

# Cost overrun and time delay of construction project in Indonesia

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**Abstract.** The success factors of project was completing the project without time delay and cost overrun. Time delay and cost overrun were arised due to uncertainty activity during the life cycle project. This may lead the problems to the project. The research aim was analysing cost overrun and time delay in construction project. Data were collected using questionnaire to 36 respondent. 15 factors have been identified in this research i.e land acquisition delay, location of site, support or protest from the local for the project, changes in design specifications, rework, subcontractors and vendors performance, delay in works approval, inaccurate budgeting and resource planning, price escalation of materials, rules and regulations of the government, owners additional required, inflation, payment delay, weak cash flow and bad weather. The result findings, owners and contractors have differences and similarty perception. In cost overrun factors, owner agreed the topmost factor causing was owner additional required while according to the contractors was rework. In delay factors, owner agreed the topmost factor causing delay was inaccurate budgeting and resource planning while according to the contractors was land acquisition delay. Nevertheless, both parties agreed the inflation has a least influent to construction project delay.

## 1. Introduction

The increasing the number of project construction has made construction project as one of the most influential industries that having significant effect to the economic growth in developing countries [1]. The problems faced by project construction in developing countries were related overrun in cost and time of project. In Jordan, most infasrtucture projects expererience cost overrun and time delays [2]. Similar with Jordan, delays and cost overrun were faced up by most of construction project delays in Iran and India [3][4]. Indonesia, as developing country also facing problem related cost overrun and time delays for the example in the end of 2017, 460 infrastructures single year project in Aceh have only progressed under 75% [5].

Both owner and contractors have to considered to cost overrun and time delays, because it can made many impact to the project even. Even on a larger scale, it will have an big impact to national economies [6]. Generally, cost overrun in project happen when the budget and or cost of project was increasing [2]. While time delays was happen when the duration of project was increasing caused by unpredictable time performance in construction project [7]. Some previous study agreed that completing the project within on schedule duration and planned budget as critical success factor of project construction [7], [8].

Previous studies hve identified some factors that causing both cost overrun and time delay in construction project. Senouci et al (2016) mention possible factors causing time delay and cost overrun in Qatari Public Construction Project were poor management and control systems, manpower low quality, construction material and equipment shortage, inappropriate estimation of massive scale of projects, harsh summers, funding constraints of private projects and also work scope and objectives



[6]. Similar with Senouci et al, Samarghandi et al (2016) has identified factors causing time delay and cost overrun in Iran as perceived by owner, contractor, consultant, law regulations and other general defects, the result shown that the most important factor causing time delay and cost overrun was different from each parties [3]. In previous research, Al-Hazim et al (2017) has analysed that the most importance factors causing time delay and cost overrun was terrain conditions.

The background of this research was lack of study analysed the factors causing time delay and cost overrun in construction project in Indonesia. The aim of this study was to analyze factors causing time delays and cost overrun in construction project in Indonesia as perceived by owner and contractors. While the objectives of this study were (1) to identify factors causing time delay and cost overrun in construction project and (2) to assess the most importance factor in causing time delay and cost overrun in construction project in Indonesia as perceived by owner and contractors. As common, the result of this study were shown (1) factors causing time delay and cost overrun and (2) the most importance factor causing time delay and cost overrun in construction project in Indonesia as perceived by owner and contractors.

## 2. Research Method

This research adopted a quantitative approach to analyze factors causing cost overrun and time delay in construction project as perceived by owners and contractors. For both parties, data were collected through questionnaire to 18 stakeholder from owners, most of them were from Ministry of Public Work and local government official. Assisted questionnaire surveys also were used to 18 contractors, most of them are from BUMN contractors. Total number of respondents used in this research were 36 respondents.

Generally, this research was containing 3 (three) phases: (1) Identifying factors causing cost overrun and time delay in construction project, (2) Rank analysing factors causing cost overrun and time delay as perceived by owners and contractors, (3) Gap analysing factors causing cost overrun and time delay from perspectives owner and contractors.

**Table 1.** Comparing Interview's Result with Previous Study

No	Factors	Samarghandi Et al (2016) [3]	Al-Hazim et al (2017) [2]	Venkateswaran et al (2017) [4]	Renuka et al (2018) [8]	Saiful et al (2019) [9]
1.	Land Acquisition Delay					√
2.	Location of site		√	√	√	√
3.	Support or protest from the local				√	
4.	Changes in design specifications	√		√		√
5.	Rework		√		√	
6.	Subcontractors and vendors performance				√	
7.	Delay in works approval	√			√	√
8.	Inaccurate budgeting and resource planning	√		√		
9.	Price escalation of materials		√	√	√	
10.	Rules and regulations	√			√	
11.	Owners additional required		√			√
12.	Inflation	√				
13.	Payment delay		√			√
14.	Weak cash flow	√			√	√
15.	Bad Weather	√	√	√	√	

Phase (1) was starting with interview to respondent in managerial level in the project. Factors which gained from interview then compared to relevant literature study. The result of comparing both interview and literatures study was shown in table 1 below.

Table 1 shown, 15 factors have been identified in this research i.e land acquisition delay, location of site, support or protest from the local, changes in design specifications, rework, subcontractors and vendors performance, delay in works approval, inaccurate budgeting and resource planning, price escalation of materials, rules and regulations of the government, owners additional required, inflation, payment delay, weak cash flow and bad weather.

Phase (2) in this research was starting with collecting data by questionnaire survey through 36 respondents. The questionnaire used in this research was divided into 2 section: (a) Information about the respondent, (b) Factors causing cost overrun and time delay in construction project. In section (b), respondents were asked to give scoring to each factors by choosing an option in 5 likert scale (1=strongly disagree; 2=disagree; 3=neither agree nor disagree; 4= agree; 5=strongly agree). The final score by respondents then were analysed using kendall's w tes in SPSS programme to gain mean rank as the most factor in causing cost overrun and time delay as perceived by owners and contractors.

Phase (3) was comparing the result finding factors causing cost overrun and time delay in construction project as perceived by owners and contractors. Phase (3) was used to know the gap between perspective owners and contractors in assessing factors causing cost overrun and time delay in construction project.

### 3. Result

The descriptive analysis using The Statistical Package for the Social Sciences (SPSS) was presented in table 2 and table 3 below.

**Table 2.** Descriptive Analysis in Cost Overrun Factors

Factors	N	Minimum		Maximum		Std. Deviation	
		Owner	Contractor	Owner	Contractor	Owner	Contractor
Land acquisition delay	18	1.00	1.00	5.00	5.00	1.28338	1.15045
Location of site	18	2.00	2.00	5.00	5.00	0.95828	0.90025
Support or protest from	18	2.00	2.00	5.00	5.00	0.95828	0.80845
Changes in design specifications	18	2.00	2.00	5.00	5.00	1.07861	0.93760
Rework	18	1.00	3.00	5.00	5.00	1.28338	0.77754
Subcontractors and vendors performance	18	1.00	2.00	5.00	5.00	1.24722	1.26284
Delay in works approval	18	1.00	2.00	5.00	5.00	1.18266	1.17851
Inaccurate budgeting and resource planning	18	1.00	3.00	5.00	5.00	1.02262	0.89479
Price escalation of materials	18	2.00	2.00	5.00	5.00	1.21133	0.99836
Rules and regulations of regulations	18	1.00	1.00	5.00	5.00	1.11437	0.92355
Owners additional required	18	2.00	2.00	5.00	5.00	0.95828	0.90749
Inflation	18	2.00	3.00	5.00	5.00	1.12749	0.83235
Payment delay	18	1.00	2.00	5.00	5.00	1.00326	1.02262
Weak cash flow	18	1.00	3.00	5.00	5.00	1.20049	0.84017
Bad weather	18	1.00	2.00	4.00	5.00	0.95828	1.09664
Valid N (listwise)	18						

Table 2 shown, the average score minimum of owner in assessing factors causing cost overrun was smaller than contractor. The descriptive analysis for factors causing delay in construction project using The Statistical Package for the Social Sciences (SPSS) was presented in table 3 below.

**Table 3.** Descriptive Analysis in Delay Factors

Factors	N	Minimum		Maximum		Std. Deviation	
		Owner	Contractor	Owner	Contractor	Owner	Contractor
Land acquisition delay	18	1.00	3.00	5.00	5.00	1.29479	0.70479
Location of site	18	2.00	2.00	5.00	5.00	0.94281	1.01782
Support or protest from	18	3.00	2.00	5.00	5.00	0.85749	10.84650
Changes in design specifications	18	2.00	3.00	5.00	5.00	1.15045	0.84017
Rework	18	3.00	3.00	5.00	5.00	0.67640	0.69780
Subcontractors and vendors performance	18	3.00	3.00	5.00	5.00	0.85749	0.98518
Delay in works approval	18	1.00	3.00	5.00	5.00	1.23140	0.83235
Inaccurate budgeting and resource planning	18	3.00	3.00	5.00	5.00	0.73208	0.94281
Price escalation of materials	18	2.00	2.00	5.00	5.00	1.02262	1.15045
Rules and regulations of regulations	18	1.00	2.00	5.00	5.00	1.13183	0.97014
owners additional required	18	3.00	3.00	5.00	5.00	0.78591	0.66911
Inflation	18	1.00	2.00	5.00	5.00	0.90749	0.89479
Payment delay	18	1.00	2.00	5.00	5.00	1.09216	1.28973
Weak cash flow	18	2.00	2.00	5.00	5.00	0.95828	0.99836
Bad weather	18	2.00	2.00	5.00	5.00	0.95828	1.04319
Valid N (listwise)	18						

Similar with table 2, table 3 shown, the average score minimum of owner in assessing factors causing delay was smaller than contractor. While the results of mean rank from Kendal's W test analysis using The Statistical Package for the Social Sciences (SPSS) were presented in table 4 and table 5 below

**Table 4.** Meank Rank for Cost Overrun Factors

Factors	Mean Rank		Rank	
	Owner	Contractor	Owner	Contractor
Land acquisition delay	6.36	9.94	12	2
Location of site	9.17	7.94	5	10
Support or protest from the local	7.69	7.94	8	9
Changes in design specifications	9.72	8.19	4	6
Rework	7.83	10.33	7	1
Subcontractors and vendors performance	8.47	7.50	6	12
Delay in works approval	6.78	7.00	11	13
Inaccurate budgeting and resource planning	10.97	9.72	2	3

Factors	Mean Rank		Rank	
	Owner	Contractor	Owner	Contractor
Price escalation of materials	10.72	8.11	3	7
Rules and regulations of regulations	5.89	4.72	13	15
Owner additional required	11.25	8.64	1	4
Inflation	7.69	7.64	9	11
Payment delay	5.17	7.97	15	8
Weak cash flow	7.08	8.58	10	5
Bad weather	5.19	5.75	14	14

Table 4 shown the topmost factor causing cost overrun for owner perspectives was factor “Owner additional required” while for contractor perspectives was “Rework”.

**Table 5.** Meank Rank for Delay Factors

Factors	Mean Rank		Rank	
	Owner	Contractor	Owner	Contractor
Land acquisition delay	10.08	11.19	3	1
Location of site	8.03	7.75	9	10
Support or protest from the local	8.33	7.61	7	11
Changes in design specifications	7	9.22	11	6
Rework	9.33	10.61	6	2
Subcontractors and vendors performance	10	9.56	4	5
Delay in works approval	10.14	8.86	2	7
Inaccurate budgeting and resource planning	10.39	9.78	1	4
Price escalation of materials	4.61	3.83	14	14
Rules and regulations of regulations	5.25	4.19	13	13
Owners additional required	9.97	10.14	5	3
Inflation	3.72	3.47	15	15
Payment delay	6.86	7.14	12	12
Weak cash flow	7.97	8.72	10	8
Bad weather	8.31	7.92	8	9

Table 5 shown the topmost factor causing cost overrun for owner perspectives was factor “Inaccurate budgetin and resource planning” while for contractor perspectives was “Land acquisition delay”.

**Table 6.** Kendalls' W Test for Cost Overrun Factors

	Owner	Contractor
N	18.000	18.000
Kendall's W(a)	0.253	0.142
Chi-Square	63.640	35.893
df	14.000	14.000
Asymp. Sig.	0.000	.001

Kendall's Coefficient of Concordance

Hypothesis:

Ho : factors have no significant effect to cost overrun in construction projects

H1 : factors have significant effect to cost overrun in construction projects

From owner perspectives, table 6 shown Kendall's W value 0.253 means 15 factors identified only gives an effect of 25.3% on occurrence cost overrun in construction project. While from contractor perspectives table 6 shown Kendall's W value 0.142. It means 15 factors identified only gives an effect of 14.2% on occurrence cost overrun in construction project.

Comparing value of asymp sig: If the probability is  $> 0.05$ , Ho is accepted, Nevertheless if the probability is  $< 0.05$ , then Ho is rejected. The result shown value of asymp sig 0.000 for owner and 0.001 for contractor. Both asymp sig were smaller than alpha 0.05, it means Ho is rejected and these factors have significant effect to cost overrun in construction projects.

Comparing count statistic with statistics table, If the statistics are calculated  $<$  table statistics, then Ho be accepted. nevertheless, If the statistics are calculated  $>$  table statistics, then Ho rejected. From the SPSS output table the value of Calculate Chi square using Kendal's W test were 63.64 for owner and 35.893 for contractor. However based on the chi-square table, for df (degree of freedom) =  $k-1 = 15-1 = 14$  with level significance = 5% (means the level of trust 95%) then from the table statistics are obtained = 23.68. It means both owner's and contractor's count statistic were bigger than table, then Ho is rejected and it means all factors have significant effect to cost overrun in construction projects.

**Table 7.** Kendalls' W Test for Delay Factors

	Owner	Contractor
N	18.000	18.000
Kendall's W(a)	0.280	0.381
Chi-Square	7.047	9.611
df	14.000	14.000
Asymp. Sig.	0.000	0.000

Kendall's Coefficient of Concordance

Hypothesis:

Ho : factors have no significant effect to delay in construction projects

H1 : factors have significant effect to delay in construction projects

From owner perspectives, table 7 shown Kendall's W value 0.280 means 15 factors identified only gives an effect of 28.0% on occurrence delay in construction project. While from contractor perspectives table 7 shown Kendall's W value 0.381. It means 15 factors identified only gives an effect of 38.1% on occurrence delay in construction project. Comparing value of asymp sig:

If the probability is  $> 0.05$ , Ho is accepted, Nevertheless if the probability is  $< 0.05$ , then Ho is rejected. The result shown value of asymp sig both owner and contractor were 0.000. It means, asymp sig were smaller than alpha 0.05, then Ho is rejected and these factors have significant effect to time delay in construction projects.

Comparing count statistic with statistics table, If the statistics are calculated  $<$  table statistics, then Ho be accepted. Nevertheless, If the statistics are calculated  $>$  table statistics, then Ho rejected. From the SPSS output table, the value of Calculate Chi square using Kendal's W test were 70.47 for owner

and 96.113 for contractor. However based on the chi-square table, for df (degree of freedom) =  $k-1 = 15-1 = 14$  with level significance = 5% (means the level of trust 95%) then from the table statistics are obtained = 23.68. It means both owner's and contractor's count statistic were bigger than table, then  $H_0$  is rejected and it means all factors have significant effect to time delay in construction projects

**Table 8.** The Topmost Factors causing Cost overrun and Time Delay

Rank	Cost Overrun		Time Delay	
	Owner	Contractor	Owner	Contractor
1	Owner additional required	Rework	Inaccurate budgeting and resource planning	Land acquisition delay
2	Inaccurate budgeting and resource planning	Land acquisition delay	Delay in works approval	Rework
3	Price escalation of materials	Inaccurate budgeting and resource planning	Land acquisition delay	Owner additional required
4	Changes in design specifications	Owner additional required	Subcontractors and vendors performance	Inaccurate budgeting and resource planning
5	Location of site	Weak cash flow	Owner additional required	Subcontractors and vendors performance

There was any difference perspectives between owner and contractor in assessing factor causing cost overrun and time delay in construction project. According to owner, the most factor causing cost overrun was "owner additional required" while according to contractor was "rework". Difference perspectives also happen in factors causing time delay, according to owner the most factor causing time delay for owner was "inaccurate budgetin and resource planning" while according contractor was "land acquisition delay". This results were similar with previous study. Samarghandi et al (2016) analysing factors causing cost overrun perceived by owner, contractor, consultant and law regulation. In his research Samarghandi et al (2016) agreed each group will assess different importance levels of risk factors causing cost overrun.

Both parties were agreed "inaccurate in budgeting and resource planning" as factor most causing cost overrun and time delay in construction project. Al-Hazim (2017) recommend both parties to have extra effort in planning phase including preparation, planning in schedulling and budgeting also analysing risk. successful management construction project may avoid problem or reduce the effect when cost overrun or time delay occurred [2]. Both parties also agreed "Owner additional required" as factor most causing cost overrun and time delay in construction project.

#### 4. Conclusion

This paper has identified 15 factors causing time delay in construction project i.e land acquisition delay, location of site, support or protest from the local, changes in design specifications, rework, subcontractors and vendors performance, delay in works approval, inaccurate budgeting and resource planning, price escalation of materials, rules and regulations of the government, owners additional required, inflation, payment delay, weak cash flow and bad weather.

The result of analysis using Kendal's W test show that all factors have significant effect to cost overrun and time delay in construction project perceived by owner and contractor. Difference perspectives between owner and contractor, the most factor causing cost overrun for owner was "owner additional required" while according to contractor was "rework". Difference perspectives between owner and contractor, the most factor causing time delay for owner was "inaccurate budgetin and resource planning" while according contractor was "land acquisition delay". According to contractors "Rework and land acquisition delay" as most factors causing cost overrun and time delay in construction project. However, from a total 15 factor identified, Both parties were agreed "inaccurate in budgeting and resource planning" and "Owner additional required" as factor most causing cost overrun and time delay in construction project.

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