CIVED
Journal of Civil Engineering and Vocational Education

EISSN: 2622-6774
Vol 10 No.3 September 2023
http://cived.ppj.unp.ac.id/index.php/CIVED

Analysis of Factors Affecting the Decline in The Quality of Building Construction Projects

Fariz Rifky[1*], I Nyoman Pahang Dita Putra[2]
[1,2] Universitas Pembangunan Nasional "Veteran" Jawa Timur, Indonesia
*Corresponding Author: farizrifky09@gmail.com
Co-Author[2]: putra_indp.ts@upnjatim.ac.id

Received 9th August 2023; Revision 15th August 2023; Accepted 26th September 2023

ABSTRACT

Quality according to planning is one of the most important things in the successful implementation of each construction project. Quality factors when implementing building construction projects are very important to know, especially for construction service providers so that they can find out what factors affect the decline in building construction quality. This study aims to analyse the factors that affect the decline in the quality of building construction. This research was conducted by distributing questionnaires in order to obtain data which will then be analysed and discussed in this study. Respondents of this questionnaire are contractors and consultants. Seven factors are obtained that affect the decline in building construction quality based on the results of questionnaires and data analysis, namely equipment, materials, implementation, environment, cost, human resources, design. Furthermore, the data that has been obtained is tested for validity to ensure that the data obtained is valid and reliable testing is carried out to ensure that the valid data is also reliable. The data was analysed using the relative importance index analysis method with the results of the inaccurate design drawing variable which has the highest RII value of 0.908, then descriptive analysis and obtained the results of the design factor having the highest mean value of 3.511 which means that the design factor has the greatest influence on reducing the quality of building construction.

Keywords: *Construction Quality; Building Construction; Building Quality; Relative Importance Index*

INTRODUCTION

As the number of companies in the construction sector increases, it has not been matched by an increase in quality and good performance. which can be proven by looking at the quality, timing of project work and the appropriate use of project resource costs in contract implementation. Construction sector entrepreneurs are still unable to control construction equipment with high technology to achieve high-quality construction projects [1]. Quality is a strategic issue for every company in the construction sector.

In construction projects, leading global companies have extensively employed quality management to guarantee the effective completion of the endeavor [2]. The performance of a construction project is significantly influenced by the dynamics and connections among essential stakeholders (such as the client, architect, and contractor). While these relationships are crucial, the individual contributions of each participant still hold significance, as the collective project performance hinges on the effectiveness of every individual involved [3].

When implementing quality, an organisation requires fundamental changes to traditional management practices [4].

Architects and engineers to achieve the objectives of responsibility and quality control must work together, contactors must ensure the required quality within the cost and time agreed in construction industry practice [5]. To be successful, construction companies need to provide assurance that they have the ability to deliver an effective, contractually compliant and commercially viable product [6]. In every construction project has a certain implementation limit [7].

Within the domain of project management, the trio of limitations consists of schedule, cost, and quality accomplishments. Among these elements, project management tends to prioritize schedule precision and cost effectiveness. Occasionally, the emphasis on achieving schedule and cost goals leads to the oversight of project quality [8]. Development in the field of infrastructure can also contribute greatly to the growth of the surrounding sectors [9]. Growth in infrastructure is believed to make a major contribution to the growth of other business activities [10].

Whether or not the objectives of a project are achieved is determined by the role of control and supervision [11]. Every construction project, there are resources that will be processed, it is during this process that management is needed so that this process runs effectively and efficiently [12]. A quality construction project is defined by the fulfilment of the requirements provided by the project owner, design team, contractor and regulations [13]. quality management is a strategy to survive in business [14]. It is important to be aware of quality factors when implementing construction projects, especially for construction service providers [15].

MATERIALS AND METHODS

Location, subject and object of research

The focus of this research is building construction projects located in Surabaya, Sidoarjo, and Gresik. The method used to collect information for determining the number of samples in this study is through the use of questionnaires with certain criteria, namely: building construction projects, government or private projects that are being implemented and have a minimum contract value of Rp5,000,000,000.00. The number of samples taken was 5 projects with 30 respondents.

Identification of factors affecting quality reduction in building construction projects

Identification of factors that affect the decline in the quality of building construction is from literature studies on the results of previous studies. Based on the results of the literature study, there are 7 factors that affect the decline in the quality of building construction, such as equipment factors (X1), material factors (X2), implementation factors (X3), environmental factors (X4), cost factors (X5), human resource factors (X6), design factors (X7). And obtained 30 variables, as shown in table 1:

Table 1. Variable list

ID.	Variable
X1.1	Lack of equipment
X1.2	Delay in delivery

X1.3	Equipment that is no longer fit for use
X2.4	Delay in material procurement
X2.5	Not enough material
X2.6	Damage during delivery
X2.7	Poor material quality
X3.8	Incomplete project scope definition
X3.9	Delay in decision making
X3.10	Poor team coordination
X3.11	Poor supervision performance
X3.12	Inappropriate construction execution method
X4.13	Poor weather conditions
X4.14	Difficult access to the project site
X4.15	Natural disaster
X5.16	Lack of funding guarantee from the owner
X5.17	Increase in equipment prices
X5.18	Increase in material prices
X5.19	Limited funding allocation
X5.20	High bank interest rate
X5.21	Inflation
X6.22	Lack of human resources
X6.23	Lack of Project manager knowledge
X6.24	Lack of competent human resources
X6.25	Poor labour management system
X6.26	Contractors lack experience
X6.27	Lack of labour skill training
X7.28	Inaccurate design drawings
X7.29	Design changes
X7.30	Not in accordance with design specifications

Data collection methods

The data collection methods used in this research are quantitative methods. Quantitative analysis uses questionnaire data to describe the magnitude of potential consequences and the likelihood that these consequences will occur. The research data was obtained through three types of data collection methods, i.e:

1. Literature Study
2. Questionnaire
3. Observation

RESULTS AND DISCUSSION

Validity Test

This study conducted a validity test to determine whether the data to be analysed is valid data. The data will be tested for significance at 0.05 and said to be valid if the correlation value of each variable is greater than the r table value. The following is the correlation value of each variable found in the corrected item-total correlation column in Table 2.

Table 2. Validity test results

Faktor	**Variable**	**Corrected Item Total Correlation**
Equipment	X1.1	0.606
	X1.2	0.401
	X1.3	0.547
Materials	X2.4	0.420
	X2.5	0.626
	X2.6	0.408
	X2.7	0.532
Implementation	X3.8	0.606
	X3.9	0.740
	X3.10	0.586
	X3.11	0.666
	X3.12	0.764
Environment	X4.13	0.427
	X4.14	0.502
	X4.15	0.603
Cost	X5.16	0.612
	X5.17	0.683
	X5.18	0.781
	X5.19	0.615
	X5.20	0.594
	X5.21	0.679
Human Resources	X6.22	0.411
	X6.23	0.714
	X6.24	0.578
	X6.25	0.595
	X6.26	0.653
	X6.27	0.501
Design	X7.28	0.525
	X7.29	0.438
	X7.30	0.453

Based on Table 2, it can be seen that all question variables are said to be valid because the correlation coefficient (r count is greater than r table of 0, 361, which this data can then be tested for reliability.

Reliability Test

Reliability testing is said to be successful if the Cronbach alpha coefficient value is ≥ 0.60, if it is greater, it can be said that the results of the test are stable, accurate, and consistent. the Cronbach's alpha coefficient of the reliability test results can be seen in Table 3.

Table 3. Reliability test results

No.	Variable	Croanbach's Alpha Value	Reliable?
1	30	0.9283	Yes

Based on Table 3, the results of the reliability test for all variables have a very good reliability value because they have a Croanbach's alpha value greater than the Croanbach's alpha reference value, namely the reliability coefficient of 0.9283. That way every variable in this study has been declared reliable.

Relative Importance Index Analysis

The method used to determine the most influential factors in reducing the quality of building construction includes the Relative Importance Index (RII). To make the results of the analysis of influential factors, the results of the questionnaire are inputted and processed with statistical calculations. The ranking system is used by weighting the values obtained from respondents after filling out the questionnaire, which can determine the most influential factors. The most influential variables in this study were determined using the RII method. The following is a ranking of each variable based on the RII value can be seen in Figure 1.

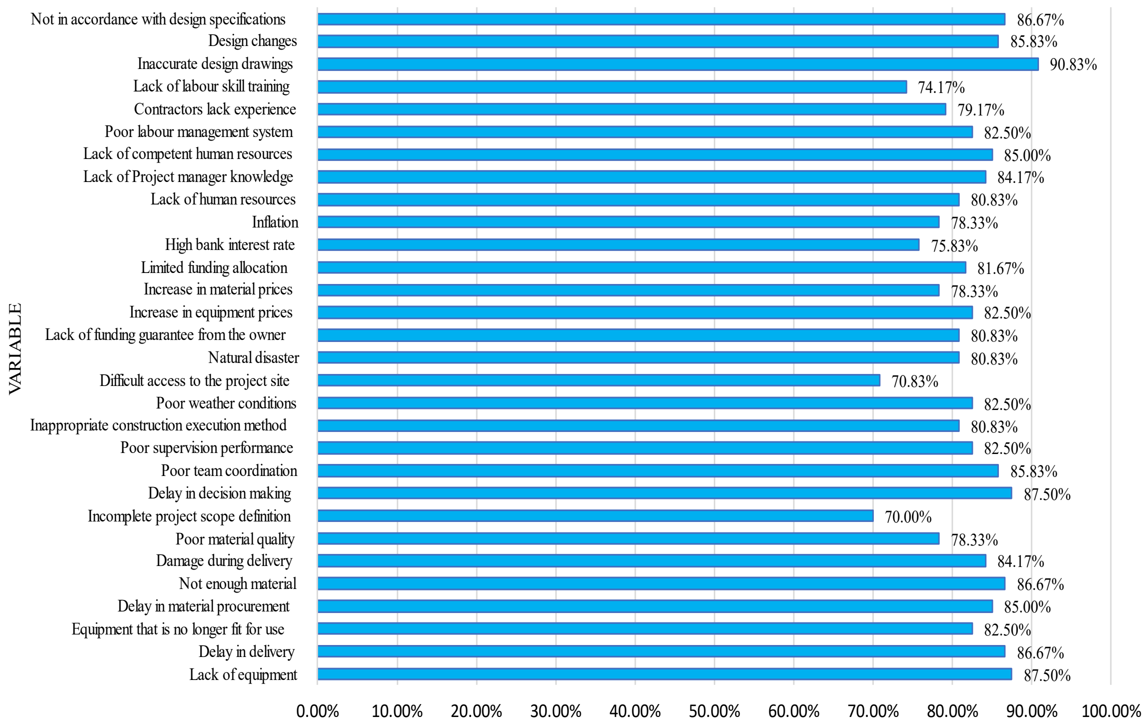


Figure 1. Relative importance index analysis results

The results show the RII value of all variables, which indicates the level of importance of these variables in influencing the decline in building construction quality. For the ranking of the results of the RII value on each variable can be seen in Table 4.

CIVED Journal of Civil Engineering and Vocational Education
EISSN: 2622-6774
Vol 10 No.3 September 2023
http://cived.ppj.unp.ac.id/index.php/CIVED

Table 4. Relative importance index analysis results

No.	Variable	Factor	RII	Rank
1	Inaccurate design drawings	Design Factors	0.908	1
2	Lack of equipment	Equipment Factors	0.875	2
3	Delay in decision making	Implementation Factors	0.875	3
4	Delay in delivery	Equipment Factors	0.867	4
5	Not enough material	Material Factor	0.867	5
6	Not in accordance with design specifications	Design factor	0.867	6
7	Poor team coordination	Implementation factor	0.858	7
8	Design changes	Design Factor	0.858	8
9	Delay in material procurement	Material Factors	0.85	9
10	Lack of competent human resources	Human Resource Factors	0.85	10
11	Damage during delivery	Material Factors	0.842	11
12	Lack of Project manager knowledge	Human Resource Factors	0.842	12
13	Equipment that is no longer fit for use	Equipment Factor	0.825	13
14	Poor supervision performance	Implementation Factors	0.825	14
15	Poor weather conditions	Environmental Factors	0.825	15
16	Increase in equipment price	Cost Factors	0.825	16
17	Poor labour management system	Human Resource Factors	0.825	17
18	Limited funding allocation	Cost Factor	0.817	18
19	Unsuitable construction implementation method	Implementation Factors	0.808	19
20	Natural disaster	Environmental Factors	0.808	20
21	Lack of funding guarantee from the owner	Cost Factor	0.808	21
22	Insufficient number of human resources	Human Resource Factors	0.808	22
23	Contractor lack of experience	Human Resource Factors	0.792	23
24	Poor material quality	Material Factors	0.783	24
25	Increase in material price	Cost Factor	0.783	25
26	Inflation	Cost Factor	0.783	26
27	High bank interest rate	Cost Factor	0.758	27
28	Lack of labour skills training	Human Resource Factor	0.742	28
29	Difficult access to project site	Environmental Factors	0.708	29
30	Incomplete project scope definition	Implementation	0.7	30

EISSN: 2622-6774
Vol 10 No.3 September 2023
http://cived.ppj.unp.ac.id/index.php/CIVED

Based on Table 4, the results show the ranking of variables that have the highest RII value, which indicates the importance of these variables in influencing the decline in building construction quality. Among the variables analysed. Inaccurate design drawings, this variable has the highest RII value of 0.908, lack of equipment, this variable has a high RII of 0.875, delays in decision making, this variable has an RII of 0.875.

Pearson Correlation Analysis Between Factors

Based on Figure 2, the highest correlation value is factor X3 (Implementation Factor) and X6 (Human Resources Factor), this shows that the two factors have a very strong relationship with a correlation value of 0.778. The second highest correlation value is factor X3 (Implementation Factor) and X5 (Cost Factor), this shows that the two factors have a very strong relationship with a correlation value of 0.655. The third highest correlation value is the X2 (Material Factor) and X6 (Human Resources Factor) factors, this shows that the two factors have a very strong relationship with a correlation value of 0.647, and the next correlation value can be seen in Figure 2.

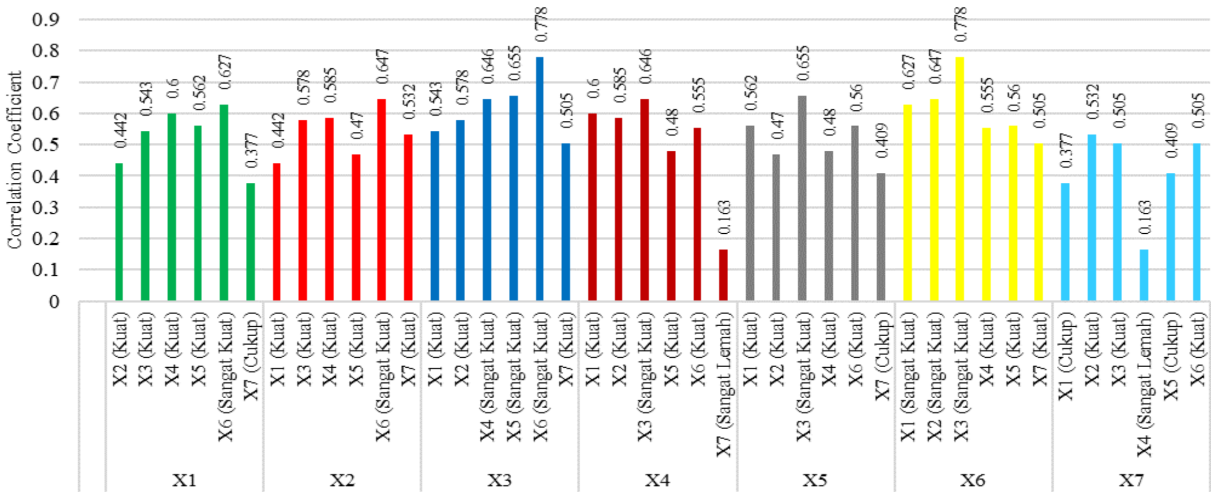


Figure 2. Pearson correlation test analysis results between factors

Pearson Correlation Analysis Between Variables

The analysis was carried out to determine the level of relationship between variables obtained from 30 respondents where these factors also had a total of thirty (30) variables. This analysis is used to determine the level of closeness of each variable with other variables.

CIVED
Journal of Civil Engineering and Vocational Education
EISSN: 2622-6774
Vol 10 No.3 September 2023
http://cived.ppj.unp.ac.id/index.php/CIVED

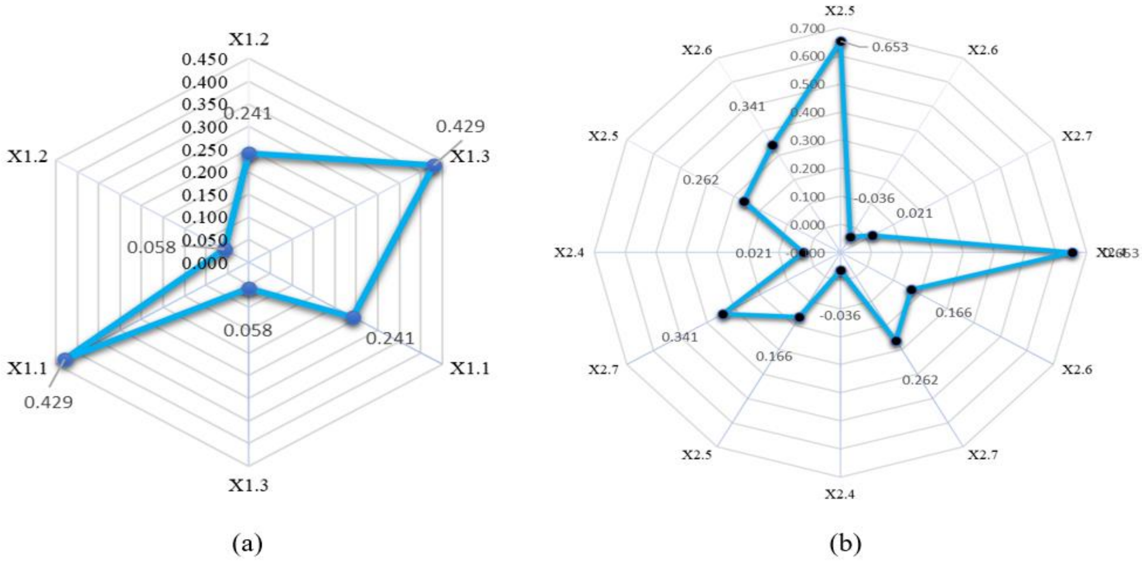


Figure 3. (a) Correlation analysis between equipment factor variables and (b) Correlation analysis between material factor variables

Based on Figure 3 (a) the correlation value between the highest equipment factor variables that have a strong correlation relationship of 0.429 is variable X1.1 (lack of equipment) and X1.3 (equipment that is not suitable for use). Based on Figure 3 (b) the correlation value between variables in the highest material factor which has a very strong correlation relationship of 0.653 which is found in variables X2.4 (delay in material procurement) and X2.5 (not enough material).

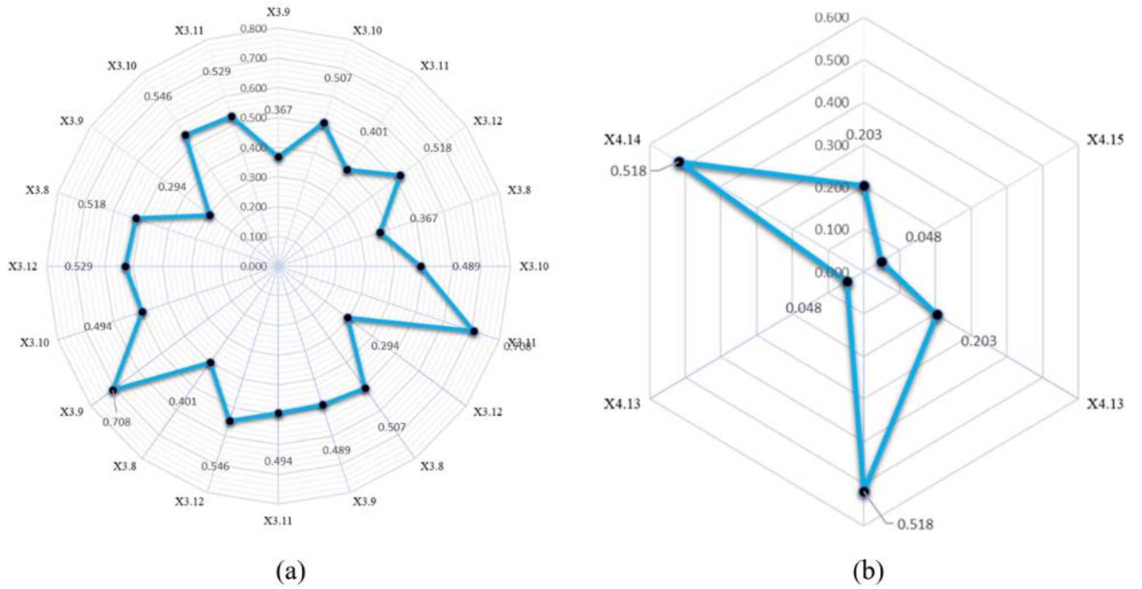
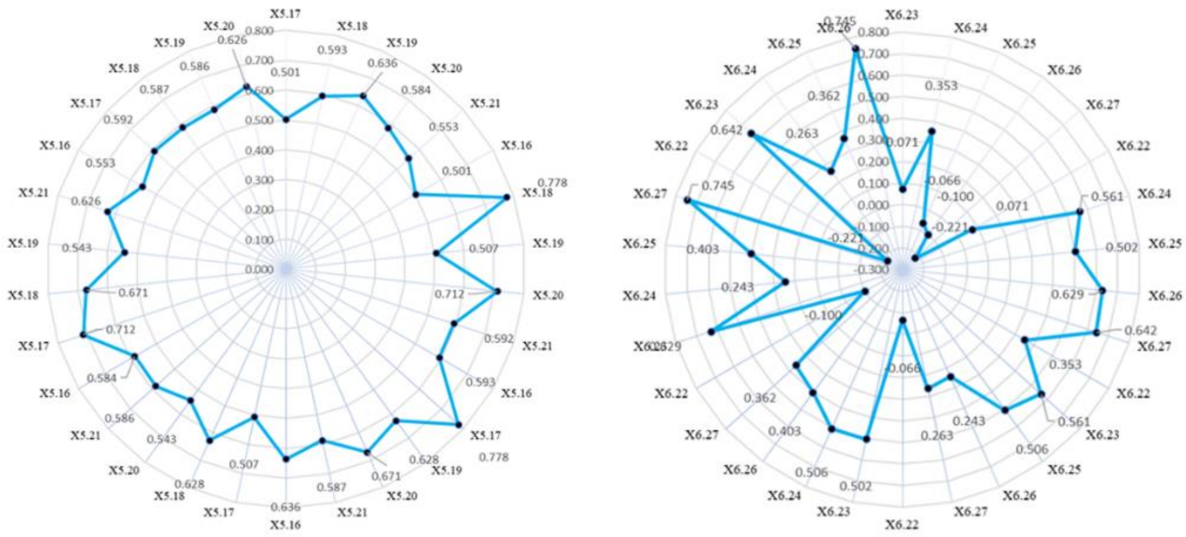


Figure 4. (a) Correlation analysis between variables of implementation factors and (b) Correlation analysis between variables of environmental factors

Based on Figure 4 (a), the correlation value between variables of the highest implementation factor that has a very strong correlation relationship of 0.708 is found in variables X3.9 (delays in decision making) and X3.11 (poor supervisory performance). Based on Figure 4 (b)

EISSN: 2622-6774
Vol 10 No.3 September 2023
http://cived.ppj.unp.ac.id/index.php/CIVED

the correlation value between variables in the highest environmental factor which has a strong correlation relationship of 0.518 found in variables X4.14 (difficult location access) and X4.15 (natural disasters).



(a) (b)

Figure 5. (a) Correlation analysis between cost factor variables and (b) Correlation analysis between human resource factor variables

Based on Figure 5 (a) the correlation value between the highest cost factor variables that have a very strong correlation relationship of 0.778 found in variables X5.17 (increase in equipment prices) and X5.18 (increase in material prices) and the second highest correlation value of 0.712 between variables X5.18 (increase in equipment prices) and X5.20 (high bank interest rates). Based on Figure 5 (b), the highest correlation value between variables in the human resource factor which has a very strong correlation relationship of 0.642 is found in variables X6.23 (lack of project manager knowledge) and X6.27 (lack of labour skills training).

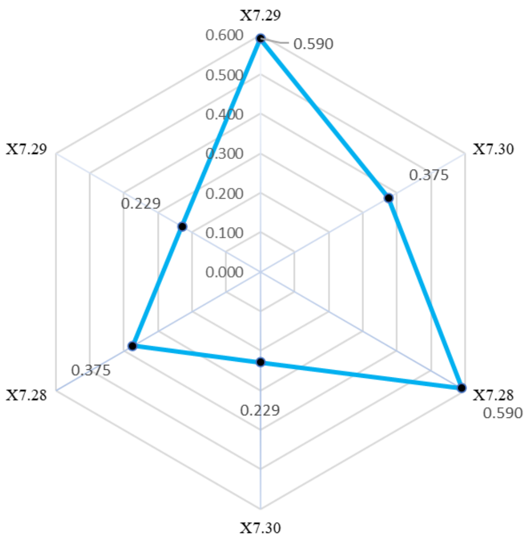


Figure 6. Correlation analysis between design factors variables

EISSN: 2622-6774
Vol 10 No.3 September 2023
http://cived.ppj.unp.ac.id/index.php/CIVED

Based on Figure 7, the correlation value between the highest design factor variables that have a strong correlation relationship of 0.590 is found in variables X7.28 (inaccurate design drawings) and X7.29 (design changes), and the correlation value between design factor variables can be seen in Figure 6.

Pearson Correlation Analysis Between Factors and Variables

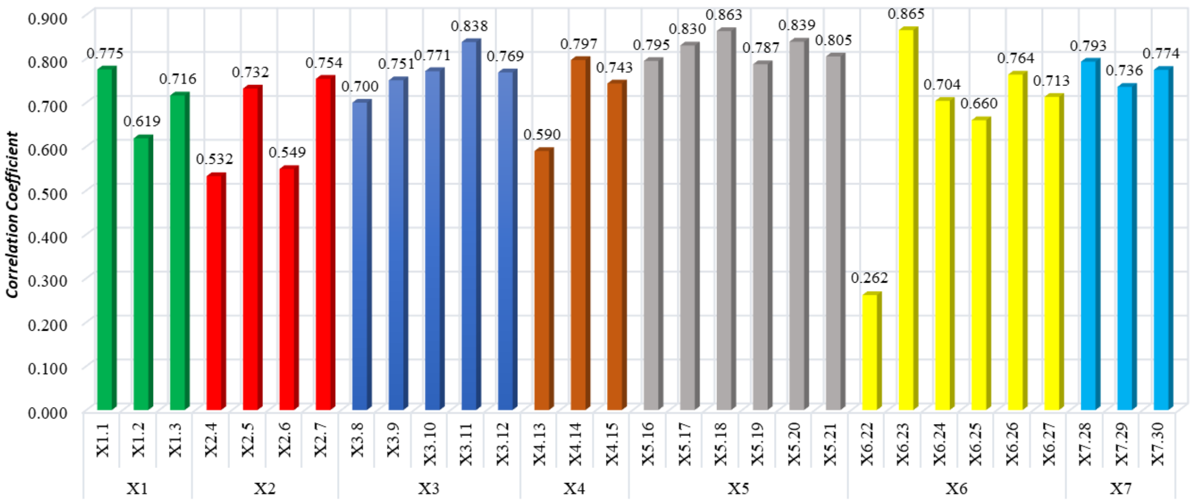


Figure 7. Pearson Correlation Test Analysis Results Between Factors and Variables

Based on Figure 7, the highest correlation value is factor X6 (Human Resources Factor) and variable X6.23 (Lack of Project manager knowledge), this shows that these factors and variables have a very strong relationship with a correlation value of 0.865. The second highest correlation value is factor X5 (cost factor) and variable X5.18 (increase in material prices) this shows that these factors and variables have a very strong relationship with a correlation value of 0.863. The third highest correlation value is factor X5 (cost factor) and variable X5.20 (high bank interest rates), this shows that these factors and variables have a very strong relationship with a correlation value of 0.839, and then you can see the correlation value between factors and variables in Figure 7.

Descriptive Analysis

From filling out questionnaires obtained from 30 respondents spread across 5 ongoing multi-storey building construction projects in Surabaya, Gresik and Sidoarjo, data processing was carried out using software to produce statistical data. The data is in the form of standard deviation, mean value, and ranking on each factor. To determine the most influential factor in reducing the quality of building construction projects is to see the greatest mean value. The standard deviation, mean, and rank values for each factor can be seen in Table 5.

Journal of Civil Engineering and Vocational Education

EISSN: 2622-6774
Vol 10 No.3 September 2023
http://cived.ppj.unp.ac.id/index.php/CIVED

Table 5. Descriptive analysis results

No.	Factor	N	Std. Deviation	Mean	Rank
1	Equipment (X1)	30	0.660	3.422	2
2	Materials (X2)	30	0.723	3.342	3
3	Implementation (X3)	30	0.654	3.253	4
4	Environment (X4)	30	0.773	3.122	7
5	Cost (X5)	30	0.688	3.183	6
6	Human Resources (X6)	30	0.757	3.239	5
7	Design (X7)	30	0.601	3.511	1

Based on the table Table 5 the results of data analysis show that the first rank is the design factor in the building construction project, the design factor has the highest mean value which is included in the very influential category with a value of 3.633 with a standard deviation value of 0.482.

Quality in building construction projects can be achieved when all parties involved, including contractors, consultants, project owners, and suppliers, work according to agreed quality standards. Good collaboration and commitment to maintaining quality are key in achieving satisfactory results. The following are some factors and variables that indicate the level of importance in influencing the decline in building construction quality that has been analysed using Relative Importance Index, Pearson Correlation Analysis, and Descriptive Analysis are:

- Inaccurate design drawings, this variable has the highest RII value of 0.908, indicating that inaccuracies in product design can significantly affect and impact the quality of building construction.
- In the correlation between factors affecting the decline in the quality of building construction projects, the highest correlation value is factor X3 (Implementation Factor) and X6 (Human Resources Factor), this shows that these two factors have a very strong correlation with a correlation value of 0.778.
- The factor that causes the most dominant quality decline in building construction projects is the design factor with a mean value of 3.511.

CONCLUSION

Based on the results of the distribution of questionnaires and data analysis, seven factors are obtained that affect the decline in the quality of building construction, namely equipment factors, material factors, implementation factors, environmental factors, cost factors, human resource factors, and design factors. The results of the data analysis obtained the relative importance index value on the most influential variable is the inaccurate design drawing variable, this variable has the highest RII value of 0.908. The Pearson correlation results on factors X3 (implementation factors) and X6 (human resource factors) have the highest value of 0.778, this shows that the two factors have a very strong correlation. Based on the analysis of the factors that affect quality reduction in the most dominant building construction project is the design factor with a mean value of 3.511.

REFERENCE

[1] A. Rauzana And D. A. Usni, “Kajian Faktor-Faktor Penyebab Rendahnya Kinerja Mutu Pada Proyek Konstruksi Di Provinsi Aceh,” *Media Komun. Tek. Sipil*, Vol. 26, No. 2, Pp. 267–274, 2020.

[2] A. Sayad, S. Azhar, M. Castillo, And P. Kappagantula, “Construction Delays In Florida: An Empirical Study,” *Asc Proc. 39th Annu. Conf.*, No. August, Pp. 491–500, 2012.

[3] L. Zhang And W. Fan, “Improving Performance Of Construction Projects: A Project Manager’s Emotional Intelligence Approach,” *Eng. Constr. Archit. Manag.*, Vol. 20, No. 2, Pp. 195–207, 2013, Doi: 10.1108/09699981311303044.

[4] L. E. Jraisat And I. H. Sawalha, “Quality Control And Supply Chain Management: A Contextual Perspective And A Case Study,” *Supply Chain Manag.*, Vol. 18, No. 2, Pp. 194–207, 2013, Doi: 10.1108/13598541311318827.

[5] R. J. Sweis, R. O. Shanak, A. A. El Samen, And T. Suifan, “Factors Affecting Quality In The Jordanian Housing Sector,” *Int. J. Hous. Mark. Anal.*, Vol. 7, No. 2, Pp. 175–188, 2014, Doi: 10.1108/Ijhma-01-2013-0004.