Identify the Factors Causing Cost Overrun in Waringin Group Office Projects

Firman Febriansyah[a], Jenny Caroline[b]

[ab]*Civil Engineering, Faculty of Civil Engineering and Planning Adhi Tama Institute of Technology Surabaya,*

Abstract. Infrastructure development in this globalization era has increased rapidly in line with the need for residential space, businesses, and buildings. Building construction projects have limitations, including cost limits or cost overruns. The conditions of proper use that are less efficient due to the development plan's location can lead to several risks during construction work. This study aims to identify and analyze the factors influencing cost overruns and determine the most dominant causal factor in cost overruns. By giving questionnaires to 40 respondents, the data were collected and then treated for validity, reliability, normality, and statistical tests through SPSS software. The analysis of the data tested indicated that all variables were declared valid because the results of the correlation between the respondents' answers to each question item obtained a significant value, namely $r_{count} > r_{table}$. The reliability test showed that the Cronbach alpha value of all variables was above 0.600. In conclusion, it was very reliable and could be trusted to be used as a variable measuring tool. The most dominant factors causing cost overruns in the Office Waringin Group project consisted of new work items at a mean of 4.33.

Keywords: Dominant Factors, Cost Overrun, Building Construction Project

1. Introduction

Infrastructure development in this era of globalization is increasing very rapidly along with the need for residential, business and building space. Construction work generally starts from the plan stage carried out by the consultant in accordance with the wishes of the project owner and then carried out by the contractor for the construction process. However, in field work often arises problems that can cause delays in the project completion schedule which usually often have an impact on the final project cost. The larger the size of the project, the greater the potential for cost overrun, and poor performance in construction project work is a common problem that results in cost overrun. (Sari. 2020)

Cost Overrun at the implementation stage is very dependent on planning, coordination and control from the contractor and depends on the estimated cost budget, so the construction of a construction project requires a good level of expertise, knowledge, and experience, based on these problems, research is needed on what can cause overbudget. Towards projects in Waringin Group offices. In this study using the validity test method using the product moment correlation technique, reliability test using the alpha Cronbach technique and normality test with the help of the SPSS program.

2. Materials and Method

2.1 Research Flow Chart

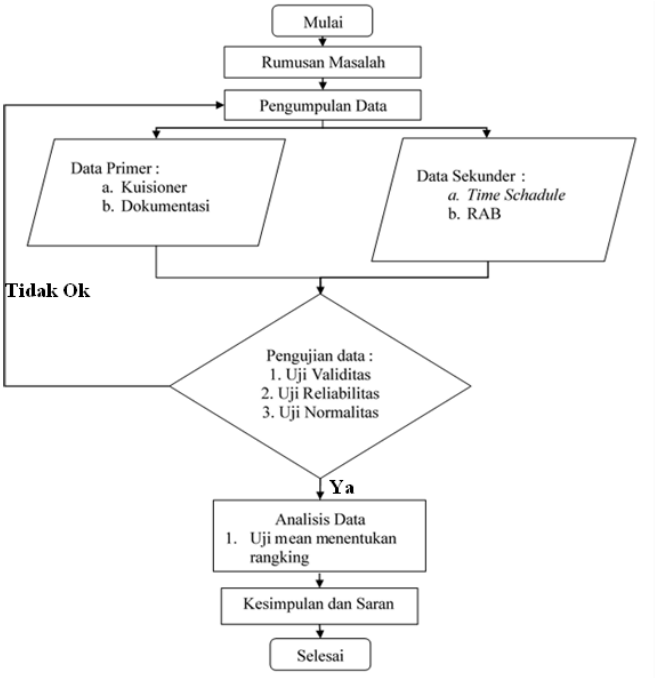

Fig. 1 Research Flow Chart

This study uses descriptive research which is one of the studies that identifies the factors that cause cost overrun, (Fahirah, 2005). To determine the number of respondents, calculations are needed using the solving formula, namely:

$$n = N/(1+N.e^2) \quad (1)$$

Where,
n = Number of samples/respondents
N = Number of all members of the population
e = error tolerance of 0.05

In the Waringin grub office project, the population number is N = 15 (project management team) and 30 (project workers) and the level of significance of the error is e = 5% then.
n = $45/(1+45x0,05^2)$
= 44,449 (45 people)

Because questions have a qualitative nature, they need to be quantified by giving a value or score to each variable, from these values or scores can be categorized such as:

Table 1.
Respondent Score Assessment

Answer	Score
Strongly disagree	1
Disagree	2
Nervous	3
Agree	4
Totally agree	5

Data was obtained by giving questionnaires to 45 respondents, then the questionnaires were collected again to be processed in the form of data. Data that has been obtained. Thus, tested validity using the product moment correlation technique, reliability test using the Cronbach alpha technique and normality test with the help of the SPSS auxiliary program.

2.2 Primary data

Primary data is data obtained directly from the field made by the author himself, this primary data can also be called original or new data.

1. Questionnaire: By using questionnaires for data collection through asking questions to the project management team
2. Documentation: Data collection by taking pictures or photos in the field for observation prove of collecting data.

2.3. Secondary Data

Data sources obtained through someone who has finished conducting research, this data is needed to support or enrich primary data that has been obtained from pre-existing research literature (Hasan, 2002). Data obtained from researchers through intermediaries to other parties. Secondary data can be obtained through literature studies, journals, and previous research that concerns the same problems as research that will be compiled by current researchers. Like journals, factors that cause Cost Overrun in construction projects compiled by (Dapu, 2016) and factors that can be factors in cost overruns in building construction in the city of Cirebon compiled by (Bukhori, 2018).

3. Result And Discussion

3.1. Respondent Profile

Description of the identity of respondents Waringin Group office project workers as follows:

Table 2.
Respondent Profile

No	Name	Highest Education	Position
1	Wawan Rudianto	High School	Project Manager
2	Bara Adi Laksono, ST	Associate degree	Site Manager
3	Meke, ST	Bachelor's degree	Site Manager
4	Kurnia sari	High School	Project Administration
5	Fuji Rianto, ST	Bachelor's degree	Site Engineer
6	Vita Andin, ST	Bachelor's degree	QC Staff
7	Linda Oktafiani	High School	Drafter
8	M. Ridwan, ST	Bachelor's degree	Supervisor
9	Eko Puji, ST	Associate degree	Safety Supervisor
10	Sugianto	High School	Supervisor Finishing
11	Arif S.H	High School	Surveyor
12	Eko Puji, ST	Bachelor's degree	Quantity Surveyor
13	Wahyudi Aminoto	Bachelor's degree	ME Coordinator
14	Arko Widodo	High School	Mechanic
15	Nurul Kuswantoro	High School	Logistic
16	Fahrur Roji	Bachelor's degree	Safety and Healthy Supervisor

3.2. Characteristics of respondents by age

Based on the results of questionnaires collected from 45 respondents, data on the characteristics of respondents based on age were obtained. These characteristics can be seen in table 3 below:

Table 3
Characteristics of Respondents by Age

Age	Number of Respondents	
	Frequency	Percentage (%)
< 25	4	8.89%
26 - 40	24	53.33%
40 >	17	37.78%
Sum	45	100

Based on table 3, the results of the characteristics of respondents who answered the majority of ages were obtained < 25 with a percentage of (8.89%), (53.33%) respondents aged 26 – 40, and (37.78%) respondents aged 40 >. This shows that Waringin Group's office project workers are mostly adults with an age range of 26 - 40 years.

3.3. Characteristics of respondents based on recent education

Based on questionnaires collected from 45 respondents, data on the last education of project workers were obtained, which can be seen in table 4.

Table 4
Characteristics of Respondents Based on Recent Education

Recent Education	Number of Respondents	
	Frequency	Percentage (%)
SD	2	4.44%
SMP	1	2.22%
SMA/SMK	23	51.11%
D3	4	8.89%
S1	15	33.33%
Sum	45	100

JCEPD-ISSN: 2830-3628

Table 4 shows that the majority of project worker respondents had the last education of vocational school with frequency (51.11%), respondents with the last education of D3 as much as (8.89%), junior high school (2.22%), S1 as much as (33.33%), and elementary school (4.44%).

3.4. Validity Test

Testing the validity of the questionnaire in this study using the Pearson Product Moment coefficient formula. The determination of valid and invalid items is done with the r product moment table. With $r_{calculate} > r_{table}$ (at 5% significance). Then the questionnaire item is valid. If $r_{calculate} < r_{tabel}$. Then the questionnaire item is invalid. The r_{table} value of 0.361 is obtained from Pearson's Product Moment coefficient table. With degree of freedom (df) = n – 2 (n = number of samples) = 45 – 2 = 43. The results of the validity test can be seen in table 5 below.

Table 5.
Validity Test Results

Variable	r_{count}		r_{tabel}	Information
X_{11}	0,687	>	0,294	Valid
X_{12}	0,819	>	0,294	Valid
X_{13}	0,627	>	0,294	Valid
X_{14}	0,663	>	0,294	Valid
X_{15}	0,650	>	0,294	Valid
X_{21}	0,633	>	0,294	Valid
X_{22}	0,831	>	0,294	Valid
X_{23}	0,603	>	0,294	Valid
X_{24}	0,643	>	0,294	Valid
X_{31}	0,845	>	0,294	Valid
X_{32}	0,632	>	0,294	Valid
X_{33}	0,630	>	0,294	Valid
X_{41}	0,579	>	0,294	Valid
X_{42}	0,648	>	0,294	Valid
X_{43}	0,665	>	0,294	Valid
X_{44}	0,620	>	0,294	Valid
X_{45}	0,782	>	0,294	Valid
X_{51}	0,862	>	0,294	Valid
X_{52}	0,768	>	0,294	Valid
X_{53}	0,725	>	0,294	Valid
X_{54}	0,677	>	0,294	Valid
X_{55}	0,642	>	0,294	Valid

Based on table 5, it can be seen that all question items or indicators of planning variables (X1), construction period (X2), and external factors (X3), equipment (X4), materials (X5) are valid. Because the correlation results between respondents' answers from each question item obtained significant values, namely $r_{calculate} > r_{table}$.

3.5. Reliability Test

According to (Sahid, et al. 2018), if the value of Cronbach's Alpha > 0.600 then the research instrument can be said to be reliable. Conversely, if Cronbach's Alpha value < 0.600, the research instrument cannot be said to be reliable. It is different if the results of the study. Reliability Test is used to find out whether the indicator used can be trusted as a variable measuring tool. With assessment criteria in accordance with table 6 Reliability Test Results can be seen in the table below.

Table 6.
Reliability Test Results

Variable	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
X_{11}	34.60	23.971	0.614	0.797
X_{12}	34.80	22.743	0.708	0.856
X_{13}	34.53	20.981	0.627	0.718
X_{14}	34.53	23.124	0.601	0.788
X_{15}	34.20	29.314	0.636	0.774
X_{21}	33.67	22.810	0.715	0.834
X_{22}	33.00	24.571	0.618	0.772
X_{23}	33.67	22.810	0.725	0.834
X_{24}	33.07	24.638	0.697	0.742
X_{31}	35.00	22.571	0.612	0.741
X_{32}	34.53	22.552	0.713	0.894
X_{33}	35.07	22.638	0.778	0.856
X_{41}	33.67	29.314	0.636	0.728
X_{42}	34.20	24.571	0.697	0.752
X_{43}	35.00	20.981	0.612	0.748
X_{44}	34.53	24.571	0.715	0.869
X_{45}	34.80	22.743	0.725	0.784
X_{51}	33.67	24.571	0.614	0.739
X_{52}	33.07	22.571	0.648	0.697
X_{53}	34.53	29.314	0.601	0.692
X_{54}	34.53	22.810	0.672	0.691
X_{55}	33.48	24.638	0.725	0.726

The results of the reliability test are known to have *alpha Cronbach* values of all variables above 0.600. It can be concluded that planning variables (X1), construction period (X2), and external factors (X3), Equipment (X4), Material (X5). It is very reliable or trustworthy to use as a variable measuring instrument.

3.6. Normality Test

The Normality Test is carried out with the aim of knowing whether the data used as research support is normally distributed or not. To find out whether or not a variable is normal, this normality test uses the Kolmogorov – Smirnov formula, while the way to identify normally distributed data is to look at the significance value, if the significance value is smaller than 0.05 then the data is said to be abnormal, if on the contrary if the Kolmogorov - Smirnov value is greater than 0.05 then the data can be said to be normal so that it passes the normality test.

Table 7
Kolmogorov – Smirnov *Normality Test Results*

		Unstandardized Residual
N		15
Normal Parameters[a,b]	Mean	0E-7
	Std. Deviation	0E-8
Most Extreme Differences	Absolute	.148
	Positive	.148
	Negative	-.119
Kolmogorov-Smirnov Z		.571
Asymp. Sig. (2-tailed)		.900

a. Test distribution is Normal.

b. Calculated from data.

From the table it can be seen that the normality test analysis produces Asym.Sigh. (2-tailed) 0.900 > 0.05. So, it can be interpreted that residual data is normally distributed.

3.7. Ranking Analysis

This method is used which aims to find out how much the respondent's rank. After the questionnaire filling data is collected, then an Analysis with Mean will be carried out. This average value is usually used to determine what are the factors that cause cost overrun which greatly affect the cost overrun of project work which can be seen in table 8 below.

Table 8
Factors with the Highest Mean Causes of Cost Overrun

No	Variable	Mean	Ranking
1	Inaccurate design	2.73	11
2	Surveys and field investigations are not in-depth	2.53	15
3	No work items available that should be available	2.80	9
4	Incomplete Design Drawings &; not in accordance with specifications	2.80	9
5	Error determining the type and quantity of work	3.13	7
6	There is a change in the scope of work	3.67	5
7	Pop-up a new job item	4.33	1
8	The complexity of the work	3.48	6
9	There is an increase in implementation time	4.27	2
10	The rarity and increase in material prices	2.33	17
11	Extreme weather changes	2.80	9
12	Inflation exchange rate increase	2.72	12
13	High price / rental of equipment	3.13	7
14	High cost of mobilization/demobilization of equipment	2.68	13
15	Equipment delivery delays	2.80	9
16	Machine selection	3.98	3
17	Errors in organizing equipment storage	2.25	18
18	Theft of materials	2.42	16
19	An increase in material prices	2.78	10
20	Delay in delivery of materials	2.60	14
21	Material selection	3.82	4
22	Disadvantages of construction materials	2.90	8

From table 8, it is found that rank number 1 is found in new work items with a mean value of 4.33, rank number 2 there is an increase in implementation time with a mean value of 4.22, for rank number 3 Selection of heavy equipment with a mean value of 3.99.

4. Conclusion

From the research data obtained and the data analysis that has been carried out, conclusions can be drawn, as follows:

1. The factors causing cost overrun in the Waringin Group Office project are:
   - Create a new job item
   - There is an increase in implementation time
   - Machine selection
   - Material selection
   - There is a change in the scope of work

2. The most dominant factor causing cost overruns in the Waringin Grub Office project is, A new work item arises with a mean of 4.33.

Suggestion

By knowing the factors that affect the occurrence of cost *overruns in* building construction projects, it is expected that contractor companies can minimize and anticipate the causes of project cost overruns to be implemented, however, the cost overrun factors in the domain above can still be carried out *risk response* or *treatment* as corrective measures to be able to prevent cost overruns.

Reference

[1] Bukhori. (2018). Factors that cause cost overruns in building construction in the city of Cirebon. *Faculty of Engineering, Universitas Swadaya Gunung Jati, vol. Xxii no. 1 April 2018,* 12-22.

[2] Dapu, Y. C. (2016). Factors that cause cost overrun in construction projects. *Journal of Civil Statics Universitas Sam Ratulangi Manado, Vol.4 No.10 October 2016 (641-647) ISSN: 2337-6732, 641-647.*

[3] Fahirah, F. (2005). IDENTIFY THE CAUSES OF OVERRUN OF BUILDING CONSTRUCTION PROJECT COSTS. 160-168.

[4] Febriantoro, M. B., Susanto, S., &; Siswanto, E. Minimizing Time Delays and Cost Overruns of Dongko Sub-District Building Construction Project, Trenggalek with the Earned Value Method. *Journal of Technology Management and Civil Engineering (JURMATEKS) (2022), 5(*1), 104-118.

[5] Iriana, R. T. K., Sebayang, M., &; Yogi, M. R. A (2022) Analysis of the dominant factors causing cost overrun in small category government building construction projects in Pekanbaru City. *Journal of civil technology and engineering*, *1*(1), 37-43.

[6] Nurtsani, R. A., Septiadi, D. R., &; Suharyanto, S. Project Cost and Time Control with the Earned Value Concept Method. *Journal of Civil Engineering Works (2017*), *6*(4), 460-470.

[7] Pandey, R. D. (2012). Analysis of factors causing equipment cost overrun in dock construction projects in North Sulawesi. *Scientific journal of media engineering, Vol. 2, No. 3, September 2012 ISSN 2087-9334 (153-162), 94-101.*

[8] Purnomo, A. Subki, A. Factors affecting cost overruns for *Owners* in the implementation of road infrastructure projects with foreign loan funding sources, *Faculty of Engineering, State University of Jakarta, 13220, Volume III No. 1, January 2008, 1-18.*

[9] Remi, F. F. (2017). Study of the factors causing cost overrun in building construction projects. *Master Program in Civil Engineering, Parahyangan Catholic University, Bandung, Vol. 06, No. 2, March 2017,* 94-101.

[10] Sahusilawane, T., Bisri, M., &; Rachmansyah, A. Analysis of Factors Causing Cost Overrun in Building Construction Projects in Ambon City. Civil Engineering (2012*), 5*(2), 118-128.

[11] Sari, M. M., Hadi, S. &; Aldiansyah. (2020). Factors causing cost overruns that affect the final cost of building construction projects. *Civil Engineering Study Program, Serang Raya University, April 21, 2020,* 59-67.

JCEPD-ISSN: 2830-3628