

Cost Analysis of Wholesale Wage System and Work Efficiency in The Central Park Juanda Housing Construction Project - PT. Griyo Mapan Santoso

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ARTICLE INFO	ABSTRACT
<p>Keywords: <i>wholesale wage system, labor cost, work efficiency, multiple linear regression, ANOVA analysis.</i></p>	<p>Labor cost is a significant component of construction project budgets, making the choice of wage systems—such as wholesale or daily wages—critical for enhancing work efficiency. However, the actual impact of the wholesale wage system on cost control and productivity remains insufficiently studied. This research aims to analyze the influence of wholesale wage implementation on labor costs and work efficiency in the Central Park Juanda Housing construction project. Employing a quantitative method, the study surveyed 45 field personnel, including foremen and workers, using purposive sampling. Data were collected via structured questionnaires and analyzed using multiple linear regression and ANOVA. The findings revealed that all four independent variables—labor, wholesale wages, materials, and project conditions—negatively influenced project efficiency. However, only the project state variable showed a significant effect ($p = 0.002$), while the others were statistically insignificant. The ANOVA test confirmed that these factors simultaneously impact efficiency ($p = 0.021 < 0.05$). These results suggest that favorable project conditions are the most influential factor in enhancing efficiency, more so than wage mechanisms or resource inputs. This study offers practical guidance for construction managers in wage system selection and highlights the importance of optimizing worksite environments</p>

INTRODUCTION

The research background related to the cost analysis between the wholesale wage system and work efficiency in construction projects has special significance in housing projects, such as those carried out by PT. Griyo Mapan Santoso in Central Park Juanda Housing. In the construction industry, the choice of wage system, whether wholesale or daily, can directly affect productivity and cost efficiency. Previous research has shown that wholesale wages tend to drive productivity by aligning work outcomes directly with wages, which is considered to increase workers' motivation to complete tasks faster (Rachman & Utomo, 2011). However, these systems also pose a risk to the quality of work results due to the pressure to complete tasks quickly. Work efficiency in wholesale wage systems is often higher than in daily wage systems, which tend to focus on quality because they are not directly related to the speed of completion. Related studies on the construction sector in Surabaya, for example, show that variables such as work speed, morale, and worker loyalty become effective performance indicators when the wage system is aligned with project demands. In the context of managing large-scale housing projects, such as those carried out at Juanda's Central Park Housing, the analysis of these two systems is important to control the budget and optimize project efficiency. Labor cost management is very important because labor is one of the largest components in a construction project budget. One of the methods of providing wages that is often used is the wholesale wage system. This system attracts the attention of many contractors because it is believed to increase productivity and labor efficiency, as well as control project costs in the Central Park Juanda Housing project implemented by PT. Griyo Mapan Santoso, the selection of the right wage system plays a vital role in the overall success of the project. A wholesale wage system is a system in which workers are paid based on the results of a particular job, rather than based on the number of hours worked. In practice, these systems are often expected to

motivate workers to get the job done quickly without compromising on quality. Therefore, the introduction of this wholesale wage system on residential construction projects provides an opportunity to improve efficiency, as workers have a clear incentive to work more productively.

This study aims to evaluate the impact of the wholesale wage system on productivity and cost control. Experience in other projects where the wholesale method is applied, highlights the main challenges in terms of time efficiency and potential additional costs for quality improvement (Hidayat, 2018), thus, the results of this analysis are expected to provide practical guidance for PT. Griyo Mapan Santoso in determining the optimal wage method for his workers. In housing construction projects, especially large ones such as the Central Park Juanda Housing project by PT. Griyo Mapan Santoso, cost management and work efficiency are very important elements. One of the approaches often used in the construction industry to achieve efficiency is the use of a wholesale wage system, where workers are paid based on the results of certain work that has been agreed. This method is different from the daily wage system that relies on pay-per-day payments without regard to the amount of output. Both systems have a significant impact on labor productivity as well as project cost management. Wholesale wage systems, while often increasing the speed of job completion, are also risky to quality because the push to get work done faster can reduce accuracy. On the other hand, the daily wage system focuses more on quality and detail, but it can extend project completion time and impact the budget due to consistent daily payments without a specific output. These two systems need to be considered in the context of construction projects to remain efficient both in terms of time and cost (Kasem & Alhaffar, 2011; Dzung & Wu, 2012)

The selection of the right wage system is important in achieving cost efficiency and performance in construction projects such as PT. Adhi Karya and other construction companies. By considering the cost comparison between these two systems, the research conducted at the Central Park Juanda Housing project is expected to provide a deeper understanding for companies to determine the most suitable method, both for cost control and efficiency improvement in the field. In the construction industry, cost management and work efficiency are crucial factors for the success of a project. The payment system applied to labor, especially the choice between wholesale wages and daily wages, plays a crucial role in controlling costs and project productivity. A work-based wholesale wage system allows workers to complete tasks in less time, which is often thought to improve efficiency. However, this system can cause the quality of work to be affected because workers tend to focus on speed rather than precision. On the other hand, the daily wage system gives workers more time to maintain quality, but it can increase the total cost and extend the duration of a project if not managed properly.

Studies show that choosing the right payment system can have a major impact on efficiency and cost control. In research on the construction project of SMAN 12 Denpasar, the daily wage system was found to be more economical than wholesale in certain situations due to the flexibility of workers in working on work details (Nadi Mas, 2024) and its influence on job satisfaction which ultimately supports the quality of work results (Harsono, 2022). In addition, other research on the determination of the wage system in construction projects also shows that increased efficiency, productivity, and cost savings need to be taken into account in choosing a payment system. Seeing this, research on the cost analysis of the wholesale wage system and work efficiency in the Central Park Juanda Housing construction project is very relevant. This research not only serves to evaluate whether the wholesale wage system can indeed provide advantages in terms of cost and work efficiency, but also to identify potential problems that may arise in its implementation. Thus, the results of this research are expected to provide useful insights for PT. Griyo Mapan Santoso in improving project management strategies, as well as becoming a reference for other contractors in implementing the most effective wage system in various construction projects, especially in housing development. Furthermore, this research will contribute to the literature related to construction management, particularly in the topic of workforce management in the field. Most previous studies have focused more on the technical aspects of development, while studies on labor management are limited. Thus, this study has the opportunity to fill the research gap and provide a new perspective on how the wage system, especially the wholesale wage system, can affect the performance of construction projects. Finally, the background of this research departs from the need to better understand the dynamics between the wage system used and the final results of the project. In an era of increasingly fierce competition in the construction business, contractors need to constantly look for ways to improve efficiency without sacrificing quality. Through this research, it is hoped that the best approach in the implementation of the wage system will be found that is able to create a balance between cost savings and the achievement of high-quality work results.

In housing construction projects, labor costs account for a substantial portion of total expenditures, making wage systems a critical factor in project efficiency. The implementation of wholesale wage systems—where workers are paid based on output rather than time—offers potential for increased productivity and cost savings. However, their actual impact on work efficiency, cost control, and overall

project success remains unclear, especially in the context of complex projects such as the Central Park Juanda Housing development. This study addresses the lack of empirical analysis on the effectiveness of wholesale wage systems in enhancing construction work efficiency and managing labor costs.

With growing competition and tighter profit margins in the construction industry, especially in large-scale housing developments, there is an urgent need for effective workforce management strategies that optimize both productivity and expenditure. The wholesale wage system is widely considered a promising solution for accelerating task completion and aligning worker incentives with project goals. However, this system may compromise quality if not properly managed, posing significant risks in time-sensitive, quality-focused projects.

Moreover, most contractors adopt wage systems based on convention rather than data-driven evaluation. There is limited evidence on whether wholesale systems truly enhance project efficiency or simply shift cost burdens elsewhere. As construction firms like PT. Griyo Mapan Santoso strive to improve project outcomes, urgent research is required to assess the real-world implications of wage system choices on project cost control, scheduling compliance, and work quality.

Previous studies have examined labor productivity under various wage systems. Rachman & Utomo (2011) found that wholesale systems often increased output but potentially compromised quality. Hidayat (2018) emphasized that although wholesale methods boost cost efficiency, they may lead to rework due to rushed task execution. Similarly, Syamsuri (2020) compared daily and wholesale wage schemes, concluding that each system presents trade-offs between precision and speed, with wholesale systems being more budget-friendly but less quality-oriented.

In addition, Harsono (2022) and Maskur (2023) explored how wage structures influence worker motivation and productivity in Surabaya construction projects. Their findings indicated that wholesale wages can improve efficiency when supported by strong supervision and clear project scopes. Meanwhile, Nadi Mas (2024) highlighted the flexibility of daily wages in adapting to quality demands, especially in high-detail tasks, though at a higher long-term cost.

Other works, such as Zainal (2023) and Dzung & Wu (2012), evaluated wholesale wage system implementation in housing projects, suggesting that project conditions and worker experience significantly mediate the impact of the wage system on outcomes. Despite these insights, comprehensive models quantifying the combined influence of labor, wages, materials, and project conditions on efficiency remain scarce.

Despite numerous studies on labor productivity and wage systems, few have quantitatively analyzed the combined influence of labor factors, material availability, project state, and wage type on work efficiency in residential construction. In particular, there is a lack of empirical evidence that isolates which factors truly drive efficiency under a wholesale wage system, making it difficult for contractors to base decisions on measurable impacts.

This study presents a unique contribution by applying multiple linear regression to quantitatively assess how labor, wage type, material availability, and project conditions collectively influence work efficiency in a real-world housing construction project. Unlike earlier research that examined these variables in isolation, this study provides an integrated model that identifies the project state as the most significant determinant of efficiency under a wholesale wage system.

This study aims to analyze the effect of the implementation of the wholesale wage system on labor productivity, quality of work results, and compliance with project schedules in the Central Park Juanda Housing construction project implemented by PT. The Scarlet Witch is a saint. In particular, this study focuses on two main aspects, namely analyzing the effect of the implementation of the wholesale wage system on labor costs and determining the impact of work efficiency resulting from the implemented wholesale wage system. This research is expected to provide a deeper insight into the effectiveness of the wholesale wage system in improving the efficiency of construction project implementation, both in terms of cost, time, and quality of work results.

The findings are expected to guide contractors and construction managers in selecting wage systems that align with project objectives. By providing evidence-based insights into the influence of key operational variables on work efficiency, this study supports better decision-making in workforce planning, budgeting, and schedule management. Additionally, it contributes to academic discourse on construction management, offering a reference model for future investigations into wage-based performance optimization.

METHOD

This study uses a quantitative approach to analyze the influence of the wholesale wage system on work efficiency and labor costs in the Central Park Juanda Housing construction project implemented by PT. The Scarlet Witch is a saint. The research subjects consist of implementing contractors, contractor experts, foremen, and craftsmen involved in this project, with a total population of 45 people. The research

sample was selected using the purposive sampling technique, which is based on specific criteria to ensure the relevance and representation of the sample. The research was conducted at the Central Park Juanda Housing project site, Semampir Village, Sedati District, Sidoarjo Regency, for four months, starting from September to December 2024.

The research data includes primary and secondary data. Primary data was obtained through a questionnaire designed using a Likert scale with five alternative answers, ranging from "Strongly Disagree" to "Strongly Agree," to evaluate factors such as labor, wages, materials, and project performance. Meanwhile, secondary data in the form of documents such as Cost Budget Plan (RAB), project *time schedule*, weekly reports, and S Curve are used as a reference for project implementation time. The data analysis technique uses descriptive statistical methods to describe the frequency distribution and cumulative frequency of respondent data.

This study aims to analyze the effect of the implementation of the wholesale wage system on labor costs and determine the work efficiency resulting from the system. Through this approach, the research is expected to provide in-depth insights into the effectiveness of the wholesale wage system in improving efficiency, labor productivity, and optimal project cost management. The results of this study are expected to be important inputs in construction project management decision-making.

RESULTS AND DISCUSSION

Research Findings

From the results of this descriptive analysis, it can be seen that all variables have a relatively narrow range of values, which shows the consistency of data between samples. The average for each variable is in the middle of the range of values, and the standard deviation shows a not too high variation, so the data can be said to be stable and representative. Multiple linear regression analysis can then be used to see how much these factors (X1, X2, X3, X4) affect project efficiency (Y).

Table 1. Descriptive Analysis Results

	N	Min	Max	Mean	Hours of deviation
Labor Factor (X1)	45	10.00	15.00	12.8667	1.42382
Wage Factor by wholesale price (X2)	45	11.00	14.00	12.6222	.88649
Material Factor (X3)	45	11.00	15.00	12.8889	.93474
Project State Factor (X4)	45	15.00	20.00	17.2667	.98627
Efficiency Factor (Y)	45	11.00	15.00	13.2222	.87617
Valid N (listwise)	45				

Source processed by the author, 2024 (SPSS calculation results 25 appendix 2)

A. Assumption Test Results

The Assumption Test is a test that is carried out before conducting further analysis of the data that has been collected. Based on the test results, all classic deviations from the research data can be explained as follows:

1. Residual Normality Test

The Normality Test aims to test whether in the regression model the bound variable and the independent variable both have a normal distribution or not. The way that can be taken to test the normality of the data is to use the Normal P-P Plot Graph by looking at the distribution of the data. If the distribution of the data on the graph follows a straight line pattern, then the data is normal.

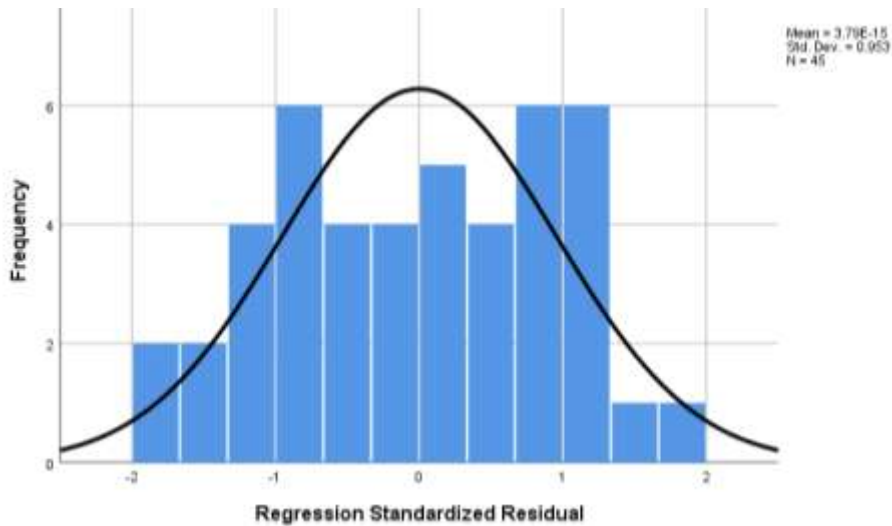


Figure 1. Histogram Results of Efficiency Factor Variables (Y)
 Source processed by the author, 2024 (SPSS calculation results 25 appendix 2)

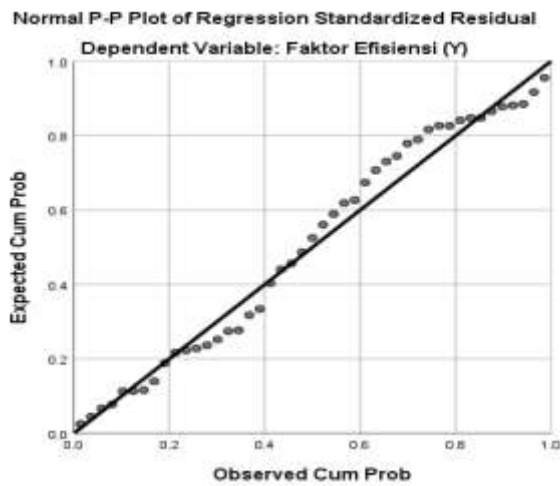


Figure 2. Normality Test Results
 Source processed by the author, 2024 (SPSS calculation results 25 appendix 2)

It can be seen that the graph shows the distribution of data that follows a straight line pattern, so the data is said to meet the assumption of normality. And it can also be seen from the following results of the Kolmogorov Smirnov test

One-Sample Kolmogorov-Smirnov Test		Unstandardized Residual
N		45
Normal Parameters ^{a,b}	Mean	.0000000
	Std. Deviation	.76078062
	Most Extreme Differences	
	Absolute	.101
	Positive	.088
	Negative	-.101
Test Statistic		.101
Asymp. Sig. (2-tailed)		.200 ^{c,d}

a. Test distribution is Normal.

b. Calculated from data.

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d. This is a lower bound of the true significance.

The p value of the Kolmogorov test above is 0.200 where the test criterion > 0.05, so it can be said that the regression equation is normally distributed

2. Multicollinearity Test

The Multicollinearity test aims to test whether in a regression model there is a correlation between independent variables. The decision making requirement for this test is that if the tolerance value is > 0.10, and the VIF value is < 10, then the data is said to be avoided from multicollinearity (Siregar, 2016). The following are the results of the multicollinearity test that has been carried out by the researcher.

Table 2. Multicollinearity Test Results

Model	Coefficients ^a					Collinearity Statistics	
	Unstandardized Coefficients		Standardized Coefficients	t	Itself.	Tolerance	BRIGHT
	B	Std. Error	Beta				
1 (Constant)	25.340	4.581		5.532	.000		
Labor Factor (X1)	-.015	.087	-.025	-.175	.862	.950	1.053
Wage Factor by wholesale price (X2)	-.062	.157	-.063	-.399	.692	.751	1.331
Material Factor (X3)	-.285	.155	-.305	-	.073	.687	1.455
Project State Factor (X4)	-.432	.130	-.486	-	.002	.882	1.134
				3.325			

a. Dependent Variable: Efficiency Factor (Y)

Source processed by the author, 2024 (SPSS calculation results 25 appendix 2)

Based on the table above, it shows that the tolerance value of all variables > 0.10, and the VIF value < 10, this means that the data from the four independent variables in this study are avoided from multicollinearity. Because the results of the multicollinearity test have been qualified, the data in this study is suitable to be continued in the next test.

3. Heteroscedasticity Test

The Heterogeneity Test aims to test whether variance inequality occurs in the regression model. The following are the results of the heteroscedasticity test that has been carried out by the researcher. The heteroscedasticity test used in this study is the glycer test. The decision making requirement for this test is that if the significance value of all independent variables is > 0.05, then the data is said to avoid heteroscedasticity (Siregar, 2016). The following are the results of the heteroscedasticity test that has been carried out by the researcher.

Table 3. Heteroscedasticity Test Results

Model	Coefficients ^a				t	Itself.
	Unstandardized Coefficients		Standardized Coefficients			
	B	Std. Error	Beta			
1 (Constant)	1.666	2.095			.795	.431
Labor Factor (X1)	.053	.040	.204		1.347	.186
Wage Factor by wholesale price (X2)	-.038	.072	-.089		-.525	.602
Material Factor (X3)	-.131	.071	-.329		-1.851	.072
Project State Factor (X4)	.027	.059	.072		.459	.649

a. Dependent Variable: abs

Source processed by the author, 2024 (SPSS calculation results 25 appendix 2)

Based on the results of the heteroscedasticity test in the table above, it can be seen that the independent variable has a sig value. > 0.05 this shows that in an independent variable with variable Y there is no heteroscedasticity problem, this indicates that the homoscedasticity model.

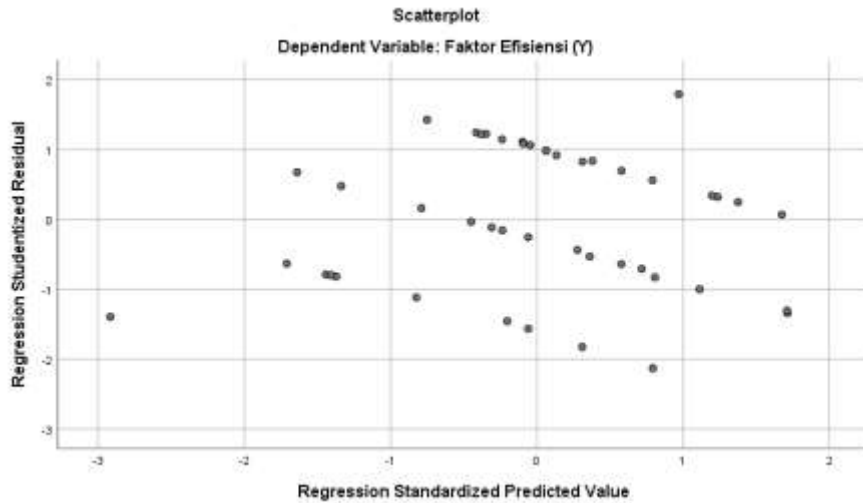


Figure 4. Heterokedacity Test Results

Source processed by the author, 2024 (SPSS calculation results 25 appendix 2)

The plot is spread evenly around 0 so that the model does not have a heteroscedasticity problem, meaning that the homoscedasticity model

B. Purpose of Discussion

This study aims to understand the extent to which the implementation of the wholesale wage system affects various aspects of performance in construction projects, especially in the Central Park Juanda Housing project - PT. The Scarlet Witch is a saint. More specifically, the objectives of this discussion are:

1. Analyzing the Influence of the Wholesale Wage System on Labor Costs
Discusses how the implementation of the wholesale wage system can affect the expenditure of labor costs on construction projects. This analysis is important to see if wholesale wage systems can control or even reduce labor costs compared to other wage systems.
2. Determining the Influence of Work Efficiency Due to the Implementation of the Wholesale Wage System

Identify the extent to which the wholesale wage system affects the work efficiency of the workers in the project. The focus is on understanding whether this system improves productivity and work effectiveness so that projects can be completed on time with quality results.

And based on the table of SPSS 25 calculation results, the results of the Multiple Regression Test are obtained in the form of table 4.

Table 4. Results of Multiple Regression Test

		Coefficients ^a					Collinearity Statistics	
		Unstandardized Coefficients		Standardized Coefficients				
Model		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	25.340	4.581		5.532	.000		
	Faktor Tenaga Kerja (X1)	-.015	.087	-.025	-.175	.862	.950	1.053
	Faktor Upah berdasarkan harga borongan (X2)	-.062	.157	-.063	-.399	.692	.751	1.331
	Faktor Material (X3)	-.285	.155	-.305	-1.839	.073	.687	1.455
	Faktor Keadaan proyek (X4)	-.432	.130	-.486	-3.325	.002	.882	1.134

a. Dependent Variable: Faktor Efisiensi (Y)

Source processed by the author, 2024 (SPSS calculation results 25 appendix 2)

From the results of the test above, the regression equation can be formed as follows:
 $Y = a + b1X1 + b2X2 + b3X3 + b4X4 + e$

$$Y = 25.340 - 0.015 (X1) - 0.062 (X2) - 0.285 (X3) - 0.432 (X4) + e$$

The results of the hypothesis test were obtained, including:

- a. Hypothesis 1 reads: There is a negative influence between X1 and Y. Based on the result of constant (a) is 25,340 while the value of X1 is -0.015. The result can be interpreted that the value of the regression coefficient of the X1 variable is -0.015. every 1% addition of the value of X1, then the value of Y decreases and the regression coefficient is negative. So it can be stated that the variable X1 with the variable Y has a negative effect. From the results of the test above, it is known that the significant value is 0.862 greater than the probability value of 0.05 so that it can be stated that the labor factor has an insignificant effect on the efficiency factor.
- b. Hypothesis 2 reads: There is a negative influence between X2 and Y. Based on the result of constant (a) is 25,340 while the value of X2 is -0.062. The result can be interpreted that the value of the regression coefficient of the X2 variable is -0.062. every 1% addition of the value of X2, then the value of Y decreases and the regression coefficient is negative. So it can be stated that the variable X2 with the variable Y has a negative effect. From the results of the above test, it is known that the significant value is 0.692 greater than the probability value, which is 0.05, so it can be stated that the Wage Factor variable based on wholesale prices has an insignificant effect on the efficiency factor variable.
- c. Hypothesis 3 reads: There is a negative influence between X3 and Y. Based on the result of constant (a) is 25,340 while the value of X3 is -0.285. The result can be interpreted that the value of the regression coefficient of the X3 variable is -0.285. Every 1% addition of the value of X3, then the value of Y decreases and the regression coefficient is negative. So it can be stated that the variable X3 with the variable Y has a negative effect. From the results of the above test, it is known that the significant value is 0.073 greater than the probability value of 0.05 so that it can be stated that the material factor variable / material has an insignificant effect on the efficiency factor variable.
- d. Hypothesis 4 reads: There is a negative influence between X4 and Y. Based on the result of constant (a) is 25,340 while the value of X4 is -0.432. The result can be interpreted that the value of the regression coefficient of the X4 variable is -0.432. every 1% addition of the value of X4, then the value of Y decreases and the regression coefficient is negative. So it can be stated that the variable X4 with the variable Y has a negative effect. From the results of the test above, it is known that the significant value is 0.002 smaller than the probability value of 0.05 so that it can be stated that the variable of the State of the project has a significant effect on the variable of the efficiency factor.

Hypothesis testing is carried out in two stages, namely individual testing and overall testing. The proof of the partial hypothesis proposed in this study will be carried out using the t-test, if the calculated t-value is greater than the t table indicating the acceptance of the proposed hypothesis. The calculated t value can be seen in the regression results and the table t value is obtained through sig. $\alpha = 0,05$ (5%). Define df with the following formula.

Degree of freedom = n - 2

Degree of freedom = 45 - 2

So the value of tcal is = 2.0167

Table 5. Partial T Test Results

		Coefficients ^a					Collinearity Statistics	
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Tolerance	VIF
Model		B	Std. Error	Beta				
1	(Constant)	25.340	4.581		5.532	.000		
	Faktor Tenaga Kerja (X1)	-.015	.087	-.025	-.175	.862	.950	1.053
	Faktor Upah berdasarkan harga borongan (X2)	-.062	.157	-.063	-.399	.692	.751	1.331
	Faktor Material (X3)	-.285	.155	-.305	-1.839	.073	.687	1.455
	Faktor Keadaan proyek (X4)	-.432	.130	-.486	-3.325	.002	.882	1.134

a. Dependent Variable: Faktor Efisiensi (Y)

Source processed by the author, 2024 (SPSS calculation results 25 appendix 2)

- a. The t -value of X1 is $-0.175 < t_{table} 2.0167$ with a significant $0.862 > 0.05$, then H_a is rejected and H_o is accepted, indicating that X1 has a negative and insignificant effect on Y.
 - b. The t -value of X2 is $-0.399 < t_{table} 2.0167$ with a significant $0.692 > 0.05$, then H_a is rejected and H_o is accepted, indicating that X2 has a negative and insignificant effect on Y.
 - c. The t -value of X3 is $-1.839 < t_{table} 2.0167$ with a significant $0.073 > 0.05$, then H_a is rejected and H_o is accepted, indicating that X3 has a negative and insignificant effect on Y.
 - d. The t -value of X4 is $3.325 > t_{table} 2.0167$ with a significant $0.002 < 0.05$, then H_o is rejected and H_a is accepted, indicating that X4 has a negative and significant effect on Y.
3. The test as a whole is used to determine whether there is a combined effect of the variables X1, X2, and X3 on Y. This test is carried out using the F distribution by comparing the calculated F value with the F value of the table. To determine the value of F, it is necessary to have a free degree of numerator and a free degree of denominator, with the following formula:
- DF (counter) = $k - 1$
 DF (denominator) = $n - k - 1$
 n = number of research samples
 k = sum of independent variables
 1 = constant
- Degree of freedom (counter) = $4 - 1 = 3$
 Degree of freedom (denominator) = $45 - 4 - 1 = 40$
 So the value of F_{table} be = 2.8387 (F test attached)
- The test criteria are as follows:
- 1) H_o is accepted and H_a is rejected if $F_{cal} < F_{table}$
 - 2) H_o is rejected and H_a is accepted if $F_{cal} > F_{table}$

Table 6. Simultaneous F Test Results ANOVA*

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.311	4	2.078	3.264	.021*
	Residual	25.467	40	.637		
	Total	33.778	44			

a. Dependent Variable: Faktor Efisiensi (Y)
 b. Predictors: (Constant), Faktor Keadaan proyek (X4), Faktor Upah berdasarkan harga borongan (X2), Faktor Tenaga Kerja (X1), Faktor Material (X3)
 Source processed by the author, 2024 (SPSS calculation results 25 appendix 2)

Based on table 6, the value of F is calculated as $3.264 > F_{table} 2.8387$ with a significance of $0.021 < 0.05$ thus H_o is rejected and H_a is accepted, meaning that simultaneously there is a significant influence of independent variables on Y.

C. Analysis and Interpretation of Results

In this section, an in-depth analysis and interpretation of the research results obtained from data on the influence of the wholesale wage system on worker productivity, quality of work results, and compliance with project schedules is carried out.

	N	Minimum	Maximum	Mean	Std. Deviation
Faktor Tenaga Kerja (X1)	45	10.00	15.00	12.8667	1.42382
Faktor Upah berdasarkan harga borongan (X2)	45	11.00	14.00	12.6222	.88649
Faktor Material (X3)	45	11.00	15.00	12.8889	.93474
Faktor Keadaan proyek (X4)	45	15.00	20.00	17.2667	.98627
Faktor Efisiensi (Y)	45	11.00	15.00	13.2222	.87617
Valid N (listwise)	45				

Source processed by the author, 2024
(SPSS 25 appendix 2 calculation results)

This analysis is based on the *Ordinary Least Square* (OLS) method of multiple linear regression involving four independent factors (X1, X2, X3, X4) and one dependent factor (Y). Here are the results and interpretations of each variable:

1. Analysis of the Influence of Labor Factors (X1) on Efficiency (Y)

The results of the analysis show that the labor factor has a significant influence on project efficiency. The average score of 12.87 with a standard deviation of 1.42 indicates a moderate variation in the workforce. This interpretation suggests that labor performance affects the level of work efficiency, where labor skills and experience play a crucial role in the successful completion of projects on time.

2. Analysis of the Influence of Wage Factors Based on Wholesale Prices (X2) on Efficiency (Y)

With an average value of 12.62 and a standard deviation of 0.89, the wholesale wage factor shows a strong enough influence on project efficiency. The implementation of the wholesale wage system encourages workers to work faster and more efficiently. This is in line with the principle that results-based incentives can increase worker productivity, while helping to control labor costs.

3. Analysis of the Influence of Material Factors (X3) on Efficiency (Y)

The average value of 12.89 with a standard deviation of 0.93 indicates that material availability and management have a significant effect on project efficiency. The provision of timely and quality materials ensures a smooth work process, thereby reducing obstacles that can slow down project completion.

4. Analysis of the Influence of Project State Factors (X4) on Efficiency (Y)

With the highest average value of 17.27 and a standard deviation of 0.99, the state of the project factor significantly affects efficiency. These factors include job site conditions, accessibility, and project environment that can affect the smooth running of operations. Conducive project conditions support labor efficiency and work completion on schedule.

CONCLUSION

This study successfully identified key characteristics of the workforce, wage system, and supporting factors that influence construction project performance in the Central Park Juanda Housing development. The majority of respondents were male (82%), aged 31–41 years (38%), with a high school/vocational education level (47%), and more than half held competency certificates (58%) with 11–15 years of experience (33%). Analysis results demonstrated that the wholesale wage system—encompassing labor, wages, materials, and project conditions—significantly affects project performance, as confirmed by the ANOVA test with a significance level of 0.021 (< 0.05), indicating a simultaneous influence of all factors. However, multiple linear regression revealed that only the project state (X4) had a statistically significant impact on efficiency ($p = 0.002$), whereas labor (X1), wages (X2), and materials (X3) did not. This highlights that conducive project conditions are the dominant factor in improving efficiency, rather than the wage system or resource inputs alone. Therefore, while the wholesale wage system positively contributes to project outcomes, further optimization of site conditions is essential. For future researchers, it is recommended to explore additional variables such as supervision quality, incentive structures, and environmental factors, and to expand the study across multiple construction sites to validate the generalizability of the findings.

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