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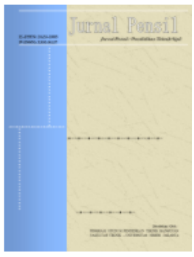

ANALYSIS OF THE INFLUENCE OF INTERNAL FACTORS ON PROJECT PERFORMANCE IN LOW-RISE COMMERCIAL BUILDING CONSTRUCTION PROJECTS IN TANGERANG

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Abstract

From the construction statistics data of the city of Tangerang, in 2022 the construction business field contributes 8.16 percent to the total economy of the city of Tangerang, each construction project certainly has a certain work plan and work schedule, which is so that the project can be completed as planned. The impact that causes delays in project implementation time can be accompanied by increased costs of implementing the project. This study aims to know and identify and analyze factors - factors Labor factors, material factors, equipment factors, place characteristics factors, managerial factors, planning and scheduling factors and other factors. that affects time and cost performance. Research uses SEM-PLS to determine potentially influencing factors through literature review. The results of the study found that managerial factors had a significant influence on time performance with a coefficient value of 3.962, while planning and scheduling had a significant influence with a coefficient value of 2.773. While the effect of time performance on cost increase has a significant effect of 5.465.

Keywords: Internal Factors, Time Performance, Cost Performance, SEM-PLS

Introduction

According to Tangerang City Construction Statistics Data, in 2022 the construction business field contributed 8.16 percent to the total economy of Tangerang City, decreasing compared to 2021 which was 9.35 percent. In 2021, where the economy began to recover, the construction business sector grew very significantly, namely 8.96 percent. Then in 2022, the construction business decreased compared to the previous year with a growth of 2.63 percent (Badan Pusat Statistik Kota Tangerang, 2023).

In general, every construction project has a certain implementation plan and scheduling so that it always refers to the assumptions made, namely the planning and scheduling of existing development, as well as when to start project implementation, and when to complete and how a project can run, as well as how resources are given, therefore problems can occur if there is a discrepancy between the plans that have been made so that The impact that causes project delays and project implementation can be accompanied by increased costs of implementing the project (Proboyo, 1999). Construction can be defined as the arrangement of the elements of a building (Rani, 2023). According to Andi et al. (2003), In general, the potential factors that affect construction time consist of seven categories, namely labor, materials/materials, equipment, site characteristics, managerial, financial, other factors. According to Proboyo (1999), in general, project delays often occur due to changes in planning during the implementation process, poor management in the contractor's organization, work plans that are not well arranged / integrated, incomplete drawings and specifications, or the contractor's failure to carry out the work.

In the implementation of construction from the results of an on-site survey carried out several information problems obtained from the project such as labor problems and worker discipline, delays in the delivery of material materials, internal company problems, design changes, changes in job descriptions in the field or additional work, payment problems from contractors and onwer and other factors that cause the project to be delayed. Project delays need to be analyzed in order to find out what factors have a significant effect on time performance and cost performance in the implementation of the project. Meanwhile, it can find out what work is experiencing delays and increased costs so that the work can be identified that hinders the implementation of other work.

Research Methodology

Location of this research was conducted in Banten Province, Tangerang Regency, on a low-rise commercial development project in Tangerang. A total of 15 contractors are the hallmark of cluster building and shophouse construction projects.

Figure 1. Location of low-rise commercial development area in Tangerang area

This analysis method is related to the analysis and identification of the effect on time performance and the effect of time performance on cost performance on the delay of low-rise commercial development projects in the tangerang area using Structural Equation Modeling Tools (SEM-PLS), The main data source is obtained by distributing questionnaires by sending questionnaires to respondents directly or through email addresses and electronic communication

media (Ma'rifah, 2023). Exploration respondents were selected by purposive sampling testing techniques. Population is defined as a place of generalization consisting of objects or subjects that have a function (Indrayana, 2020).

This research was conducted by submitting questionnaires to respondents directly or through email addresses and electronic communication media. The total number of questionnaires distributed in this study amounted to 110 samples, of which 110 questionnaires had been filled out and re-received. Of the 110 questionnaires received, only 105 questionnaires could be processed, while the remaining 5 questionnaires could not be processed because the filling data was invalid and/or filled in by incompetent subjects in this study.

Table 1. Description of respondent data

Criterion	Category	Frequency
Gender	Male	104
	Woman	6
Working position	Project Manager	6
	Site Manager	9
	Supervisor by onwer	22
	Contractor executor	64
	Engineering staff	24
Work experience	0 – 5 years	83
	6 – 10 years	14
	11 – 16 years	8
	>20 years	5

The variables discussed in this study are independent variables, interveaning variables and dependent variables. Among them the independent variables contained in this article are: X1. Labor factor), X2. Material availability factor, X3. Equipment factor, X4. Characteristic factors of the place. X5. Managerial factors, X6. Planning and scheduling factors X7. Other factors. While the interveaning variable in this study is time performance which is the dependent variable is Cost performance. The structural model describes the relationship between latent variables (Robi et al., 2017).

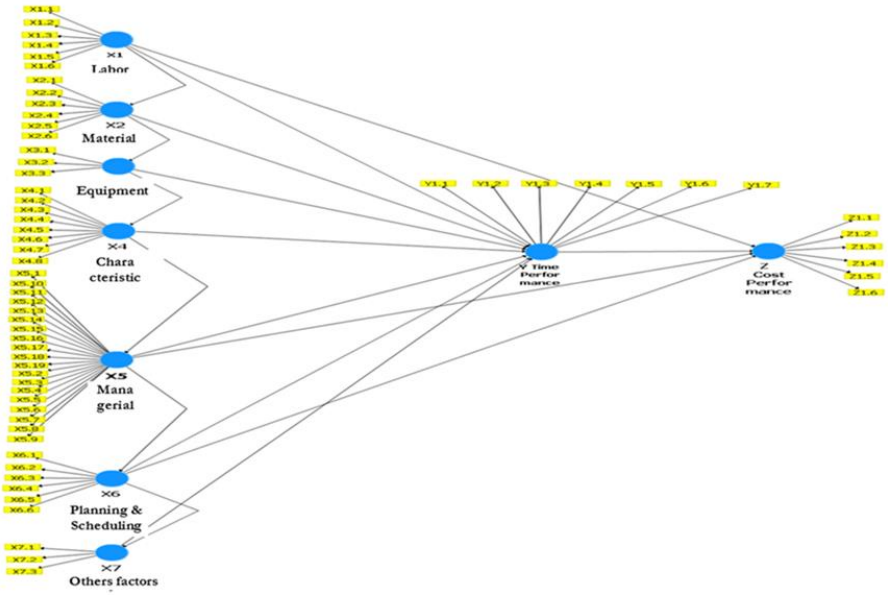

Figure 2. Research model

Hypothesis:

H1 : There is a relationship between factors in internal variables that have mutual influence

H2 : There is an influence of internal factors on time performance in low-rise commercial development in Tangerang.

H3 : There is an influence of internal factors on cost performance in low-rise commercial development in Tangerang.

H4 : There are the most dominant causes affecting time performance and cost performance in low-rise commercial development in Tangerang.

Research Results and Discussion

Reliability Test

In this study using composite reliability. If the variable meets the reliability value by having a reliability value of > 0.70 (Rahmad & Suhardi, 2019).

Table 2. Reliability test results and Cronbach's alpha values

	Cronbach's Alpha	Composite Reliability
X1. Labor	0.937	0.953
X2. Material	0.964	0.973
X3. Equipment	0.868	0.922
X4. Characteristic	0.957	0.964
X5. Managerial	0.974	0.977
X6. Plan & Scheduling	0.926	0.944
X7. Other Factor	0.902	0.937
Y. Performance Time	0.949	0.959
Z. Cost Performance	0.948	0.959

All composite reliability values are above 0.70. Reliability values are categorized as reliable.

f^2 Measures of Influence

The size of influence (f^2) has values of 0.02, 0.15 and 0.35 meaning that the latent predictor variables have small, medium and large influences at the structural level of the model (Rahmad & Suhardi, 2019), here are the results.

Table 3. Effect of f^2

	X1	X2	X3	X4	X5	X6	X7	Y	Z
X1		3.11						0.00	0.04
X2			2.19					0.01	
X3				9.90				0.00	
X4					4.14			0.01	
X5						12.64		0.14	0.00
X6							4.57	0.12	0.01
X7								0.02	
Y									0.52

Based on the results of f^2 influence factor of labor to material amounted to 3.114, material to equipment amounted to 2.193, equipment to place characteristics amounted to 9.903, place characteristics to managerial amounted to 4.144, managerial influence on planning and scheduling amounted to 12.645, planning and scheduling to other factors amounted to 4.567 while time performance was 0.0165 cost performance was 0.519. F Square (f^2) A variable in such a structural

model can be influenced by a number of different variables. For variables X1 ,X2, X3, X4, X5, X6, X7 and cost performance has a great influence, while time performance has an intermediate influence.

Q^2 Predictive Relevance

The following table is the result of Q-square calculations for nine test sample region models.

Table 4. Predictive relevance

	R Square	R Square Adjusted	**Q-square (Q^2)**
X2 Material	0.758	0.756	0.639
X3 Equipment	0.688	0.685	0.535
X4 Characteristic	0.909	0.906	0.687
X5 Managerial	0.807	0.805	0.538
X6 Plan & Schedulling	0.928	0.927	0.672
X7 Other Factors	0.821	0.820	0.678
Y Performance Time	0.905	0.896	0.675
Z Cost Performance	0.865	0.858	0.660

This measurement model is concluded to have a strong predictive relevance value with a value of 0.35

T-Statistics

T-statistics in model tests are useful for testing significance in hypotheses (Rahmad & Suhardi, 2019). Hypothesis testing can be seen in the table below.

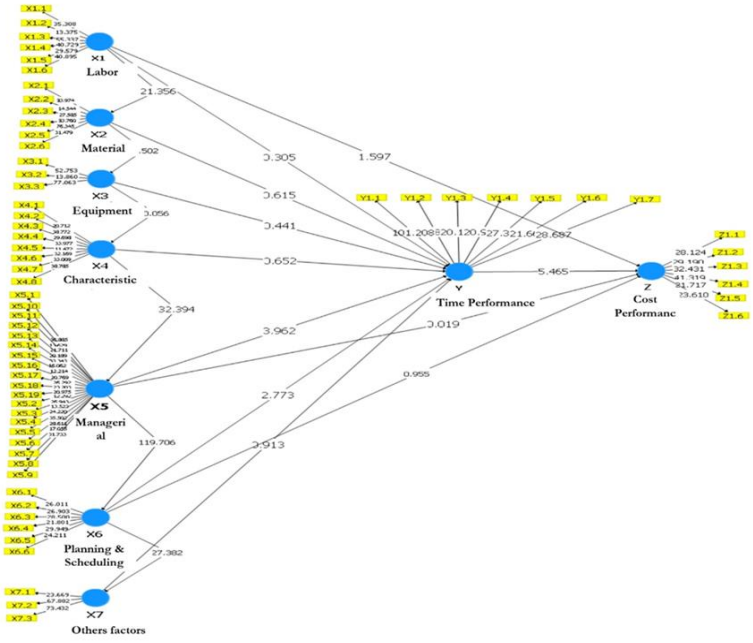

Figure 3. Measurement t-value model to test the hypothesis

From the picture of the measurement model results above, the equation obtained from this measurement model is as follows:

Time Performance = 0.3054 LBR + 0.6146 M + 0.4411 EQ + 0.6523 CAR +3.9621 MAN + 2.7730 PS + 0.9138 FOT, R2 = 0.905

Cost Performance = 1.5968 TK+ 0.0193 MAN+0.9554PS + 5.4647 TP, R2 = 0.865

Based on the equation above, it can be concluded that all of these factors have a positive and significant effect on time performance by giving an influence of 90.5% on time performance. While the remaining 9.5% by other factors that were not included in the study. The greatest 3.962 implementation and scheduling factors and 2.773 managerial and implementation and scheduling with a positive direction will directly affect the completion of the project. Meanwhile, the labor factor has an influence of 0.305, materials of 0.615, equipment of 0.441, place characteristics of 0.652 and other factors give a value of 0.913.

In the performance equation, time to cost increase has an effect of 86.5%. The remaining 13.5% were not included in the study. The amount of influence by time performance on cost performance has an influence of 59.425, while labor factors are 1.597, managerial is 0.019 and other implementation and scheduling factors are 0.955.

Hypothesis Testing

Hypothesis testing is a decision-making method based on data analysis. In statistics a result can be said to be statistically significant if the event is almost impossible to cause by a chance factor, according to a predetermined probability limit. However, the R-Square and Goodness of Fit values are not precise parameters for measuring the accuracy of prediction models. The accuracy of the prediction model is tested by looking at the value of the path coefficient and T-Calculation, which looks at the positive or negative influence relationship between constructs and how significant the relationship between constructs on each path in the prediction model is. The value of the path coefficient (original sample estimate) indicates the level of significance in hypothesis testing. Testing the research hypothesis is acceptable if the t-count value > 1.96 for the two-tailed hypothesis and > 1.64 for the one-tailed hypothesis (Hair et al., 2018). Table 5 shows the results of path coefficients and t-statistics.

Table 5. Results of path and t-statistics coefficient value

	Original sample (O)	**Sample Mean (M)**	**Standard Deviation (STDEV)**	**T Statistic (|O/STDEV|)**	**P Value**	**Conclusion**
X1 → X2	0.86999	0.86880	0.04074	21.35622	0.00000	Accepted
X1 → Y	0.03691	0.04451	0.12085	0.30545	0.38008	Rejected
X1 → Z	0.25225	0.23974	0.15797	1.59684	0.05547	Rejected
X2 → X3	0.82870	0.83278	0.04042	20.50196	0.00000	Accepted
X2 → Y	0.08146	0.07743	0.13252	0.61465	0.26953	Rejected
X3 → X4	0.95304	0.95400	0.01190	80.05553	0.00000	Accepted
X3 → Y	-0.06072	-0.01622	0.13764	0.44116	0.32964	Rejected
X4 → X5	0.89754	0.89762	0.02771	32.39395	0.00000	Accepted
X4→ Y	-0.12596	-0.15376	0.19308	0.65237	0.25723	Rejected
X5 → X6	0.96266	0.96341	0.00804	119.70596	0.00000	Accepted
X5 → Y	0.67332	0.67065	0.16996	3.96172	0.00004	Accepted
X5 → Z	0.00442	0.01367	0.22801	0.01938	0.49227	Rejected
X6 → X7	0.90573	0.90490	0.03308	27.38165	0.0000	Accepted
X6 → Y	0.45896	0.45696	0.16551	2.77305	0.00288	Accepted
X6 → Z	-0.14256	-0.15219	0.14921	0.95544	0.16991	Rejected
X7 → Y	-0.13387	-0.10472	0.14668	0.91268	0.18093	Rejected
Y → Z	0.82092	0.83449	0.15022	5.46479	0.00000	Accepted

The result of the hypothesis test is that if the value is >T table 1.64 then the hypothesis is accepted. Meanwhile, if the value is < 1.64 then the hypothesis is rejected. Based on the results, of hypothesis testing the labor coefficient of influence on materials is 0.870, material on equipment is 0.829, equipment on place characteristics is 0.953, place characteristics on managerial is 0.898,

managerial on planning and scheduling gives a value of 0.963 and planning and scheduling on other factors is 0.906 (meaning all the effects are positive).

P Value on time performance is 0.000 <0.05 (meaning significant), while t-count >T table 1.64 (meaning significant) thus it can be said that the relationship between these factors has a relationship and influences each other. In line with research by Halim et al. (2021) state the most dominant causes of delays due to design changes, material delivery delays, and wrong work methods. Also the results of Dwinanda et al. (2023) mentioned it affects the lack of manpower, materials and tools. Research by Alaydrus & Hardjomuljadi (2018) found that ue to labor, material and design changes. Research by Perdana Putra et al. (2021) found that causes of delay due to material problems, poor planning, management and supervision, while research by Putra (2022) fount it as obstacles to work caused rainfall, soil characteristics, access to inaccessible locations, and research, and research by Rofi Henindia & Suroso (2022), The cause of delay is due to auction problems, execution time problems, and execution method problems, while research by Rosdianto et al. (2018) found he probability of delay obtained from the results of the FTA analysis is 0.7342, likewise the results of research by Darmawi et al. (2020) main factors causing design changes, natural disasters, site conditions, while research by Darmawan & Yuwono, (2021) found the causes of delay are Covid 19 factors and resource readiness factors.

Other supporting researches by Rachmat et al. (2020) fount the factors of labor, materials, equipment, changes, scope of contracts/documents, planning and scheduling and managerial 54.96%, delays in the provision of tools/materials, the number of workers who are less available, and research by Alsuliman (2019) found 20 causes of delay were identified factors before starting tenders, factors after starting tenders, after tender approvals, and general factors, while research by Wuala & Rarasati (2020) problems of material shortages, finances and incompetence of contractors, and problems occur by the owner, while the results of this study are compared with previous studies.

The labor factor coefficient on time performance is 0.037 (meaning the effect is positive), P Value on Y is 0.380 < 0.05 (meaning not significant), t-count on Y is 0.305 > T table 1.64 (meaning not significant) then the labor factor can be said have no effect on time performance, and the material factor coefficient on time performance is 0.081 (meaning the effect is positive), P Value on Y is 0.270 < 0.05 (meaning not significant), t-count on Y is 0.615 > T table 1.64 (meaning insignificant. Thus, the material has no effect on time performance, while in the coefficient of equipment factor to time performance is -0.061 (meaning the effect is negative), P Value to Y is 0.330 < 0.05 (meaning not significant), t-count to Y is 0.441 > T table 1.64 (meaning not significant). Then, the discharge has no effect on time performance, while the value of the place characteristic factor coefficient on time performance is -0.126 (meaning the effect is negative), P Value on Y1 is 0.257 < 0.05 (meaning insignificant), t-count on Y is 0.652 > T table 1.64 (meaning insignificant) thus has no effect on time performance. The results of this study are compared with previous studies value of the coefficient of managerial factors on time performance is 0.673 (meaning the effect is positive), P The value on time performance is 0.000 < 0.05 (meaning significant), t-count on Y1 is 3.962 > T table 1.64 (meaning significant). The managerial has a positive and significant effect on time performance.

This is in line with research conducted by J. C. P. Putra et al. (2017) which state that there are indicators of errors in the design. The most dominant factors that affect the performance of time and cost so that it needs consideration and waiting for approval of changes that occur. So that the work schedule becomes late in time, and costs result in an increase in project costs. And in line with research Sutarja et al. (2020) found the cause of delay is caused by owner, planning consultant, supervisory consultant, contractor, non-technical problems of the surrounding community and government and other factors, while research by Buya et al. (2022) stated that the main factors of delay in building construction were caused by human resources, financial resources and working methods. The main factor of project delay is also caused by changes in specification / design with a weighting value of 0.1264, and while research by Melyana & Sulistio (2022) which

found errors in choosing a construction method with a weight value of 0.0912 need good planning and working methods, and research by Al Amri & Oztemir (2022) found that managerial issues involve delays in payments to contractors.

Thus the value of planning and scheduling factors on time performance is 0.459 (meaning it has a positive effect), P The value of time performance is 0.003 < 0.05 (meaning significant), t-count on Y is 2.773 > T table 1.64 (meaning significant) so that the implementation factor and work relations have a positive and significant effect on time performance. In this study in line with that conducted by Mustafaruddin et al. (2018), It can be seen that the factors causing obstacles during planning and scheduling. In addition, what hinders work are design and planning factors. This condition is because the time needed to plan a project is too short due to the limited time for the completion of the project itself. If not properly anticipated, these mistakes will already be implemented, so the contractor bears the risk. This research is in line with research by Sutarja et al., (2020) the cause of delay is caused by owner, planning consultant, supervisory consultant, contractor, and results from the research by Rachid et al. (2019) who found the causes of delays, payment problems made and ineffective planning and scheduling of contractors, while the results of this study are compared with previous studies thus the value of the coefficient of other factors on time performance is -0.134 (meaning the effect is negative), P Value on Y is 0.181 < 0.05 (meaning not significant), t-count on Y is 0.913 > T table 1.64 (meaning not significant) then it has no effect on time performance.

By the results of time performance, against the increase in cost give value 0.821 (meaning the effect is positive), P Value on time performance is 0.000 <0.05 (meaning significant), t-on Y is 5.465>T table 1.64 (meaning significant) so that time performance has a positive and significant effect on cost performance. This study is in line with what was done by Endawati (2022); where the most dominant factor influencing cost performance in office building projects is the design change factor. With a coefficient value of 0.459, so that the planned work schedule is not on time and costs result in an increase in project costs. Research by Dapu et al. (2016) mentioned the main factors causing cost overrun are project cost planning, material quality control, and not paying attention to the project location, while research by Ayu (2017) the causes are increased material costs, planning and scheduling, material inventory control and external factors. Another research by Sun et al. (2020) also mentioned lack of team coordination, lack of experience and misfit in their field, human resource planning, also research Listanto & Hardjomuljadi (2018) mentioned factors like payment issues, material quality, work issues.

Research by Kurniawan & Anggraeni (2020) mentioned the main causes of problems paying for work and finding work results that do not match the quality, financial problems and research results Remi (2017) that affect payment, material, labor, while research by Irian et al. (2022) found cost estimation, quality/quality, design changes, material shortages, equipment, and payment. Strengthened by Simanjuntak & Dalian (2020), the issues of payment, material, labor, and while research by Paparang et al. (2018) found the implementation time, socio-cultural, project finance, while research by Iskandar et al. (2022) which has a significant effect on changes in the scope of work, changes in specifications, changes in design. Lastly, by Ruslim et al. (2023) state that contractors lack experience, lack of control over the work, the impact of cost overruns and waste of time, while research by Endawati & Susetyo (2023) found the changes in design, material availability and labor productivity.

Conclusion

The results of this study identify and analyze variables that affect time performance and cost performance in low-level commercial development in tangerang, so that it can be concluded that the cause of delays and increased costs in low-rise commercial development projects in the tangerang area is caused by managerial factors, namely design changes, and planning and scheduling plan factors because work often changes so that it has a significant influence on time and cost performance. Every relationship between factors has a relationship and influences each

other and affects with labor factors having an influence on material is 0.870, material on equipment is 0.829, equipment on place characteristics is 0.953, place characteristics on managerial is 0.898, managerial on planning and scheduling gives a value of 0.963 and planning and scheduling on other factors is 0.906. There are several dominant indicators causing delays in indicator X1.3 absenteeism rate = 55.337, X2.4 the amount of material delivered is incorrect before r = 93.760, X2.1 delay in Material Delivery = 93.974, X3.3 equipment productivity = 77.063 X4.8 vision or environmental response = 39.785, X5.1 Design and planning changes = 35.885, X6.5 Owner's work plan that often changes by = 29.949 X7.3 Problem The cultural difference at the project site = 73.432, Y1.1 delay in drawing preparation and approval amounted to 101.208, and Z1.4 overhead costs amounted to 41.319.

Based on the limitations of this study, this study only focused on low-rise commercial development projects and identified significant effects on time performance and cost performance. It can be deepened and expanded about the model applied in this study to predict the factors that affect the magnitude of influence on time performance and cost performance. The object of research can be developed in other types of construction projects besides building construction projects.

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