORETICAL BASIS

Labor Productivity of Palm Oil Harvesters

Productivity is the ratio of output to input used in a work process. Productivity reflects not only the efficiency of resource use but also the effectiveness in achieving predetermined goals (Siagian, 2000; Green, 2000). In oil palm plantations, harvester labor productivity is measured by the number of Fresh Fruit Bunches (FFB) harvested in a specific time unit, such as tons per workday (Douw et al., 2021). Harvester labor productivity is a crucial indicator of the operational success of a plantation company. High productivity levels demonstrate workers' ability to optimally utilize their time, energy, and skills to achieve production targets. Various studies have shown that harvester productivity is influenced by both individual and external factors, such as age, work experience, premiums, and the company's incentive system (Nadeak & Laia, 2022; Aini et al., 2024). Therefore, increasing productivity requires effective management support and a work system capable of sustainably driving workforce performance.

Age

Age is one factor influencing labor productivity. Workers of productive age generally have better physical condition, stamina, and work abilities than older workers. With optimal physical condition, workers can carry out harvesting activities more effectively, thereby increasing work productivity. Research by Situmeang (2024) and Hasibuan (2020) shows that age significantly influences the productivity of oil palm harvesters.

Premium

A premium is a form of additional compensation given to workers for achieving specific work targets. A fair and competitive premium system can increase work motivation and morale, and encourage workers to increase harvest yields. Therefore, premiums are a crucial instrument for increasing labor productivity. Research by Billa and Iswarini (2022) and Lubis (2020) shows that premiums have a positive and significant effect on the productivity of oil palm harvesters.

Work experience

Work experience reflects the length of time a person has been involved in a job, thus enhancing their knowledge and skills. Harvesters with more work experience tend to have a better understanding of proper harvesting techniques, are more efficient, and can complete tasks with optimal results. Research by Sinaga (2024) and Hasibuan (2020) demonstrates that work experience significantly impacts the productivity of oil palm harvesters.

Number of Family Dependents

The number of dependents in a family reflects the number of family members who are a financial burden on a worker. The greater the number of dependents, the greater the economic needs that must be met. This situation can encourage workers to increase their efforts and work productivity to earn higher incomes. Therefore, the number of dependents in a family is often used as a variable suspected of influencing labor productivity.

RESEARCH METHODS

This study used a quantitative descriptive method that aims to systematically describe the factors that influence the productivity of oil palm harvesters based on data obtained in the field. This approach utilizes statistical analysis to test the relationship between research variables and answer the formulated hypotheses (Kusumastuti et al., 2020). The study was conducted in Afdeling III of Bah Birung Ulu Plantation, PT Perkebunan Nusantara IV Regional II, Simalungun Regency, North Sumatra, from February to April 2026. The study location was selected purposively because it has a more diverse variation in harvester labor productivity compared to other afdelings.

The independent variables in this study consist of premium (X1), work experience (X2), age (X3), and number of dependents (X4), while the dependent variable is the productivity of the harvester's workforce (Y). Premiums are measured based on the income received by the harvester each month, work experience based on the length of service in years, age based on the respondent's age in years, number of dependents based on the number

of family members who are an economic burden, and productivity is measured based on the number of fresh fruit bunches harvested in kilograms. The study population comprised all 35 harvesters in Division III of Kebun Bah Birung Ulu. The sampling technique used was a saturated sampling method, allowing all members of the population to become respondents. The data used consisted of primary data obtained through direct observation and interviews with respondents, as well as secondary data sourced from company documents and various supporting literature.

Data analysis was performed using SPSS software. Prior to the regression analysis, classical assumption tests were conducted, including normality, multicollinearity, and heteroscedasticity tests, to ensure model feasibility. Furthermore, the effect of premiums, work experience, age, and number of dependents on labor productivity was analyzed using multiple linear regression. Hypothesis testing was conducted using partial (t-test), simultaneous (F-test), and coefficient of determination (R^2) analyses to determine the contribution of the independent variables in explaining variations in labor productivity among oil palm harvesters.

RESEARCH RESULT

CLASSICAL ASSUMPTIONS

Normality Test

A normality test is performed to determine whether the residual data in the regression model is normally distributed. This test uses the Kolmogorov-Smirnov method, with decision-making based on the significance value (Asymp. Sig.) obtained from the data processing results.

Table 1. Data Normality Results

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		35
Normal Parameters ^{a,b}	Mean	.0000000
	Std. Deviation	193.89377816
Most Extreme Differences	Absolute	.124
	Positive	.124
	Negative	-.104
Test Statistics		.124
Asymp. Sig. (2-tailed)		.188^c
a. Test distribution is Normal.		
b. Calculated from data.		
c. Lilliefors Significance Correction.		

The results of the normality test using the *Kolmogorov-Smirnov statistical test* showed an *Asymp. Sig. (2-tailed)* value of $0.188 > \alpha (0.05)$, so it can be stated that the data in this study is normally distributed.

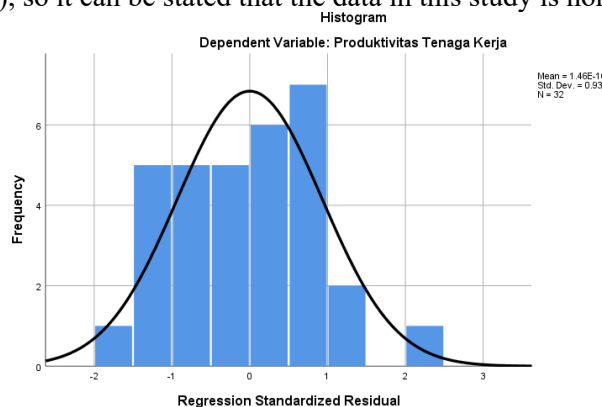


Figure 1. Results of the Histogram Normality Test

The results of the normality test using the histogram test state that the data distribution is balanced and forms a bell-shaped pattern, so it can be stated that the data is normally distributed.

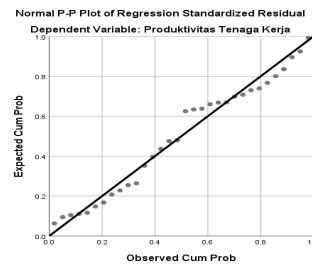


Figure 2. Results of the P-Plot Normality Test

Based on the results of the normality test using the **Normal P-Plot of Regression Standardized Residual graph**, it can be seen that the residual points are spread around the diagonal line and follow the direction of the diagonal line. This distribution pattern indicates that the residuals are normally distributed, so the regression model meets the assumption of normality and is suitable for further analysis.

Multicollinearity

The multicollinearity test aims to determine whether a strong correlation exists between independent (dependent) variables in the regression model. A good regression model should not show any correlation between independent variables. Multicollinearity detection can be concluded if the *Variance Inflation Factor* (VIF) value is <10 and the tolerance value is >0.1, indicating no symptoms of multicollinearity. The results of the multicollinearity test in this study can be seen in the following table:

Table 2. Multicollinearity Test Results

Coefficients ^a								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	839,464	236,036		3,557	.001		
	Premium	.000	.000	.869	8,357	.000	.809	1,235
	Work experience	36,861	7,990	.564	4,613	.000	.587	1,705
	Age	- 17,848	8,341	-.327	- 2,140	.041	.375	2,668
	Number of Dependents	37,308	37,717	.136	.989	.330	.461	2,169
a. Dependent Variable: Productivity Power Work								

Based on Table 2, the results of the multicollinearity test indicate that all independent variables do not experience symptoms of multicollinearity. This is indicated by the *Variance Inflation Factor* (VIF) values for the Premium (1.235), Work Experience (1.705), Age (2.668), and Number of Dependents (2.169) variables, all of which are less than 10. In addition, the *Tolerance values* for each variable are 0.809; 0.587; 0.375; and 0.461, all of which are greater than 0.10. Thus, it can be concluded that the regression model has met the multicollinearity assumptions and is therefore suitable for further analysis.

Heteroscedasticity

This heteroscedasticity test is performed using a scatter plot. If the pattern is regular, heteroscedasticity is declared. Conversely, if the pattern is irregular and the points are scattered irregularly, heteroscedasticity is declared absent. The results of the heteroscedasticity test using a *scatter plot* are shown in the following figure:

Table 3. Heteroscedasticity Test Results

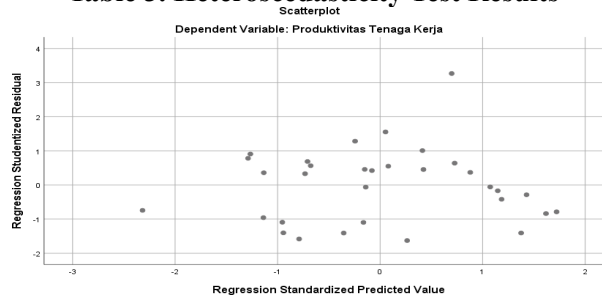


Figure 3. Heteroscedasticity Test Results

Based on the results of the heteroscedasticity test using a scatterplot, it can be seen that the residual points are randomly distributed above and below zero on the Y-axis and do not form a specific pattern. This distribution pattern indicates that the residual variance is constant at each prediction level. Therefore, it can be concluded that the regression model does not experience heteroscedasticity, thus fulfilling one of the classical assumptions in regression analysis.

MULTIPLE LINEAR REGRESSION ANALYSIS

Multiple linear regression analysis was used to determine the influence of the Premium (X1), Work Experience (X2), Age (X3), and Number of Dependents (X4) variables on Labor Productivity (Y) and to measure the magnitude of the influence of each independent variable on the dependent variable.

Table 3. Results of Multiple Linear Regression Analysis

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	839,464	236,036		3,557	.001
	Premium	.000	.000	.869	8,357	.000
	Work experience	36,861	7,990	.564	4,613	.000
	Age	- 17,848	8,341	-.327	- 2,140	.041
	Number of Dependents	37,308	37,717	.136	.989	.330

a. Dependent Variable: Productivity Power Work

Based on the results of the multiple linear regression analysis, a constant value of 839.464 was obtained. Meanwhile, the regression coefficient value for the Premium (X₁) variable was 0.000, Work Experience (X₂) was 36.861, Age (X₃) was -17.848, and Number of Dependents (X₄) was 37.308. Thus, the multiple linear regression equation formed is:

$$Y = 839.464 + 0.000X_1 + 36.861X_2 - 17.848X_3 + 37.308X_4$$

The equation shows that the constant value of 839.464 indicates that the productivity of harvesting labor is estimated at 839.464 kg if the Premium, Work Experience, Age, and Number of Dependents variables are in a constant condition or have a value of zero. The positive Premium regression coefficient (X₁) indicates that an increase in the premium tends to increase labor productivity, although the magnitude of the coefficient appears very small due to the difference in the measurement scale in rupiah units.

The regression coefficient of Work Experience (X₂) of 36.861 indicates that every additional year of work experience will increase labor productivity by 36.861 kg assuming other variables remain constant. Conversely, the regression coefficient of Age (X₃) which is negative at -17.848 indicates that every one-year increase in age will decrease labor productivity by 17.848 kg, assuming other variables remain constant. Meanwhile, the regression coefficient of Number of Dependents (X₄) of 37.308 indicates a positive relationship, which means that every additional dependent tends to increase labor productivity by 37.308 kg.

Based on the results of hypothesis testing, the Premium and Work Experience variables are proven to have a positive and significant effect on the productivity of oil palm harvesters. The Age variable has a negative and significant effect on labor productivity. The Number of Dependents variable has a positive direction of influence, but does not have a significant effect because it has a significance value of 0.330 which is greater than the significance level of 0.05. Thus, the productivity of oil palm harvesters at PT Perkebunan Nusantara IV Regional II Kebun Bah Birung Ulu is more influenced by premium factors, work experience, and age than the number of family dependents.

HYPOTHESIS TESTING

Partial Test (T-Test)

Multiple linear regression analysis is used to analyze the influence of the variables Premium (X_1), Work Experience (X_2), Age (X_3), and Number of Dependents (X_4) on Labor Productivity (Y), as well as to determine the direction and magnitude of the influence of each independent variable on the dependent variable.

Table 4. Partial Test Results (t-Test)

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	839,464	236,036		3,557	.001
	Premium	.000	.000	.869	8,357	.000
	Work experience	36,861	7,990	.564	4,613	.000
	Age	- 17,848	8,341	-.327	- 2,140	.041
	Number of Dependents	37,308	37,717	.136	.989	.330

a. Dependent Variable: Productivity Power Work

The discussion of each variable is as follows.

a. The Effect of Premiums (X_1) on Labor Productivity (Y)

Based on the results of the partial test (t-test), the calculated t-value was 8.357, which was greater than the t-table of 2.042, with a significance value of 0.000, which was less than 0.05. This indicates that the Premium variable (X_1) partially has a positive and significant effect on the Labor Productivity (Y) of oil palm harvesters at PT. Perkebunan Nusantara IV Regional II Kebun Bah Birung Ulu. The results of this study indicate that the greater the premium received by the workforce, the higher the work productivity produced. The premium is a form of incentive given by the company for achieving certain work targets so that it can encourage the workforce to work harder and increase their harvest yields. The additional income through the premium motivates the workforce to improve work performance and efficiency in the field.

b. The Effect of Work Experience (X_2) on Labor Productivity (Y)

Based on the results of the partial test (t-test), the calculated t-value was 4.613, which was greater than the t-table of 2.042, with a significance value of 0.000, which was less than 0.05. This indicates that partially the Work Experience variable (X_2) has a positive and significant effect on the Labor Productivity (Y) of oil palm harvesters at PT. Perkebunan Nusantara IV Regional II Kebun Bah Birung Ulu. Longer work experience will improve the ability, skills, and accuracy of the workforce in carrying out harvesting activities. Experienced workers generally have a better understanding of good harvesting techniques, the use of effective harvesting tools, and are able to manage work time more efficiently. Thus, work experience is an important capital that can increase labor productivity in achieving the harvest targets set by the company.

c. The Effect of Age (X_3) on Labor Productivity (Y)

Based on the results of the partial test (t-test), the t-count value was obtained at -2.140 with a significance value of 0.041 which is smaller than 0.05. This indicates that partially the Age variable (X_3) has a significant effect on Labor Productivity (Y) of oil palm harvesters at PT. Perkebunan Nusantara IV Regional II Kebun Bah Birung Ulu. The negative regression coefficient value of -17.848 indicates that the

relationship between age and labor productivity is negative. This means that as the age of the workforce increases, work productivity tends to decrease. This condition is caused by the work of oil palm harvesting requiring high physical strength, stamina, and work endurance. As age increases, the physical abilities of the workforce generally decrease so that it can affect the ability to achieve optimal harvest targets.

d. The Effect of the Number of Dependents (X_4) on Labor Productivity (Y)

Based on the results of the partial test (t-test), the calculated t-value was 0.989, smaller than the t-table of 2.042, with a significance value of 0.330, greater than 0.05. This indicates that partially the variable Number of Dependents (X_4) does not have a significant effect on Labor Productivity (Y) of oil palm harvesters at PT. Perkebunan Nusantara IV Regional II Kebun Bah Birung Ulu. The results of this study indicate that the number of family dependents is not the main factor determining the level of labor productivity. Although workers with more dependents tend to have greater economic needs, this condition does not directly increase work productivity. Labor productivity is more influenced by factors related to work ability, experience, physical condition, and incentives provided by the company. Therefore, the number of family dependents is not proven to have a significant effect on the productivity of oil palm harvesters.

Simultaneous Significance Test (F-Test)

The simultaneous test (F Test) aims to determine whether the Premium (X_1), Work Experience (X_2), Age (X_3), and Number of Dependents (X_4) variables simultaneously influence Labor Productivity (Y). The decision-making criteria are carried out by comparing the significance value and the calculated F value with F_{table} . If the significance value is <0.05 or calculated $F > F_{table}$, then the independent variables simultaneously have a significant effect on Labor Productivity. Conversely, if the significance value is >0.05 or calculated $F < F_{table}$, then the independent variables simultaneously do not have a significant effect on Labor Productivity.

Table 5. Results of Simultaneous Significance Test (F-Test)

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3587263.466	4	896815.867	21,048	.000_b
	Residual	1278223.105	30	42607.437		
	Total	4865486.571	34			
a. Dependent Variable: Productivity Power Work						
b. Predictors: (Constant), Amount Liability, Premium, Experience Work, Age						

Based on the results of the simultaneous test (F Test), the F count value was obtained at 21.048 which was greater than the F table of 2.68 with a significance value of 0.000 <0.05 . These results indicate that the Premium (X_1), Work Experience (X_2), Age (X_3), and Number of Dependents (X_4) variables together had a significant effect on Labor Productivity (Y) of oil palm harvesters at PT. Perkebunan Nusantara IV Regional II Kebun Bah Birung Ulu. This finding indicates that labor productivity is the result of the interaction of various factors, where premiums act as work incentives, work experience improves skills and efficiency, age affects physical abilities, and the number of dependents can be a driver in meeting family economic needs. Therefore, the combination of these four variables simultaneously is able to explain changes in labor productivity. Thus, although there are variables that partially have no significant effect, simultaneously the variables Premium, Work Experience, Age, and Number of Dependents have a significant effect on the productivity of oil palm harvesters at PT. Perkebunan Nusantara IV Regional II Kebun Bah Birung Ulu.

Coefficient of Determination (R^2)

The coefficient of determination is used to measure the contribution of an independent variable to a dependent variable. The coefficient of determination ranges from 0 to 1, with values closer to 1 indicating that the independent variable is more able to explain the variation in the dependent variable. The results of the coefficient of determination test can be seen in the following table.

Table 6. Coefficient of Determination (R^2)

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.859 ^a	.737	.702	206,416
a. Predictors: (Constant), Amount Liability, Premium, Work Experience, Age				
b. Dependent Variable: Productivity Power Work				

The results of the determination coefficient test show an R^2 value of 0.737, which means that the Premium (X_1), Work Experience (X_2), Age (X_3), and Number of Dependents (X_4) variables are able to explain variations in Labor Productivity (Y) by 73.7%, while the remaining 26.3% is influenced by other factors outside the research model. The Adjusted R Square value of 0.702 indicates that after adjusting for the number of variables and research samples, the four independent variables are still able to explain variations in labor productivity by 70.2%. These results indicate that the regression model used has a strong ability to explain the influence of Premium, Work Experience, Age, and Number of Dependents on Labor Productivity of oil palm harvesters.

CONCLUSION

Based on the results of the study, it can be concluded that partially the Premium and Work Experience variables have a positive and significant effect on the productivity of oil palm harvesters, while the Age variable has a negative and significant effect. Meanwhile, the Number of Dependents variable does not have a significant effect on labor productivity. Simultaneously, the Premium, Work Experience, Age, and Number of Dependents variables have a significant effect on the productivity of oil palm harvesters at PT. Perkebunan Nusantara IV Regional II Kebun Bah Birung Ulu. The results of the determination coefficient test show an R^2 value of 0.737, which means that the four variables are able to explain variations in labor productivity by 73.7%, while the remaining 26.3% is influenced by other factors outside the research model.

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