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Journal of Civil Engineering Science

(E-ISSN: XXXXX)

Vol. 1, No. 1, May, 2026

Analysis of Factors Affecting Project Delays at the Mabarrot Hasyimiyah Manyar Gresik Clinic

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Received 20 January 2026 ; Revised 19 Februari 2026; Accepted 31 March 2026 ; Published 1 May 2026

Abstract

Construction project delays are one of the main problems that often occur in construction implementation, including the second floor construction project of the Mabarrot Hasyimiyah NU Manyar Gresik Clinic. This study aims to identify and analyze the factors that influence project delays and determine the most dominant factors. The method used is a descriptive quantitative method with data collection through the distribution of questionnaires to 40 respondents consisting of contractors, supervisors, implementers, and project workers. Data analysis was carried out using SPSS version 26 through validity tests, reliability tests, and mean value calculations. The results of the study indicate that all indicators from the five independent variables—project management, human resources, materials and equipment, design changes, and external factors—influenced project delays. The most dominant factors influencing delays were delays in material and equipment procurement and a lack of skilled labor. It is hoped that the results of this study can provide input for relevant parties to minimize the risk of delays in similar construction projects in the future.

Keywords: Project delay, Causal factors, Project management, Material, Human resources

1. Introduction

Construction project delays are a common issue affecting project performance in terms of cost, time, and quality[1], [2]. Delays may arise from various factors such as poor project management, material shortages, labor issues, and external conditions[3]. Previous studies have identified that material procurement delays and poor coordination among stakeholders are among the dominant causes of construction delays[3], [4]. In the case of the second-floor construction project of the Mabarrot Hasyimiyah NU Clinic in Manyar, Gresik, several obstacles were observed, including delays in material delivery, lack of skilled labor, and environmental constraints.

However, limited studies specifically analyze delay factors in small-scale healthcare construction projects using quantitative statistical approaches. Therefore, this study aims to identify and analyze the factors influencing project delays and determine the most dominant factors affecting project performance. Project delays can occur due to a variety of factors, including poor project management, inadequate human resources, delays in material procurement, design changes, and external conditions such as weather or regulatory issues[5].

http://dx.doi.org/xxxxxx-XXXXXXXX

Stated that delays in construction projects are often caused by incomplete project planning, weak organizational management, unclear specifications, and unexpected field conditions.

In the case of the second floor construction project of the Mabarrot Hasyimiyah NU Clinic located in Manyar, Gresik, several obstacles were encountered during project implementation. These obstacles include delays in material procurement, limited workforce availability, weak coordination among project stakeholders, and external factors such as weather conditions. These issues resulted in disruptions to the planned work schedule and affected the progress of project completion. Therefore, it is necessary to conduct a comprehensive study to identify the factors contributing to project delays and determine the most dominant factors affecting the construction process. By understanding these factors, project managers and stakeholders can develop more effective strategies to improve project planning, coordination, and risk management[6].

Based on this background, this study aims to analyze the factors affecting project delays in the construction of the second floor of the Mabarrot Hasyimiyah NU Clinic in Manyar, Gresik. The study focuses on five main variables: project management, human resources, materials and equipment, design changes, and external factors. The results of this research are expected to provide useful insights for improving project management practices and minimizing delays in similar construction projects in the future.

2. Research Methods

This study employed a quantitative descriptive research approach to analyze the factors influencing project delays in the construction of the second floor of the Mabarrot Hasyimiyah NU Clinic located in Manyar, Gresik. The quantitative method was chosen because it allows the researcher to measure the influence of several variables on project delays using statistical analysis.

2.1. Research Location and Object

This study employed a quantitative descriptive approach to analyze factors influencing construction project delays. Quantitative methods are widely used to examine relationships between variables in construction management studies [8].

The variables used in this study consist of five independent variables and one dependent variable. The independent variables include project management, human resources, materials and equipment, design changes, and external factors. Meanwhile, the dependent variable is the delay in project implementation. The research was conducted on the second-floor construction project of the Mabarrot Hasyimiyah NU Clinic in Manyar, Gresik.

2.2. Data Collection Methods

Data collection was carried out using both primary and secondary data sources. Primary data were obtained through questionnaire surveys distributed to respondents involved in the construction project. The respondents consisted of contractors, supervisors, implementers, and construction workers who have direct experience in the project implementation. A total of 40 respondents participated in this study. Primary data were collected through questionnaires distributed to 40 respondents consisting of contractors, supervisors, and workers involved in the project. Secondary data were obtained from project documents and literature studies[1], [5].

The questionnaire was designed using a Likert scale with values ranging from 1 to 5 to measure respondents' perceptions regarding factors causing project delays. Secondary data were obtained from project documentation, literature studies, previous research, and related references that support the theoretical framework of this study.

2.3. Data Analysis Techniques

The collected data were analyzed using the Statistical Package for Social Sciences (SPSS) version 26. Several statistical tests were performed to ensure the validity and reliability of the research data.

a. Validity Test

The validity test was conducted to determine whether the questionnaire items accurately measure the intended research variables. This test was performed using correlation analysis between each item score and the total score. An item is considered valid if the calculated correlation value (r-count) is greater than the r-table value at a significance level of 0.05.

b. Reliability Test

Reliability testing was conducted to evaluate the consistency of the research instrument. The reliability of the questionnaire was tested using the Cronbach's Alpha method. A variable is considered reliable if the Cronbach's Alpha value exceeds 0.60.

c. Mean Analysis

Mean analysis was conducted to determine the average perception of respondents toward each factor influencing project delays. The mean value indicates the relative importance of each factor, where a higher mean value indicates a stronger influence on project delays.

d. Multiple Linear Regression Analysis

Multiple linear regression analysis was used to analyze the relationship between independent variables and the dependent variable. This analysis helps determine the magnitude and direction of the influence of each factor on project delays.

e. Hypothesis Testing

Hypothesis testing was carried out using the T-test and F-test. The T-test was used to determine the partial influence of each independent variable on the dependent variable, while the F-test was used to evaluate the simultaneous effect of all independent variables on project delays.

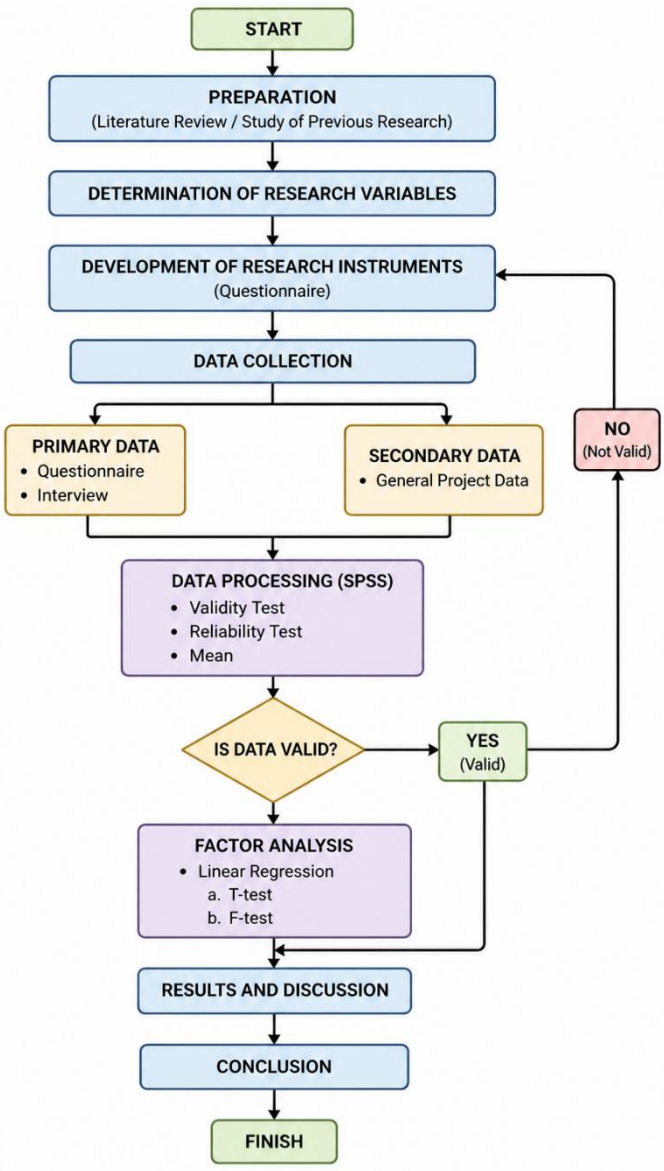

Figure 1. Flow Chart

3. Results and Discussion

3.1. Data Processing Results

Data processing was carried out after all distributed questionnaires were collected. The data processing process in this study included questionnaire testing, including validity and reliability tests. These testing techniques aimed to ensure the validity and reliability of the statement attributes in this study. Data from the questionnaires were input into SPSS (Statistical Product and Services Solution) version 2.6. All questionnaire items were declared valid (r-count > r-table) and reliable (Cronbach's Alpha > 0.6), indicating the instrument is acceptable and consistent.

3.2. Validity Test

Validity testing was conducted by analyzing the correlation between the scores for each statement and the total score. The survey statements were deemed effective in identifying the research objectives. The efficacy of this study was statistically tested using IBM Statistical Product and Service Solution (SPSS) version 26 with a two-tailed test at a significance level of 0.05 (5%).

Table 1. Analysis

No	Indicators / Variables	r Count	r Table (0.3120) N-2 = 38	Information
Project Management (X1)				
1.	X1.1	0.512	0.3120	VALID
	X1.2	0.698	0.3120	VALID
	X1.3	1.00	0.3120	VALID
Human Resources (X2)				
2.	X2.1	0.821	0.3120	VALID
	X2.2	0.886	0.3120	VALID
	X2.3	1.00	0.3120	VALID
Materials and Equipment (X3)				
3.	X3.1	0.538	0.3120	VALID
	X3.2	0.424	0.3120	VALID
	X3.3	1.00	0.3120	VALID
Design Changes (X4)				
4.	X4.1	0.640	0.3120	VALID
	X4.2	0.810	0.3120	VALID
	X4.3	1.00	0.3120	VALID
Factors (X5)				
5.	X5.1	0.392	0.3120	VALID
	X5.2	1.00	0.3120	VALID
Delay in Work Implementation (Y)				
6.	Y.1	0.436	0.3120	VALID
	Y.2	1.00	0.3120	VALID

In the table above, it can be seen that after conducting a validity test on 30 respondents with a significance level of 5%, r_(tabel) (df = n-2, 40-2 = 38) r_(tabel)0.3120 was obtained with all question items from variables X1, X2, X3, X4, X5 and Y. Not all of them produced values r_(hitung)greater than r_(tabel)so it can be concluded that all statement items in this study are said to be valid.

3.3. Reliability Test

Reliability testing refers to understanding whether an instrument can measure something consistently over time. The reliability testing method used is the internal consistency method with the Cronbach's alpha stability method using the reliability coefficient r. Reliability testing is carried out on All questionnaire items were declared valid (r-count > r-table) and reliable (Cronbach's Alpha > 0.6), indicating the instrument is acceptable and consistent. The results of the reliability test for each variable are processed using the IBM Statistical Product and Service Solution (SPSS) version 26 program.

Table 2. Reliabel Test

No	Indicators/variables	Cronbach's alpha	Correlation coefficient	Information
Project Management (X1)				

No	Indicators/variables	Cronbach's alpha	Correlation coefficient	Information
1.	X1.1	0.842	0.6	Reliable
	X1.2	0.842	0.6	Reliable
	X1.3	0.842	0.6	Reliable
Human Resources(X2)				
2.	X2.1	0.950	0.6	Reliable
	X2.2	0.950	0.6	Reliable
	X2.3	0.950	0.6	Reliable
Equipment and Materials (X3)				
3.	X3.1	0.768	0.6	Reliable
	X3.2	0.768	0.6	Reliable
	X3.3	0.768	0.6	Reliable
Design Changes (X4)				
4.	X4.1	0.880	0.6	Reliable
	X4.2	0.880	0.6	Reliable
	X4.3	0.880	0.6	Reliable
External Factors (X5)				
5.	X5.1	0.625	0.6	Reliable
	X5.2	0.625	0.6	Reliable
Delay in Work Execution (Y)				
6.	Y.1	0.607	0.6	Reliable
	Y.2	0.607	0.6	Reliable

Based on the reliability coefficient table, which exceeds the minimum Cronbach's Alpha value of 0.6, it can be concluded that the questionnaire meets the standards required to be considered suitable for use in research. These results provide confidence that the research instrument has good ability to consistently measure the variables being studied.

3.4. Linear Regression

Multiple Linear Regression Analysis is an analysis that connects two or more independent variables with a dependent variable with the aim of measuring how much influence each dependent variable has, either partially or simultaneously.

Table 3. Coeeficient Test

Coefficients [a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3,457	1,285		2,690	,011
	Project Management	-,192	,214	-,186	-,897	,376
	Human Resources	-,158	,198	-,169	-,798	,430
	Materials and Equipment	,225	,210	,201	1,070	,292
	Design Changes	,441	,319	,405	1,384	,175
	External Factors	-,134	,211	-,122	-,635	,529
a. Dependent Variable: Delay in Work Execution						

Based on the results of multiple linear regression, a constant of 3.457 was obtained with a significance of 0.011 (<0.05), indicating a basic project delay even though the independent variables did not have a significant effect. Project management variables (–0.192; sig. 0.376) and human resources (–0.158; sig. 0.430) tended to decrease delays, but were not significant. Materials and equipment (0.225; sig. 0.292) and design changes (0.441; sig. 0.175) actually increased delays, with design changes having the greatest influence although still not significant. External factors (–0.134; sig. 0.529) also did not have a significant effect. Overall, there were no significant variables, but design changes were practically the most dominant factor.

3.5. F test

Based on the t-test results, a constant of 3.457 with a calculated t of 2.690 and a significance of 0.011 indicates that project delays still occur even without considering the independent variables. The project management variables (–0.192; sig. 0.376) and human resources (–0.158; sig. 0.430) are negative, meaning that improvements in these two aspects tend to reduce delays, but the effect is not significant. Materials and equipment (0.225; sig. 0.292) and design changes (0.441; sig. 0.175) have a positive effect, where constraints on both increase delays, with design changes being

the most dominant factor although still not significant. Meanwhile, external factors (–0.134; sig. 0.529) also have no significant effect. Overall, no variables have a significant effect, but practically design changes make the largest contribution to project delays.

3.6. T-test

The F test was used to determine whether the independent variables in this study, namely project management, human resources, materials and equipment, design changes, and external factors, simultaneously influence the dependent variable, namely delays in work implementation. Based on the ANOVA table, the calculated F value was 1.194 with a significance value of 0.333. Because the significance value is greater than 0.05, it can be concluded that together the five independent variables do not have a significant effect on project delays. This indicates that variations in delays in work implementation cannot be explained strongly by the regression model used in this study, and it is likely that there are other factors outside the variables studied that more dominantly influence delays.

3.7. Mean

Mean analysis was performed to find the average value for each variable in the questionnaire. The data tested to find the mean value was the data that was validated. From this mean value, we can see the average opinion of respondents regarding the most dominant factor contributing to project delays. These findings align with previous studies indicating that environmental conditions and material supply significantly influence project delays. The following is the calculation of the mean value using SPSS.

Table 4. Mean

No	Indicators of Variable Factors Causing Delays	Code	Mean Value
1.	**Project Management Factors**		
	Project planning that is not detailed and realistic	X1.1	3.35
	Coordination between implementation teams is less effective	X1.2	3.35
	Weak project implementation control	X1.3	3.55
2.	**Human Resources Factors**		
	The number of workers is not sufficient for field needs	X2.1	3.35
	Lack of workforce skills or expertise	X2.2	3.25
	Low work discipline and poor communication between workers	X2.3	3.20
3.	**Material and Equipment Factors**		
	Delays in procurement or delivery of materials	X3.1	3.95
	Materials or equipment do not comply with the project's technical specifications.	X3.2	3.63
	Damage or unpreparedness of equipment during project implementation	X3.3	3.65
4.	**Design Change Factors**		
	Design changes frequently made by the owner	X4.1	3.27
	The process of changing a pending plan	X4.2	3.55
	Not following the initial plan designed by the owner	X4.3	3.60
5.	**External Factors**		
	Extreme weather conditions hampering work	X5.1	4.22
	Disturbance or rejection from the community around the project	X5.2	3.63
6.	**Factors that cause delays in work implementation**		
	Number of late activities	Y.1	3.60
	Cause of Delay, (weather, labor, equipment materials, etc.).	Y.2	4.05

From the results of the table above, the highest ranking of variable factors that influence project delays is external factors where the mean value is 4.22 for extreme weather conditions. Then the factor that has the next highest mean value is the material and equipment factor where the question items in the material and equipment factor have a mean value of 3.95 for the variable item of delays in procurement or delivery of materials, 3.65 for the variable item of equipment damage or unpreparedness during implementation and 3.63 for materials or equipment that do not comply with the project's technical specifications. While the lowest mean value is the human resource factor where the mean value is 3.35 for the number of workers is insufficient for field needs, 3.25 for insufficient skills or expertise of workers and 3.20 for low work discipline and poor communication between workers.

To find out the factors that influence project delays and the most dominant factors that influence project delays in the construction of the Mabarrot Hasyimiyah Manyar Gresik clinic, data analysis was carried out, namely factor analysis using the IBM SPSS 21 program. The explanation is as follows:

3.8. Factors Affecting Project Delays

The analysis results show that the average project management is 3.10, indicating that this factor is still a cause of delays although relatively low, with a coefficient of 0.123, a t value of 1.428, and a significance of 0.162 so it is not significant. Human resources have an average of 3.05 which reflects a shortage of labor and skills, but its influence is also not significant (coefficient 0.052; t = 0.747; sig. 0.460). Meanwhile, materials and equipment have an average of 3.95 which is quite high, especially related to delays in material procurement, with significant regression results (coefficient 0.287; t = 3.020; sig. 0.005). Design changes obtained an average of 3.20 which indicates that it is quite hampering the work, but is not the main factor and its influence is not significant (coefficient 0.095; t = 1.338; sig. 0.190). Meanwhile, external factors have the highest average, namely 4.22, mainly caused by extreme weather, with very significant regression results and being the dominant factor in project delays (coefficient 0.401; t = 4.507; sig. 0.000).

3.9. The Most Dominant Factors Influencing Project Delays

The analysis results show that external factors, particularly extreme weather conditions such as heavy rain, strong winds, and high humidity, obtained a mean value of 4.22, which is categorized as very high. These conditions are a major obstacle in the implementation of field work, especially in structural and casting work that is highly dependent on environmental conditions. The regression results also strengthen this finding with a coefficient of 0.401, a t-value of 4.507, and a significance of 0.000, so it can be concluded that external factors have a significant influence and are the variables with the largest contribution to project delays. In addition, material and equipment factors also play an important role, with the indicator of material procurement delays obtaining a mean value of 3.95, which is categorized as high. This indicates that delays in material supply are a significant obstacle due to the sequential nature of construction work, so that delays in material supply directly impact the next stage. The regression results show a coefficient of 0.287, a t-value of 3.020, and a significance of 0.005, which confirms that materials and equipment have a significant influence on project delays, although the level of influence is smaller than external factors.

4. Conclusions

1. Factors affecting the delay in the construction project of the second floor of the Mabarrot Hasyimiyah NU Manyar Gresik Clinic , Project management and human resources factors have a relatively low average of 3.10 and 3.05, as well as an insignificant regression test, so their role in causing project delays is relatively small. The design change factor also shows an average of 3.20, but its influence remains insignificant. On the other hand, the material and equipment factors have a fairly high average of 3.95, so it is proven to contribute significantly to delays, especially in the aspect of material procurement. External factors are the main cause with the highest average value of 4.22, mainly influenced by extreme weather conditions. Project delays are mainly influenced by external factors and material procurement issues. External factors, particularly weather conditions, are the most dominant contributors, followed by material delays. Improvements in logistics planning, coordination, and resource management are necessary to minimize delays in construction projects.
2. The most dominant factors influencing project delays indicate that the main causes of project delays come from external factors as well as material and equipment factors. External factors occupy the highest position with an average value of 4.22. This confirms that extreme weather such as heavy rain, strong winds, and high humidity are major obstacles, especially in structural and casting work which are highly influenced by environmental conditions. On the other hand, material and equipment factors also prove significant with an average value of 3.95, where delays in material supply are the main obstacle due to the interconnected nature of construction work, so that any delay in material distribution will disrupt the next work process.

5. Declarations

5.1. Author Contributions

Conceptualization, M.F.H. and I.M.; methodology, P.A.P.S.; software, M.F.H.; validation, M.F.H., I.M., and D.M.A.; formal analysis, M.F.H.; investigation, P.A.P.S.; resources, P.A.P.S.; data curation, M.F.H.; writing—original draft preparation, I.M.; writing—review and editing, D.M.A.; visualization, D.M.A.; supervision, P.A.P.S.; project administration, P.A.P.S. All authors have read and agreed to the published version of the manuscript.

5.2. Data Availability Statement

The data presented in this study are available on request from the corresponding author.:

5.3. Funding

Funding information is not available:

5.4. Acknowledgements

The authors would like to express their sincere appreciation to all parties who contributed to the completion of this study. The authors also acknowledge the support and facilities provided by the Civil Engineering Study Program, Universitas Islam Darul ‘Ulum (UNISDA) Lamongan, which greatly facilitated this research.:

5.5. Conflicts of Interest

The authors declare no conflict of interest.:

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