Eduvest – Journal of Universal Studies
Volume 5 Number 5, May, 2025
p- ISSN 2775-3735- e-ISSN 2775-3727

EVALUATION OF THE IMPACT DELAY PAYMENTS ON THE PERFORMANCE OF SUBCONTRACTORS

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ABSTRACT

Delayed payments in construction projects remain a persistent issue that directly impacts subcontractor performance, causing project timelines, quality, and financial sustainability disruptions. Despite the critical role of subcontractors, empirical research analyzing the influence of owner and contractor financial management on subcontractor performance, particularly moderated by payment delays, is still limited in Indonesia. This study aims to examine the effects of owner and contractor financial management on subcontractor performance, while evaluating the moderating role of payment delays. A quantitative approach was employed, collecting primary data through questionnaires distributed to 34 respondents involved in construction projects across Java and Lampung. Data were analyzed using Partial Least Squares-Structural Equation Modeling (PLS-SEM) with SmartPLS. The results indicate that owner financial management significantly affects subcontractor performance, whereas contractor financial management shows no significant impact. Payment delays significantly moderate the relationship between contractor financial management and subcontractor performance, but have no significant moderating effect on the relationship with owner financial management. These findings highlight the necessity for robust financial management practices and timely payment processes to enhance subcontractor performance. The study offers practical implications for project stakeholders to develop better payment and financial strategies, thereby improving project efficiency and subcontractor sustainability.

KEYWORDS *Payment Delay, Financial Management, Subcontractor Performance, Construction Projects, PLS-SEM*

Article Info:
Submitted: 05-05-2025 Final Revised: 04-05-2025 Accepted: 23-05-2025 Published: 26-05-2025

INTRODUCTION

The construction industry has unique characteristics, where service providers/contractors provide services and costs in advance to achieve the progress of certain work before the billing process. So, healthy cash flow is an important factor for the survival of construction companies. The main contractor often

How to cite: Sulung, A. P. (2025). Evaluation of The Impact Delay Payments on The Performance of Subcontractors. Journal Eduvest. *5*(5): 5448-5464.
E-ISSN: 2775-3727

requires the role and services of subcontractors and suppliers, both for specialist work and for the purchase of materials and tools with specific specifications. In the construction world, a risk that often occurs in the relationship between the main contractor and the subcontractor is the late payment or non-payment of a contract (Bolton, 2022).

In construction projects, payment is required for materials, workers' wages, subcontractors, preparations, and other general costs required during the work. Some practitioners consider late payments normal, but this view worsens the situation and makes the problem more difficult to overcome. Late payments can negatively impact a company's cash flow, potentially resulting in bankruptcy. (Ansah, 2011). Therefore, ensuring timely payments is very important (Ye & Rahman, 2010).

Previous researchers have more often identified the causes and impacts of late payments to owners by the main contractor. Cash flow disruptions caused by late payments can have a significant impact on small companies, depending on the number of pending bills and the length of the delay (Chadee et al., 2023; Nguyen et al., 2024; Xie et al., 2019). So, the timeliness of payments is a key factor in determining the company's performance and profitability (Listanto & Hardjomuljadi, 2018). And including the performance of the subcontractor, the subcontractor itself is a construction company that contracts with the parent contractor to perform some aspect or special aspects of the main contractor's work (Lindhard & Larsen, 2016). Meanwhile, it is still rare to find previous research that examines the impact of delays on subcontractors (Chamara, n.d.).

Therefore, this study was conducted to determine the relationship between the owner's financial management and subcontractor performance, and the contractor's financial management and subcontractor performance in Indonesia, as well as to evaluate the impact of late payment on subcontractor performance (Eriksson et al., 2023).

The issue of delayed payments in construction projects is a persistent problem that significantly affects subcontractor performance (Al Alawi, 2021). Subcontractors often bear the financial burden caused by cash flow disruptions from main contractors and project owners, which can lead to project delays, reduced work quality, and even company insolvency (Akinsiku & Ajayi, n.d.). Despite the critical role subcontractors play in project execution, there is limited empirical research focusing on the specific impact of delayed payments on subcontractor performance in Indonesia (Yunianto & Rarasati, 2021).

The urgency of this research arises from the growing reliance on subcontractors in complex construction projects, where timely payments are crucial to maintaining project timelines and financial stability. Since subcontractors frequently operate with limited capital, payment delays can jeopardize their ability to procure materials, pay wages, and meet contractual obligations. Furthermore, the construction sector’s contribution to national economic development underscores the need for effective financial management practices to mitigate payment-related risks.

Additionally, the normalization of payment delays in industry practices exacerbates the problem, creating systemic inefficiencies that hinder project

performance and profitability. Without strategic interventions and a comprehensive understanding of financial management dynamics, the sustainability of subcontractor operations remains at risk, ultimately affecting the broader construction supply chain (Maharani & Bernard, 2018).

Previous studies, such as Ye & Rahman (2010), have highlighted the risks of late payments in the Malaysian construction industry, emphasizing their impact on contractor performance and project delivery. Similarly, Enshassi & Abuhamra (2015) explored subcontractor perspectives on delayed payments in public projects, identifying cash flow issues and contractual enforcement as key challenges (Messah, n.d.). In Indonesia, Listanto and Hardjomuljadi (2018) analyzed factors causing delayed payments from main contractors to subcontractors, focusing on internal financial mismanagement and project owner constraints.

Other research by Peters et al. (2019) examined causes and effects of late payments in the construction industry globally, suggesting that transparent contract management and stricter payment regulations could mitigate these issues. Sabri & Isa (2020) studied the impact of late payments on small contractors in Malaysia, revealing significant productivity losses and increased financial vulnerability. Chamara (n.d.) evaluated subcontractor performance factors, yet did not specifically address the role of delayed payments as a critical determinant (Cheng et al., 2011).

Despite these contributions, there remains a lack of empirical evidence analyzing the direct relationship between project owners' and main contractors' financial management practices and their impact on subcontractor performance in Indonesia. Moreover, the moderating effect of payment delays on these relationships has been scarcely explored, leaving a gap in understanding the comprehensive dynamics affecting subcontractor performance (Ramadhani et al., 2019).

This study introduces novelty by empirically examining the moderating effect of payment delays on the relationship between owner and contractor financial management and subcontractor performance. Using the Partial Least Squares-Structural Equation Modeling (PLS-SEM) approach, this research comprehensively analyzes how financial practices influence subcontractor outcomes in Indonesian construction projects.

The objective of this research is to analyze the influence of project owner and contractor financial management on subcontractor performance and assess the moderating role of payment delays in construction projects across Java and Lampung.

The benefit of this study is to contribute to academic literature by providing empirical evidence on the impact of delayed payments on subcontractor performance, while offering practical insights for contractors, project owners, and policymakers to develop effective financial management strategies that ensure payment timeliness, enhance project performance, and strengthen the construction supply chain.

RESEARCH METHOD

The research method in this study follows scientific procedures aimed at obtaining data systematically, rationally, and empirically for research purposes (Sugiyono, 2018). The study adopts a qualitative approach by conducting direct surveys and observations of late payment phenomena in construction projects in Indonesia. The research was conducted in various cities and regencies across Java and Lampung. Data collection involves both primary and secondary sources. Primary data were obtained through questionnaires distributed to main contractors and subcontractors, and through direct interviews with key informants. Secondary data were collected from previous research, journal articles, and related literature to support the analysis.

The population of this study includes project stakeholders with expertise in project and financial management. Respondents were selected using purposive sampling, ensuring that participants had sufficient experience and understanding of construction project payment issues. A total of 34 respondents participated, fitting within the recommended range for SmartPLS analysis (30-100 samples). Research instruments were developed using indicators derived from literature on Owner's Financial Management, Contractor's Financial Management, payment delays, and Subcontractor Performance. Responses were measured using a 5-point Likert scale, from strongly disagree (1) to agree (5) strongly.

For data analysis, this study employed the Partial Least Squares-Structural Equation Modeling (PLS-SEM) method, using SmartPLS software. The purposive sampling technique was chosen for its ability to target respondents with specific, relevant characteristics. PLS-SEM was used to confirm theoretical models and analyze relationships between latent variables, accommodating both reflective and formative indicators. The combination of SPSS and SmartPLS applications ensured a comprehensive analysis of data reliability, validity, and hypothesis testing, thereby providing robust empirical insights into the factors affecting subcontractor performance due to late payments.

RESULT AND DISCUSSION

Research Overview

This study aims to examine the relationship between latent variables and the relationship between the owner's financial management, the contractor's financial management, and subcontractor performance. This study uses questionnaire surveys as a data collection tool. The questionnaire is aimed at construction stakeholders who have or are working on projects on the island of Java and Lampung Province. Respondents in this survey consisted of project managers, site managers, and accountants. The questionnaire was distributed through field observation and Google Forms. Of the total 40 questionnaires distributed, only 34 were confirmed. The questionnaire results were used as primary data for analysis to achieve the research objectives. The data collected through the questionnaire survey was then processed using descriptive analysis and path analysis with the help of SmartPLS software.

Descriptive Analysis of the Owner's Financial Management, the Main Contractor's Financial Management, Late Payment, and Subcontractor Performance.

A descriptive analysis of respondents' responses was carried out by calculating each indicator's mean and standard deviation for each latent variable. The respondents' answer intervals can then be classified based on class intervals, as listed in Table 1.

Table 1. Classification of Respondent Answers

Class Intervals	Category
4.2<Mean<5.00	Strongly agree
3.40<Mean<4.20	Agree
2.60Mean<3.40	Agree
1.80<Mean<2.60	Disagree
1.00<Mean<1.80	Strongly Disagree

Descriptive Analysis of Owner's Financial Management Indicators

The data processing results, shown in Table 4.2, show the respondents' assessment of the owner's financial management, along with the indicators and averages for each indicator.

Table 2. Descriptive analysis of the owner's financial management elements

Yes		Indicators	Average		Information
1	X1.1	Delay in the disbursement of retention to contractors	2,85		Agree
2	X1.2	Deduction of payment from the owner	2,91		Simply Agree
3	X1.3	The owner has enough funds, but the payment schedule is not in accordance with what is stated in the contract	2,68	2,71	Simply Agree
4	X1.4	The owner refuses to pay	2,41		Simply Agree
5	X1.5	The owner holds the payment	2,71		Simply Agree

Table 2 shows respondents are quite satisfied with the owner's financial management indicators. The average score of 2.71 on the owner's financial management indicator X1.2 (Withholding of payments from the owner) received the highest score, with a score of 2.91. Thus, respondents strongly agreed that the owner's financial management (withholding of payments from the owner) is an element of the owner's financial management that is often encountered during late payments.

Analysis of contractors' financial management indicators

The data processing results showed the respondents' assessment of the contractor's financial management and indicators, and averages for each indicator. The results of the processing are shown in Table 3

Table 3. Descriptive analysis of the contractor's financial management elements

Yes		Indicators	Average		Information
1	X2.1	Delay of the contractor in filing a claim	3,26		Simply Agree
2	X2.2	Financial failure due to bankruptcy	3,32		Simply Agree
3	X2.3	Dependence on borrowed capital	3,44		Agree
4	X2.4	Lack of Capital to finance projects	3,62	3,39	Agree
5	X2.5	Insufficient finances	3,44		Agree
6	X2.6	Poor project cost estimates	3,26		Simply Agree

The respondents strongly agree with the contractor's financial management indicators, with an average score of 3.39. The highest score for the indicator of lack of capital to finance the project was 3.62. With this value, the respondents strongly agreed that X2.4 (lack of capital to finance the project) is a cause that often arises during the payment process.

Late payment analysis

Data processing results can provide respondents' assessment of late payments and indicators and averages for each indicator. The results of the processing are shown in Table 4.

Table 4. Late payment analysis

Yes		Indicators	Average		Information
1	M1	Difficulties in the procurement of materials and equipment	3,5		Agree
2	M2	Difficulty paying workers' wages	3,47		Agree
3	M3	Cash flow problems	3,5		Agree
4	M4	Project cost overrun	3,41	3,47	Agree
5	M5	Low profit margins	3,47		Agree

Subcontractor performance analysis

Data processing results can provide respondents' assessment of the subcontractor's performance, along with indicators and averages for each indicator. The processing results are shown in Table 5.

Table 5. Subcontractor performance analysis

Yes		Indicators	Average		Information
1	Y1	Accuracy of prediction of implementation time plans	4,09		Agree
2	Y2	Accuracy of the prediction of the implementation cost plan	4,21	4,16	Strongly agree
3	Y3	Quality of work results	4,18		Agree

Based on Table 5, respondents strongly agree on the performance indicators of the subcontractors, affecting the accuracy of project costs during the construction phase, causing delays in the construction schedule, and causing unsatisfactory work quality during the construction phase. These 3 (three) indicators are indicators that affect the performance of subcontractors during the payment phase. This is shown by the statement of respondents strongly agreeing, which is an average of 4.16. Based on the analysis of subcontractor performance indicators, cost performance received the highest score with a value of 4.21. Thus, cost performance is the most important indicator during the payment phase.

Analysis of the relationship between the owner's financial management, the contractor's financial management, the delay in payment, and the performance of the subcontractor

The model of the analysis of the relationship between the owner's financial management, rental financial management, late payment, and subcontractor performance is from previous research. The data analysis was carried out with the help of a statistical program, Smart-PLS. The covariance-based SEM method became a variant-based method. Covariance-based SEM is generally used to test theories, while PLS focuses more on predictive modeling. The prediction in question is the prediction of the relationship between constructs. In predictive modeling, the results obtained can be tested even without a strong theoretical basis. Statistical assumptions in PLS are classified as nonparametric types, so they do not require data with a normal distribution. The measurement of the estimation model in PLS is divided into two types, namely the inner model measurement and the outer model.

Outer model measurements are carried out to ensure the measurements used are valid and reliable. Convergent validity and discriminant validity are used as validity tests in research. The Outer analysis of the reflective model describes the relationship between the latent variable and its indicators, while the formative Outer model defines the relationship between the indicator and its latent variable. At the same time, an internal evaluation of the model is carried out to ensure the accuracy of the constructed structural model. The evaluation of the internal model can be seen from several indicators, namely: Coefficient of Determination (R-Square), predictive relevance (R-Square), and Goodness of Fit (GoF). The analysis of the inner model aims to determine the relationship between latent variables. Figure 4.4 shows the measurement model's results, which are then used as data for validity test, reliability test, determination coefficient, predictive relevance, Goodness of Fit, and path coefficient.

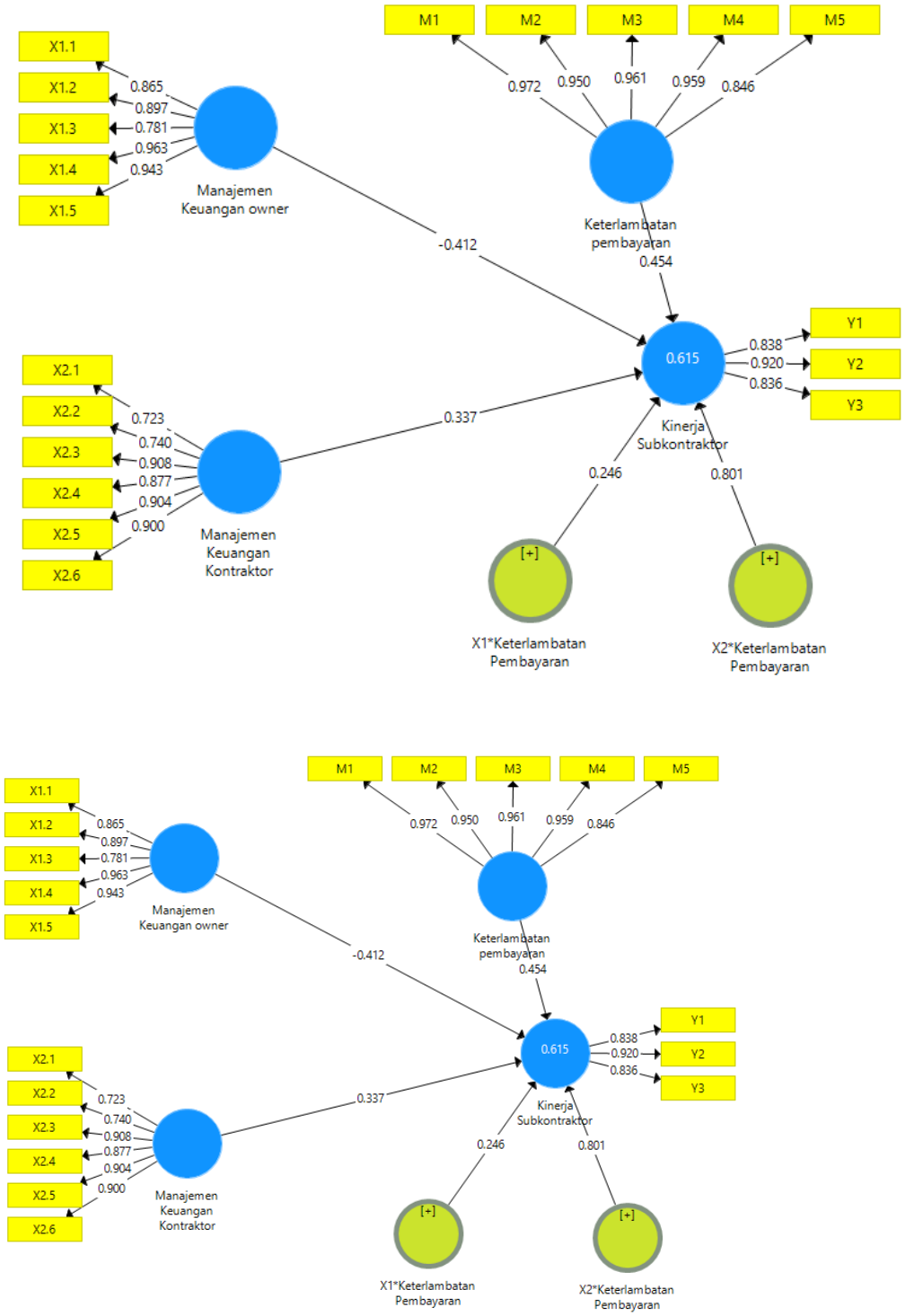

Figure 1. Outer Model Measurements

Variable Validity Test

The validity test in this study was carried out using a questionnaire as a data collection tool. The validity test aims to determine whether the questionnaire used in the study is valid. A *reliable* instrument may not necessarily be valid. This research construct validity is used to test the validity related to the extent to which a scale reflects and functions as a concept to be measured (Hair *et al*, 2010). The construct validity test applied in this study includes a convergent validity test and a discriminant validity test.

Convergent validity

The first *model of Outer* measurement is a convergent validity test that aims to determine the validity of each relationship between an indicator and its latent construct or variable (McDaniel & Gates, 2013). Convergent validity indicates the results of the identification of respondent status. This study uses an all-inclusive model. Reflective models show that each indicator measures errors in latent variables. The causal direction is from the latent variable to the indicator. Thus, the indicators reflect variability. In the SEM or PLS approach, a measure is considered to meet convergent validity if it meets several conditions (Hair *et al.*, 2010), namely:
1. The value of AVE (Average Variance Extracted) ≥ 0.5 is valid (Hair *et al.*, 2010)
2. Loading factor value with ≥ value of 0.7. Valid (Hair *et al.*, 2010)
3. The reliability value of composites ≥ 0.7 is realizable (Hair *et al.*, 2010)

Table 6. Convergent Validity Test

Variable Constructs	Cronbach's Alpha	Rho_A	Composite Reliability	Average Variance Extracted	Information	
					reliability (≥ 0.7 realistic)	ETA (≥ 0.5 valid)
Late Payment	0,968	1,181	0,974	0,881	Realistic	Valid
Subcontractor Performance	0,831	0,841	0,899	0,749	Realistic	Valid
Contractor Financial Management	0,927	1,013	0,937	0,715	Realistic	Valid
Financial Management Owner	0,950	1,557	0,951	0,796	Realistic	Valid
X1*late payment	0,987	1,000	0,988	0,770	Realistic	Valid
X2*late payment	0,980	1,000	0,982	0,651	Realistic	Valid

Based on the initial convergent validity test in **Table 6**, the AVE value of the project complexity variable of 0.436 does not meet the minimum *requirement (Average Variance Extracted)* > 0.5 (Hair *et al.*, 2010). The loading factor analysis in Table 7 shows that the loading factor limit value for the convergent validity test requirement is >0.7 (Hair *et al.*, 2010).

Table 7. Mean Value Results and Loading Factor

Yes	Code	Indicators	Mean Value	Loading factor value	Loading factor description > 07 (valid)
1	M1	Difficulties in the procurement of materials and equipment	3,5	0,972	Valid
2	M2	Difficulty paying workers' wages	3,47	0,950	Valid
3	M3	Cash flow problems	3,5	0,961	Valid
4	M4	Project cost overrun	3,41	0,959	Valid
5	M5	Low profit margins	3,47	0,846	Valid
6	Y1	Accuracy of prediction of implementation time plans	4,09	0,838	Valid
7	Y2	Accuracy of the prediction of the implementation cost plan	4,21	0,920	Valid
8	Y3	Quality of work results	4,18	0,836	Valid
9	X1.1	Delay in the disbursement of retention to contractors	2,85	0,865	Valid
10	X1.2	Deduction of payment from the owner	2,91	0,897	Valid
11	X1.3	The owner has enough funds, but the payment schedule is not in accordance with what is stated in the contract	2,68	0,781	Valid
12	X1.4	The owner refuses to pay	2,41	0,963	Valid
13	X1.5	The owner holds the payment	2,71	0,943	Valid
14	X2.1	Delay of the contractor in filing a claim	3,26	0,723	Valid
15	X2.2	Financial failure due to bankruptcy	2,32	0,740	Valid
16	X2.3	Dependence on borrowed capital	3,44	0,908	Valid
17	X2.4	Lack of Capital to finance projects	3,62	0,877	Valid
18	X2.5	Insufficient finances	3,44	0,904	Valid
19	X2.6	Poor project cost estimates	3,26	0,900	Valid

Discriminatory Validity

Discriminant Validity (Fornell-Larcker)

AVE Variable > of the correlation value between variables

The next step is to test the validity of the discriminator by using *the Fornell-Larcker criterion* test. The *Fornell-Larcker criterion* test is a test of *the outer* loading value on one construct of a variable that is smaller than the AVE value of the variable, compared to the other variable. The value *of the Fornell-Larcker criterion* in Table 8 is below.

Table 8. Value *Fornell Larcker Criterion*

Fornell-Larcker Criterion	Late payment	Subcontractor Performance	Contractor Financial Management	Financial Management Owner
Late payment	**0,939**			
Subcontractor Performance	0,064	**0,865**		
Contractor Financial Management	0,873	0,203	**0,846**	
Financial Management Owner	0,626	0,278	0,775	**0,892**

Based on Table 4.8, the *value of the Fornell-Larcker criterion* coefficient of each indicator on one latent variable is higher than the other latent variable indicators. It can be concluded that the indicator used as a measure of latent variables in this study has met the *Discriminant Validity test.*

Relibia Test

In this study, the reliability test used *Cronbach's Alpha*, *rho_A*, and composite reliability to evaluate the Outer model measurement. The reliability test is a consistency test of the indicator question item, whether it produces the same measurement at different times. Variables are said to be reliable if Cronbach's Alpha, rho_A, and composite reliability values are greater than 0.70. The results of the reliability test can be seen in Table 9.

Table 9. Result: *Construct Reliability and validity test*

Variable Constructs	Cronbach's Alpha	Rho_A	Composite Reliability
Late Payment	0,968	1,181	0,974
Subcontractor Performance	0,831	0,841	0,899
Contractor Financial Management	0,927	1,013	0,937
Financial Management Owner	0,950	1,557	0,951

Based on Table 9, the *construct Reliability and validity* test has a value above 0.7, so it can be concluded that the variables in the research model are reliable.

Evaluation of the value of R square

The structural model or *inner model* aims to explain 55% of the target data (variable dependent). The remaining 45% of the variation in the data is not explained by the model. This can be caused by other variables not included in the model, as shown by the R-squared value in the results of the PLS structural model in Figure 4.5. Results of the internal evaluation of the model are in Table 10.

Table 10. Value *R-Square*

Dependent Variable	R Square	R Square Adjusted
Subcontractor Performance	0,615	0,546

Hypothesis Test

The R-squared *value* is not the right parameter to measure the accuracy of a prediction model. The accuracy of the prediction model was checked using the path coefficient value and the T-value, which shows the relationship between positive or negative influences between constructs and how significant the relationship between constructs is in each prediction path.

The Original *Sample Estimate* value indicates the significance level in the hypothesis test. The research hypothesis is acceptable if the t-value is> 1.96 for the two-sided hypothesis and > 1.6 for the one-sided hypothesis (Hair et al., 2010). The values of the path coefficient and t-statistics are shown in Table 11.

Table 11. Results of Path Coefficients and T-Calculations

Construct Variables	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Late payment -> Subcontractor Performance	0,454	0,376	0,393	1,157	**0,124**
Contractor Financial Management -> Subcontractor Performance	0,337	0,239	0,376	0,896	**0,185**
Owner Financial Management -> Subcontractor Performance	-0,412	-0,275	0,283	1,455	**0,073**
X1*Late Payment -> Subcontractor Performance	0,246	0,230	0,242	1,015	**0,155**
X2*Late Payment -> Subcontractor Performance	0,801	0,689	0,261	3,071	**0,001**

In Table 11, the Path Coefficient and T-Calculation results are based on the bootstrapping test using SmartPLS 3 software with a sub-sample of 500 samples. The results show the beta coefficient, mean, standard deviation, t-calculation, and P-value values. To test the study's hypothesis, it is acceptable if the condition of t-count > t-Table; in this study, the value of the t-Table is 1.64. The results of the bootstrapping test modeling can be seen in Figure 4.5.

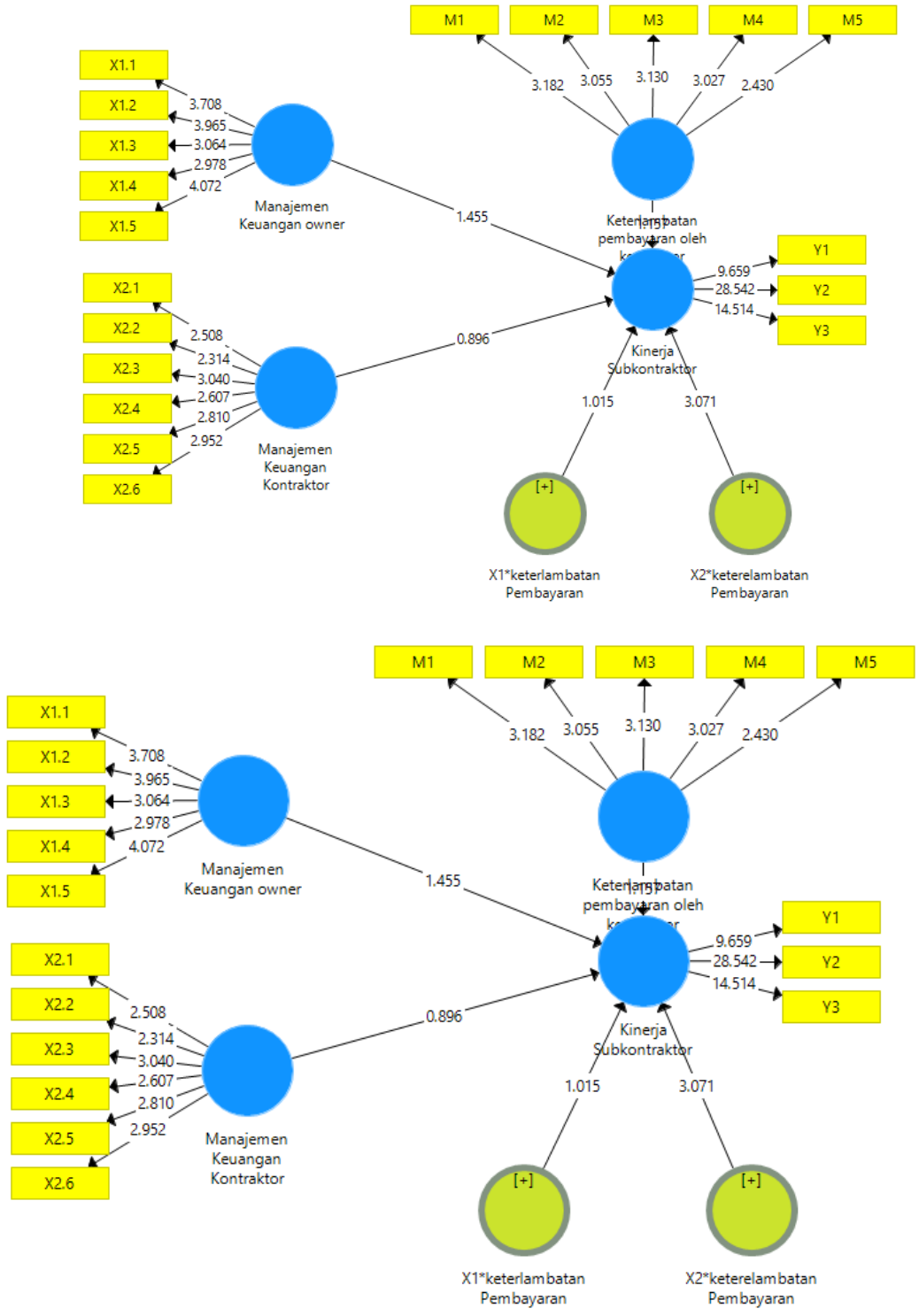

Figure 2. Inner Measurement Bootstrapping Test Model

Based on the results of the bootstrapping test, 2 hypotheses were accepted from the initial 4 hypotheses, which are as follows:

- Hypothesis 1 states that the owner's financial management negatively affects the Subcontractor's performance. Based on the t-test results of 1.455, it can be said that the owner's financial management significantly affects the subcontractor's performance. This means that the first hypothesis is acceptable
- Hypothesis 2 states that the contractor's financial management positively affects the Subcontractor's performance. Based on the t-calculation result of 0.896, it can be said that the contractor's financial management is not significant to the subcontractor's performance. This means that the second hypothesis is unacceptable
- Hypothesis 3 states that late payment affects the owner's financial management of the Subcontractor's performance. Based on the result of the t-calculation of 1.015, it can be said that the delay in payment is not significant to the owner's financial management regarding the subcontractor's performance. This means that the third hypothesis is unacceptable
- Hypothesis 4 states that late payment affects the contractor's financial management on the Subcontractor's performance. Based on the t-calculation results of 3.071, it can be said that the delay in payment is significant to the contractor's financial management regarding the subcontractor's performance. This means that the fourth hypothesis is acceptable

The results of hypothesis testing using SmartPLS resulted in a supported hypothesis. Based on the results of the bootstrapping test in Table 4.10, all hypotheses show positive and negative beta coefficient values and p values of less than < 0.1, which indicates that the unidirectional path analysis hypothesis affects the intended variable.

Research Findings

Based on the results of the identification of elements of project complexity and risks. This study found 5 indicators of financial management of owners and 6 financial management of contractors, and 5 late payments that influence the performance of subcontractors, where the performance that is influenced includes the performance of cost, time, and quality. The identification results are presented in Figure 3.

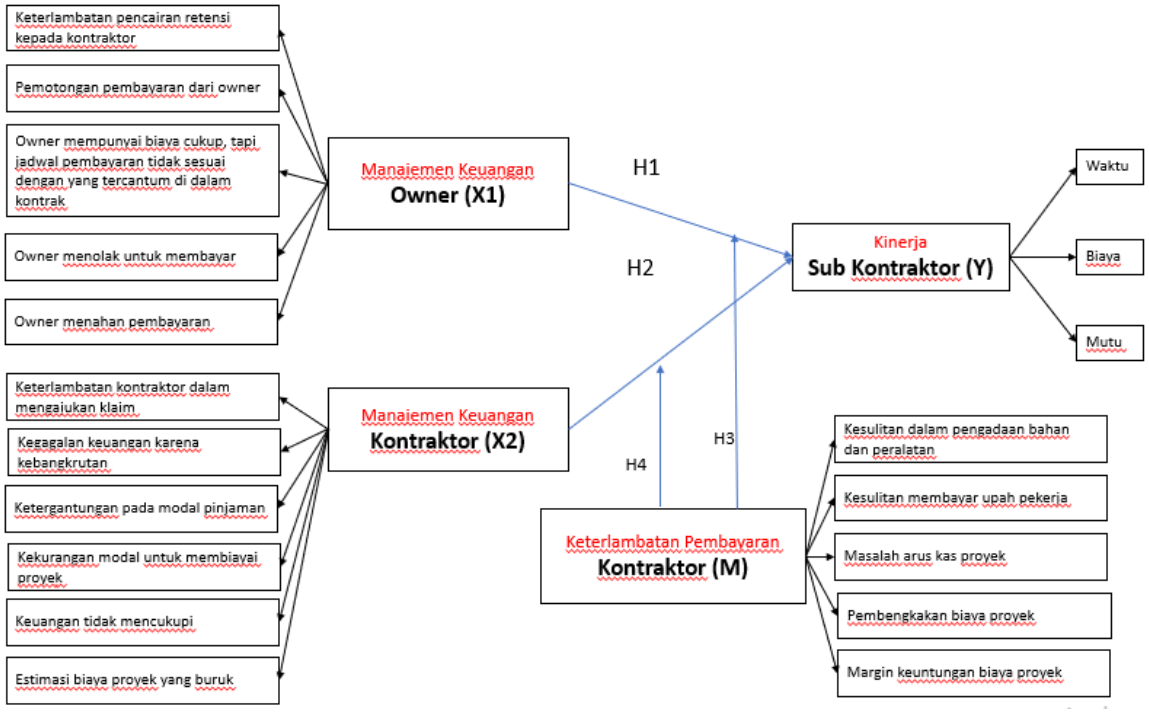

Figure 3. Identification Results: Owner's financial management, contractor financial management, late payment, and subcontractor performance

The descriptive analysis results found 1 indicator of the highest owner's financial management, namely the owner refusing to pay. The descriptive results found that the contractor's financial management was the highest dependency on borrowed capital. The descriptive results found that the highest payment delays were difficulties in the procurement of materials and equipment. The descriptive results of the subcontractor's performance found the cost performance in terms of the accuracy of the prediction of the implementation cost plan.

CONCLUSION

Based on the analysis and discussion, it can be concluded that the owner's financial management, particularly the refusal to pay, significantly affects subcontractor performance, while the contractor's financial management, especially the dependence on borrowed capital, shows no significant impact. The most dominant factor influencing late payments is the difficulty procuring materials and equipment, which disrupts project cash flow and subcontractor performance. Furthermore, late payments significantly moderate the relationship between the owner's financial management and subcontractor performance, directly reducing subcontractor productivity, whereas the moderation effect on contractor financial management is insignificant. For future researchers, conducting a more detailed analysis of other factors influencing subcontractor performance, such as legal contract enforcement, supply chain resilience, and project financing models, is

recommended. Additionally, expanding the scope of research to include longitudinal studies and comparative analyses across different regions and project types will provide deeper insights into the systemic challenges and potential mitigation strategies related to payment delays in the construction industry.

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