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ANALYSIS OF FACTORS OF DELAY IN INFRASTRUCTURE WORK IN SIGI REGENCY

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ABSTRACT

The reason for choosing this title is because, like construction projects in general, the implementation of road infrastructure projects in Sigi Regency also faces several obstacles that cause the risk of delays (delay). Disruption of the work will cause losses, both moral and material, those affected by the losses are the parties directly related to the project. The purpose of this research is to analyze what factors influence delays in infrastructure work in Sigi Regency and to find out the most dominant factors causing delays in infrastructure work in Sigi Regency. The type of research used is descriptive research with the sampling technique used being total sampling with a total of 50 respondents. Data analysis with factor analysis method. Based on the results of the research there are six factors that influence delays in infrastructure work in Sigi Regency, these six factors include poor field management, contractor management and natural disaster problems, incompetent field managers, HR readiness and conflicts in the field, additional work and labor turnover, and monitoring quality and weather conditions during work. The amount of influence resulting from all of these factors reached 74,735% while the remaining 25,265% was influenced by other factors that had no significant effect. From the results of this study, it was found that the factor that had the highest influence on the performance of construction workers on road projects in the Sigi Regency area was the factor of bad field management with the highest variance value of 41.958%.

KEYWORDS: Delay Factor, Infrastructure Work, Road Project.

1. INTRODUCTION

A construction project is a series of activities that generally have a certain period of time with limited resources and are required to be able to complete a job according to the time, quality, and cost allocated. The process that occurs in a series of activities certainly involves related parties, either directly or indirectly. Resources are a determining factor in the success of a construction project. Influential resources in the project consist of man, materials, machines, money, and method.

Given the complexity and complexity of construction projects, a good management function is needed, namely planning activities, implementation activities, and control activities. A project is categorized as successful if it is right on cost/budget, right on quality, and on time. These three constraints are benchmarks for the success of a construction project.

One of the most important problems in project construction is *delay*. The bad thing is, project delays often recur in aspects that are affected and influencing factors because project actors often underestimate project delays and don't make this incident an important lesson and experience in implementing the next project. Project delays will impact other aspects of the project. For example, increased costs for businesses to speed up work and increase project overhead costs. Another impact that also often occurs is a decrease in quality because the work has to be done faster than it should, thus allowing several technical matters to be violated in order to reduce project delays

Astina (2012) mentions that every construction project has a specific implementation plan and schedule, including when the implementation of the construction project begins, when the project is completed, how the construction project is carried out, and how to provide resources for the project. The planning of a construction project always refers to the estimates that existed at the time the development plan was made, so that problems can arise if there is a discrepancy between the plans that have been made and the actual reality. Therefore tof impact on the non-compliance is the delay in the time of project implementation and the increase in the cost of implementing the project.

A delay in a construction project means an increase in the project completion time planned and stated in the contract. Delays in the completion of construction projects can be caused by aspects that play a role in the implementation of the construction project. Delays in project implementation generally always have detrimental consequences for owners and contractors because the impact of delays is conflict and debate about what and who is the cause, as well as time demands and added costs.

The contractor is the party that is directly affected by the loss, the loss here that is really felt is related to finance. Because the profit expected by the contractor will certainly decrease, in other words, it will not reach the target, and worse, it will not get a profit, or even have to cover the financial shortfall. Likewise, the consultant will experience a loss, but unlike a contractor, the consultant will experience a loss of time outside the planned schedule. Because of this delay, the consultant will lose the opportunity to do other work, thwhicheans losing profits from other projects. Whereas for the owner, the delay in completing the work causes a loss to the project's operating time, so that the use of the project becomes backward late. Therefore, the stakeholders involved in the project need to identify the factors that cause delays in project completion time, so that it can be used as evaluation material, so that in the future the project can run as planned by overcoming or minimizing the consequences of the various factors that arise.

2. METHODOLOGY

2.1 Location and Time of Research

This research is located in Sigi Regency, Central Sulawesi. The selection of this location is based on data and information obtained from observations which show that in the implementation of construction projects, especially roads in the area, there are still delays, this is influenced by several factors, so it is important to analyze through this study For its implementation, this research is planned to be carried out from May to June 2022.

2.2 Types of Research

The type of research used in this research is descriptive research, using a quantitative approach. According to Resseffendi in Sugiyono (2017) said that descriptive research is research that uses observation, interviews, or questionnaires regarding the current situation, regarding the subject we are studying.

2.3 Data source

Sources of data collected in this study are divided into two, namely

a. Primary data source

Primary data is research data obtained from sources directly without going through intermediary media. In this study, primary data is data that comes directly from the results of filling out questionnaires distributed by researchers to respondents, which aims to find out the technical factors that cause delays in the issuance of PBG, as well as observations made by researchers regarding the problems studied.

b. Secondary data sources

Secondary Data, this data is needed to support maximum analysis and discussion. Secondary data is also needed regarding the disclosure of phenomena in this study. This secondary data includes literature (*Library Research*), supporting documents that have relevance to this research, and documents that are relevant to this research.

2.4 Population and Sample

2.4.1 Population

Sugiyono (2017), said Population is a generation area consisting of objects/subjects that have certain qualities and characteristics determined by the researcher to be studied and then conclusions drawn. The population in this study are all project officials (such as project *owners* , contractors, and consultants) and employees of construction service companies who have handled each construction project, especially road construction in Sigi Regency in the last 5 years which are clearly described in Table 3.1 below.

Table 3.1: List of Highway Work Packages in Sigi Regency for the last 5 (Five) Years.

Year	Job Package Name	Population
2017	Construction of Jalan Binangga - Kalukubula (TDCC): 1. Project *Owners* 2. Contractor 3. Consultant 4. Construction service company employees who handle each project	 1 1 1 7

Year	Job Package Name	Population
2018	Construction of Jalan Binangga - Kalukubula (TDCC): 1. Project *Owners* 2. Contractor 3. Consultant 4. Construction service company employees who handle each project	 1 1 1 7
2019	Proud Road Construction - Boundaries (Road Opening): 1. Project *Owners* 2. Contractor 3. Consultant 4. Construction service company employees who handle each project	 1 1 1 7

2020	Construction of Strategic Village Roads in Baliase Village, Kec. Marawola: 1. Project *Owners* 2. Contractor 3. Consultant 4. Construction service company employees who handle each project	1 1 1 7
2021	Tinggede Road Improvement - Baliase Kec. Marawola: 1. Project *Owners* 2. Contractor 3. Consultant 4. Construction service company employees who handle each project	1 1 1 7
Total		**50**

Source: Public Works and Housing Agency (2022)

From the table above, the total population in this study is 50 officials (consisting of *Owners*, Contractors, and Consultants) and employees involved in each of the Highways Works in Sigi Regency in the last five years.

2.4.2 Research Sample

According to Sugiyono (2017), The sample is part of the number and characteristics possessed by the population, while the sampling technique is called sampling. According to Sugiyono (2017), the sampling technique in this study was *total sampling* . *Total sampling* is a sampling technique where the number of samples is equal to the population. The reason for taking *total sampling* is that the total population is less than 100. So the number of samples in this study is 50 people.

2.5 Data collection technique

Techniques in collecting primary data, authors use several ways, including:

a. Observation

Interpreted as observing patterns of human behavior in certain situations, to obtain information about the desired phenomenon. Observations made by researchers by direct observation of the object of research.

b. Questionnaire Use

The questionnaire is a data collection technique that is carried out by giving a set of questions or written questions to the respondent to answer. The questionnaire in this study contains several questions related to research variables. In writing a questionnaire, the questions prepared must pay attention to the contents of the questions, the language used is easy to understand, the same questions are not made in duplicate, the length of the questions, the order of the questions, and the physical appearance of the questionnaire.

2.6 Research Instruments

Research instruments are tools that are selected and used in data collection activities so that data collection activities become systematic and easy (Sugiyono, 2017). The instrument used in this study was in the form of a questionnaire (questionnaire). The data collected in the research will be used to answer the problems that have been formulated and used as the basis for decision-making The questionnaire used in this study aims to find out someone's opinion about a matter which is prepared with an open statement given to the respondent to get a response. The questionnaire design that will be used in data collection is presented in Table 3.2 as follows:

Table 3.2: The design of the research questionnaire.

No	Factor	Sub Factor		Source
1	management factor	1	The low quality of human resources at the contractor management level	Rita et al. (2021)
		2	Field manager experience	Agritama et al. (2018)
		3	Poor field supervision	Rita et al. (2021)
		4	Lack of control of work in the field	Ramang et al. (2017)
		5	Poor communication between *stakeholders*	
		6	Additional work instructed by the project owner	Adi et al. (2020)
		7	Preparation of human resources	Arditi et al. in Proboyo (1999)
		8	Financial Problem	Romance (2016)
		9	Project mobility is late	Rita et al. (2021)
2	labor factor	10	Shortage of labor	Assaf in Suharno (2014)
		11	Expertise in operating construction equipment	Agritama et al. (2018)
		12	Occupational accidents that occur to workers	
		13	Low labor productivity	Ramang et al. (2017)
		14	Lack of labor discipline	
		15	Executors (foremen) are not good	Romance (2016)
		16	Labor work motivation	Andi et al. (2003)
		17	Disputes of work between different parts of the project	Assaf in Suharno (2014)
3	change factor	18	There is a change in work methods	Adhi. et al. (2020)
		19	Changes to the main structure work	

		20	New employee turnover	Andi et al. (2003)
4	material factor	21	There was a shortage of materials	Rita et al. (2021)
		22	The material used by the implementing contractor is not in accordance with the specifications	Adi et al. (2020)
5	equipment factor	23	Delay in the provision of heavy equipment	Ramang et al. (2017)
		24	Equipment malfunction	Assaf in Suharno (2014)
		25	Lack of equipment that supports smooth work	Rita et al. (2021)
6	environmental condition factor	26	Extreme weather conditions during the implementation	Adi et al. (2020)
		27	Natural disasters	Ramang et al. (2017)
		28	Difficult location/workplace *conditions*	Romance (2016)

Then the scale used in the preparation of the questionnaire is the *Likert scale* with the value interval of each answer from 1 to 5. The frequency of occurrence of these factors:

1. Very Unaffected = STM
2. Does Not Affect = TM
3. Neutral / Don't Know = N/TT
4. Affect = M
5. Very Influential = SM

2.7 Data analysis

This data processing sub-technique, it describes the analytical methods that will be used to answer the formulation of the problem, but before that, the first step that needs to be done is to test the validity and reliability of the research data obtained.

1. Validity test

A validity test is used to measure whether a questionnaire is valid or not. A questionnaire is said to be valid if the questions or statements on the questionnaire are able to reveal something that will be measured by the questionnaire. According to Ghozali (2011), measuring validity can be done by correlating the score of the question items with the total score of the construct or variable. The significance test was carried out by comparing the r count value with r table (at a significance level of 5% which was connected with a sample of 50 people, the r table value was 0.279. If the r count is greater than the n r table and the r value is positive, the statement is declared valid so that the data from valid statements can be analyzed further, meanwhile, if the data is not valid then the data from the statement or question is removed from the analysis.

2. Reliability Test

A reliability test is a tool for measuring a questionnaire which is an indicator of a variable or construct. A questionnaire is said to be reliable or reliable if one's answers to statements are consistent or stable from time to time (Ghozali, 2011) . In this test, the researcher measures the reliability of a variable by looking at *the Cronbach Alpha* with a significance greater than 0.70. A construct or variable is said to be reliable if it gives a *Cronbach Alpha value* > 0.70 (Ghozali, 2011).

After the process of testing the validity and reliability is complete, then proceed with statistical tests to answer the formulation of the problem in this study, while the analytical techniques used include descriptive statistical analysis and *factor analysis*.

1. Descriptive Statistical Analysis

Descriptive statistics are statistics that are used to analyze data by describing or describing the data that has been collected as it is without intending to make general conclusions or generalizations. Descriptive statistics, among others, is the presentation of data through tables, graphs, pie charts, pictograms, and calculation of the mean, *td. Deviation* and *skewness* calculation of deciles, and percentiles, calculation of the spread of data through the calculation of the average and standard deviation,and calculation of percentages. (Sugiyono, 2017).

2. *Factor Analysis* (Factor Analysis)

Factor analysis is a technique used to find factors that can explain the relationship or correlation between various independent indicators that are observed. Factor analysis is an extension of principal component analysis. It is also used to identify a relatively small number of factors that can be used to explain a large number of interrelated variables. The factor analysis research was carried out with the help of the SPSS version 26 application.

3. RESULTS AND DISCUSSION

3.1 Research Instrument Test

According to Azawar in Arikunto (2010), Validity comes from the word *validity* which means the extent to which the accuracy and accuracy of a measuring instrument performs its measurement function. In addition, validity is a measure that shows that the variable being measured is really the variable that the researcher wants to examine. A test can be said to have high validity if the test performs its measuring function, or provides precise and accurate measurement results in accordance with the intent of the test. A test that produces data that is irrelevant to the purpose of the measurement is said to be a test that has low validity. To determine whether or not a question is appropriate for use in a questionnaire, a *Bivariate Pearson correlation test* (*Pearson Moment Product*) is usually performed. This validity test was carried out by correlating each item score with the total score obtained from the results of the questionnaire. Each question item that is significantly correlated with the total score indicates that each of these question items can provide support to answer what you want to research in a valid manner. The trick is to do a comparison between r count and r table (*r Product moment*) with a significance level of 5% (0.05). If r count ≥ r table (2-sided test with sig. 0.05) then the instrument used has a significant correlation with the total score or is declared valid. So that with a total of 50 respondents involved, with a confidence *interval* of 95% or *level of significance* (α) = 0.05, an r table value of 0.279 is obtained. For this reason, in knowing the results of the validity test on each question item in the questionnaire used, it can be seen in Table 4.8.

Table 4.8 Test the validity of individual worker factors.

Factor	R Count	R Table	Ket.
F1	0.845	0.279	Valid
F2	0.629	0.279	Valid
F3	0.550	0.279	Valid
Factor	R Count	R Table	Ket.
F4	0.657	0.279	Valid
F5	0.657	0.279	Valid
F6	0.719	0.279	Valid
F7	0.589	0.279	Valid
F8	0.825	0.279	Valid
F9	0.825	0.279	Valid
F10	0.516	0.279	Valid
F11	0.484	0.279	Valid
F12	0.682	0.279	Valid
F13	0.646	0.279	Valid
F14	0.348	0.279	Valid
F15	0.572	0.279	Valid
F16	0.639	0.279	Valid
F17	0.539	0.279	Valid
F18	0.706	0.279	Valid
F19	0.642	0.279	Valid
F20	0.590	0.279	Valid
F21	0.845	0.279	Valid
F22	0839	0.279	Valid
F23	0.880	0.279	Valid
F24	0.829	0.279	Valid

F25	0931	0.279	Valid
F26	0.295	0.279	Valid
F27	0.775	0.279	Valid
F28	0.773	0.279	Valid

The results of the validity test described in Table 4.8 show that all question items or statements in this study fall into the valid criteria for all question items where the r count value obtained is greater than r table. Thus, based on the results of the validity test on the question items from all the factors above, we can see that all the questions on the sub-factors used in this study are considered valid, so each question item in the questionnaire can be used in subsequent research activities.

Sitinjak and Sugiarto (2006) state that reliability refers to an understanding that the instruments used in research to obtain information used can be trusted as a data collection tool and are able to reveal actual information in the field. A questionnaire is said to be reliable or reliable if one's answers to statements are consistent or stable from time to time.

The reliability of a test refers to the degree of stability, consistency, predictability, and accuracy. Measurements that have high reliability are measurements that can produce reliable data. One popular method is the reliability test, where if *tronbach's alpha value* is > 0.70 then each variable tested has a reliable question item or indicator. There are two reasons researchers use *Cronbach's alpha test*. First, this technique is the most frequently used questionnaire reliability testing technique. Second, by carrying out the *bach's alpha test* , inconsistent indicators will be detected. The results of the reliability test in this study can be seen in Table 4.9:

Table 4.9 Reliability Test Results

Variable	***Cronbach Alpha (a)***	**Required *Cronbach's Alpha***	**Ket.**
management factor	0.769	>0.7	Reliable
labor factor	0.728	>0.7	Reliable
change factor	0.734	>0.7	Reliable
material factor	0.861	>0.7	Reliable
equipment factor	0.857	>0.7	Reliable
environmental condition factor	0.795	>0.7	Reliable

Looking at the reliability test results that have been presented in table 4.9, it is known that the *Cronbach Alpha value* for each factor is greater than 0.70. So it can be said that all statement items for each factor are declared reliable so that the data from the questionnaire results can be processed further.

3.2 Factor Analysis

a. *Kaiser Meyer Olkin* (KMO) calculations and *Bartlett's Test*

To find out the results of the *KMO and Bartlett's Test* can be seen in table 4.10.

Table 4.10 KMO and *Bartlett's Test.*

Kaiser-Meyer-Olkin Measures of Sampling Adequacy.		0.743
Bartlett's Test of Sphericity	approx. Chi-Square	1209,111
	df	378
	Sig.	0.000

Based on table 4.10 it can be seen that the resulting KMO value is 0.756, of course the results of the analysis show that this value is above 0.5. Then apart from that, *Bartlett's Test* shows that the significance value obtained from the results of this analysis is 0.000 which is smaller than 0.05. So from these results the data in this study are feasible to be processed at the next stage.

b. *Measure Of Sampling Adequacy* (MSA)

The MSA value for each variable can be briefly seen in Table 4.11.

Table 4.11 MSA values for 28 sub factors.

Sub Factor	MSA value	Criteria	Information
F1	.869 [a]	>0.5	MSA Qualified
F2	.565 [a]	>0.5	MSA Qualified
F3	.655 [a]	>0.5	MSA Qualified
F4	.725 [a]	>0.5	MSA Qualified
F5	.588 [a]	>0.5	MSA Qualified
F6	.687 [a]	>0.5	MSA Qualified
F7	.683 [a]	>0.5	MSA Qualified
F8	.798 [a]	>0.5	MSA Qualified
F9	.897 [a]	>0.5	MSA Qualified
F10	.802 [a]	>0.5	MSA Qualified
F11	**.449 [a]**	**< 0.5**	**MSA Not Qualified**
F12	.829 [a]	>0.5	MSA Qualified
F13	.559 [a]	>0.5	MSA Qualified
F14	.707 [a]	>0.5	MSA Qualified
F15	.610 [a]	>0.5	MSA Qualified
F16	.625 [a]	>0.5	MSA Qualified
F17	.676 [a]	>0.5	MSA Qualified
F18	.571 [a]	>0.5	MSA Qualified

F19	**.473 [a]**	**< 0.5**	**MSA Not Qualified**
F20	.659 [a]	>0.5	MSA Qualified
F21	.809 [a]	>0.5	MSA Qualified
F22	.749 [a]	>0.5	MSA Qualified
F23	.828 [a]	>0.5	MSA Qualified
F24	.789 [a]	>0.5	MSA Qualified
F25	.827 [a]	>0.5	MSA Qualified
F26	.667 [a]	>0.5	MSA Qualified
F27	.788 [a]	>0.5	MSA Qualified
F28	.883 [a]	>0.5	MSA Qualified

From Table 4.11 it turns out that there are 2 sub-factors that have an MSA value of less than 0.5 (in bold) and there are 26 sub-factors that have an MSA value of more than 0.5 (in bold). If MSA = 1 the variable can be predicted without error by other variables, if MSA > 0.5 the item can still be predicted and can be analyzed further and if MSA < 0.5 the item cannot be predicted and cannot be analyzed further. The sub-factors that must be excluded first are those that have an MSA value of less than 0.5 before retesting the 26 sub-factors that have an MSA value of more than 0.5 until appropriate results are obtained, ie there are no more indicators that have an MSA value of less than 0.5. So that the results obtained for this retest can be seen in table 4.12.

Table 4.12 MSA values for 26 sub factors.

Sub Factor	MSA value	Criteria	Information
F1	.871 [a]	>0.5	MSA Qualified
F2	.665 [a]	>0.5	MSA Qualified
F3	.697 [a]	>0.5	MSA Qualified
F4	.756 [a]	>0.5	MSA Qualified
F5	.635 [a]	>0.5	MSA Qualified
F6	.678 [a]	>0.5	MSA Qualified
F7	.692 [a]	>0.5	MSA Qualified
F8	.815 [a]	>0.5	MSA Qualified
F9	.900 [a]	>0.5	MSA Qualified
F10	.879 [a]	>0.5	MSA Qualified
F12	.833 [a]	>0.5	MSA Qualified
F13	.604 [a]	>0.5	MSA Qualified
F14	.687 [a]	>0.5	MSA Qualified
F15	.636 [a]	>0.5	MSA Qualified
F16	.665 [a]	>0.5	MSA Qualified
F17	.679 [a]	>0.5	MSA Qualified
F18	.541 [a]	>0.5	MSA Qualified
F20	.650 [a]	>0.5	MSA Qualified
F21	.803 [a]	>0.5	MSA Qualified
F22	.800 [a]	>0.5	MSA Qualified
F23	.841 [a]	>0.5	MSA Qualified

F24	.814 [a]	>0.5	MSA Qualified
F25	.866 [a]	>0.5	MSA Qualified
F26	.630 [a]	>0.5	MSA Qualified
F27	.827 [a]	>0.5	MSA Qualified
F28	.872 [a]	>0.5	MSA Qualified

Measure Of Sampling Adequacy (MSA) analysis process was carried out, no sub-standard sub-factors were found, meaning that the 26 sub-factors had an MSA value above 0.5 so that data from the 26 sub-factors could be further processed. Meanwhile, two factors were excluded from the model, namely the skill factor in operating construction equipment and changes to the main structure work because it has an MSA value below 0.5. Apart from that, the reality on the ground shows that these two factors are not factors that hinder the implementation of road construction work in Sigi Regency, because the construction service providers have employed competent personnel in operating various road construction equipment, and besides that there have been changes in the main structure in road construction is almost never done, so this factor is considered not to have much influence on the implementation of road construction work in Sigi Regency.

From table 4.13 it can be seen that the 26 sub factors have a communal value above 0.5 which means that there are 26 variable variants that are filtered with other variables. So that all of these sub factors can be tested using further factor analysis.

c. Factor Extraction (*Factor Extructed*)

Factor analysis always tries to produce factors that are fewer in number than the number of variables processed. The approach used to determine the number of factors obtained in this study is based on eigenvalues, variance presentation *and* scree *plots* . Factors will be formed from components that have an eigenvalue *with* the criteria of an *eigenvalue* > 1. The *eigenvalue* arrangement is always sorted from largest to smallest. To find out the number of factors formed from the extraction results can be seen in table 4.14.

Table 4.14 Factor Extraction Results.

Components	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variances	cumulative %	Total	% of Variances	cumulative %
1	10,909	41,958	41,958	10,909	41,958	41,958
2	2,640	10.153	52,112	2,640	10.153	52,112
3	2.143	8,241	60,353	2.143	8,241	60,353
4	1,497	5,759	66,112	1,497	5,759	66,112
5	1.168	4,494	70,606	1.168	4,494	70,606

6	1,074	4,129	74,735	1,074	4,129	74,735
7	0947	3,642	78,377			
8	0.919	3,536	81,913			
9	0.754	2,899	84,812			
10	0.715	2,750	87,562			
11	0.568	2,185	89,747			
12	0.503	1935	91,682			
13	0.440	1694	93,376			
14	0.360	1,386	94,762			
15	0.323	1,242	96,005			
16	0.266	1,024	97,029			
17	0.195	0.750	97,778			
18	0.122	0.470	98,248			
19	0.105	0.406	98,654			
20	0.097	0.372	99,026			
21	0.075	0.290	99,316			
22	0.066	0.253	99,570			
23	0.035	0.134	99,704			
24	0.032	0.125	99,828			
25	0.026	0.099	99,927			
26	0.019	0.073	100,000			
Extraction Method: Principal Component Analysis.						

Total Variance Explained table above shows that there are 7 factors formed from the 26 sub-factors entered. Each factor *has an eigenvalue* > 1. *Component* 1 has *an eigenvalue* of 10,909 with *a Variance of* 41,958%, *Component* 2 has *an eigenvalue* of 2,640 with *a Variance of* 10,153%, *Component* 3 has *an eigenvalue* of 2,143 with *a Variance* 8.241 %, *Component* 4 has *an eigenvalue* of 1.497 with *Variance* 5,759 %, *Component* 5 obtained *an eigenvalue* of 1,168 with *a Variance of* 4,494%, *Component* 6 obtained *an eigenvalue* of 1,074 with *a Variance of* 4,129%, and the eigenvalue *describes* the relative importance of each factor in calculating the variance of the 28 sub-factors analyzed. The total variance of the 28 sub-factors that have been extracted into 7 factors, which to determine the value of the influence of the seven factors is as follows:

41.958% + 10.153% + 8.241% + 5.759% + 4.494% + 4.129% = **74.735%**

The magnitude of *the variance* that is able to be explained by the seven new factors formed shows the magnitude of the influence exerted by the 26 factors on the performance of the construction workforce, where after adding up the *variance values*, the total influence generated by the 28 factors is 74,735 %. while the remaining 25,265% is influenced by other factors outside of the indicators used in this study. Then in addition to the table above, factor extraction in this study can also be seen in the following *Scree Plot image*.

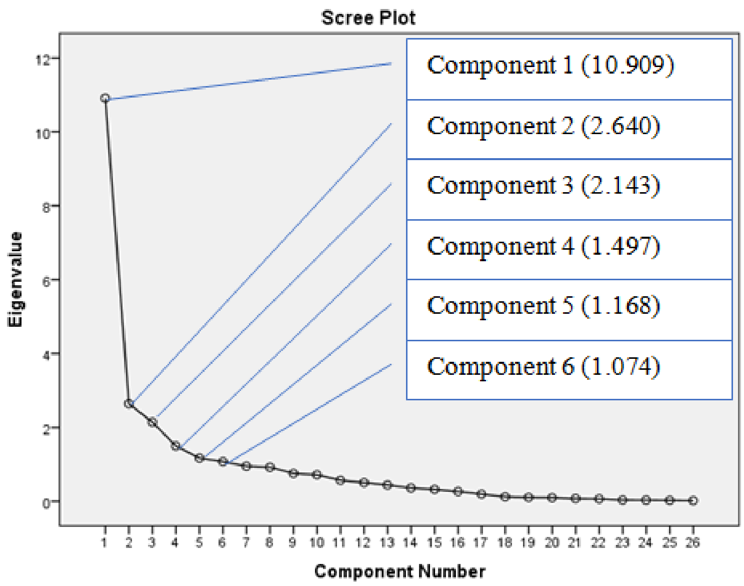

Figure 4.4: ***Scree Plots.***

Graph 4.4 shows that there are seven *components* that have an eigenvalue *above* 1, so that the results of this factor extraction produce seven new factors that have been formed.

d. Matrix and Rotation Components

The next stage is to determine the most dominating items in each of these sections, which can be seen from the analysis results in the *Component Matrix* which outlines the distribution of each of the sub-factors studied in the seven factors that have been formed. By analyzing the weighting factors, it is very good to solve which things get a place with which factors by looking at the magnitude of the weighting factors for each item against the seven formed factors. More details can be seen in Table 4.15.

Table 4.15 ***Component Matrix.***

Sub Factor	Components					
	1	2	3	4	5	6
F1	0891	-0.025	-0.276	-0.028	0.000	-0.014
F2	0.459	0.606	0.160	0.381	-0.042	0.082
F3	0.449	0.130	0.168	-0.414	0.497	-0.191
F4	0691	-0.255	0.159	-0.109	0.063	-0.097
F5	0.492	0.687	0.020	0.220	0.036	0.355
F6	0.676	0.239	-0.193	0.313	0.070	-0.397
F7	0.536	0.296	0.533	-0.361	-0.145	-0.163
F8	0.863	0.025	-0.260	-0.132	0.031	-0.063

F9	0911	-0.138	-0.065	-0.058	-0.050	0.197
F10	0.516	-0.462	0.079	0.027	0.081	0.150
F12	0.773	-0.221	-0.092	-0.041	-0.014	0.213
F13	0.505	0.652	-0.021	0.254	0.055	0.420
F14	0.277	-0.328	0.531	0.324	0.149	-0.267
F15	0.535	0.110	-0.415	-0.047	-0.067	-0.006
F16	0.613	-0.016	-0.526	-0.104	0.102	-0.071
F17	0.526	0.454	0.458	-0.344	-0.219	-0.110
F18	0.135	-0.478	0.099	0.462	0.308	0.201
F20	0.532	0.040	-0.308	0.301	0.169	-0.477
F21	0.754	-0.098	-0.102	-0.042	-0.178	-0.045
F22	0.655	-0.195	0.329	0.319	-0.146	-0.117
F23	0.659	-0.195	0.466	0.041	-0.161	0.095
F24	0.794	-0.128	0.036	-0.012	-0.127	0.027
F25	0.823	-0.327	0.214	0.072	-0.208	0.082
F26	-0.315	-0.033	0.165	0.248	0.345	0.056
F27	0.775	0.004	-0.312	-0.081	0.097	-0.059
F28	0.883	-0.164	0.008	-0.044	0.011	0.139

The results of the extraction from the analysis process show that it is very difficult to determine which sub-factor or dominant indicator with the highest value is included in the factor because the resulting correlation value is almost the same for each item. As a solution, it is necessary to do factor rotation which is expected to describe the distribution of each item so that it is clearer and easier to understand.

In this study, the rotation used was the varimax method. The varimax rotation mechanism is to make item correlation only dominant to one factor. This is done by making item correlations close to the absolute values of 1 and 0 for each factor, making it easier to interpret the dominant item. The purpose of the rotation process in the results of this study is to obtain factors with clear factor loadings for interpretation. The component matrix rotation (*rotated component matrix*) is a correlation matrix that shows a clearer and more real distribution of variables than *the component matrix*. More details can be seen in Table 4.16:

Table 4.16 ***Rotated Component Matrix Results.***

Sub Factor	**Components**					
	1	**2**	**3**	**4**	**5**	**6**
F1	0.438	0.619	0.237	0.039	0.312	0.173
F2	0.170	0.098	0.774	0.208	0.226	-0.124
F3	0.111	0.114	0.035	0.369	0.299	0691
F4	0.616	0.333	-0.042	0.180	0.150	0.234
F5	0.051	0.167	0911	0.134	0.069	0.078
F6	0.231	0.357	0.324	0.088	0.728	-0.036
F7	0.385	0.034	0.199	0.784	0.044	0.162

F8	0.379	0.692	0.191	0.153	0.259	0.201
F9	0.635	0.504	0.261	0.039	0.085	0.219
F10	0.612	0.185	-0.072	-0.178	0.013	0.229
F12	0.567	0.383	0.181	-0.078	0.089	0.241
F13	0.069	0.204	0.929	0.056	0.034	0.085
F14	0.634	-0.244	-0.103	0.033	0.305	0.047
F15	0.113	0.828	0.153	0.072	0.005	-0.080
F16	0.112	0.802	0.057	-0.046	0.204	0.136
F17	0.273	0.007	0.343	0.792	0.067	0.111
F18	0.438	-0.245	0.017	-0.600	0.174	0.199
F20	0.155	0.335	0.092	-0.074	0.776	0.010
F21	0.507	0.553	0.108	0.156	0.130	-0.017
F22	0.772	0.131	0.149	0.105	0.236	-0.128
F23	0.806	0.127	0.146	0.252	-0.070	0.033
F24	0.625	0.511	0.150	0.163	0.064	0.037
F25	0.857	0.290	0.103	0.087	0.064	0.020
F26	-0.067	-0.094	-0.016	-0.189	-0.143	0.044
F27	0.305	0.629	0.173	0.047	0.301	0.224
F28	0.652	0.424	0.222	0.050	0.139	0.261

It can be seen that after rotation. We can more easily determine factor one, factor two, and subsequent factors up to factor six.

e. Factor Naming

After the seven factors are formed, the next step is to name each of these factors, as explained in the following description:

1. Factor 1

This factor consists of eleven sub-factors that make up, including the lack of control of work in the field (F4) with a *loading value* of 0.616, late project mobility (F9) with a *loading value* of 0.635, labor shortage (F10) with a *loading value* of 0.612, work accidents that occur to workers (F12) with a *loading value* of 0.567, lack of labor discipline (F14) with a *loading value* of 0.634, there is a change in work methods (F18) with a *loading value* of 0.438, the material used by the contractor is not in accordance with the specifications (F22) with a *loading value* of 0.772, delay in the provision of heavy equipment (F23) with a *loading value* of 0.806, equipment damage (F24) with a *loading value* of 0.625, lack of equipment that supports smooth work (F25) with a *loading value* of 0.857, and conditions difficult location/workplace (F28) with a *loading value* of 0.652. So thus, based on the characteristics of the sub-factors that make up factor 1, it will be named the factor of **bad field management**, this actor has the highest *variance value* when compared to other factors, with a *variance value* of 41.958% which makes this factor a factor with influence the highest on delays in infrastructure work, especially road infrastructure projects in Sigi Regency compared to other factors.

2. Factor 2

This second factor also consists of six sub-factors that make up which the six sub-factors are The low quality of human resources at the contractor management level (F1) with a *loading value* of 0.619, financial problems (F8) with a *loading value* of 0.692, the executor (foreman) is not good (F15) with a *loading value* of 0.828, work motivation of the workforce (F16) with a *loading value* of 0.802, there was a shortage of material (F21) with a *loading value* of 0.553, and natural disasters (F27) with a *loading value* of 0.629. Referring to the characteristics of each sub-factor in factor 2, the researcher chose to name this factor, namely the factor of **contractor management and natural disaster problems**, which this factor has the second highest *variance value*, namely with a *variance value* of 10,153% making this factor as a factor with the second highest influence on delays in infrastructure work, especially road infrastructure projects in Sigi Regency after poor field management.

3. Factor 3

This third factor is formed by three sub-factors, which the three sub-factors include the experience of the field manager (F2) with a *loading value* of 0.774, poor communication between *stakeholders* (F5) with a *loading value* of 0.911, and low labor productivity (F13) with a *loading value* of 0.929. Of course, when viewed from the characteristics of each sub-factor that has formed this third factor, the researcher chose to name the **incompetent field manager factor**, this factor has the third highest *variance value, with a variance value* of 8.241% which makes this factor a factor with the third highest influence on delays in infrastructure work, especially road infrastructure projects in Sigi Regency.

4. Factor 4

Furthermore, the fourth factor is formed from two sub-factors, which include the preparation of human resources (F7) with a *loading value* of 0.784, and work disputes between different parts of the project (F17) with a *loading value* of 0.792. When viewed from the characteristics of each sub-factor that make up this fourth factor, the researchers chose to name the factor **HR readiness and conflict in the field**, this factor has the fourth highest *variance value, with a value reaching 5.759% making this factor the factor with the fourth highest influence* to delays in infrastructure work, especially road infrastructure projects in Sigi Regency.

5. Factor 5

The fifth factor, this factor is formed from two sub-factors, which include additional work instructed by the project owner (F6) with a *loading value* of 0.728, and new labor turnover (F20) with a *loading value* of 0.776. When viewed from the characteristics of the two sub-factors that make up this fifth factor, the researcher chose to give a name, namely **the addition of work and labor turnover** factors, this factor has the fifth highest *variance value*, with a value reaching 4,494% making this factor the factor with the highest influence fifth to delays in infrastructure work, especially road infrastructure projects in Sigi Regency.

6. Factor 6

Furthermore, the sixth factor, this factor is also formed by two sub-factors, which include poor field supervision (F3) with a loading value of *0.691*, and extreme weather conditions during the implementation period (F26) with a *loading value* of 0.044. Of course, if you look at the characteristics of the two sub-factors that make up this factor, then it is named the **quality control factor and weather conditions during construction**, this factor has the sixth highest *variance value, with a variance value* of 4.129% making this factor the sixth factor that has an influence on delays in infrastructure work, especially road infrastructure projects in Sigi Regency.

3.3 DISCUSSION

Based on the results of the analysis previously presented by the researchers, it shows that there are seven factors that influence the performance of construction workers on road projects in the Sigi Regency area, these seven factors include: 1) poor field management; 2) management of contractors and natural disaster issues; 3) incompetent field managers; 4) readiness of human resources and conflicts in the field; 5) addition of work and change of workforce; and 6) quality control and weather conditions during work. The amount of influence resulting from all of these factors reaches 74,735% while the remaining 25,265% is influenced by other factors outside of the indicators used in this study such as the physical condition of workers, socio-political issues, work strikes, and many more. is also an important aspect that affects delays in infrastructure work, especially road infrastructure projects in Sigi Regency. Apart from that, from the factor analysis there were two sub-factors that could not be processed further or were excluded from the factor analysis stage so that they were declared not to have an effect on delays in infrastructure work, especially road infrastructure projects in Sigi Regency.

4. CONCLUSION

Based on the results of the research that has been discussed systematically in the previous chapter, it can be concluded that:

1. The results of the analysis show that poor field management factors, contractor management and natural disaster problems, incompetent field managers, human resource readiness and conflicts in the field, additional work and workforce turnover, and quality of supervision and weather conditions during construction affect delays in infrastructure work. in Sigi Regency. The amount of influence resulting from all of these factors reached 74,735% while the remaining 25,265% was influenced by other factors that had no significant effect.
2. From the results of this study, it was found that the factor that had the most dominant influence on delays in infrastructure work in Sigi Regency was poor field management with the highest *variance value* of 41.958%.

REFERENCES

1. Agritama Randy Putra, Huda Miftahul, Rin Titien Setiyo. 2018. Factors Affecting Delays in Construction Projects in Surabaya. *Journal of Construction Engineering and Management*, April 2018; 6(1).
2. Astina. Analysis of the Factors Causing Delays in the Implementation of Construction Project Work in Tabanan Regency. *Civil Engineering Infrastructure Electronic Scientific Journal*, 2014; 4(1).
3. Adhi Santoso Waskito, Alexander Purba, Ika Kustiani Factors causing project delays in the construction of the Serang - Panimbang toll road. *Civil Engineering*, 2020; 24(1): 22-26.
4. Asmaroni Dedi. Analysis of Time Delays in Implementation of Government Building Construction Projects in Pamekasan Regency. *Journal of Civil Engineering Engineering*, 2016; 1(1): 19-23.
5. Ghozali, Imam. *Application of Multivariate Analysis with the SPSS Program*. Semarang: Diponegoro University Publishing Agency, 2011.
6. Proboyo, B. *Delay in Project Implementation Time: Classification and Ranking of the Causes*. Bandung: Civil Engineering Dimensions, 1999.
7. Ramang, Ruslan, John H. Frans, Putri DK Djahamouw. Factors for Delay in Highway Projects in the City of Kupang Based on Stakeholder Perceptions. *Journal of Civil Engineering*, 2017; 6(1): 103-116.

8. Rita Eva, Carlos Nasfryzal, and Nandi. Causes and Impact of Road Work Delays in West Sumatra, Indonesia. *Engineering Journal*, 2021; 11(1): 27-37.
9. Sitinjak and Sugiarto. *Lisrel*. First Edition. Yogyakarta First Printing: Graha Ilmu Publisher, 2006.
10. Sugiyono. *Qualitative Quantitative Research Methods and R&D*. Bandung: Alphabet, 2017.
11. Suharno. *Project Management Methods and Handling GAP Inside.* Bandung: Alphabet, 2014.