

Applied Statistics to Identification of The Causes of Delays Construction Project (Case Study of Construction Project in The Regency of Buton)

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Abstract

As the economy develops in Buton Regency, construction projects are increasing. However, not all projects in progress are going according to the targeted plan. For example, the construction of the Multipurpose Building in the Takawa Buton office complex which was built from 2016 until now has not been realized. Apart from that, there are also other projects such as the road connecting Gonda and Lapodi Village in Pasarwajo Subdistrict, the road connecting Siontapina and Sangiarano Villages in South Lasalimu Subdistrict, Kamaru Capital Road in Lasalimu Subdistrict, Bonetiro Village road in Kapontori Subdistrict, etc. are still pending in the process. This type of research is a quantitative research, where the data is processed and tested with a statistical approach. Descriptive research that provides an overview of a situation where every problem and subject will be taught systematically, actually and accurately with a deductive discussion technique where the discussion starts from general things to more specific things. There are two methods used, namely validation test and reliability test. The solution to the factors that cause delays in construction projects in the Buton Regency area is that the unavailability of equipment can hinder the project's progress. The solution is not to rely on just one vendor. Make a list of vendors who can provide the necessary tools during the project. Make sure the vendors can provide everything on time.

Keywords: delays construction, construction project, buton.

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1. Introduction

The company's success in achieving its goals cannot be separated from the role of work planning and work scheduling. This includes construction projects which generally have a work plan and implementation schedule, when the project should start and when it should end. The success of a project is influenced by the performance of each component implementing the work, including the project owner.

Based on their nature and objectives, each component involved has different interests which if not managed optimally will create the potential for disputes in various forms and complexities that can potentially increase construction costs and delay the completion of work. The success of a construction project is also determined from the suitability of the time, cost and quality specified in the contract documents.

This planned success is one of the most important goals for owners and contractors alike. But generally not everything can be predicted initially according to reality, which will eventually lead to delays. Project delays that often occur can cause various forms of losses for service providers and service users. (Ogunlana, S.O. et al 1998) identified factors for lack of equipment quantity: frequent equipment breakdowns, and equipment allocation problems were important factors that contributed to the cause of delays. According to (Suharto 2001) companies must understand two basic thoughts on the notion of project management. First, project management does not guarantee 100% project success. This means that there is no certainty of the success of the project implementation. Second,

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project management can help increase the percentage of project success even though it costs money. However, the benefits gained far outweigh the costs

Delay is one of the important risks that routinely occurs in every construction project. For implementing contractors, delays can mean tangible and intangible losses while on the other hand, for owners, delays can result in not achieving benefits or outcomes. (Mubarak 2005) also emphasizes that this delay can result in delays in claims such as time extension, monetary compensation or both". Basically the interpretation of delay refers to project delays. The results of the study of (Assaf and Al Heijji 2006) that delay is the addition of time either outside the completion date specified in the contract or outside the agreed date of the parties running the project". The element of time extension in project completion is clearly the main effect of delays.

As the economy develops in Buton Regency, construction projects are increasing. However, not all projects in progress are going according to the targeted plan. For example, the construction of the Multipurpose Building in the Takawa Buton office complex which was built from 2016 until now has not been realized. Apart from that, there are also other projects such as the road connecting Gonda and Lapodi Village in Pasarwajo Subdistrict, the road connecting Siontapina and Sangiarano Villages in South Lasalimu Subdistrict, Kamaru Capital Road in Lasalimu Subdistrict, Bonetiro Village road in Kapontori Subdistrict, etc. are still pending. in the process.

Many previous studies were consulted and used in this study as a reference and in the development of this research. The first study found the following: The research method is a quantitative research and the data collection used is a survey with a questionnaire tool. The results of the study: the potential factors that cause delays in building construction projects in the Kediri area are materials, labor and access to project sites; Supervision, improper implementation and condition of the project site; Unexpected factors; Employment and contractual issues; contractor credibility; Planning errors; Characteristics of the project owner; waiting time factor; and Design inconsistency factors (Wisudanto, 2013). The second study, namely the factors that cause delays in construction projects and their alternative solutions (Case Study: Manado Town Square III)". Methods of data collection using questionnaires, data processing using SPSS program with descriptive analysis method. The results of the study: the main factors that affect the delay in the completion of the Mall (Manado Town Square III) construction project are Lack of construction materials, Material changes in form, function, and specifications, Delay in material delivery, Equipment damage, Financial availability during implementation, Delay in the payment process by the owner, Design errors made by planners, Lack of manpower, Manpower capabilities, Differences in the schedule of sub contractors in project completion (Hassan et al., 2016). The third study is the analysis of factors causing delays in the implementation of building project work in Jembrana Regency. Methods of collecting data using questionnaires, data analysis methods used are relative index and factor analysis which are operated using SPSS 16.0 for Windows. The results are: the most influential factor in the delay in the implementation of building project work in Jembrana Regency is rainfall (Handayani et al., 2013), and the last research reference is the Analysis of the Factors Causing Delay in Completion of Construction Projects Its Effect on Costs". Data collection using questionnaires, data processing using the computer program SPSS (Statistical Product and Service Solution) version 17.00. The results are: the factors that affect the delay in the first project are changes in the scope and work documents, the second is the coordination and transportation of resources and workforce expertise, the third is the evaluation and planning system (Sianipar, 2012)

2. Methodology

2.1. Types of research

This type of research is a quantitative research, where the data is processed and tested with a statistical approach. Descriptive research that provides an overview of a situation where every problem and subject will be taught in a systematic, actual and accurate manner with a deductive discussion technique where the discussion starts from general things to more specific things.

2.2. Data Collection Method with Questionnaire

The data collection method used in this study was a questionnaire. This questionnaire is given to the respondents directly. Data was collected using closed questionnaires to obtain data about the dimensions of the concepts developed in this study.

This list of questions or questionnaires has been compiled in such a way that it is hoped that it will make it easier for respondents to answer the questions. The list of questions or questionnaires was distributed to respondents to be filled out by going directly to the offices of Owners, Consultants and Contractors in the Buton district.

Because the answer is still qualitative, it needs to be quantified by giving a value/scale for each variable. Scale items have a fixed alternative and are able to place individual responses at a point on the scale, for this study the measurement of respondents' answers used the summed rating method (popular with the name Likert model scaling). The Likert scale is a psychometric scale that is commonly used in questionnaires, and is the most widely used scale in survey research. The scale is named after Rensis Likert, who published a report describing its use.

This scale is an attitude statement scaling method that uses the distribution of “important” or “not important” and “influential” or “not influential” responses. An empirical study found that some of the statistical characteristics of the questionnaire results with various numbers of choices were very similar. The Likert scale is a bipolar scale method that measures both positive and negative responses to a statement. This study uses a five-choice scale for a questionnaire that forces people to choose one pole because the "neutral" option is not available. The important and unimportant values / scales are as follows:

- 1) For answers that are not very important are given a score of 1
- 2) For answers that are less important are given a score of 2
- 3) For answers that are quite important are given a score of 3
- 4) For important answers given a score of 4
- 5) For very important answers given a score of 5

and for the scale values of influence and no effect are as follows:

- 1) For answers that are not very influential are given a score of 1
- 2) For answers that are less influential are given a score of 2
- 3) For moderately influential answers, a score of 3 is given
- 4) For influential answers are given a score of 4
- 5) For highly influential answers, a score of 5 is given

The questionnaire was then delivered directly by the researcher to the intended location and provided an explanation of matters relating to the research. Filling out the questionnaire was distributed to respondents by way of direct delivery by the researcher, with the intention of asking the respondent to fill out the questionnaire. If the respondent is quite busy, the researcher leaves the questionnaire, then asks to be filled in directly by the respondent and will be taken after an interval of a few days.

2.3. Research Population

According to (Sugiyono, 2003) population is a generalization area consisting of objects or subjects that have certain qualities and characteristics determined by researchers to be studied and then drawn conclusions. The population for this research is the owners, consultants and contractors who are in the Buton Regency environment.

2.4. Research sites

Lambelu village is one of the oldest villages in the district. Pasikolaga. Located on the coast of the district. Pasikolaga with an area of 19.39 and a percentage of 39.75. The people of Lambelu village mostly work as farmers to fulfill their daily needs. In addition, the community uses garden produce to pay for their children's schooling, however, the lack of transportation facilities in agricultural areas makes it difficult for people to process their garden products and hampers community economic growth, especially in agriculture.

2.5. Research Sample

According to Sugiyono (2003) the sample is part of the number and characteristics possessed by the population. Determination of the number of samples in this study was carried out using the Purposive Sampling method, where sampling was carried out only on the basis of the considerations of the researcher who considered the desired elements already existed in the members of the sample taken. In the implementation of sampling using this technique, the identification of all population characteristics is first carried out, as well as in other ways to study various things related to the population. After that, it was determined based on consideration, some of the members of the population became the research sample. So the sampling technique with purposive sampling is based on the researcher's personal considerations.

The sampling technique is done by selecting a sampling unit based on the consideration of a group of experts in the field of science being studied. Because the study aims to determine the factors that affect construction project delays in the Buton Regency, the selected samples are owners, consultants, and contractors in Buton Regency.

3. Result and Discussion

3.1. Data analysis method

After all the data has been collected, then data analysis is carried out in a quantitative way, namely the survey results in the form of questionnaires from the respondents are processed according to the method used. The data analysis method used in this study is static analysis using IBM SPSS (Statistical Package for Social Sciences) for frequency and descriptive analysis. The analytical method used in this study is adjusted to the number of stages of data collection.

3.2. Validity test

Every research conducted using a questionnaire or questionnaire method, it is necessary to test the validity. The validity test is useful to determine the validity or suitability of the questionnaire used by researchers to obtain data from respondents or research samples. Test the validity of the product moment Pearson correlation using the principle of correlating or connecting between each item or question score with the total score obtained from the respondents' answers to the questionnaire.

Comparing the calculated r value with the table r value

- 1) Comparing the value of r arithmetic $>$ r table, then the item in the questionnaire is declared valid
- 2) If the value of r count $<$ r table, then the item in the questionnaire is declared invalid

Comparing the value of Sig. (2-tailed) with a probability of 0.05

- 1) If the value of Sig. (2-tailed) $<$ 0.05 and the Pearson Correlation is positive, then the item in the questionnaire is valid
- 2) If the value of Sig. (2-tailed) $<$ 0.05 and the Pearson Correlation is negative, then the item in the questionnaire is invalid.
- 3) If the value of Sig. (2-tailed) $>$ 0.05, then the item in the questionnaire is not valid

The steps to test the validity are:

- 1) Input the total score of each variable (score calculation table) on the SPSS page
- 2) Click Analyze -> Correlate -> Bivariate
- 3) In the "Bivariate Correlations" box, enter all variable items in the Variables box. Check Pearson's list; Two-Tailed ; Flag Significant Correlations

4) Click ok

Based on the output of “Correlations”, it is known that the calculated r value (Pearson Correlation Item_1 value with Total_Score) is 0.493. The r table value for $N = 50$ at 5% significance, found the r table value of 0.279 (see table of distribution of r values in appendix 7).

Based on the output of "Correlations" see the table in appendix 5, it is known that the value of Sig. (2-tailed) for the relationship or correlation item_1 is $0.000 < 0.05$ and the Pearson Correlation is positive, which is 0.493, it can be concluded that the item is valid. To find out the validity of item number 2 and so on, the method is the same as analyzing item number 1 and the results can be seen in the table 1.

Table 1. Validity test output

Item	r_{xy}	r_{tabel}	conclusion
F1	0,493	0,279	valid
F2	0,372	0,279	valid
F3	0,563	0,279	valid
F4	0,666	0,279	valid
F5	0,668	0,279	valid
F6	0,603	0,279	valid
F7	0,320	0,279	valid
F8	0,364	0,279	valid
F9	0,384	0,279	valid
F10	0,478	0,279	valid
F11	0,473	0,279	valid
F12	0,466	0,279	valid
F13	0,463	0,279	valid
F14	0,636	0,279	valid
F15	0,481	0,279	valid
F16	0,594	0,279	valid
F17	0,457	0,279	valid
F18	0,436	0,279	valid
F19	0,311	0,279	valid
F20	0,784	0,279	valid
F21	0,378	0,279	valid
F22	0,609	0,279	valid
F23	0,518	0,279	valid
F24	0,515	0,279	valid
F25	0,618	0,279	valid
F26	0,468	0,279	valid
F27	0,639	0,279	valid
F28	0,311	0,279	valid
F29	0,634	0,279	valid
F30	0,653	0,279	valid
F31	0,528	0,279	valid
F32	0,601	0,279	valid
F33	0,536	0,279	valid
F34	0,358	0,279	valid
F35	0,484	0,279	valid
F36	0,644	0,279	valid
F37	0,329	0,279	valid
F38	0,570	0,279	valid

Item	r_{xy}	r_{tabel}	conclusion
F39	0,634	0,279	valid
F40	0,396	0,279	valid
F41	0,644	0,279	valid
F42	0,343	0,279	valid
F43	0,620	0,279	valid
F44	0,478	0,279	valid
F45	0,542	0,279	valid
F46	0,416	0,279	valid
F47	0,653	0,279	valid
F48	0,314	0,279	valid
F49	0,446	0,279	valid
F50	0,578	0,279	valid
F51	0,305	0,279	valid
F52	0,666	0,279	valid
F53	0,554	0,279	valid

If there are several items in the questionnaire that are not valid, there are several solution options, namely (1) repeating and replacing with other questions, (2) repeating the questionnaire and distributing it to respondents again without having to change the question, (3) not changing the question. and did not redistribute the questionnaire to respondents, but the invalid questionnaire items were dropped out (provided that valid items could still describe and measure the variables studied) and were not counted in the next test (reliability test). Because the results of the 53rd item validity test are valid, then the reliability test for the 53 items is carried out. From the research data, analysis and discussion, conclusions can be drawn, namely:

The main factors causing construction project delays in the Buton Regency area as a whole are taken as three major factors, namely:

- 1) From the Equipment factor, namely the unavailability of equipment (F22) it is ranked 1 with a mean of 15.42
- 2) From the Owner factor, namely the error of the project feasibility study (F48) it ranks 2 with a mean of 14.32
- 3) From External factors, namely unfavorable weather conditions (F33) ranked 3rd with a mean of 14.14

The solutions to the factors that cause construction project delays in the Buton Regency area are:

- 1) Unavailability of equipment can hinder the progress of the project. The solution is not to rely on just one vendor. Make a list of vendors who can provide the necessary tools during the project. Make sure these vendors can provide everything on time.
- 2) Errors in the project feasibility study had a fairly widespread impact on several aspects, not only physical but also non-physical. The solution is that in making a feasibility study analysis, of course, it is necessary to pay attention to the comprehensive/comprehensive aspects that will be projected in the future, both at the implementation/construction and post-construction stages which have a direct impact on the surrounding area in terms of utilization, maintenance, social, economic, environment and applicable regulations.
- 3) Unfavorable weather conditions affect project delays. The solution is to do a weather forecast before the project planning is made. If the project is carried out during extreme weather, there are several ways that can be done to anticipate the impact of bad weather on construction work. Among them, preparing special tents for equipment, materials, and workers; installation of tarpaulins in work areas that are feared to be easily damaged or endanger workers if exposed to rain or wind; preparing raincoats for workers; prepare incandescent lamps and blower fans to assist the drying process of project parts that must always be dry; installation of lightning rods to protect workers, making temporary drainage channels equipped with water pumps, strengthening the entrance to the project work site so that traffic of workers and materials is not hampered.

3.2. Reliability Test

After the product moment validity test with SPSS was carried out, then a reliability test was carried out so that the questionnaire in this study was truly reliable.

In his book (Sujarweni. 2014., p.-193) explains that the reliability test can be carried out simultaneously on all the questions in the research questionnaire. The basis for making decisions in reliability testing are as follows:

- 1) If Cronbach's Alpha value > 0.60 then the questionnaire or questionnaire is declared reliable or consistent
- 2) If Cronbach's Alpha value < 0.60 then the questionnaire or questionnaire is declared unreliable or inconsistent

The reliability test steps are:

- 1) Input data to be tested in the tabulation (recapitulation) of each respondent's answers
- 2) Click Analyze -> Scale -> Reliability Analysis
- 3) Select a variable in the Reliability Analysis window
- 4) Click Statistics in the Reliability Analysis window. In the Reliability Analysis: Statistics window, tick Scale if item deleted, then click Continue
- 5) Click OK

Table 2. Output Case Processing Summary

Case Processing Summary			
		N	%
Cases	Valid	50	100.0
	Excluded ^a	0	.0
	Total	50	100.0

a. Listwise deletion based on all variables in the procedure.

The output table 2 provides information about the number of samples or respondents (N) analyzed in the SPSS program, namely N as many as 50 respondents. Because there is no empty data (in the sense that all respondents' answers are filled in) then the valid number is 100%.

Table 3. Reliability Statistics

Reliability Statistics	
Cronbach's Alpha	N of Items
.944	53

From the output table 3, it is known that there are N of Items (number of items or questionnaire questions) there are 53 items with a Cronbach's Alpha value of 0.944. Because Cronbach's Alpha value is $0.944 > 0.60$, then as the basis for decision making in the reliability test above, it can be concluded that the 53 or all items in the questionnaire are reliable or consistent.

4. Conclusion

The research data indicates that the primary factors causing construction project delays in the Buton Regency area as a whole are taken from the top three, namely the Equipment factor, specifically the unavailability of equipment (F22), which ranks first with a mean of 15.42, the Owner factor, specifically the project feasibility study error (F48), which ranks second with a mean of 14.32, and the External factor, specifically unfavorable weather conditions (F33), which ranks third with a mean of 14.32. The solution to the problems that contribute to building project delays in the Buton

Regency area is that equipment shortages can stymie project development. The solution is to avoid reliance on a single vendor. Make a list of vendors who can supply the tools required for the project. Ascertain that these vendors are capable of delivering everything on time. The inaccuracy in the feasibility study had a pretty widespread effect on a number of different factors, both physical and non-physical. The solution is that, when conducting a feasibility study analysis, it is necessary to consider the comprehensive/comprehensive aspects that will be projected in the future, both during the implementation/construction and post-construction stages, which will have a direct impact on the surrounding area in terms of utilization, maintenance, social, economic, and environmental impacts, as well as applicable regulations. Weather conditions are a factor in project delays. The solution is to do a weather forecast prior to initiating project planning. If the project is being carried out during inclement weather, there are numerous approaches to mitigate the effects of inclement weather on construction activity. Among them are the preparation of special tents for equipment, materials, and workers; the installation of tarpaulins in work areas that are feared to be easily damaged or endanger workers if exposed to rain or wind; the preparation of raincoats for workers; the preparation of incandescent lamps and blower fans to aid in the drying process of project components that must remain dry at all times; the installation of lightning rods to protect workers; the construction of temporary drainage channels equipped with water pumps; and the

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