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# RISK MANAGEMENT ANALYSIS OF TALUS DEVELOPMENT PROJECTS

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**KEYWORDS**

development of talud, risk impacts, executor.

**ABSTRACT**

The construction of the riprap in the Kertosari area is divided into four segments with the length of the riprap segment 1 STA i0+000 i – STA 1+600 with a riprap height of 2M, segment 2 STA 0+00 – STA 0 +200 with a riprap height of 2M, segment 3 STA 0+000 – STA 0+200 with a slope of 3M, segment 4 STA 0+000 – STA 0+200 with a slope of 3M and a project value of Rp. 15,250,000,000. - (Fifteen Billion Two Hundred and Fifty Million Rupiah). The objective of the research to be achieved from implementing the thesis research conducted in this project is to identify the impact of risks as a threat to the talus construction project and the appropriate risk response to the talus construction project. The House of Risk method has 2 stages of analysis, namely in the risk analysis process using HOR phase 1, which focuses on the risk identification process, including risk agents and events. The data obtained in this case study were taken from the Kertosari, Bambar, and Ganefo Talus development projects located in Sentani, Jayapura Regency which involved contractors, the three projects as respondents. Executors and the smallest percentage is 12.1%, i.e., Director, Project Manager, and Site Manager. The age of respondents who dominated this study was> 30 years. The working period of the respondents who dominated in this study was 1-5 years with a total percentage of 87.9 %.

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## INTRODUCTION

Kindly geographical position of Jayapura Regency, especially Sentani City, is very strategic Because it becomes a buffer to the main city of Jayapura, which is the capital of the province of Papua (Sindy, 2022). Besides That, Jayapura Regency became a door pool mainly in Papua because located at the airport became a door entry from cities and others throughout Indonesia and also in the districts in the province, especially those in the middle mountains (Laksmana, 2013). For area, this transportation air becomes the leading choice. Remember Still limited access through land.

Development of the Gap Jayapura Regency, which is in the Kertosari Region shared into four segments with long talud segment 1 STA 0+000 – STA 1+600 with tall 2M Salud, segment 2 STA 0+00 – STA 0+200 with tall 2M Salud, segment 3 STA 0+000 – STA 0+200 with tall 3M Salud, segment 4 STA 0+000 – STA 0+200 with tall 3 M talud and value project 15,250,000,000 IDR (Fifteen Billion Two Hundred Fifty Million Rupiah). On the talus Bambar with long talud STA 0+000 – STA 0+238 with tall 2 M talud and value project IDR 2,000,000,000 - (Two Billion Rupiah) and Projects Talud Ganevo with long talud ST 0+00 – STA 0+ 300 with tall 2 M talud and value project in the amount of IDR 1,721,274,000, - (One Billion Seven Hundred Two Twenty-One Two Hundred Seven Tens Four Rupiah) located in Jayapura district is one activity project construction in support development infrastructure in Papua. Completion project This will be significantly affected by the availability of local source power, conditions, weather, and natural ability management company.

Some potential risks to the project development are The Kertosari River/Calime Gap in Kertosari and the Bambara River/Calime Gap in Bambara, Jayapura Regency. Due to That approach, management risk is significant. That thing is mentally disabled back writer takes topic Management Risks in the Development of Gaps Kertosari and Talud Bambar Jayapur Regency. Study This uses the House Of Risk Analysis method, which aims at action prevention. To determine which risk is being prioritized, will give action mitigation (Princess, 2020) nor countermeasures risk.

In the study, this management risk analysis is only on the project's development road. As for the formulation problem, what impact risks have been identified, and how to respond to risk To prevent or reduce impact risks that occur (Soputa Soputan, Gabby EM, Sompie, Bonny F., & & & Mandagi, 2014). The study Analyzed management risk only on the project's development road. So, discussion in writing is limited for discussion in writing It Can be directed and systematic. This limitation problem that impacts the risks studied is risk threat from the corner view contractor (Rahman, 2020) and methods research used in the study. This is the House of Risk method. The objective of research you want to be achieved from the implementation study of the thesis carried out in the project. This identifies impact risk as threats impacting the project development response and response appropriate risk to the project development talud (Anwar & Yulianto, n.d.) so that can become something reference to handle risks that occur in other projects.

Definition Risk Need is a known definition of risk based on researcher earlier that is as following risk is a variation from the possibility happening something things or events outside engendered hope to threat loss consequence the hazard occurred (Ruane, 2013) and By general risk associated with the likelihood (probability) of occurrence incident beyond expected (Enrico Souhuwat & Dita Saputro, 2021). Define management risk is a method for identifying and measuring absolute risk -ko inside something project or business so that one can decide on How to manage risk (Febriansyah & Hendy Ginting, 2020). Management risk is something effort the application of policy regulations. It systematically measures practical management in analyzing risk use and control to protect workers, society, and the environment (Sepang et al., 2013).

Related research on management risk use of the House of Risk method has been carried out by (Ulfah et al., 2016). HOR is a model based on the needs of management action-focused risk prevention. To determine which risk to prioritize, will be given action mitigation or countermeasures risk (Magdalena & Vannie, 2019). The study aims to identify incident and agent risks and determine priority action prevention (Kusnindah et al., 2014) in handling risk in project flyover construction in Indonesia.

## METHODS

Respondents in the study This is the perpetrator's construction where the respondent consists of the Director, Project Manager, Site Manager, and executors who work in project development in the talus Jayapura district. To help study this tool researchers used is form questionnaire which is a tool for data collection for getting an answer from respondents, that is, contractors (Hassan, Mangare, & Pratasis, 2016), and computers as a tool For processing the existing data obtained from the questionnaire. Variable study in study This is the risks at the time of implementation of the basic construction process consisting of impact risk and treatment risk.

The House of Risk method is needed to manage risk. To identify risks that occur and focus on following prevention risks, determine why the risk is prioritized and given action mitigation or countermeasures risk. The House of Risk method has two stages of analysis that are in the process of analysis risk. This uses HOR phase 1, which focuses on identifying process risks, including agent and incident risks. In the study, design mitigation risk is shown in HOR phase 2. In phase this focuses on

determining form response or mitigation suitable risk. Where form mitigation the must characteristic easy For applied But can reduce probability happening agent risk (Ronny, n.d.).

## RESULTS AND DISCUSSION

Data obtained in studies case This is taken from project development Talmud Kertosari, Bambar, and Ganefo located in Sentani Jayapura Regency, which involves contractor, third project the as respondent. Amount participating respondents in studies case This totals 33 respondents. Following this are general data respondents, which include position respondents regarding studies case. This is grouped in tables 4.1, 4.2, 4.3, and 4.4 into six categories, namely, Director, Project Manager, Site Manager, Safety Officer, executor, and supervisor.

**Table 1. Position Respondents Contractor Gap Development Project Kertosari Segment**

| Respondents | Amount | % |
|---|---|---|
| Director | 1 | 11,11 |
| ProjectManager | 1 | 11,11 |
| SiteManager | 1 | 11,11 |
| Safety Officer | 1 | 11,11 |
| executor | 3 | 33,33 |
| Supervisor | 2 | 22,22 |
| Total | 9 | 100 |

There are nine respondents in the project development talud kerosene segment 1, 8 respondents in the talus Kertosari segment 2-4, 8 responses to the slope geneva, and eight respondents in the talus Bambara.

**Table 2. Position Respondents Gap construction contractor segment 2-4**

| Respondents | Amount | % |
|---|---|---|
| Director | 1 | 12.50 |
| ProjectManager | 1 | 12.50 |
| SiteManager | 1 | 12.50 |
| Safety Officer | 1 | 12.50 |
| executor | 2 | 25.00 |
| Supervisor | 2 | 25.00 |
| Total | 8 | 100 |

**Table 3. Position Respondents Gap construction contractor Ganevo**

| Respondents | Amount | % |
|---|---|---|
| Director | 1 | 12.50 |
| ProjectManager | 1 | 12.50 |
| SiteManager | 1 | 12.50 |
| Safety Officer | 1 | 12.50 |
| executor | 2 | 25.00 |
| Supervisor | 2 | 25.00 |
| Total | 8 | 100 |

**Table 4. Position Respondents Gap construction contractor Bambar**

| Respondents | Amount | % |
|---|---|---|
| Director | 1 | 12.50 |
| ProjectManager | 1 | 12.50 |
| SiteManager | 1 | 12.50 |
| Safety Officer | 1 | 12.50 |
| executor | 2 | 25.00 |
| Supervisor | 2 | 25.00 |

| Respondents | Amount | % |
|---|---|---|
| Total | 8 | 100 |

Age respondents in studies case This own various type age, there age 21 – 30 years own amount age the most with a total of 29 respondents. Following this is age data for respondents in the study's case.

**Table 5. Age Respondents**

| Age | Amount | % |
|---|---|---|
| 21–30 | 29 | 88 |
| 31–40 | 4 | 12 |
| 41–50 | 0 | 0 |
| >50 | 0 | 0 |
| | 33 | 100 |

Period of work on studies case this grouped into four categories, namely:

**Table 6. Working Period Respondents**

| Long Working Time | Amount | % |
|---|---|---|
| <1 Year | 0 | 0 |
| 1 – 5 Years | 29 | 88 |
| 6 – 10 Years | 4 | 12 |
| >10 Years | 0 | 0 |
| Total | 33 | 100 |

The background behind respondents to the study case This has four categories consisting _ of middle school or equivalent, high school or equivalent, Master's Degree (S1), and Master's Degree (S2). Respondents with background having a Bachelor's degree background amount most, totaling 32 respondents.

**Table 7. Background Behind Respondents**

| Education | Amount | % |
|---|---|---|
| Middle school or Equal | 0 | 0 |
| High school or Equal | 0 | 0 |
| S1 | 32 | 97 |
| S2 | 1 | 3 |
| Total | 33 | 100 |

On the project construction development road Currently, there are 26 impact items risk (Risk Event) that has been researcher identification and results evaluation impact risk contractor project development talud Kertosari segment 1, segment 2-4, talud geneva and talus Bambara. Evaluation impact has done with fill in column questionnaire using numbers 1 = very small, 2 = small, 3 = moderate, and 4 = very large.

**Table 8. Position Respondents Contractor Gap Development Project Kertosari Segment 1**

| Respondents | Amount | % |
|---|---|---|
| Director | 1 | 11,11 |
| ProjectManager | 1 | 11,11 |
| SiteManager | 1 | 11,11 |
| Safety Officer | 1 | 11,11 |
| executor | 3 | 33,33 |
| Supervisor | 2 | 22,22 |
| Total | 9 | 100 |

There are nine respondents on the project development talud kerosene segment 1, 8 respondents on the talus Kertosari segment 2-4, 8 responses to the slope geneva, and eight on the talus Bambara.

**Table 9 Position Respondents Gap construction contractor segment 2-4**

| Respondents | Amount | % |
|---|---|---|
| Director | 1 | 12.50 |
| ProjectManager | 1 | 12.50 |
| SiteManager | 1 | 12.50 |
| Safety Officer | 1 | 12.50 |
| executor | 2 | 25.00 |
| Supervisor | 2 | 25.00 |
| Total | 8 | 100 |

**Table 10. Position Respondents Gap construction contractor Ganevo**

| Respondents | Amount | % |
|---|---|---|
| Director | 1 | 12.50 |
| ProjectManager | 1 | 12.50 |
| SiteManager | 1 | 12.50 |
| Safety Officer | 1 | 12.50 |
| executor | 2 | 25.00 |
| Supervisor | 2 | 25.00 |
| Total | 8 | 100 |

**Table 11. Position Respondents Gap construction contractor Bambar**

| Respondents | Amount | % |
|---|---|---|
| Director | 1 | 12.50 |
| ProjectManager | 1 | 12.50 |
| SiteManager | 1 | 12.50 |
| Safety Officer | 1 | 12.50 |
| executor | 2 | 25.00 |
| Supervisor | 2 | 25.00 |
| Total | 8 | 100 |

Age respondents in studies case This own various type age, there age 21 – 30 years own amount age the most with a total of 29 respondents. Following this is age data for respondents in studies case this.

**Table 12. Age Respondents**

| Age | Amount | % |
|---|---|---|
| 21–30 | 29 | 88 |
| 31–40 | 4 | 12 |
| 41–50 | 0 | 0 |
| >50 | 0 | 0 |
| Total | 33 | 100 |

Period of work on studies case This grouped into four categories, namely:

**Table 13. Working Period Respondents**

| Long Working Time | Amount | % |
|---|---|---|
| <1 Year | 0 | 0 |
| 1 – 5 Years | 29 | 88 |
| 6 – 10 Years | 4 | 12 |
| >10 Years | 0 | 0 |
| Total | 33 | 100 |

The background behind respondents to the study case This has 4 categories consisting of middle school or equivalent, high school or equivalent, Master's Degree (S1), and Master's Degree (S2) most respondents with a Bachelor's degree background amount most, totaling 32 respondents.

**Table 14. Background Behind Respondents**

| Education | Amount | % |
|---|---|---|
| Middle school or Equal | 0 | 0 |
| high school or Equal | 0 | 0 |
| S1 | 32 | 97 |
| S2 | 1 | 3 |
| Total | 33 | 100 |

Identification impact risk on project construction development road Currently, there are 26 impact items risk (Risk Event) that has been researcher identification and results evaluation impact risk contractor project development talud Kertosari segment 1, segment 2-4, talud geneva and talus Bambara. Evaluation impact has done with fill in column questionnaire using numbers 1 = minimal, 2 = small, 3 = moderate, and 4 = very large.

**Table 15. Identification reason risk**

| Risk Events | Code |
|---|---|
| Earthquake Earth | E1 |
| Landslide _ | E2 |
| Change scope work/sports orders | E3 |
| Specification technical No fulfilled | E4 |
| Loss or lateness Because change in design/location | E5 |
| Materials delay | E6 |
| Material and equipment damage Work | E7 |
| Loss of materials and equipment Work | E8 |
| Loss or lateness Because change in design/location | E9 |
| Access to location project difficult | E10 |
| Error estimate cost and time | E11 |
| The estimation that the cost is too low | E12 |
| Expenditure cost Because lateness settlement project | E13 |
| Payment system/terms bad | E14 |
| Problems with quality Work | E15 |
| Loss or lateness Because of unrest | E16 |
| Problems with licensing | E17 |
| The low safety Work | E18 |
| Strike work | E19 |
| Losses and delays Because of equipment and methods of wrong construction | E20 |

| Risk Events | Code |
|---|---|
| There are processing ulan on the construction process | E21 |
| Excessive water discharge problem Because Rain is not expected | E22 |
| Damage during maintenance | E23 |
| Subcontractor failure _ | E24 |
| Damage ecological | E25 |
| Illegal fees | E26 |

Identification reason risk (Risk Agent) stage identification reason risk is done with the use questionnaire. Evaluation is done by filling in a table questionnaire with information 1 = very rarely, 2 = rarely, 3 = often, and 4 = very often.

**Table 16. Assessment Reason Risk Contractor Gap Development Project Kertosari Segment 1**

| Risk Agent | Code | Occurrence |
|---|---|---|
| Communication that is not smooth / lacking effective | A1 | 3 |
| Management less project good | A2 | 3 |
| Denning unfinished project | A3 | 1 |
| Scarcity of materials | A4 | 2 |
| Poor quality of materials | A5 | 2 |
| No set K3 | A6 | 2 |
| Witnesses that have not strict about violation fraud | A7 | 2 |
| Coordination with the owner is not Good | A8 | 2 |
| Execution time is not adequate | A9 | 2 |
| Procurement process source Power natural stop | A10 | 1 |
| No checking to equipment used | A11 | 2 |
| Addition scope Work | A12 | 1 |
| No guard sustainability natural | A13 | 2 |

**Table 17. Assessment Reason Risk Contractor Gap Development Project Kertosari Segments 2-4**

| Risk Agent | Code | Occurrence |
|---|---|---|
| Communication that is not smooth / lacking effective | A1 | 3 |
| Management less project good | A2 | 3 |
| Denning unfinished project | A3 | 1 |
| Scarcity of materials | A4 | 2 |
| Poor quality of materials | A5 | 2 |
| No set K3 | A6 | 2 |
| Witnesses that have not strict about violating fraud | A7 | 2 |
| Coordination with the owner is not Good | A8 | 2 |
| Execution time is not adequate | A9 | 2 |
| Procurement process source Power natural stop | A10 | 1 |
| No, do check to equipment used | A11 | 2 |
| Addition scope Work | A12 | 1 |
| No guard sustainability natural | A13 | 2 |

**Table 18. Assessment Reason Risk Contractor Gap Development Project Ganevo**

| Risk Agent | Code | Occurrence |
|---|---|---|
| Communication that is not smooth / lacking effective | A1 | 3 |
| Management less project good | A2 | 3 |
| Denning unfinished project | A3 | 1 |
| Scarcity of materials | A4 | 2 |
| Poor quality of materials | A5 | 2 |
| No set K3 | A6 | 2 |
| Witnesses that have not been strict about violating fraud | A7 | 2 |
| Coordination with the owner is not Good | A8 | 2 |
| Execution time is not adequate | A9 | 2 |
| Procurement process source Power natural stop | A10 | 1 |
| No, do check to equipment used | A11 | 2 |
| Addition scope Work | A12 | 1 |
| No guard sustainability natural | A13 | 2 |

**Figure 19. Evaluation Reason Risk Contractor Gap Development Project Bambar**

| Risk Agent | Code | Occurrence |
|---|---|---|
| Communication that is not smooth / lacking effective | A1 | 3 |
| Management less project good | A2 | 3 |
| Denning unfinished project | A3 | 1 |
| Scarcity of materials | A4 | 2 |
| Poor quality of materials | A5 | 2 |
| No set K3 | A6 | 2 |
| Witnesses that have not strict to violation fraud | A7 | 2 |
| Coordination with the owner is not Good | A8 | 2 |
| Execution time is not adequate | A9 | 2 |
| Procurement process source Power natural stop | A10 | 1 |
| No, do check to equipment used | A11 | 2 |
| Addition scope Work | A12 | 1 |
| No guard sustainability natural | A13 | 2 |

Occurrence Value This will be used in calculating Aggregate Risk 25 Potential (ARP), i.e., determining the most influential risk agent based on calculation.

Identification Handling Risk At stage evaluation handling risk, respondents evaluate the possibility of difficulty with fill-in-column questionnaires using numbers 1 = accessible, 2 = little complex, 3 = complicated, and 4 = very difficult. The evaluation results will correlate with the results evaluation reason risk for look for mark *Effectiveness to Difficulty* (ETD).

| Penilaian Tingkat Kesulitan Penanganan Risiko Kontraktor Proyek Pembangunan Talud kertosari segmen 1 | | Tingkat |
|---|---|---|
| Penanganan Risiko | Kode | Kesulitan |
| Mengasuransikan proyek | PA1 | 2 |
| Memanda proyek | PA2 | 2 |
| Menentukan pengecualian klausa akan penambahan kompensasi di kontrak pembayaran | PA3 | 2 |
| Menentukan sistem rekruitmen, seleksi pekerja dan sistem komunikasi yang baik | PA4 | 2 |
| Membuat Jadwal dan biaya dalam rencana dan control yang jelas dan sesuai | PA5 | 2 |
| Memasukkan pengecualian klausa yang sesuai dalam tingkat suku bunga, tingkat dan keterlambatan untuk rencana kontigensin yang ada pada | PA6 | 2 |
| Mengadopsi program safety control, manajemen system, pengawasan dan pencegahan yang sesuai. | PA7 | 2 |
| Memasukkan kondisi di dalam kontrak untuk tingkat pohisi dan sebagainya | PA8 | 2 |
| Membagi risiko dengan cara mengalihkan pekerjaan ke sub-kontraktor | PA9 | 2 |
| Menyediakan stok kebutuhan material terlebih dahulu dan menyimpannya | PA10 | 2 |
| Memperbaiki segala kerusakan atas complain yang diterima | PA11 | 2 |

**Figure 1. Difficulty Level Rating Handling Risk Contractor Gap Development Project Kertosari Segment 1**

| Penanganan Risiko | Kode | Tingkat Kesulitan |
|---|---|---|
| Mengasuransikan proyek | PA1 | 2 |
| Memanda proyek | PA2 | 2 |
| Menentukan pengecualian klausa akan penambahan kompensasi di kontrak pembayaran | PA3 | 2 |
| Menentukan sistem rekruitmen, seleksi pekerja dan sistem komunikasi yang baik | PA4 | 2 |
| Membuat Jadwal dan biaya dalam rencana dan control yang jelas dan sesuai | PA5 | 2 |
| Memasukkan pengecualian klausa yang sesuai dalam tingkat suku bunga, tingkat dan keterlambatan untuk rencana kontigensin yang ada pada kontrak | PA6 | 2 |
| Mengadopsi program safety control, manajemen system, pengawasan dan pencegahan yang sesuai. | PA7 | 2 |
| Memasukkan kondisi di dalam kontrak untuk tingkat pohisi dan sebagainya | PA8 | 2 |
| Membagi risiko dengan cara mengalihkan pekerjaan ke sub-kontraktor | PA9 | 2 |
| Menyediakan stok kebutuhan material terlebih dahulu dan menyimpannya | PA10 | 2 |
| Memperbaiki segala kerusakan atas complain yang diterima | PA11 | 2 |

**Figure 2. Difficulty Level Rating Handling Risk Contractor Project Builder Talmud Kertosari Segments 2-4**

| Penanganan Risiko | Kode | Tingkat Kesulitan |
|---|---|---|
| Mengasuransikan proyek | PA1 | 2 |
| Memanda proyek | PA2 | 2 |
| Menentukan pengecualian klausa akan penambahan kompensasi di kontrak pembayaran | PA3 | 2 |
| Menentukan sistem rekruitmen, seleksi pekerja dan sistem komunikasi yang baik | PA4 | 2 |
| Membuat Jadwal dan biaya dalam rencana dan control yang jelas dan sesuai | PA5 | 2 |
| Memasukkan pengecualian klausa yang sesuai dalam tingkat suku bunga, tingkat dan keterlambatan untuk rencana kontigensin y | PA6 | 1 |
| Mengadopsi program safety control, manajemen system, pengawasan dan pencegahan yang sesuai. | PA7 | 3 |
| Memasukkan kondisi di dalam kontrak untuk tingkat pohisi dan sebagainya | PA8 | 3 |
| Membagi risiko dengan cara mengalihkan pekerjaan ke sub-kontraktor | PA9 | 3 |
| Menyediakan stok kebutuhan material terlebih dahulu dan menyimpannya | PA10 | 2 |
| Memperbaiki segala kerusakan atas complain yang diterima | PA11 | 2 |

**Figure 3. Difficulty Level Rating Handling Risk Contractor Project Builder Talmud Ganevo**

| Penanganan Risiko | Kode | Tingkat Kesulitan |
|---|---|---|
| Mengasuransikan proyek | PA1 | 1 |
| Memanda proyek | PA2 | 1 |
| Menentukan pengecualian klausa akan penambahan kompensasi di kontrak pembayaran | PA3 | 2 |
| Menentukan sistem rekruitmen, seleksi pekerja dan sistem komunikasi yang baik | PA4 | 2 |
| Membuat Jadwal dan biaya dalam rencana dan control yang jelas dan sesuai | PA5 | 1 |
| Memasukkan pengecualian klausa yang sesuai dalam tingkat suku bunga, tingkat dan keterkaitan untuk rencana kontigensin y | PA6 | 1 |
| Mengadopsi program safety control, manajemen system, pengawasan dan pencegahan yang sesuai. | PA7 | 2 |
| Memasukkan kondisi di dalam kontrak untuk tingkat polusi dan sebagainya | PA8 | 2 |
| Membagi risiko dengan cara mengalihkan pekerjaan ke sub-kontraktor | PA9 | 2 |
| Menyediakan stok kebutuhan material terlebih dahulu dan menyimpannya | PA10 | 2 |
| Memperbaiki segala kerusakan atas complain yang diterima | PA11 | 2 |

**Figure 4. Difficulty Level Rating Handling Risk Contractor Project Builder Talmud Bambar**

From the results, that is one handling possible risks a little difficulty happens, like sharing risk with method divert work to sub-contractors because those who do project development talud Bambara This only one contractor.

Rating top based on mark highest ARP After calculation, Aggregate Risk Potential value between Risk Event and Risk Agent is obtained furthermore, will take five per- level top based on mark highest ARP.

| Kode | Risk Agent | ARP | Ranking |
|---|---|---|---|
| **A2** | **Manajemen proyek yang kurang baik** | **314** | **1** |
| **A1** | **Komunikasi yang tidak lancar/kurang efektif** | **243** | **2** |
| **A9** | **Waktu pelaksanaan yang tidak memadai** | **166** | **3** |
| **A5** | **Kualitas material yang buruk** | **162** | **4** |
| **A8** | **Koordinasi dengan owner tidak baik** | **156** | **5** |
| A11 | Tidak melakukan pengecekan terhadap peralatan yang digunakan | 150 | 6 |
| A4 | kelangkaan material | 112 | 9 |
| A7 | Sanksi yang belum ketat terhadap pelanggar kecurangan | 128 | 7 |
| A3 | Pendanaan proyek yang tidak lancer | 118 | 8 |
| A12 | Tambahan lingkup kerja | 111 | 10 |
| A13 | Tidak menjaga kelestarian alam | 90 | 11 |
| A6 | Tidak menetapkan K3 | 78 | 12 |
| A10 | Proses pengadaan sumber daya alam berhenti | 20 | 13 |

**Figure 5. Risks that need to be handled by the Project Contractor Development Talud Kertosari Segment 1**

Results in Figure 5 show five ratings based on the ARP value that has been obtained. The risk Agent who has given ranking next will be given handling.

| Kode | Risk Agent | ARP | Ranking |
|---|---|---|---|
| **A2** | **Manajemen proyek yang kurang baik** | **292** | **1** |
| **A9** | **Waktu pelaksanaan yang tidak memadai** | **219** | **2** |
| **A1** | **Komunikasi yang tidak lancar/kurang efektif** | **178** | **3** |
| **A5** | **Kualitas material yang buruk** | **138** | **4** |
| **A8** | **Koordinasi dengan owner tidak baik** | **132** | **5** |
| A3 | Pendanaan proyek yang tidak lancar | 110 | 6 |
| A12 | Tambahan lingkup kerja | 102 | 7 |
| A7 | Sanksi yang belum ketat terhadap pelanggar kecurangan | 100 | 8 |
| A4 | kelangkaan material | 65 | 9 |
| A11 | Tidak melakukan pengecekan terhadap peralatan yang digunakan | 65 | 9 |
| A13 | Tidak menjaga kelestarian alam | 40 | 11 |
| A6 | Tidak menetapkan K3 | 33 | 12 |
| A10 | Proses pengadaan sumber daya alam berhenti | 28 | 13 |

**Figure 6. Necessary risks handled by the contractor Gap Development Project Kertosari Segments 2-4**

The results are in Figure 6. show five ratings based on the ARP value that has been obtained. *The risk Agent* who has given ranking next will be given handling.

| Kode | Risk Agent | ARP | Ranking |
|---|---|---|---|
| **A12** | Tambahan lingkup kerja | **160** | **1** |
| **A2** | Manajemen proyek yang kurang baik | **137** | **2** |
| **A1** | Komunikasi yang tidak lancar/kurang efektif | **130** | **3** |
| **A9** | Waktu pelaksanaan yang tidak memadai | **127** | **4** |
| **A7** | Sanksi yang belum ketat terhadap pelanggar kecurangan | **126** | **5** |
| A5 | Kualitas material yang buruk | 110 | 6 |
| A8 | Kualitas material yang buruk | 108 | 7 |
| A3 | Pendanaan proyek yang tidak lancer | 95 | 8 |
| A11 | Tidak melakukan pengecekan terhadap peralatan yang digunakan | 94 | 9 |
| A6 | Tidak menetapkan K3 | 90 | 10 |
| A4 | kelangkaan material | 47 | 11 |
| A13 | Tidak menjaga kelestarian alam | 29 | 12 |
| A10 | Proses pengadaan sumber daya alam berhenti | 22 | 13 |

**Figure 7. Necessary risks handled by the contractor Gap Development Project Ganevo**

The results in Figure 7 show five ratings based on the ARP value that has been obtained. *The risk Agent* who has given ranking next will be given handling.

| Kode | Risk Agent | ARP | Ranking |
|---|---|---|---|
| **A12** | Tambahan lingkup kerja | **160** | **1** |
| **A2** | Manajemen proyek yang kurang baik | **137** | **2** |
| **A1** | Komunikasi yang tidak lancar/kurang efektif | **130** | **3** |
| **A9** | Waktu pelaksanaan yang tidak memadai | **127** | **4** |
| **A7** | Sanksi yang belum ketat terhadap pelanggar kecurangan | **126** | **5** |
| A5 | Kualitas material yang buruk | 110 | 6 |
| A8 | Kualitas material yang buruk | 108 | 7 |
| A3 | Pendanaan proyek yang tidak lancer | 95 | 8 |
| A11 | Tidak melakukan pengecekan terhadap peralatan yang digunakan | 94 | 9 |
| A6 | Tidak menetapkan K3 | 90 | 10 |
| A4 | kelangkaan material | 47 | 11 |
| A13 | Tidak menjaga kelestarian alam | 29 | 12 |
| A10 | Proses pengadaan sumber daya alam berhenti | 22 | 13 |

**Figure 8. Necessary risks handled by the contractor Gap Development Project Bambar**

The results in Figure 8 show five ratings based on the ARP value that has been obtained. The risk Agent who has given ranking next will be given handling.

Rating Top risk management strategies There are 11 risk management strategies used as follows mitigation For reducing the impact from that risk happens, then five rating top as a Risk Agent priority will be made a handling strategy in accordance mark Effectiveness to Difficulty (ETD). With mark Effectiveness to Difficulty (ETD), the largest will be used for treatment strategy based on five risks top already elected.

| Kode | Penanganan Risiko | ETD | Ranking |
|---|---|---|---|
| **PA2** | **Menunda proyek** | **1299** | **1** |
| **PA5** | **Membuat Jadwal dan biaya dalam rencana dan control yang jelas dan sesuai** | **1179** | **2** |
| **PA4** | **Menentukan sistem rekruitmen, seleksi pekerja dan sistem komunikasi yang baik** | **1122** | **3** |
| **PA7** | **Mengadopsi program safety control, manajemen system, pengawasan dan pencegahan yang sesuai.** | **944** | **4** |
| **PA9** | **Membagi risiko dengan cara mengalihkan pekerjaan ke sub-kontraktor** | **844** | **5** |
| PA6 | Memasukkan pengecualian klausa yang sesuai dalam tingkat suku bunga, tingkat dan keterlambatan untuk rencana kontigensi v | 819 | 6 |
| PA3 | Menentukan pengecualian klausa akan penambahan/kompensasi di kontrak pembayaran | 728 | 7 |
| PA1 | Mengasuransikan proyek | 723 | 8 |
| PA6 | Memasukkan pengecualian klausa yang sesuai dalam tingkat suku bunga, tingkat dan keterlambatan untuk rencana kontigensi v | 451 | 9 |
| PA10 | Menyediakan/stok kebutuhan material terlebih dahulu dan menyimpannya | 318 | 10 |
| PA8 | Memasukkan kondisi di dalam kontrak untuk tingkat polisi dan sebagainya | 221 | 11 |

**Figure 13. Rating top Treatment Strategy Risks to the Contractor Gap Development Project Kertosari Segment 1**

| Kode | Penanganan Risiko | ETD | Ranking |
|---|---|---|---|
| PA2 | Memanda proyek | 1092 | 1 |
| PA4 | Menentukan sistem rekruitmen, seleksi pekerja dan sistem komunikasi yang baik | 1013 | 2 |
| PA5 | Membuat Jadwal dan biaya dalam rencana dan control yang jelas dan sesuai | 755 | 3 |
| PA7 | Mengadopsi program safety control, manajemen system, pengawasan dan pencegahan yang sesuai. | 746 | 4 |
| PA11 | Memperbaiki segala kerusakan atas complain yang diterima | 597 | 5 |
| PA9 | Membagi risiko dengan cara mengalihkan pekerjaan ke sub-kontraktor | 582 | 6 |
| PA3 | Menentukan pengecualian klausa akan penambahan kompensasi di kontrak pembayaran | 502 | 7 |
| PA11 | Mengasuransikan proyek | 408 | 8 |
| PA6 | Memasukkan pengecualian klausa yang sesuai dalam tingkat suku bunga, tingkat dan keterlambatan untuk rencana kontigensin y | 327 | 9 |
| PA10 | Menyediakan stok kebutuhan material terlebih dahulu dan menyimpannya | 282 | 10 |
| PA8 | Koordinasi dengan owner tidak baik | 188 | 11 |

**Figure 14. Rating top Treatment Strategy Risks to the Contractor Gap Development Project Kertosari Segments 2-4**

| Kode | Penanganan Risiko | ETD | Ranking |
|---|---|---|---|
| PA2 | Memanda proyek | 939 | 1 |
| PA4 | Menentukan sistem rekruitmen, seleksi pekerja dan sistem komunikasi yang baik | 864 | 2 |
| PA5 | Membuat Jadwal dan biaya dalam rencana dan control yang jelas dan sesuai | 766 | 3 |
| PA1 | Mengasuransikan proyek | 753 | 4 |
| PA11 | Memperbaiki segala kerusakan atas complain yang diterima | 744 | 5 |
| PA3 | Menentukan pengecualian klausa akan penambahan kompensasi di kontrak pembayaran | 704 | 6 |
| PA 6 | Memasukkan pengecualian klausa yang sesuai dalam tingkat suku bunga, tingkat dan keterlambatan untuk rencana kontigensin y | 654 | 7 |
| PA7 | Mengadopsi program safety control, manajemen system, pengawasan dan pencegahan yang sesuai. | 386 | 8 |
| PA10 | Menyediakan stok kebutuhan material terlebih dahulu dan menyimpannya | 372 | 9 |
| PA8 | Memasukkan kondisi di dalam kontrak untuk tingkat polisi dan sebagainya | 136 | 10 |
| PA9 | Menyediakan stok kebutuhan material terlebih dahulu dan menyimpannya | 0 | 11 |

**Figure 15. Rating top Treatment Strategy Risks to the Contractor Gap Development Project Ganevo**

| Kode | Penanganan Risiko | ETD | Ranking |
|---|---|---|---|
| PA2 | Memanda proyek | 355 | 1 |
| PA1 | Mengasuransikan proyek | 354 | 2 |
| PA5 | Membuat Jadwal dan biaya dalam rencana dan control yang jelas dan sesuai | 295 | 3 |
| PA4 | Menentukan sistem rekruitmen, seleksi pekerja dan sistem komunikasi yang baik | 174 | 4 |
| PA10 | Menyediakan stok kebutuhan material terlebih dahulu dan menyimpannya | 174 | 5 |
| PA11 | Memperbaiki segala kerusakan atas complain yang diterima | 130 | 9 |
| PA6 | Memasukkan pengecualian klausa yang sesuai dalam tingkat suku bunga, tingkat dan keterlambatan untuk rencana kontigensin yang | 139 | 6 |
| PA3 | Menentukan pengecualian klausa akan penambahan kompensasi di kontrak pembayaran | 134 | 7 |
| PA7 | Mengadopsi program safety control, manajemen system, pengawasan dan pencegahan yang sesuai. | 131 | 8 |
| PA8 | Memasukkan kondisi di dalam kontrak untuk tingkat polisi dan sebagainya | 49 | 10 |
| PA9 | Membagi risiko dengan cara mengalihkan pekerjaan ke sub-kontraktor | 0 | 11 |

**Figure 16. Rating top Treatment Strategy Risks to the Contractor Gap Development Project Bambar**

From the analysis of the results, *House of Risk* so can is known the risks and coping strategies that will be used.

Analysis Results *House of Risk* After getting 5 rating results as top *Risk Agent* and five ratings as top Handling Risk, *the Risk Agent* will be given handling / follow mitigation.

| Risk Agent | Kode | | Penanganan Risiko |
|---|---|---|---|
| Manajemen proyek yang kurang baik | A2 | PA4 | Menentukan sistem rekruitmen, seleksi pekerja dan sistem komunikasi yang baik |
| | | PA5 | Membuat Jadwal dan biaya dalam rencana dan control yang jelas dan sesuai |
| | | PA7 | Mengadopsi program safety control, manajemen system, pengawasan dan pencegahan yang sesuai. |
| Komunikasi yang tidak lancar kurang efektif | A1 | PA4 | Menentukan sistem rekruitmen, seleksi pekerja dan sistem komunikasi yang baik |
| | | PA7 | Mengadopsi program safety control, manajemen system, pengawasan dan pencegahan yang sesuai. |
| | | PA2 | Memanda proyek |
| Waktu pelaksanaan yang tidak memadai | A9 | PA5 | Membuat Jadwal dan biaya dalam rencana dan control yang jelas dan sesuai |
| | | PA7 | Mengadopsi program safety control, manajemen system, pengawasan dan pencegahan yang sesuai. |
| Kualitas material yang buruk | A5 | PA7 | Mengadopsi program safety control, manajemen system, pengawasan dan pencegahan yang sesuai. |
| | | PA11 | Memperbaiki segala kerusakan atas complain yang diterima |
| | | PA10 | Menyediakan stok kebutuhan material terlebih dahulu dan menyimpannya |
| Koordinasi dengan owner tidak baik | A8 | PA4 | Menentukan sistem rekruitmen, seleksi pekerja dan sistem komunikasi yang baik |
| | | PA11 | Memperbaiki segala kerusakan atas complain yang diterima |

**Figure 17. Results of House of Risk Analysis on Contractors Gap Development Project Kertosari Segment 1**

| Risk Agent | Kode | | Penanganan Risiko |
|---|---|---|---|
| Manajemen proyek yang kurang baik | A2 | PA4 | Menentukan sistem rekruitmen, seleksi pekerja dan sistem komunikasi yang baik |
| | | PA7 | Mengadopsi program safety control, manajemen system, pengawasan dan pencegahan yang sesuai. |
| | | PA11 | Memperbaiki segala kerusakan atas complain yang diterima |
| | | PA5 | Membuat Jadwal dan biaya dalam rencana dan control yang jelas dan sesuai |
| Waktu pelaksanaan yang tidak memadai | A9 | PA5 | Membuat Jadwal dan biaya dalam rencana dan control yang jelas dan sesuai |
| | | PA7 | Mengadopsi program safety control, manajemen system, pengawasan dan pencegahan yang sesuai. |
| Komunikasi yang tidak lancar kurang efektif | A1 | PA4 | Menentukan sistem rekruitmen, seleksi pekerja dan sistem komunikasi yang baik |
| | | PA7 | Mengadopsi program safety control, manajemen system, pengawasan dan pencegahan yang sesuai. |
| | | PA2 | Memanda proyek |
| Kualitas material yang buruk | A5 | PA7 | Mengadopsi program safety control, manajemen system, pengawasan dan pencegahan yang sesuai. |
| | | PA11 | Memperbaiki segala kerusakan atas complain yang diterima |
| | | PA10 | Menyediakan stok kebutuhan material terlebih dahulu dan menyimpannya |
| Koordinasi dengan owner tidak baik | A8 | PA4 | Menentukan sistem rekruitmen, seleksi pekerja dan sistem komunikasi yang baik |
| | | PA11 | Memperbaiki segala kerusakan atas complain yang diterima |

**Figure 18. Results of House of Risk Analysis on Contractors Gap Development Project Kertosari Segments 2-4**

| Risk Agent | Kode | | Penanganan Risiko |
|---|---|---|---|
| Tambahan lingkup kerja | A12 | PA5 | Membuat Jadwal dan biaya dalam rencana dan control yang jelas dan sesuai |
| | | PA3 | Menentukan pengecualian/klausa akan penambahan/kompensasi di kontrak pembayaran |
| Manajemen proyek yang kurang baik | A2 | PA7 | Mengadopsi program safety control, manajemen system, pengawasan dan pencegahan yang sesuai. |
| | | PA11 | Memperbaiki segala kerusakan atas complain yang diterima |
| | | PA5 | Membuat Jadwal dan biaya dalam rencana dan control yang jelas dan sesuai |
| Komunikasi yang tidak lancar kurang efektif | A1 | PA4 | Menentukan sistem rekruitmen, seleksi pekerja dan sistem komunikasi yang baik |
| | | PA7 | Mengadopsi program safety control, manajemen system, pengawasan dan pencegahan yang sesuai. |
| | | PA2 | Memanda proyek |
| Waktu pelaksanaan yang tidak memadai | A9 | PA5 | Membuat Jadwal dan biaya dalam rencana dan control yang jelas dan sesuai |
| | | PA7 | Mengadopsi program safety control, manajemen system, pengawasan dan pencegahan yang sesuai. |
| Sanksi yang belum ketat terhadap pelanggar kecurangan | A7 | PA4 | Menentukan sistem rekruitmen, seleksi pekerja dan sistem komunikasi yang baik |
| | | PA7 | Mengadopsi program safety control, manajemen system, pengawasan dan pencegahan yang sesuai. |

**Figure 19. Results of House of Risk Analysis on Contractors Gap Development Project Ganevo**

| Risk Agent | Kode | | Penanganan Risiko |
|---|---|---|---|
| Tambahan lingkup kerja | A12 | PA5 | Membuat Jadwal dan biaya dalam rencana dan control yang jelas dan sesuai |
| | | PA3 | Menentukan pengecualian/klausa akan penambahan/kompensasi di kontrak pembayaran |
| Komunikasi yang tidak lancar kurang efektif | A1 | PA4 | Menentukan sistem rekruitmen, seleksi pekerja dan sistem komunikasi yang baik |
| | | PA7 | Mengadopsi program safety control, manajemen system, pengawasan dan pencegahan yang sesuai. |
| Tidak menerapkan K3 | A6 | PA4 | Menentukan sistem rekruitmen, seleksi pekerja dan sistem komunikasi yang baik |
| | | PA7 | Mengadopsi program safety control, manajemen system, pengawasan dan pencegahan yang sesuai. |
| Sanksi yang belum ketat terhadap pelanggar kecurangan | A7 | PA4 | Menentukan sistem rekruitmen, seleksi pekerja dan sistem komunikasi yang baik |
| | | PA7 | Mengadopsi program safety control, manajemen system, pengawasan dan pencegahan yang sesuai. |
| Keterlambatan material | A4 | PA2 | Memanda proyek |
| | | PA5 | Membuat Jadwal dan biaya dalam rencana dan control yang jelas dan sesuai |
| | | PA10 | Menyediakan stok kebutuhan material terlebih dahulu dan menyimpannya |

**Figure 20. Results of House of Risk Analysis on Contractors Gap Development Project Bambar**

## CONCLUSION

The conclusion of the risk management analysis research on the Talud Kertosari Development Project Segment 1, Talud Kertosari Segment 2-4, Talud Ganevo and Talud Bambar using the House of

Risk method is that poor project management can be carried out risk management by determining the recruitment system, selection of workers and a good communication system, adopting safety control programs, system management, appropriate supervision and prevention. In addition, risk management can also be done by creating schedules and costs in clear and appropriate plans and controls and transferring work to subcontractors, providing, and storing material needs in advance, delaying projects, and determining exceptions/clauses on payment contracts. The background of respondents in this study was dominated by those who studied Strata 1 (S1) with the largest percentage. The age and length of service of the respondents who dominated were > 30 years and 1 - 5 years, respectively. The position of the respondent with the largest percentage is the Executor.

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