Risk identification at the pre-construction stage in post-earthquake community based housing reconstruction project in Pidie Jaya Regency

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Abstract. The post-earthquake housing reconstruction project is inseparable from being exposed to various risks. Risk is the possibility for an adverse event to occur due to uncertainty. The reconstruction in Pidie Jaya Regency after the 2016 earthquake is still ongoing and uses community-based methods. The purpose of this paper is to identify risks during pre-construction stage in the implementation of community houses reconstruction after the earthquake disaster in Pidie Jaya Regency. Stakeholders who were directly involved in the reconstruction phase were the Management Consultants, Community Group (Pokmas), and the Regional Disaster Management Agency (BPBD) and each had its own potential risks. Data were obtained using 58 respondents from these stakeholders by distributing questionnaires in the research location, namely Pidie Jaya Regency. A total of 29 risk variables were identified, of which there are 8 variables that had high risk. The results of the analysis show that when viewed from risk factors, the Pokmas formation factor is the most potential risk factor compared to other risk factors because these risk variables are owned by the three groups of respondents with the highest ranking.

1. Introduction
On Sunday, December 7th, 2016 an earthquake of 6.5 Mw occurred in the northern part of the Indonesian island of Sumatra. The Earthquake Center is located in Pidie Jaya Regency, Aceh Province. This destructive earthquake also affected the districts closest to Pidie Jaya, namely Pidie and Bireun Regencies, but the worst impact was in Pidie Jaya Regency. This disaster is included in the status of a regional disaster based on the number of casualties, property losses, damage to infrastructure and land, the wide coverage of the affected areas and the socio-economic impacts it causes. The community housing sector is the worst affected sector where 17,673 houses were damaged, including 2,202 severely damaged and 4,542 moderately damaged and 10,929 slightly damaged [1]. The house reconstruction phase in Pidie Jaya Regency used a community-based method and involved Management Consultants and the Regional Disaster Management Agency (BPBD). Initial research was conducted and it was found that there were delays in the community housing reconstruction project, namely in the pre-construction and construction phases [2,3]. There is no construction project that does not have risks in its implementation, especially in post-disaster reconstruction projects with a very complex situation compared to normal and community-based situations in the construction process [4]. If the risk is not managed, there will be chances of not achieving project goals such as delays, lack of costs and performance or reputation. Project risk management includes the process of implementing risk
management planning, identification, analysis, response planning, response implementation, and risk monitoring on a project. The objective of project risk management is to increase the probability and / or impact of positive risks and to reduce the probability and / or negative impacts [5].

Risk management has not been widely practiced in post-disaster housing reconstruction projects [6]. The pre-construction phase is an important phase that must receive great attention because this phase has been identified as giving a very large contribution to the success of reconstruction projects using community-based methods [4]. There are several regulations issued by the Indonesian government regarding the rehabilitation and reconstruction of houses using community-based methods [7,8,9], and this method was born and has been directly practiced in the reconstruction of houses after the earthquake disaster and tsunami 2004 in Aceh Province. The community not only received benefits from housing assistance but they participated in building their own houses, controlled and were accountable for the assistance funds that had been provided by the government assisted by the facilitators. Several countries such as BAM, Iran, Gujararat, and Indonesia apply community-based methods and have garnered many successes [4], however other studies suggest that the failure of reconstruction projects was due to one of them being a lack of community participation [10].

The identification of risks in the pre-construction phase of the housing reconstruction project has been carried out by several researchers and found the factors that have the potential to cause the average risk on the part of the government [4, 11]. There were two activities that took a lot of time in the pre-construction phase, namely the formation of Community Groups (Pokmas) and design activities. It took 5 months in the process of forming Pokmas for post-disaster reconstruction of the 2004 earthquake and tsunami in Aceh Province [12]. There are five main factors that cause the delay in carrying out the reconstruction of the house at the pre-construction stage, namely idea activities, identification of damaged houses, recruitment of facilitators, training programs for the community, formation of Community Groups (Pokmas), program socialization and coordination, inventory, verification and data validation, damage, and design [2, 4, 11]. These factors in the pre-construction phase need to be identified again to get the risks that are the responsibility of each party, namely the Community Group (Pokmas), Management Consultants (KM) and the government (in this research is BPBD). The purpose of this paper is to identify risks during pre-construction taking place in the implementation of reconstruction of community houses after the earthquake disaster in Pidie Jaya District. The benefits of this research can be used as input in decision making for related parties to overcome the negative consequences that occur in the handling of post-earthquake community-based housing reconstruction projects in the future.

2. Methods

The research location that was used as a place for distributing questionnaires, interviews and observations was Pidie Jaya Regency. The risk identification used in this study is based on the risk management method contained in the PMBOK Guide Sixth edition [5]. The inputs, tools / techniques and outputs used are described below:

- The inputs used are: (1) the document for the implementation of reconstruction from the Regional Disaster Management Agency (BPBD) of Pidie Jaya Regency which consists of the 2016 Pidie Jaya Earthquake Action Plan, Technical Guidelines for Post-Earthquake Rehabilitation and Reconstruction of Pidie Jaya Regency which contains data on damage to people's homes, estimated duration and list of stakeholders; (2) business environment factors, namely the results of similar studies that have been published on risk identification.

- The tools and techniques used are data collection by: (1) Brainstorming, namely identifying a list of risk ideas from stakeholders, as many as 5 people who are directly involved in the post-disaster housing reconstruction process in Pidie Jaya Regency consisting of CM, Pokmas, and BPBD. In this risk identification, the risk owner will choose the risk that is in accordance with what has been experienced and state the response actions they have taken. Data collection and analysis is carried out for 2 months and the results will be compiled into a questionnaire containing risks and risk owners; (2) A checklist containing risks that have occurred before and which are relevant to the
The scope of this study. A total of 5 journals / proceedings that examine risk identification during the pre-construction phase of post-disaster housing reconstruction projects [2,3,4,11,12]; (3) Interviewing and distributing questionnaires to risk owners by visiting directly to the research location and also by means of cell phones and e-mails. The questionnaire contains the characteristics of the respondent and the risk probability in the pre-construction phase with a Likert measurement scale. The assessment categories used were very frequent (5), frequent (4), moderate (3), rare (2) and never (1). Data collection was conducted from May 2020 to July 2020. Snowball sampling technique was used to get respondents. A total of 58 respondents were used in this study consisting of 10 people from BPBD Pidie Jaya Regency, 20 people from Management Consultants and 28 people from Pokmas.

- The output is a risk register containing a list of risks, risk owners and potential risk responses that have an impact on the implementation of housing reconstruction after the earthquake disaster in Pidie Jaya Regency.

To test the quality of the research instrument, the validity and reliability tests were used. The validity test used the product moment correlation with a significant level of 5% and the reliability test used the Cronbach alpha (c-alpha) with a value of ≥ 0.6 which was considered feasible. The risk proportions were analyzed using the Frequency Index (FI) method and from the FI results the potential risk factors that occurred in housing construction after the earthquake in Pidie Jaya Regency were obtained. The FI formula is as follows:

\[ FI = \frac{\sum_{i=1}^{5} \alpha_i \cdot n_i}{5N} \]

Where \( i \) = Response category index, \( \alpha_i \) = the weight associated with the i- response value, \( n_i \) = frequency of the i-th response as a percentage of the total respondents for each factor, dan \( N \) = The total number of respondents.

Then after getting the FI value for risk probability, it is continued by categorizing the risk based on the value of the FI value shown in Table 1.

| Score | Weight | Risk Assessment |
|-------|--------|-----------------|
| 1     | 0,000 ≤ FI/SI ≤ 0,125 | Very low       |
| 2     | 0,125 ≤ FI/SI ≤ 0,375 | Low            |
| 3     | 0,375 ≤ FI/SI ≤ 0,625 | Moderate       |
| 4     | 0,625 ≤ FI/SI ≤ 0,875 | High           |
| 5     | 0,875 ≤ FI/SI ≤ 1,000 | Very High      |

Analysis of variance (ANOVA) was used in this study to test the comparison hypothesis of more than two samples and each sample consisted of two or more types simultaneously. similarity mean of three or more populations. The purpose of a two-way analysis is to examine the differences between two or more groups where there are two or more factors being considered, namely the possibility of risk variables occurring in the three groups of risk owners in the pre-construction phase. The initial hypothesis is stated that there is no significant effect between the risk variable and the risk owner on the likelihood / opportunity of risk. Two-way ANOVA summary Table as described in the Table 2.
Table 2. Two-way Anova summary.

| Source of Diversity (SK) | Sum of Squares (JK) | degrees of freedom (db) | Middle Square (KT) | Fcount |
|-------------------------|---------------------|-------------------------|--------------------|--------|
| Row Average             | JKB                | $db_{numer1} = r-1$     | $s^2B = \frac{JKB}{r-1}$ | $f_{count} = \frac{KTB}{KTG}$ |
| Colum Average           | JKK                | $db_{numer2} = k-1$     | $s^2K = \frac{JKK}{k-1}$ | $f_{count} = \frac{KTK}{KTG}$ |
| Error                   | JKG                | $db_{denum} = (r-1)(k-1)$ | $s^2G = \frac{KTG}{(r-1)(k-1)}$ |        |
| Total                   | JKT                | $r.k - 1$               |                    |        |

3. Analysis and discussion

The data obtained are in the form of respondents' answers from questionnaires that have been distributed. The questionnaire was addressed to 58 respondents involved in the implementation of housing reconstruction rehabilitation. Characteristic data, validity tests, reliability tests, and Frequency Index (FI) analysis are described below.

3.1 Characteristics of respondents

Respondent characteristics are divided into three groups according to the object of the respondent, namely the Management Consultant (CM), Community Group (Pokmas) and Government (BPBD). Respondent characteristics consist of the respondent's position, age, latest education, and experience in construction. It is summarized in Table 3.

3.2 Risk identification

Risk identification starts with the activities carried out during the pre-construction phase of the community housing reconstruction project, in this study only the pre-construction scope of socialization activities, validation of house damage assessment, identification of beneficiaries, establishment of Pokmas and Pokmas training.

Table 4 explained that risk identification starts from a check list of the risks of pre-construction construction of houses in the post-earthquake reconstruction phase that has occurred and is adjusted to the conditions that occurred in this study by giving 5 respondents who were considered experts and were directly involved in the reconstruction process, namely from the CM including the facilitator, Pokmas and BPBD. Respondents will choose the risks they face and explain the causes of the risks and respond to the risks they have done. The risk response put forward by the expert is how the strategy they have implemented to overcome the risk in order to minimize the threat and reduce the overall risk exposure.

In this study, data on risk response is only at the risk identification stage, while in more detail the risk response will be discussed in the next research after the quantitative risk analysis stage is carried out by following the stages in risk management based on the PMBOK Guide Sixth edition.

It can be explained that the socialization factor with variable V1 is the lack of facilitators in program socialization, the 5 experts gave their opinion that the risk owners are CM, PK and BPBD and on average choose the risk response to accept. Accepting means accepting these risks and acknowledging the threats that will occur, namely that time and costs will increase in outreach activities. There is compensation from the BPBD for the extension of time in this outreach activity so that it means that this acceptance strategy is active. The risk responses for the other variables can be explained in the Table 4. Then, this checklist was compiled into a questionnaire and was distributed to respondents using a likert rating scale.
3.3 The result of validity and reliability tests
Data from the distribution of questionnaires will be tested first whether the questionnaire is valid and reliable. The validity test with a significant level of 5% was used in this study. Testing by taking 20 respondents from the Management Consultant with $r_{table} = 0.444$, Pokmas as many as 28 respondents with $r_{table} = 0.378$ and BPBD as many as 10 respondents with $r_{table} = 0.632$. The test criterion is if $r_{count} \geq r_{table}$, then the instrument is declared valid and vice versa declared invalid. Table 5 describes the results of data processing for testing the validity of the instrument. All questionnaires were declared valid so that they could be carried out for the next stage of testing, namely the reliability test.

Table 3. Respondent characteristics.

| Respondent Data                     | CM  | Pokmas | BPBD |
|-------------------------------------|-----|--------|------|
|                                     | Freq. | Percentage | Freq. | Percentage | Freq. | Percentage |
| Respondent Age                      |      |          |      |            |      |            |
| < 20 Year                           | 0    | 0%      | 0    | 0.0%       | 0    | 0%         |
| 20 - 40 Year                        | 11   | 55%     | 1    | 3.6%       | 5    | 50%        |
| >40 Year                            | 9    | 45%     | 27   | 96.4%      | 5    | 50%        |
| Gender                              |      |          |      |            |      |            |
| Male                                | 18   | 90%     | 27   | 96.4%      | 5    | 50%        |
| Female                              | 2    | 10%     | 1    | 3.6%       | 5    | 50%        |
| Position / Occupation               |      |          |      |            |      |            |
| Leader Management Consultant        | 1    | 5%      | -    | -          | -    | -          |
| Senior Facilitator                  | 8    | 40%     | -    | -          | -    | -          |
| Technical Facilitator               | 11   | 55%     | -    | -          | -    | -          |
| Farmers / Fishermen                 | -    | -       | 13   | 46.5%      | -    | -          |
| Entrepreneur / Gov. Employee        | -    | -       | 5    | 17.8%      | -    | -          |
| Builder                             | -    | -       | 9    | 32.1%      | -    | -          |
| Housewife                           | -    | -       | 1    | 3.6%       | -    | -          |
| BPBD Rehab / Recon Officer          | -    | -       | -    | -          | 2    | 20%        |
| BPBD Recon Rehab Staff              | -    | -       | -    | -          | 8    | 80%        |
| Level of Education                  |      |          |      |            |      |            |
| Elementary School                   | 0    | 0%      | 3    | 10.7%      | 0    | 0%         |
| Junior High School                  | 0    | 0%      | 9    | 32.1%      | 0    | 0%         |
| Senior High School                  | 0    | 0%      | 12   | 42.9%      | 0    | 0%         |
| Diploma                             | 5    | 25%     | 3    | 1.3%       | 1    | 10%        |
| Undergraduate Degree (S1)           | 15   | 75%     | 3    | 10.7%      | 7    | 70%        |
| Graduate Degree (S2)                | 0    | 0%      | -    | -          | 2    | 20%        |
| Work Experience In Construction     |      |          |      |            |      |            |
| 0 Year                              | 0    | 0%      | 8    | 28.6%      | 0    | 0%         |
| 1-4 Year                            | 2    | 10%     | 12   | 42.9%      | 5    | 50%        |
| 4-8 Year                            | 10   | 50%     | 3    | 10.7%      | 2    | 20%        |
| >8 Year                             | 8    | 40%     | 5    | 17.9%      | 3    | 30%        |
| Experience as a companion to the community self-management program |      |          |      |            |      |            |
| 1 Times                             | 3    | 15%     | -    | -          | -    | -          |
| 2-5 Time                            | 5    | 25%     | -    | -          | -    | -          |
| 5-8 Time                            | 6    | 30%     | -    | -          | -    | -          |
Table 4. Risk identification.

| Factor                      | Variable Code | Variable                                                                 | CM | PK | BPBD | Risk response |
|-----------------------------|---------------|--------------------------------------------------------------------------|----|----|------|---------------|
| Socialization risk (F1)     | V1            | Lack of facilitators in program socialization                            | √  | √  | √    | Accept        |
|                             | V2            | Inexperienced facilitator                                                | √  | √  | √    | Accept        |
|                             | V3            | Schedule tight / short                                                   | √  | √  |       | Mitigate      |
| Validation of damage assessment (F2) | V4         | Lack of a housing database                                              | √  |    | √    | Accept        |
|                             | V5            | Too many parties are involved                                           |    | √  | √    | Mitigate      |
|                             | V6            | Non-uniform damage assessment methods                                   |    |    |    | Mitigate      |
|                             | V7            | Coordination problems in assessment                                     | √  | √  | √    | Mitigate      |
|                             | V8            | The number of surveyors / insufficient no. assessment facilitators       |    |    |    | Transfer      |
| Validation of damage assessment (F2) | V9         | Surveyor / facilitator inexperienced                                     | √  | √  |       | Mitigate      |
|                             | V10           | Weak assessment by the government                                        |    |    | √    | Transfer      |
|                             | V11           | Local authority pressure on damage assessments                           |    |    | √    | Transfer      |
|                             | V12           | Lack of involvement of the entire community in identifying damage to houses |    |    |    | Mitigate      |
| Recipient identification (F3) | V13          | Transportation access is difficult to identify and land ownership        |    |    | √    | Accept        |
|                             | V14           | Collusion in determining beneficiaries                                   |    |    | √    | Mitigate      |
|                             | V15           | Problems with land ownership / rights                                    | √  | √  | √    | Mitigate      |
|                             | V16           | Validation issues identify ownership                                     | √  | √  |       | Transfer      |
|                             | V17           | The results of the assessment by the government are inaccurate            |    |    | √    | Transfer      |
| Pokmas formation (F4)       | V18           | Facilitator who has no experience in forming community organizations (Pokmas) | √  |    |      | Mitigate      |
|                             | V19           | Failure to build community organizations                                |    |    | √    | Mitigate      |
|                             | V20           | Community resistance to the process of forming community organizations   |    |    | √    | Transfer      |
|                             | V21           | Society manipulated by other parties                                    |    |    | √    | Mitigate      |
|                             | V22           | Disagreement with community contracts / agreements                       |    |    | √    | Mitigate      |
|                             | V23           | Brief schedule for the stages of forming community organizations        |    |    | √    | Mitigate      |
| Pokmas / Worker training (F5) | V24          | Lack of facilitators in community / worker training                      | √  | √  |      | Accept        |
|                             | V25           | Facilitator who is not experienced in training                           |    |    | √    | Accept        |
|                             | V26           | Limited knowledge about how to build earthquake resistant houses         |    |    | √    | Mitigate      |
|                             | V27           | The training material is lacking and beyond the expected results         |    |    | √    | Accept        |
|                             | V28           | Lacking Government support for training                                  | √  | √  |      | Mitigate      |
|                             | V29           | The low role of the community                                           |    |    | √    | Avoid         |
Table 5. Validity test results.

| Variable Code | Number of Variables | Value Range | r<sub>tab</sub> | Value Range | r<sub>tab</sub> | Value Range | r<sub>tab</sub> | Value Range | r<sub>tab</sub> | Explanation |
|---------------|---------------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|--------------|
|               |                     | Management Consultant | Pokmas | BPBD | Management Consultant | Pokmas | BPBD | Management Consultant | Pokmas | BPBD | Management Consultant | Pokmas | BPBD | Management Consultant | Pokmas | BPBD | Management Consultant | Pokmas | BPBD | Management Consultant | Pokmas | BPBD | Management Consultant | Pokmas | BPBD | Management Consultant | Pokmas | BPBD |
| V1-V3         | 3                   | 0.636 – 0.706 | 0.444 | 0.618-0.934  | 0.374 | 0.740-0.777 | 0.632 | Valid |
| V1, V2        | 2                   |             |             |             |             |             |             |             |             | Valid |
| V4, V6, V7    | 3                   | 0.576 – 0.669 | 0.444 | 0.558-0.952  | 0.374 |             |             | Valid |
| V7, V9, V10   | 3                   |             |             |             |             |             |             |             | Valid |
| V4-V12        | 7                   |             |             |             |             |             |             |             | Valid |
| V13, V15, V16 | 3                   | 0.514 – 0.918 | 0.444 |             |             | 0.636-0.757 | 0.632 | Valid |
| V15, V17      | 2                   |             |             |             |             | 0.920-0.969 | 0.374 | Valid |
| V13-V16       | 4                   |             |             |             |             |             |             |             | Valid |
| V20, V21, V23 | 3                   | 0.673 – 0.905 | 0.444 |             |             |             |             |             | Valid |
| V18, V19, V21, V22, V23 | 5 | 0.434-0.897 | 0.374 | 0.666-0.762 | 0.632 | Valid |
| V19, V20, V21 | 3                   |             |             |             |             |             |             |             | Valid |
| V24, V26, V28, V29 | 4 | 0.556 – 0.777 | 0.444 |             |             |             |             |             | Valid |
| V24, V25, V27, V28 | 4 | 0.582-0.822 | 0.374 |             |             |             |             |             | Valid |

The results of the reliability test which aims to determine the level of reliability of the instrument using the Cronbach Alpha value exceeding the value of 0.6. The reliability test is carried out from the results of the questionnaire from each risk owner. The test results show that from the Management Consultant there is 1 factor that has a Cronbach Alpha value of less than 0.6, namely identification of beneficiaries so that these factors are eliminated and not used in further analysis, as indicated by Table 6.

Table 6. Management consultant reliability test results summary.

| Questioner Code | Number of Variables | C-Alpha Management Consultant | Pokmas | BPBD |
|-----------------|---------------------|-------------------------------|--------|------|
| V1-V3           | 3                   | 0.7                          | 0.63   | 0.84 |
| V1, V2          | 2                   | 0.67                         |        |      |
| V4, V6, V7      | 3                   | 0.62                         |        |      |
| V7, V9, V10     | 3                   | 0.52                         |        |      |
| V4-V12          | 7                   | 0.83                         |        |      |
| V13, V15, V16   | 3                   | 0.76                         |        |      |
| V15, V17        | 2                   | 0.83                         |        |      |
| V13-V16         | 4                   | 0.71                         |        |      |
| V18, V19, V21, V22, V23 | 5 | 0.83 |        |      |
| V19, V20, V21   | 3                   | 0.67                         |        |      |
| V24, V26, V28, V29 | 4 | 0.61 |        |      |
| V24, V25, V27, V28 | 4 | 0.61 |        |      |

3.4 Result of the frequency index (FI) analysis of risk variables

The pre-construction phase in the implementation of post-disaster housing reconstruction, where each risk owner has a number of different factors and variables. Management Consultant has 4 factors and 13 variables, Pokmas has 5 factors and 17 variables, while BPBD has 4 factors and 16 variables. Potential factors and variables are determined based on the results of the FI analysis. The results of this analysis provide an overview of the indexes of each variable ranging from 0 to 1. The higher the index value, the greater the frequency or chance of risk arising in the implementation of activities in the pre-construction phase. Table 7 below describes the highest FI rating for each risk owner.
Table 7. Frequency Index (FI).

| Factor | Variable | CM F1 Rank | PK F1 Rank | BPBD F1 Rank |
|--------|----------|------------|------------|--------------|
| F1     | V1       | 0.280 13   | 0.314 14   | 0.440 7      |
|        | V2       | 0.490 8    | 0.429 7    | 0.420 12     |
|        | V3       | 0.470 9    | 0.264 17   |              |
|        | V4       | 0.710 1    |            | 0.440 8      |
|        | V5       |            |            | 0.760 1      |
|        | V6       | 0.430 10   |            |              |
|        | V7       | 0.530 6    | 0.389 12   | 0.560 4      |
|        | V8       |            |            | 0.360 14     |
|        | V9       |            | 0.421 10   | 0.360 15     |
|        | V10      |            |            | 0.443 5      |
|        | V11      |            |            | 0.720 2      |
|        | V12      |            | 0.420 11   |              |
|        | V13      |            |            | 0.320 16     |
|        | V14      |            |            | 0.420 10     |
|        | V15      |            | 0.264 16   | 0.400 13     |
|        | V16      |            |            | 0.440 9      |
|        | V17      |            | 0.629 3    |              |
|        | V18      | 0.386 13   |            |              |
|        | V19      |            | 0.493 4    | 0.460 5      |
|        | V20      | 0.600 4    |            | 0.640 3      |
|        | V21      | 0.610 3    | 0.679 1    | 0.460 6      |
|        | V22      |            | 0.671 2    |              |
|        | V23      | 0.320 12   | 0.400 11   |              |
|        | V24      | 0.330 11   | 0.421 9    |              |
|        | V25      |            | 0.429 8    |              |
|        | V26      | 0.600 5    |            |              |
|        | V27      |            | 0.443 6    |              |
|        | V28      | 0.670 2    | 0.286 15   |              |
|        | V29      | 0.520 7    |            |              |

Table 7 describes the ranking of each pre-construction risk variable, where each risk owner has different potential risk variables. Management Consultant has 2 high risk variables and Pokmas and BPBD have 3 high risk variables. When viewed from the risk factors, the Pokmas formation factor (F4) is the most potential risk factor compared to other risk factors in the pre-construction phase because there is a potential risk variable with the highest rank held by the three parties. This is closely related to the initial research [2], which was carried out due to the increase in the number of damaged house data after re-validation so that the number of Pokmas automatically increased. resulting in Pokmas formation and training activities not running effectively. The involvement of the community with a very complex background and the absence of a risk management plan from the government triggers this risk. These potential factors and variables should be of concern to the government because if the identified risks are not immediately planned for a resolution strategy, it is possible that these risks will likely reoccur in the future.

3.5 Analysis of variance (Anova)
Based on the results of the analysis, F count > F table and P value < α (0.05), then the initial hypothesis is rejected. It can be concluded that there is a significant influence between risk variables and risk owners on the likelihood / likelihood of risk occurring in the pre-construction phase.

4. Conclusion
Based on the results of the research and discussions that have been carried out, it can be concluded that the pre-construction stage activities in the post-earthquake housing reconstruction process in Pidie Jaya Regency have the potential for risks that can impact time, cost and quality. The government, in this case the BPBD, as the coordinator in the rehabilitation and reconstruction of houses after an earthquake...
disaster has the responsibility to reduce the risks that have the opportunity to arise again in the future if risk management is not planned. The list of potential risk identification that has been obtained from this study can be used as input in planning risk management for the pre-construction stage of post-disaster housing reconstruction when using community-based methods.

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