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Risk Analysis of Time Delay in The Sumbawa Shrimp Pond Farming Project

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Abstract

Sekar Laut Group is opening a new land of around 1,000 hectares for shrimp ponds in the Sumbawa area, West Nusa Tenggara. The land in Sumbawa is suitable for shrimp farming because the water is considered cleaner and has no pollution. during the construction process, there were various kinds of obstacles that resulted in work delays of around 23% of the agreed schedule. Therefore, research is conducted to determine the dominant risk that affects the project's time performance and provide risk mitigation so that the risks that occur can be minimized. This research uses quantitative research methods by distributing questionnaires to related parties and testing the validity and reliability using SPSS version 25 software. The data processing method uses risk value data analysis to determine which risks are classified as high risk. The number of risks identified in this research were 35 risks consisting of 33 risks based on literature studies and 2 new findings risks. based on 35 risks distributed to respondents, there are 2 risks that are categorized as high risk. 1 (one) risk comes from a literature study is the subcontractor's poor performance, and 1 (one) other risk comes from the risk of new findings from expert advice is the large amount of repair work due to the earthquake.

Keywords
Project Delays, Risk Management, Risk Value, Shrimp Pond Project.

1. Introduction

Sekar Laut Group opened about 1000 hectares of land for shrimp cultivation ponds in Sumbawa area, West Nusa Tenggara. The selection of land in Sumbawa is suitable for shrimp cultivation, because the water is considered lebih clean and not polluted (Jajeli, 2016). In 2018 Sekar Laut Group opened a new company, PT. Sentra Budidaya Biotek which manages the field of shrimp cultivation ponds recorded in the first stage of land management built an area of 365 hectares. During its work the project has experienced a delay of 23% of the total weight of 100%.

Figure 1. S Curve of the Sumbawa Shrimp Farming Project
Source: S-Curve Document for the Sumbawa Shrimp Pond Farming Project, 2020

The delay in completion is caused by risk factors both internal and external that arise from the early stages of project implementation. Therefore, risk management should be carried out throughout the project cycle from the initial stage to the end of the project (Pertiwi, 2017). There is currently no specific risk analysis applied to the Sumbawa Shrimp Pond project, which was carried out only to identify the cause of the delay. Risk analysis consists of three stages, namely, risk identification, risk analysis, prioritizing risk and mitigation. In risk management, ineffective handling can lead to loss of profits from projects and also a swelling of funds as a result of poor risk management. While the handlers are effective, it is expected that the negative effects of these risks can be minimized so that the project schedule and budget can run smoothly in accordance with the planning. Therefore, a study is needed to identify the risks that often arise in the construction of the project. This research seeks to conduct risk management on the implementation of shrimp cultivation project PT Sentra Budidaya Biotek so that it is expected that the project can be completed as scheduled and provide maximum profit for various parties.

1.1. Problem Identification

From the background that the authors have described, identify the problems that will be made the following research materials:

1. There is a delay of about 23% so that the schedule is not achieved.
2. There has not been a specific risk management, which has been done only to identify the cause of the delay.
3. The need for handling and allocation of risk is classified *as high risk.*

1.2. Problem Formulation

Based on the identification of the problem and in order for the discussion to be more targeted according to its purpose, the problem is formulated as follows:

1. What are the most dominant risk variables and affect project time performance in the construction of shrimp cultivation ponds?
2. How does proper handling and mitigation of the dominant risk variables affect project time performance in the construction of Sumbawa Shrimp Cultivation Pond?

1.3. Research Objectives

The purposes and objectives of this research are:

1. To know the most dominant risk that causes to affect the project time performance on the construction of Sumbawa Shrimp Cultivation Pond.
2. Formulate an appropriate handling strategy against the dominant risks that cause it to affect the time performance of the Sumbawa Shrimp Cultivation Pond project.

2. Method

Here's a flow chart of the research in the image below:

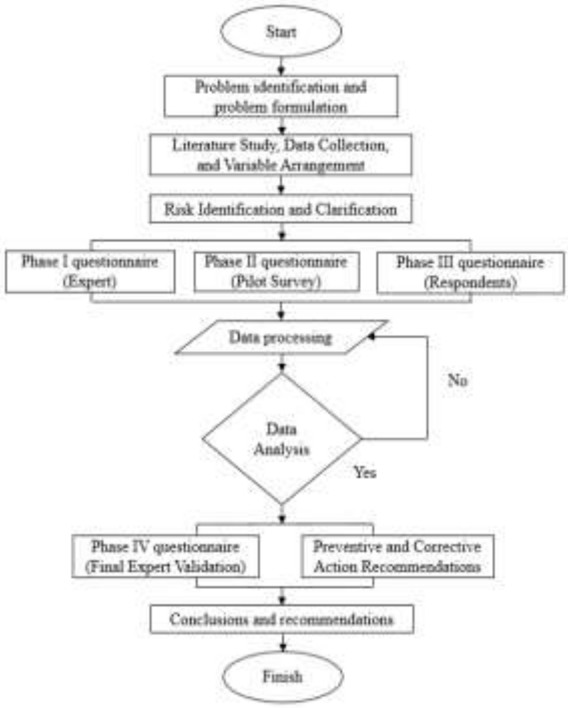

Figure 2. Research Method Flow Chart
Source: Processed Authors, 2020

2.1. Population

Population is a generalized region consisting of objects/subjects that have certain qualities and characteristics set by researchers to be studied and then drawn conclusions (Sugiyono, 2017). In this study, the population that became the object in the study was employees /staff and workers at the Shrimp Cultivation Pond Development Project in Sumbawa. The selection of population characteristics of this study was conducted with the consideration that employees/staff have a direct role in ongoing projects. The selection of population characteristics of this study was conducted with the consideration that employees/staff have a direct role in ongoing projects. The population will be used as a questionnaire for respondents in this study as many as 30 respondents.

2.2. Research Variables

In determining variables, the authors reviewed the results of previous research journal literature studies by taking each of the most dominant variables and observing the conditions in the field, as well as conducting interviews with project staff in order to get a synchronization of relevant variables from the results of the literature study with the conditions of the Sumbawa Shrimp Pond development project. Furthermore, in order for variables to be easier to understand, the author asks for advice and input from experts on the preparation of variable categories. Research variables to be used as questionnaires, previously validated by experts. Whether the variables are relevant or inappropriate, and experts will add some additional variables if they are assessed the variables presented do not represent the problem that occurred. Here are the variables that experts agree on :

Table 1. Research Variables

Variable	Risk Affecting Project Time Performance
	Internal Factors
X1	The process of making work drawings by contractors
X2	Contractor's ability in financial
X3	Limited work equipment
X4	Supervision and job evaluation are not carried out
X5	Lack of supervision during project implementation
X6	Unclear work policies and procedures
X7	Incorrect construction methods lead to errors
X8	Lack of communication and coordination

Table 2. Research Variables

Variable	Risk Affecting Project Time Performance
	Internal Factors
X9	Lack of competence of experts
X10	Low level of management discipline
X11	Slow decision making

Table 3. Research Variables

External Factors	
X12	Late delivery of materials
X13	Late payment by the owner
X14	Low productivity of equipment and machines
X15	Difficult road access to the project site
X16	Delivery locations that are far from the warehouse
X17	Late approval shopdrawing
X18	Process of requesting and approving working drawings by owner
X19	Poor subcontractor performance
X20	Unstable weather conditions
X21	Lack of construction facilities
X22	There is a request for changes to work that has been completed
X23	Increase in material prices
X24	Change in material type during work execution
X25	The work area reaches the sea trough area, so quite a lot of material is shifting manually
X26	A job waiting for the low tide
X27	The occurrence of landslides
X28	An earthquake
X29	Damage to concrete structures
X30	The number of repair works due to the earthquake
X31	Conflict between human resources
X32	Poor soil conditions
X33	Design specifications are low
X34	Order limited quantities of ingredients
X35	The material does not yet exist in the local market

Source: Processed Authors, 2020

2.3. Data Analysis

In this research technical analysis of the data used leads to quantitative analysis. In analyzing the data for research purposes, researchers used a tool that is SPSS software. The data that has been obtained from the field through literature studies and processing of questionnaire variables based on previous research, is then analyzed using the following statistical techniques:

2.3.1 Validity Test

(Dewi, 2018) suggests that the validity of factors is measured when items are arranged using more than one factor (between factors with each other there are similarities). Measuring the validity of these factors by correlated between the factor score (the summation of items in one factor) and the total factor score (the total of the total factors). Measure the validity of an item by correlated between the item score and the total score of the item. The validity of the item is indicated by the correlation or support of the total item (total score). When we use more than one factor, it means testing the validity of an item by correlated between the item score and the factor score, then continuing to correlate between the item and the total factor score (the summation of several factors). From the results of the correlation calculation will be able to be a correlation coefficient used to measure the validity rate of an item and determine whether an item is worth using or not. In determining whether or not an item is used, calculate the correlation between each statement and the total score by using the product moment correlation formula. This research conducted reliability test with statistical package for social sciences (SPSS 25.0 for Windows) software programtools.

2.3.2. Reliability Test

Reliability tests aim to determine the level of data reability generated by an instrument to ensure consistency of research instruments in the same concept. A commonly used reliability analysis is cronbach alpha (C-alpha) analysis. This research conducted reliability test with statistical package for social sciences (SPSS 25.0 for Windows) software programtools.

2.3.3. Probability Assesment

Probability Calculation uses the following equation formula:

$$(Probability) = \sum_{i=1}^{5} \left[a.\left(\frac{n}{N}\right) \right]$$

Where :
i : Response category index (1,2,3,4, and 5).
a : Weight associated with the Ith response value (1,2,3,4,and 5 sequentially).
n : Number of respondents per response value to i.
N : Total number of respondents.

2.3.4. Impact Assessment

Probability Calculation uses the following equation formula*:*

$$(Impact) = \sum_{i=1}^{5} \left[a.\left(\frac{n}{N}\right) \right]$$

Where :
i : Response category index (1,2,3,4, and 5).
a : Weight associated with the Ith response value (1,2,3,4,and 5 sequentially).
n : Number of respondents per response value to i.
N : Total number of respondents.

2.3.5. Risk Value Rating

Test Analysis of the score in order to find the highest weight of each variable in the Analysis. In this study, the scoring was conducted using the PMBOK Analysis method 2017, by creating a weighting of the probability and weighting criteria of the impact criteria, with the average result of the impact value and the probability value obtained from the respondent. Furthermore, the average probability value is multiplied by the average impact value and taken the highest variables that will be used as the result as the dominant factor in the project delay.

To measure risk, use a formula:

$$Risk\ Value\ (\boldsymbol{R}) = P \text{ X } I$$

Where :
P : Probability
I : Impact

Table 4. Scoring Probability and Impacts Matrix

Probability	Threats					Opportunities					Probability
Very High 0.90	0.05	0.09	0.18	0.36	0.72	0.72	0.36	0.18	0.09	0.05	Very High 0.90
High 0.70	0.04	0.07	0.14	0.28	0.56	0.56	0.28	0.14	0.07	0.04	High 0.70
Medium 0.50	0.03	0.05	0.10	0.20	0.40	0.40	0.20	0.10	0.05	0.03	Medium 0.50
Low 0.30	0.02	0.03	0.06	0.12	0.24	0.24	0.12	0.06	0.03	0.02	Low 0.30
Very Low 0.10	0.01	0.01	0.02	0.04	0.08	0.08	0.04	0.02	0.01	0.01	Very Low 0.10
	Very Low 0.05	Low 0.10	Moderate 0.20	High 0.40	Very High 0.80	Very High 0.80	High 0.40	Moderate 0.20	Low 0.10	Very Low 0.05	
	Negative Impact					Positive Impact					

Source: PMBOK 2017

3. Results And Discussions

The data of the analysis results is obtained by the method shown above. The results are as follows:

Table 5. Risk Value Analysis Results and Risk Rating Categories

Variable	Probability (P)	Impact (D)	Risk (P x I)	Rank
X1	0.54	0.35	0.19	Low
X2	0.47	0.30	0.14	Moderate
X3	0.54	0.34	0.19	Moderate
X4	0.57	0.34	0.19	Moderate
X5	0.53	0.36	0.19	Moderate
X6	0.59	0.34	0.20	Moderate
X7	0.53	0.30	0.16	Moderate
X8	0.57	0.30	0.17	Moderate
X9	0.61	0.31	0.19	Moderate
X10	0.59	0.35	0.20	Moderate
X11	0.56	0.34	0.19	Moderate
X12	0.59	0.30	0.18	Moderate
X13	0.55	0.33	0.18	Moderate
X14	0.57	0.33	0.19	Moderate
X15	0.39	0.12	0.04	Low
X16	0.53	0.36	0.19	Moderate
X17	0.47	0.30	0.14	Moderate
X18	0.52	0.34	0.18	Moderate
X19	0.69	0.44	0.30	High
X20	0.47	0.30	0.14	Moderate
X21	0.59	0.27	0.16	Moderate
X22	0.55	0.37	0.20	Moderate
X23	0.37	0.13	0.05	Low
X24	0.59	0.31	0.18	Moderate
X25	0.59	0.33	0.20	Moderate
X26	0.61	0.29	0.17	Moderate
X27	0.56	0.31	0.18	Moderate
X28	0.57	0.34	0.19	Moderate
X29	0.54	0.31	0.17	Moderate
X30	0.75	0.50	0.38	High
X31	0.43	0.12	0.05	Low
X32	0.57	0.34	0.19	Moderate
X33	0.67	0.30	0.20	Moderate
X34	0.55	0.36	0.20	Moderate
X35	0.55	0.33	0.18	Moderate

Source: Processed Authors, 2020

Based on the results of risk value analysis, then get 2 variables with high risk category, as follows:

Table 3. High Risk Affecting Time Performance

Variable	Risk Affecting Project Time Performance
X19	Poor subcontractor performance
X30	The number of repair works due to the earthquake

Source: Processed Authors, 2020

It will then be sought preventive and corrective measures.

From 2 (two) causes of project delays, to 2 (two) experts have provided advice on preventive and corrective measures, namely:

3.1. Poor Performance of Subcontractors

3.1.1. Preventive Measures

Evaluation of subcontractors' working methods on a regular basis, and the holding of internal meetings both on the part of the main contractor and subcontractors related to planning problems and ineffective working methods, Selecting experienced and well-performing subcontractors and able to complete the work according to the project target, Inserting clauses tied to contract documents.

3.1.2. Corrective Action

Replacing the initial subcontractor with a new subcontractor who is expert in his field with a committed and qualified record and keriteria, taking over the work for himself by the main contractor, Looking for other subcontractors who are able to complete the rest of the work.

3.2. Number of Earthquake Repair Works

3.2.1. Preventive Measures

Planning must be adjusted to the guidelines of Design in accordance with the Indonesian National Standard (SNI) earthquake, Tighten supervision in the field on the work (in case of structural nature) to comply with the planning, Conduct risk analysis for disaster mitigation. Coordination with civil engineering engineers in the planning stage.

3.2.2. Corrective Action

Immediately evaluate the potential losses that occur such as, calculating the frequency of losses. After the evaluation is prepared the next step is to conduct a coordination meeting with all the sections to discuss appropriately to overcome the work that needs to be improved, To evaluate the structural work, after the evaluation of the engineering team looking for the concept of adding structure strengthenment to the damaged building with an efficient and strong concept, rescheduling with the acceleration of time, the addition of shift work, or the addition of workers to be able to be made a group that completes the repair work and the group that completes the main work.

Conclusion

Based on the results of analysis and discussion of the data collected from the respondents' answers in this study, conclusions can be drawn, among others:

1. The most dominant risks of identified risks are external factors in variables (X19 = Poor Subcontractor Performance with matrix probability and impacts value of 0.30), and (X30 = Number of Earthquake Repair Works with matrix probability and impacts value of 0.38).
2. Handling risks that affect project time performance can be done with the following precautions:
   a. select experienced subcontractors and commit to the work to be carried out, conduct internal meetings with subcontractors to evaluate problems occurring in the field and evaluate less effective working methods,
   b. tighten management to supervisorsin thegan, conduct disaster mitigation risk analysis, evaluate planning design before implementation with reference to SNI design.

Advice

Based on the results of the analysis of the research and all the limitations of the existing research, the authors suggest for further research on the same topics, including:

1. Risks associated with poor subcontractor performance issues, it is best to tender from several subcontractors first. Of the subcontractors selected, it is required to present a working method and understanding of the work to be carried out. So that subcontractors can be assessed expertly and experienced as well as the most able to complete the work with the best results on the target of the project.
2. In relation to the risks associated with the problem of many earthquake repair work, it is recommended that before carrying out the work needs to be done planning that is guided towards design in accordance with SNI standards so that the design results are more accurate and said to be feasible to be carried out.
3. For further research, the authors suggest that to get more accurate answers, it is necessary to increase the number of respondents from subcontractors. So respondents who were initially only the owner and maincontractors then became owners, maincontractors, and subcontractors.

Reference

Dewi, D. A. N. N. (2018). *Modul Uji Validitas dan Reliabilitas*. *7*(1), 17–23.

Jajeli, R. (2016). *Pertumbuhan Ekonomi Jawa Timur Tahun 2016 Naik 0,23 Persen*.

Pertiwi, H. (2017). Implementasi Manajemen Risiko Berdasarkan PMBOK Untuk Mencegah Keterlambatan Proyek Area Jawa Timur (Studi Kasus: PT. Telkom). *Jurnal Studi Manajemen Dan Bisnis*, *4*(2), 96–108. https://doi.org/10.21107/jsmb.v4i2.3959

Sugiyono. (2017). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Alfabeta.