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Comparative Study of Delay Factors In Construction Projects In South Sulawesi (BUMN VS Private)

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Abstract. *The development of the construction world is currently growing rapidly along with the times, where stakeholders in the construction world are required to be able to complete a project efficiently, but in reality there are still many obstacles that we encounter that result in a work being hampered. Referring to the Government Agency Performance Report (LKIP) of the Office of Highways and Construction Development of South Sulawesi Province (2018-2019) and the Office of Public Works and Spatial Planning of South Sulawesi Province (2020) there are still many jobs that are delayed. The purpose of this research is to analyze the factors that influence the completion of construction projects and to analyze the comparison of factors/variable delays that significantly affect construction project delays in the scope of government (BUMN) and private sector in South Sulawesi as well as alternative handling. The method used is Frequency Index Analysis, Influence Index, Interest Index, and risk analysis. The results of the research show that 27 of the 35 factors distributed are relevant in South Sulawesi and the comparison of the risk factors for delay is dominant. The first rank was for BUMN respondents. There was a design change by the owner (58 %) and the first rank was for Private. Delay in delivery of goods/materials (79.44 %). The alternative on the BUMN side is that there is a design change by the owner is to review and discuss together about the urgency to change items and improve design planning. The alternative for the private sector, namely delays in delivery/material goods, is to ensure that construction management conducts coordination meetings with contractors to evaluate the order mechanism so that it can be carried out early.*

Keywords: *Project Delay, Data Analysis, BUMN and Private, South Sulawesi*



1. Introduction

The development of the construction world is currently growing rapidly along with the times, where stakeholders in the world are required to be able to complete a project efficiently, but in reality there are still many obstacles that we encounter that result in a work being hampered[1].

Referring to the Government Agency Performance Report (LKIP) of the Office of Highways and Construction Development of South Sulawesi Province (2018-2019) and the Office of Public Works and Spatial Planning of South Sulawesi Province (2020) there are still many jobs that are experiencing delays in the scope of South Sulawesi [2] Abdullah's statement; et al. (2010) in Causes of Delay in MARA Management Procurement Construction Projects that over the years the problem of delays in construction projects has slowed down and was so significant that it slowed down implementation planning[3]. The same thing is also stated by Aziz (2013) in the Ranking of Delay Factors in Construction Projects After Egypt Revolution that delay is a frequent phenomenon and is related to almost all construction projects[4].

Construction project delays can basically be calculated but certain conditions that can occur outside the planning calculations can be caused by improper management, material, labor, equipment, and environmental problems that do not support project implementation[5]. Even Assaf and Al-Hejji (2006) in the Causes of Delays in Large Construction Projects say that the causes of delays can be seen in terms of materials, labor, equipment, costs, design changes, relations with related agencies, scheduling and control, supervision procedures, testing processes, environmental issues, contractual issues and the absence of professional consultants[6]. For delays, a special assessment is needed in the project implementation process (Ismail, 2013)[7]. The size of a project does not determine the level of complexity. Small projects can be more complex than larger projects. Complexity requires regulation and control in such a way that there are no problems in project implementation (Soeharto, 1999) [8].

The Problem of the reaserach, What are the factors that affect the completion of the project ?, What is the comparison of delay factors/variables that significantly affect construction project delays in the government (BUMN) and private sector in South Sulawesi? , What alternatives/strategies are there to reduce the impact of construction project delays? [9].

2. Methods and Literature Review

2.1 Location and Research Design

The design of this research is a comparative analysis research, where the subject in this study is a construction project that is currently underway or has been completed between the 2019-2021 timeframe which is reviewed from the BUMN and Private sector in the scope of South Sulawesi

2.2 Risk Management

The definition of risk is the possibility of something happening that will have an impact on the target, measured in terms of consequences and likelihood. What is meant by the consequence is the result of an event that is stated qualitatively or quantitatively, which is a loss, loss, or gain.

2.3 Validity and Reliability Test

Validity test is the accuracy of an instrument in measurement. while the reliability test is used to determine the consistency of the measuring instrument, whether the measuring instrument used is reliable and remains consistent if the measurement is repeated.

2.4 Analysis Frequency Index, Severity Index, and Importance Index

Analysis of the frequency index is known as the Frequency Index (F_i), showing the level of occurrence of factors that affect work performance, while the influence index is known as the Severity Index (S_i), showing the level of impact caused by each risk factor and Analysis of Importance Index (I_i) shows the results of the multiplication between frequency and the influence on the factors causing delays that have the most influence on contractor performance

$$F_i (\%) = \sum_{i=1}^5 = 1 \frac{(ai * ni)}{n} \times \frac{100}{5} \quad (1)$$

$$S_i (\%) = \sum_{i=1}^5 = 1 \frac{(ai * ni)}{n} \times \frac{100}{5} \quad (2)$$

$$I_i (\%) = \frac{F_i (100\%) \times S_i (100\%)}{100} \quad (3)$$

2.5 Risk Analysis

Risk analysis is the development of an understanding of risk (SNI ISO 31000,2011). ISO 31000:2018 states that the purpose of risk analysis is to understand the nature of risk and its characteristics according to the level of risk.

2.6 Type of research

Metathesis study of previous research (national and international journals) as a reference for determining research variables and questionnaire results on respondents. The measurement uses the analysis of the Frequency Index, Influence Index and Interest Index, as well as risk analysis

2.7 Data Source

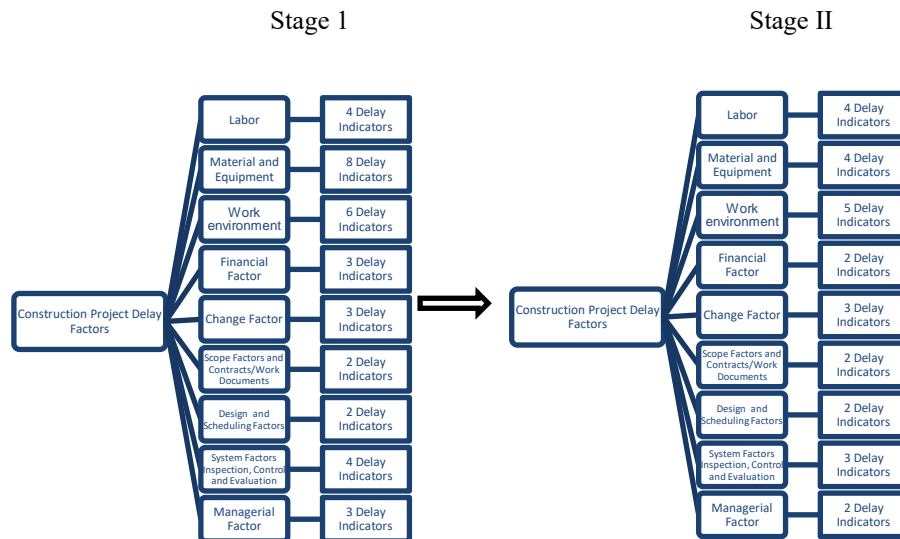
In this study, the respondents were contractors, both BUMN and private in the scope of South Sulawesi, with specifications for technical personnel in a project, minimum education level.

2.8 Measuring tools

2 stage questionnaire, Stage 1 (pre test) to validate the factors that have been determined based on the results of the metathesis study and stage 2 to determine the dominant factor in each respondent, both overall, BUMN, Private. as a reference in determining mitigation according to the level of occurrence and impact.

2.9 Research hierarchical process

Phase 1 questionnaire (pre-test) was conducted to validate the factors that have been determined based on the results of the metathesis study totaling 35 variables of delay for all respondents (BUMN and Private) then conducting a 2-stage questionnaire totaling 27 variables testing the occurrence and impact of the risk factors for project delays.



3. Result and Discussion

3.1 Identification of Risk Factors for Phase I Construction Project Delays

The first analysis is the validation of 35 delay factors to all respondents who occur in the implementation of construction projects from hierarchical process stage 1.

Figure 1. Results of Risk Factor Identification in the percentage of respondents' choice of project delays Phase 1 Questionnaire Construction (pre-test)

No	Delay Risk Variable	N	Indicator		P	Information
			Occur	Not Occur		
1 Labor						
X1	Unskilled workforce	21	12	9	57%	Relevant Occurring
X2	Shortage of labor	21	14	7	67%	Relevant Occurring
X3	Labor productivity	21	13	8	62%	Relevant Occurring
X4	Communication between the workforce and the chief handyman/foreman	21	13	8	62%	Relevant Occurring
2 Material and Equipment						
X5	Delay in delivery of goods/materials	21	17	4	81%	Relevant Occurring
X6	Lack of construction materials	21	13	8	62%	Relevant Occurring
X7	Material quality is not good	21	6	15	29%	Irrelevant
X8	Damage to materials in storage	21	4	17	19%	Irrelevant

X9	Material changes in form, function, and specifications	21	5	15	24%	Irrelevant
X10	Delay in delivery/equipment supply	21	4	17	19%	Irrelevant
X11	Equipment breakdown	21	18	3	86%	Relevant Occurring
X12	Availability of adequate equipment/as needed	21	15	6	71%	Relevant Occurring
3	Work Environment					
X13	Poor response from the surrounding community to the project/complaint	21	11	10	52%	Relevant Occurring
X14	Storage area for materials/materials away from the project site	21	4	17	19%	Irrelevant
X15	Access to the project site/ Different natural conditions from the time of survey	21	13	8	62%	Relevant Occurring
X16	Limited scope of work	21	14	7	67%	Relevant Occurring
X17	High rainfall intensity	21	21	0	100%	Relevant Occurring
X18	The occurrence of unexpected things such as fire, flood, bad weather	21	19	2	90%	Relevant Occurring
4	Financial Factor					
X19	Material price	21	17	4	81%	Relevant Occurring
X20	Funding difficulties in contractors	21	19	2	90%	Relevant Occurring
X21	Payment difficulties by owner	21	7	14	33%	Irrelevant
5	Change Factor					
X22	There has been a design change by the owner	21	21	0	100%	Relevant Occurring
X23	Incorrect/incomplete planning (drawings/specifications)	21	18	3	86%	Relevant Occurring
X24	Changes in the scope of work at the time of implementation	21	20	1	95%	Relevant Occurring
6	Scope Factors and Contracts/Work Documents					
X25	Owner's delay in making decisions	21	20	1	95%	Relevant Occurring
X26	There is a request for changes to the work that has been completed	21	14	7	67%	Relevant Occurring
7	Design and Scheduling Factors					
X27	Work order plans that are not well structured/integrated	21	14	7	67%	Relevant Occurring
X28	Differences in the schedule of sub-contractors in project completion	21	21	0	100%	Relevant Occurring
8	System Factors Inspection, Control and Evaluation					
X29	The material sample approval process takes a long time by the owner	21	15	14	71%	Relevant Occurring
X30	Delays in the inspection and testing of materials	21	17	4	81%	Relevant Occurring
X31	A lot of work that must be repaired / redone due to defects / not correct	21	16	5	76%	Relevant Occurring
X32	The long process of evaluating work progress	21	8	16	38%	Irrelevant
9	Managerial Factor					
X33	Field manager experience	21	8	13	38%	Irrelevant
X34	Poor communication between the owner's representative and the contractor	21	17	4	81%	Relevant Occurring
X35	Poor communication between planners and contractors	21	18	3	86%	Relevant Occurring

3.2 Identification of Risk Factors for Phase 2 Construction Project Delays

Based on the results of the identification of risk of delays on figure 1, from 35 variables of risk of delays in construction projects to 27 variables of risk of delays in construction projects, due to the low level of selectability of risk variables below 40%, 8 variables of delay risk were eliminated based on the results of the phase I questionnaire.

3.3 Validity Test and Reliability Test

Validity test meets The value of r table for $n = 21$ is 0.4329, most of the calculated r values are greater than r The table of all indicators causes delays so that it can be used as an instrument in the questionnaire and Reliability Test meets because the value of the C-Alpha coefficient is greater than 0,60, then all categories of causes of delay are reliable and appropriate to be used as a questionnaire instrumen

3.4 Analysis Results Frequency Index (F_I), Severity Index (S_I) and Importance Index (I_I)

Figure 2. Comparison of Highest Ranking Frequency Index (F_I)

No	Overall Respondents	BUMN contractor	Private Contractor
1	Communication between the workforce and the chief handyman/foreman	There has been a design change by the owner	Delay in delivery of goods/materials
2	Delay in delivery of goods/materials	Incorrect/incomplete planning (drawings/specifications)	Delay in delivery of goods/materials
3	Lack of construction materials	Changes in the scope of work at the time of implementation	Communication between the workforce and the chief handyman/foreman
4	There has been a design change by the owner	Labor productivity	Equipment breakdown
5	Labor productivity	Communication between the workforce and the chief handyman/foreman	Shortage of labor

Figure 3. Comparison of Highest Ranking Severity Index (S_I)

No	Overall Respondents	BUMN contractor	Private Contractor
1	Lack of construction materials	Funding difficulties in contractors	Lack of construction materials
2	Equipment breakdown	There is a request for changes to the work that has been completed	Delay in delivery of goods/materials
3	Delay in delivery of goods/materials	High rainfall intensity	Equipment breakdown
4	Unskilled workforce	Equipment breakdown	Shortage of labor
5	Shortage of labor	Lack of construction materials	Unskilled workforce

Figure 4. Comparison of Highest Ranking Importance Index (*I_i*)

No	Overall Respondents	BUMN contractor	Private Contractor
1	Lack of construction materials	There has been a design change by the owner	Delay in delivery of goods/materials
2	Delay in delivery of goods/materials	Changes in the scope of work at the time of implementation	Lack of construction materials
3	Communication between the workforce and the chief handyman/foreman	High rainfall intensity	Equipment breakdown
4	There has been a design change by the owner	Incorrect/incomplete planning (drawings/specifications)	Communication between the workforce and the chief handyman/foreman
5	Equipment breakdown	There is a request for changes to the work that has been completed	Shortage of labor

3.5 Alternative to reduce Impact of delay

Determination of alternative for the dominant category based on the results of respondents' answers in the stage 2 questionnaire

Figure 5. Responses and Actions for the Treatment of Project Delay Risk Variables in South Sulawesi all respondents (top 5)

No	Delay Risk Variable	Risk Response Category	Risk Response and Action Risk Treatment Based on Questionnaire Results
1 Labor			
X4	Communication between the workforce and the chief handyman/foreman	<i>Avoidance</i>	Coordination meeting related to manpower, tools, working time
2 Material and Equipment			
X5	Delay in delivery of goods/materials	<i>Avoidance</i>	Ensure that construction management conducts coordination meetings with contractors to evaluate the order mechanism so that it is carried out early
X6	Lack of construction materials	<i>Avoidance</i>	Better evaluation of order mechanism and calculation of material requirements
X7	Equipment breakdown	<i>Avoidance</i>	Routine maintenance is carried out on equipment such as an excavator when the work is carried out when the equipment is damaged, the work is forced to wait for the equipment to be repaired
5 Change Factor			
X16	There has been a design change by the owner	<i>Avoidance</i>	Review and discuss together about the urgency to change items and improve design planning

4. Conclusion

1. From the results of this study, we can conclude that the dominant influence of the delay factor in construction projects on the BUMN side is more on the delay factor which is difficult to accommodate while on the private contractor side it is more on the delay factor that can be accommodated. Overall, respondents have 5 dominant risk factors for delays, among others, Lack of Construction Materials (56.67%). Delay in delivery/material goods (55,62 %), Communication between the workforce and the chief handyman/ foreman (50,34 %), There was a design change by the owner (50,23 %), Equipment damage (49,34 %). In BUMN respondents, 5 dominant risk factors for delays were, among others, there was a design change by the owner (58%), Changes in the scope of work at the time of implementation (50.38%), Rain intensity (49.50%), Planning (drawing/specifications) incorrect/incomplete (48.84%), There is a request for changes to the work that has been completed (48.88%) while in the Private Contractor respondents 5 dominant risk factors for delays are, among others, delays in delivery of goods/materials (79, 44 %), Lack of Construction Materials (79.33 %), Equipment Damage (65 %), Communication between the workforce and the head of the foreman (63.89 %). Lack of manpower (63.75%). Alternatives/strategies to minimize the impact caused by the risk of delays in construction projects are obtained after conducting risk mapping based on risk analysis at all levels of respondents, both overall respondents, BUMN respondents, and private respondents. Next, evaluate the risk based on the probability and consequence values for the occurrence of problems in the construction project so that the predicate/category of each variable risk of delay (Retention, Reduction, Transfer, Avoidance) is found. In the final stage, the risk response is carried out for each predicate/category at each level of the respondent.

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