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The Influence of Employee Competency and Work Discipline on Technology Use Effectiveness in Palm Oil Mills

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ABSTRACT

This study aims to analyze the influence of employee competency and work discipline on the effectiveness of palm oil processing technology use at PT ANJ Binanga. The research was conducted from February to April 2026 using a quantitative method with an associative causal approach. The population consisted of employees working in the processing section of the palm oil mill, with a total sample of 53 respondents selected using accidental sampling. Primary data were collected through questionnaires measured using a Likert scale, while the data were analyzed using multiple linear regression with the assistance of SPSS. The results show that employee competency has a positive and significant effect on technology use effectiveness, with a regression coefficient of 0.278 and a significance value of 0.005. Work discipline also has a positive and significant effect, with a regression coefficient of 0.535 and a significance value of 0.000. These findings indicate that work discipline has a stronger influence than employee competency on the effectiveness of technology use. The F-test result shows that employee competency and work discipline simultaneously have a significant effect on technology use effectiveness, with an F-value of 13.052 and a significance value of 0.000. The coefficient of determination indicates that both independent variables explain 34.3% of the variation in technology use effectiveness. Therefore, improving employee competency and strengthening work discipline are important strategies to optimize the use of processing technology in palm oil mills.

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INTRODUCTION

Indonesia is one of the world's largest producers of palm oil, and the palm oil industry plays an important role in supporting national economic growth, employment, and agro-industrial development. Palm oil processing mills are required to operate efficiently in order to produce crude palm oil (CPO) and palm kernel products that meet quality standards. In this context, processing technology has become an essential factor in improving production capacity, operational efficiency, product quality, and workplace safety(Dini Hendriani et al., 2025; Hariyanti & Syahza, 2024).

Palm oil processing technology is applied in several important stages, including sterilization, threshing, digestion, pressing, clarification, kernel recovery, and machine monitoring(Hidayatno et al., 2025; Sequiño & Avenido, 2015). The use of modern machines, automatic control systems, digital monitoring, and integrated production systems allows palm oil mills to reduce processing time, minimize oil losses, improve consistency of product quality, and support preventive maintenance. However, the effectiveness of technology use cannot be determined only by the availability of advanced machines. The success of technology implementation also depends on the ability and behavior of the employees who operate and maintain the equipment(Longo et al., 2017, 2019).

Employee competency is one of the main factors that determines whether processing technology can be used effectively. Competency includes knowledge, technical skills, work attitudes, and problem-solving abilities that enable employees to perform their tasks properly (Indiyaningsih, 2019; Syam et al., 2023). In palm oil mills, competent employees are expected to understand machine functions, processing parameters, standard operating procedures, quality requirements, and basic troubleshooting. Employees with strong competency are more capable of operating equipment correctly, identifying technical problems, reducing operational errors, and supporting smooth production processes(Dini Hendriani et al., 2025; Evianisa et al., 2021).

In addition to competency, work discipline is also an important factor in supporting the effectiveness of technology use. Work discipline refers to employees' compliance with company rules, working hours, standard operating procedures, occupational safety requirements, and administrative responsibilities(Dieva & Swasti, 2024; Heslina & Syahruni, 2021; Hidayat et al., 2022). In palm oil processing, discipline is highly important because production activities are continuous and closely related to machine performance, process stability, and workplace safety. Employees who are disciplined in following SOPs, using personal protective equipment, reporting abnormal conditions, and recording operational data accurately can help reduce downtime, prevent machine damage, minimize work accidents, and maintain product quality(Al-Dabbagh et al., 2016; Chaedir et al., 2024).

Although technology is increasingly used in palm oil processing, many operational problems still occur due to limited employee readiness. In some cases, technology is available but not used optimally because employees do not fully understand its functions or do not consistently follow operational procedures (Kusjono & Srirezeki, 2025; Purike & Aslan, 2025; Samsifren Siska & Hasyim, 2021). This shows that the effectiveness of technology use is not only a technical issue but also a human resource issue. Therefore, employee competency and work discipline need to be studied together as important factors that influence the successful use of processing technology in palm oil mills(Chaedir et al., 2024; Evianisa et al., 2021).

Previous studies have discussed the relationship between human resources and technology adoption, employee performance, and operational effectiveness. However, many of these studies focus more on technical competency or general employee performance, while work discipline is often not discussed deeply as a key factor in technology use(Afrianda & Takih, 2024; Rustandi, 2025; Sitorus et al., n.d.). In the context of palm oil mills, research that simultaneously examines employee competency and work discipline as predictors of technology-use effectiveness is still limited. This creates a research gap, especially in understanding how technical capability and disciplined work behavior jointly contribute to the effective use of palm oil processing technology(Hizam et al., 2021; Nazief et al., 2025; Wonua et al., 2023).

The novelty of this study lies in its focus on combining employee competency and work discipline as two main independent variables that influence the effectiveness of technology use in palm oil processing(Jaya et al., 2025; Munawaroh et al., 2026). Unlike studies that only emphasize technological facilities or employee competency, this study positions technology-use effectiveness as the result of both employee technical readiness and disciplined compliance with operational procedures(Amri Muammar et al., 2026; Jaya et al., 2025; Malik et al., 2023). By conducting research at PT ANJ Binanga, this study provides empirical evidence on how human resource factors contribute to the successful use of processing technology in a palm oil mill.

Based on the background above, this study aims to analyze the influence of employee competency and work discipline on the effectiveness of palm oil processing technology use at PT ANJ Binanga. Specifically, this study examines the partial effect of employee competency on technology-use effectiveness, the partial effect of work discipline on technology-use effectiveness, and the simultaneous effect of employee competency and work discipline on technology-use effectiveness.

The hypotheses of this study are formulated as follows:

H1: Employee competency has a positive and significant effect on the effectiveness of technology use in palm oil processing.

H2: Work discipline has a positive and significant effect on the effectiveness of technology use in palm oil processing.

H3: Employee competency and work discipline simultaneously have a positive and significant effect on the effectiveness of technology use in palm oil processing.

METHOD

Research Design

This study used a quantitative research method with an associative causal approach. This approach was selected because the study aimed to examine the influence of two independent variables, namely employee competency and work discipline, on one dependent variable, namely the effectiveness of technology use in palm oil processing(Sugiyono, 2022). The quantitative method was considered appropriate because the data were collected in numerical form through a structured questionnaire and analyzed statistically using multiple linear regression(Sarstedt et al., 2021). The research was conducted at PT ANJ Binanga, with a focus on employees involved in palm oil processing activities. The study examined how human resource factors, particularly competency and work discipline, contribute to the effectiveness of technology use in the palm oil mill.

Population and Sampling

The population of this study consisted of 115 employees of PT ANJ Binanga who were involved in palm oil processing activities. Because the population size was known, the sample size was determined using the Slovin formula with a 10% margin of error.

The Slovin formula is as follows:

$n = N / 1 + N(e^2)$

Where:

n = sample size

N = population size

e = margin of error

Based on the formula:

$n = 115 / 1 + 115(0.10^2)$

$n = 115 / 1 + 1.15$

$n = 115 / 2.15$

$n = 53.48$

Thus, the sample size was rounded to 53 respondents.

This study used non-probability sampling with an accidental sampling technique. Respondents were selected based on their availability and willingness to complete the questionnaire during the research period. Therefore, this study consistently uses the term accidental sampling, not random sampling, because the respondents were not selected through a probability-based random procedure.

Data Collection Techniques

The main data collection technique used in this study was a questionnaire. The questionnaire was distributed to employees who worked in the processing unit of PT ANJ Binanga. The questionnaire was designed using a five-point Likert scale to measure respondents' perceptions of employee competency, work discipline, and technology-use effectiveness.

The Likert scale used in this study was as follows:

5 = Strongly Agree

4 = Agree

3 = Less Agree

2 = Disagree

1 = Strongly Disagree

In addition to questionnaires, interviews, observation, and documentation were also used as supporting data collection techniques. Interviews were conducted to obtain additional information related to the implementation of technology and employee work behavior in the mill. Observation was used to support the researcher's understanding of workplace conditions, operational activities, and the use of processing technology. Documentation was used to collect supporting information related to company records, research location, and operational context. However, the main data analyzed statistically in this study were obtained from the questionnaire.

Variables and Measurement

This study consisted of three main variables: employee competency as the first independent variable, work discipline as the second independent variable, and effectiveness of technology use as the dependent variable. Employee competency (X1) refers to the knowledge, skills, and problem-solving ability of employees in operating and understanding palm oil processing technology. The indicators of employee competency include technical knowledge, operational skills, and problem-solving ability.

Work discipline (X2) refers to employee compliance with working time, standard operating procedures, safety requirements, and administrative responsibilities. The indicators of work discipline include time discipline, procedural and safety discipline, and administrative discipline.

Effectiveness of technology use (Y) refers to the extent to which palm oil processing technology supports operational efficiency, process reliability, product quality, occupational safety, and equipment maintenance. The indicators of technology-use effectiveness include operational efficiency, process reliability and product quality, workplace safety, and equipment maintenance.

Score Category Interpretation

The questionnaire responses were interpreted using score categories based on the mean score of each variable. Since the questionnaire used a five-point Likert scale, the category interval was determined using the following formula:

Interval = (Highest score - Lowest score) / Number of categories
Interval = (5 - 1) / 5
Interval = 0.80

Based on this calculation, the score categories were interpreted as follows:

Table 1. Score Categories

Mean Score Range	Category
1.00–1.80	Very Low / Very Poor
1.81–2.60	Low / Poor
2.61–3.40	Moderate
3.41–4.20	High / Good
4.21–5.00	Very High / Very Good

These categories were used to interpret the descriptive results of employee competency, work discipline, and effectiveness of technology use.

Data Quality Test

Before conducting regression analysis, the research instrument was tested using validity and reliability tests. The validity test was conducted by comparing the calculated correlation value of each item with the r-table value at a significance level of 5%. An item was considered valid if the calculated r-value was higher than the r-table value. The reliability test was conducted using Cronbach's Alpha. A variable was considered reliable if the Cronbach's Alpha value was greater than 0.70. The reliability test was used to ensure that the questionnaire items consistently measured the intended variables.

Classical Assumption Tests

Classical assumption tests were conducted before applying multiple linear regression. These tests were used to ensure that the regression model met the basic statistical requirements. The normality test was conducted using the Kolmogorov-Smirnov test. The data were considered normally distributed if the significance value was greater than 0.05. The multicollinearity test was conducted by examining the Tolerance and Variance Inflation Factor (VIF) values. Multicollinearity was considered absent if the Tolerance value was greater than 0.10 and the VIF value was lower than 10. The heteroscedasticity test was conducted using the Glejser test. Heteroscedasticity was considered absent if the significance value of each independent variable was greater than 0.05.

Data Analysis Technique

The data were analyzed using multiple linear regression with the assistance of SPSS. Multiple linear regression was used to examine the influence of employee competency and work discipline on the effectiveness of technology use.

The regression model used in this study was:

$Y = \alpha + \beta 1X1 + \beta 2X2 + e$

Where:
Y = Effectiveness of technology use
α = Constant
β1 = Regression coefficient of employee competency
β2 = Regression coefficient of work discipline
X1 = Employee competency
X2 = Work discipline
e = Error term

The partial effect of each independent variable was tested using the t-test. The t-test was used to determine whether employee competency and work discipline individually had a significant effect on the effectiveness of technology use. A variable was considered significant if the significance value was lower than 0.05. The simultaneous effect was tested using the F-test. The F-test was used to determine whether employee competency and work discipline jointly had a significant effect on the effectiveness of technology use. The model was considered significant if the significance value was lower than 0.05.

The coefficient of determination (R^2) was used to determine the proportion of variation in the effectiveness of technology use that could be explained by employee competency and work discipline. Based on the regression output, the R^2 value was 0.343, which means that employee competency and work discipline explained 34.3% of the variation in technology-use effectiveness. The remaining 65.7% was explained by other factors outside this research model, such as leadership, work environment, employee motivation, training intensity, maintenance system, and organizational culture.

RESULTS AND DISCUSSION

Respondent Characteristics

This study involved 53 respondents who worked in the operational and technical units of the palm oil mill at PT ANJ Binanga. The respondents consisted of employees who were directly involved in palm oil processing activities, including machine operation, production supervision, and technical support. Respondent characteristics were classified based on gender, age, education level, position, and length of service.

Table 2. Respondent Characteristics

Characteristic	Category	Frequency	Percentage (%)
Gender	Male	53	100.00
	Female	0	0.00
	Total	**53**	**100.00**
Age	21–25 years	13	24.53
	26–30 years	19	35.85
	31–35 years	12	22.64
	36–40 years	9	16.98
	Total	**53**	**100.00**
Education Level	Senior High School/Vocational School	37	69.81
	Diploma	7	13.21
	Bachelor's Degree	9	16.98
	Total	**53**	**100.00**
Position	Operator	38	71.70
	Assistant	15	28.30
	Total	**53**	**100.00**
Length of Service	Less than 5 years	24	45.28
	5–10 years	17	32.08
	More than 10 years	12	22.64

Characteristic	Category	Frequency	Percentage (%)
Total		**53**	**100.00**

Based on Table 2, all respondents were male, indicating that the operational and technical work in the palm oil mill was dominated by male employees. Most respondents were aged 26–30 years, representing 35.85% of the total sample. This shows that the majority of employees were in a productive age group. In terms of education, most respondents were graduates of senior high school or vocational school, accounting for 69.81%. This indicates that operational positions in the palm oil mill were mostly filled by employees with secondary-level technical or vocational education.

In terms of job position, 71.70% of respondents were operators, while 28.30% were assistants. This composition is relevant to the research objective because operators are directly involved in the use of processing technology. Regarding length of service, 45.28% of respondents had worked for less than five years, while 22.64% had worked for more than ten years. This variation shows that the sample included both relatively new employees and more experienced employees.

Descriptive Results of Research Variables

The descriptive analysis was conducted to determine the general tendency of respondents' answers for each research variable. Since the questionnaire used a five-point Likert scale, the interpretation of descriptive results should be based on the average score per item rather than only the total mean score. Therefore, the total mean score of each variable was divided by the number of questionnaire items in each variable.

Table 3. Descriptive Statistics of Research Variables

Variable	N	Minimum	Maximum	Total Mean Score	Number of Items	Mean Score per Item	Std. Deviation	Category
Employee Competency (X1)	53	43	55	53.21	11	4.84	2.983	Very High
Work Discipline (X2)	53	33	43	37.47	9	4.16	2.493	High
Technology-Use Effectiveness (Y)	53	34	45	39.06	9	4.34	2.405	Very High

Based on Table 3, employee competency obtained a total mean score of 53.21. Since this variable consisted of 11 questionnaire items, the mean score per item was 4.84. This value falls within the range of 4.21–5.00, indicating that employee competency was in the very high category. This shows that most respondents had strong technical knowledge, operational skills, and problem-solving ability in using palm oil processing technology.

Work discipline obtained a total mean score of 37.47. Since this variable consisted of 9 questionnaire items, the mean score per item was 4.16. This value falls within the range of 3.41–4.20, indicating that work discipline was in the high category. This means that respondents generally demonstrated good discipline in punctuality, compliance with standard operating procedures, use of personal protective equipment, reporting, and administrative responsibilities.

Technology-use effectiveness obtained a total mean score of 39.06. Since this variable consisted of 9 questionnaire items, the mean score per item was 4.34. This value falls within the range of 4.21–5.00, indicating that technology-use effectiveness was in the very high category. This shows that the technology used in the palm oil mill was perceived as highly effective in supporting operational efficiency, process reliability, product quality, occupational safety, and equipment maintenance. This revision ensures that the descriptive interpretation is consistent with the five-point Likert scale category range used in the study.

Validity Test Results

The validity test was conducted to determine whether each questionnaire item was able to measure the intended variable. The validity test was carried out by comparing the r-count value of each item with the r-table value. With 53 respondents and a significance level of 5%, the r-table value was 0.273. An item was considered valid if the r-count value was greater than the r-table value.

Table 4. Validity Test Results

Variable	Item Code	r-count	r-table	Status
Employee Competency (X1)	X1_1	0.517	0.273	Valid

Employee Competency (X1)	X1_2	0.809	0.273	Valid
Employee Competency (X1)	X1_3	0.654	0.273	Valid
Employee Competency (X1)	X1_4	0.713	0.273	Valid
Employee Competency (X1)	X1_5	0.725	0.273	Valid
Employee Competency (X1)	X1_6	0.869	0.273	Valid
Employee Competency (X1)	X1_7	0.782	0.273	Valid
Employee Competency (X1)	X1_8	0.763	0.273	Valid
Employee Competency (X1)	X1_9	0.650	0.273	Valid
Employee Competency (X1)	X1_10	0.760	0.273	Valid
Employee Competency (X1)	X1_11	0.286	0.273	Valid
Work Discipline (X2)	X2_1	0.738	0.273	Valid
Work Discipline (X2)	X2_2	0.641	0.273	Valid
Work Discipline (X2)	X2_3	0.390	0.273	Valid
Work Discipline (X2)	X2_4	0.304	0.273	Valid
Work Discipline (X2)	X2_5	0.738	0.273	Valid
Work Discipline (X2)	X2_6	0.641	0.273	Valid
Work Discipline (X2)	X2_7	0.390	0.273	Valid
Work Discipline (X2)	X2_8	0.304	0.273	Valid
Work Discipline (X2)	X2_9	0.738	0.273	Valid
Technology-Use Effectiveness (Y)	Y_1	0.699	0.273	Valid
Technology-Use Effectiveness (Y)	Y_2	0.507	0.273	Valid
Technology-Use Effectiveness (Y)	Y_3	0.399	0.273	Valid
Technology-Use Effectiveness (Y)	Y_4	0.495	0.273	Valid
Technology-Use Effectiveness (Y)	Y_5	0.699	0.273	Valid
Technology-Use Effectiveness (Y)	Y_6	0.507	0.273	Valid
Technology-Use Effectiveness (Y)	Y_7	0.399	0.273	Valid
Technology-Use Effectiveness (Y)	Y_8	0.495	0.273	Valid
Technology-Use Effectiveness (Y)	Y_9	0.699	0.273	Valid

Based on Table 4, all questionnaire items had r-count values greater than the r-table value of 0.273. Therefore, all items used to measure employee competency, work discipline, and technology-use effectiveness were declared valid. This means that each item was empirically appropriate for measuring the intended research variable.

Reliability Test Results

The reliability test was conducted using Cronbach's Alpha to determine the consistency of the research instrument. A variable was considered reliable if the Cronbach's Alpha value was greater than 0.70.

Table 5. Reliability Test Results

Variable	Cronbach's Alpha	Threshold	Status
Employee Competency (X1)	0.886	0.70	Reliable
Work Discipline (X2)	0.733	0.70	Reliable
Technology-Use Effectiveness (Y)	0.706	0.70	Reliable

Based on Table 5, all variables had Cronbach's Alpha values greater than 0.70. Employee competency had a Cronbach's Alpha value of 0.886, work discipline had a value of 0.733, and technology-use effectiveness had a value of 0.706. These results indicate that all questionnaire instruments were reliable and consistently measured the intended variables.

Classical Assumption Test Results

Classical assumption tests were conducted before applying multiple linear regression. These tests included normality, multicollinearity, and heteroscedasticity tests.

Table 6. Classical Assumption Test Results

Assumption Test	Indicator	Obtained Value	Threshold	Conclusion
Normality Test	Kolmogorov-Smirnov Test Statistic	0.081	-	Residual data tested
Normality Test	Asymp. Sig.	0.200	> 0.05	Normally distributed
Multicollinearity Test	Tolerance for Employee Competency (X1)	0.953	> 0.10	No multicollinearity
Multicollinearity Test	VIF for Employee Competency (X1)	1.05	< 10	No multicollinearity
Multicollinearity Test	Tolerance for Work Discipline (X2)	0.953	> 0.10	No multicollinearity
Multicollinearity Test	VIF for Work Discipline (X2)	1.05	< 10	No multicollinearity
Heteroscedasticity Test	Glejser Sig. for Employee Competency (X1)	0.331	> 0.05	No heteroscedasticity
Heteroscedasticity Test	Glejser Sig. for Work Discipline (X2)	0.881	> 0.05	No heteroscedasticity

Based on Table 6, the normality test produced an Asymp. Sig. value of 0.200, which was greater than 0.05. This indicates that the residual data were normally distributed. The multicollinearity test showed that employee competency and work discipline each had a Tolerance value of 0.953 and a VIF value of 1.05. Since the Tolerance values were greater than 0.10 and the VIF values were lower than 10, it can be concluded that there was no multicollinearity between the independent variables.

The heteroscedasticity test using the Glejser method showed that the significance value for employee competency was 0.331 and the significance value for work discipline was 0.881. Both values were greater than 0.05, indicating that the regression model did not suffer from heteroscedasticity. Therefore, the data met the classical assumption requirements and were appropriate for multiple linear regression analysis.

Model Summary and F-Test Results

The model summary and F-test results are presented to show the explanatory power and overall significance of the regression model.

Table 7. Model Summary and F-Test Results

R	R Square	Adjusted R Square	Std. Error of Estimate	F-value	Sig.
0.586	0.343	0.317	1.988	13.052	0.000

The model summary shows that the R value was 0.586, indicating a moderate relationship between employee competency, work discipline, and technology-use effectiveness. The coefficient of determination, or R Square, was 0.343. This means that employee competency and work discipline explained 34.3% of the variation in technology-use effectiveness. Meanwhile, the remaining 65.7% was explained by other factors outside the research model, such as leadership, work environment, employee motivation, training intensity, maintenance system, organizational culture, organizational support, technology readiness, and safety culture.

The Adjusted R Square value was 0.317, indicating that after adjustment for the number of independent variables and sample size, the model still explained 31.7% of the variation in technology-use effectiveness. The standard error of estimate was 1.988, indicating the average prediction error in the regression model. The F-test result showed an F-value of 13.052 with a significance value of 0.000. Since the significance value was lower than 0.05, employee competency and work discipline simultaneously had a significant effect on technology-use effectiveness.

Multiple Linear Regression Results

Multiple linear regression analysis was used to examine the influence of employee competency and work discipline on technology-use effectiveness.

Table 8. Multiple Linear Regression Results

Variable	B	Std. Error	Beta	t-value	Sig.
Constant	4.237	7.267	-	0.583	0.562

Employee Competency (X1)	0.278	0.095	0.344	2.931	0.005
Work Discipline (X2)	0.535	0.113	0.555	4.723	0.000

Based on Table 8, the regression equation is as follows:
Y = 4.237 + 0.278X1 + 0.535X2 + e

The constant value of 4.237 indicates that if employee competency and work discipline are assumed to be constant or equal to zero, the value of technology-use effectiveness is 4.237. The regression coefficient of employee competency is 0.278. This means that every one-unit increase in employee competency will increase technology-use effectiveness by 0.278, assuming that work discipline remains constant. The significance value of employee competency is 0.005, which is lower than 0.05. Therefore, employee competency has a positive and significant effect on technology-use effectiveness.

The regression coefficient of work discipline is 0.535. This means that every one-unit increase in work discipline will increase technology-use effectiveness by 0.535, assuming that employee competency remains constant. The significance value of work discipline is 0.000, which is lower than 0.05. Therefore, work discipline has a positive and significant effect on technology-use effectiveness. The standardized beta value of work discipline is 0.555, which is higher than the standardized beta value of employee competency at 0.344. This indicates that work discipline has a stronger contribution to technology-use effectiveness than employee competency.

Partial Hypothesis Test Results

The t-test was used to examine the partial effect of each independent variable on technology-use effectiveness.

Table 9. Partial Hypothesis Test Results

Hypothesis	Variable	t-value	Sig.	Decision	Conclusion
H1	Employee Competency (X1)	2.931	0.005	Accepted	Positive and significant effect
H2	Work Discipline (X2)	4.723	0.000	Accepted	Positive and significant effect

Based on Table 9, employee competency had a t-value of 2.931 and a significance value of 0.005. Since the significance value was lower than 0.05, H1 was accepted. This means that employee competency has a positive and significant effect on technology-use effectiveness.

Work discipline had a t-value of 4.723 and a significance value of 0.000. Since the significance value was lower than 0.05, H2 was accepted. This means that work discipline has a positive and significant effect on technology-use effectiveness.

Simultaneous Hypothesis Test Results

The F-test was used to examine whether employee competency and work discipline simultaneously influence technology-use effectiveness.

Table 10. Simultaneous Hypothesis Test Results

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	103.186	2	51.593	13.052	0.000
Residual	197.644	50	3.953	-	-
Total	300.830	52	-	-	-

Based on Table 10, the F-test result showed an F-value of 13.052 with a significance value of 0.000. Since the significance value was lower than 0.05, H3 was accepted. This means that employee competency and work discipline simultaneously have a positive and significant effect on technology-use effectiveness. This finding indicates that technology-use effectiveness in palm oil processing is influenced not only by employee competency but also by disciplined work behavior. Competent employees are able to understand and operate technology properly, while disciplined employees ensure that technology is used consistently according to standard operating procedures, safety requirements, and operational rules.

Discussion

The results of this study show that employee competency has a positive and significant effect on technology-use effectiveness. The regression coefficient of employee competency was 0.278, with a significance value of 0.005. This indicates that employees with better technical knowledge, operational skills, and problem-solving ability are more capable of using palm oil processing

technology effectively(Gulo et al., 2025; Wonua et al., 2023). In the context of palm oil mills, employee competency is important because workers must understand machine operation, processing parameters, quality standards, and basic troubleshooting.

The results also show that work discipline has a positive and significant effect on technology-use effectiveness. The regression coefficient of work discipline was 0.535, with a significance value of 0.000. This means that employees who are disciplined in following work schedules, complying with SOPs, using personal protective equipment, reporting abnormal conditions, and completing operational records are more likely to support effective technology use (Ikhsan & Suwarsi, 2026; Samsifren Siska & Hasyim, 2021).

An important finding of this study is that work discipline has a stronger influence than employee competency. This can be seen from the standardized beta value of work discipline, which was 0.555, while the standardized beta value of employee competency was 0.344. In palm oil mill operations, this finding is reasonable because production activities are highly procedural and depend on strict compliance with SOPs, safety rules, fixed processing times, reporting accuracy, and continuous monitoring(Hizam et al., 2021). Even when employees have adequate competency, technology may not function effectively if they do not consistently follow operational procedures.

The simultaneous test result shows that employee competency and work discipline jointly have a significant effect on technology-use effectiveness. The F-value was 13.052 with a significance value of 0.000. This confirms that the effectiveness of technology use in palm oil processing is shaped by the combination of technical ability and disciplined work behavior. However, the coefficient of determination shows that the R Square value was 0.343. This means that employee competency and work discipline explained only 34.3% of the variation in technology-use effectiveness, while the remaining 65.7% was explained by other factors outside the model. Therefore, although both variables are significant, the explanatory power of the model is moderate.

Other factors that may influence technology-use effectiveness include leadership, work environment, employee motivation, training intensity, maintenance system, organizational culture, organizational support, technology readiness, safety culture, and supervision quality. For example, employees may have good competency and discipline, but technology-use effectiveness may still be limited if machine maintenance is not optimal, spare parts are unavailable, training is not conducted regularly, or operational monitoring is weak. Therefore, the findings of this study should be interpreted within the specific context of PT ANJ Binanga. Future studies are recommended to include additional variables and involve larger samples or several palm oil mills so that the findings can be generalized more broadly.

CONCLUSIONS

Based on the results of the study, it can be concluded that employee competency has a positive and significant effect on the effectiveness of palm oil processing technology use at PT ANJ Binanga. This is shown by the regression coefficient of 0.278 and a significance value of 0.005. Employees with better technical knowledge, operational skills, and problem-solving abilities are more capable of supporting effective technology use in palm oil processing. Work discipline also has a positive and significant effect on technology-use effectiveness. This is shown by the regression coefficient of 0.535 and a significance value of 0.000. Employees who comply with working schedules, standard operating procedures, safety rules, reporting procedures, and administrative responsibilities are more likely to support the proper and consistent use of processing technology.

Employee competency and work discipline simultaneously have a significant effect on technology-use effectiveness. This is shown by the F-value of 13.052 and a significance value of 0.000. The R Square value of 0.343 indicates that employee competency and work discipline explain 34.3% of the variation in technology-use effectiveness, while the remaining 65.7% is influenced by other factors outside the model. Among the two independent variables, work discipline has the stronger influence, as indicated by its standardized beta value of 0.555, compared with employee competency at 0.344. This shows that disciplined compliance with SOPs, safety standards, operational routines, reporting, and monitoring is highly important in palm oil mill operations. This study has limitations. The research was conducted only at PT ANJ Binanga with a sample of 53 respondents, so the findings should not be overgeneralized to all palm oil mills. Future studies are recommended to involve larger

samples, multiple palm oil mills, and additional variables such as leadership, training, maintenance culture, organizational support, motivation, work environment, technology readiness, and safety culture.

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AUTHOR CONTRIBUTION STATEMENT

ISP contributed to the research design, data collection, data analysis, and manuscript preparation. F provided academic supervision, methodological guidance, and manuscript review. YAS contributed to research supervision, content evaluation, and final manuscript revision.

AI DISCLOSURE STATEMENT

The author used ChatGPT during the preparation of this work for language editing, academic writing improvement, and manuscript structure refinement. After using the tool, the author thoroughly reviewed and edited the content as needed and takes full responsibility for the content of the publication.

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