Factors Affecting Post-Disaster Housing Reconstruction on Preconstruction Stage in Pidie Jaya Regency Indonesia

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Abstract. Pidie Jaya regency is one of the regencies located in Aceh Province, Indonesia. On 7 December 2016 an earthquake rocked the Pidie Jaya with a magnitude of 6.5 on the Richter scale on coordinates 5.25 ° North and 96.24 ° East latitude with an estimated in-depth of 15 km. The impact of the disaster caused a lot of damage to infrastructure, especially public housing. The Reconstruction of disaster victim housing in Pidie Jaya District uses community-based methods designed with a community organizing strategy. In the early stages of reconstruction many problems arose between the government, the management consultant, and the community beneficiaries resulting in a delay in the construction housing implementation. This period is called preconstruction, where the activities carried out focused on the preparatory activities to rebuild housing of disaster victims. Questionnaire surveys and interviews were given to stakeholders from the government, the management consultants and the community involved in housing reconstruction. Data were analyzed using statistical software. The results of this study have identified that the dominant factors influencing implementation in pre-construction are starting at the moment (1) recruitment of facilitators; (2) program training for the community; (3) formation of community organizations; (4) program socialization and coordination; (5) inventory, verification and validation of damage data; (6) design and funding. The dominant factors in the pre-construction are interrelated with each other because the problems that occur at the beginning of the pre-construction period, result in delays in the implementation of the construction of the houses. Identifying specific factors that create problems that affect the success of the project in this study is the basis for practitioners, stakeholders and the community in managing a post-disaster housing project, so that it can anticipate the occurrence of similar things in the implementation of reconstruction in the future.

Keywords: Preconstruction, post disaster housing reconstruction, community–based

1. Introduction

On December 7, 2016 an earthquake rocked Aceh Province, precisely in Pidie Jaya, Bireun and Sigli Regencies. The enormous impact occurred in Pidie Jaya District, especially in the housing sector. Damaged houses recorded as an earthquake rose in Pidie Jaya Regency amounted to 17,673, of which 2,202 were severely damaged, 4,542 were moderately damaged, and 10,929 were slightly damaged [1]. The reconstruction phase for disaster housing in Pidie Jaya regency in using the community based and coordinating with Management consultants and the Post Earthquake Disaster Rehabilitation and Reconstruction Coordination Team under the Regional Disaster Management Agency (Badan
Penanggulangan Bencana Daerah/BPBD) of Pidie Jaya Regency. The approach in post-disaster housing reconstruction uses community-based methods, where people become owners, supervisors even as implementers of their own house reconstruction projects (Jha et al., 2010., Silva, 2010., Ophiyandri, et al., 2010). In the early stages of reconstruction many problems arose between the government, management consultants and beneficiary communities. At this time it was called pre-construction where the activities carried out focused on the preparation to rebuild the housing of the disaster victims. Activities carried out during the pre-construction period, namely the procurement of construction management services, facilitator recruitment and training, socialization of the reconstruction program, damaged validation, formation and training of Community Groups (Kelompok Masyarakat/Pokmas), and the initial disbursement process. The problem in this study was the implementation of delayed housing construction for 11 months which was calculated since the completion of the emergency response transition period until the construction of housing was carried out. The construction of new disaster victims housing took place in February 2018. This should be a serious concern by the government considering that the community as victims affected by the disaster cannot be left too long in temporary homes or in damaged housing conditions. The purpose of the research is to get the factors that influence the pre-construction stage, thus impacting the postponement of post-disaster housing construction in Pidie Jaya District. Identifying obstacles that can delay the reconstruction program can help improve the reconstruction process in the future.

2. Literature Review

Based on Aceh Governor Regulation number 147 of 2016 concerning Action Plans for Post-Disaster Earthquake Rehabilitation and Reconstruction in Pidie, Pidie Jaya and Bireun Districts 2017-2019, that the earthquake that struck Aceh on December 7, 2016 at 05:02:36 WIB, shallow earthquake, 10 km, with a magnitude of 6.5 MW centered in Pidie District and had an impact on Pidie and Bireuen Regencies. This disaster resulted in fatalities and caused tremendous damage to community housing, infrastructure and socio-economic communities. As a result of the impact of the earthquake, the Governor of Aceh declared the provincial disaster response status for fourteen days, dated from 7 to 20 December 2016, through the Disaster Emergency Response Statement Number 39 / PER / 2016. The government also sets emergency transition status from December 21, 2017 to March 20, 2017. After this period the rehabilitation and reconstruction period began in the community housing sector although during the emergency transition status the rehabilitation and reconstruction phase has begun in other infrastructure sectors.

Based on the Regulation of the Head of National Disaster Management Agency (Badan Nasional Penanggulangan Bencana/BNPB) No.11 of 2008 concerning the Post Disaster Rehabilitation and Reconstruction Guidelines stated that reconstruction is the formulation of policies and efforts as well as well planned concrete steps, consistent and sustainable way to permanently rebuild all infrastructure, facilities and institutional systems, both at the government and community levels. The objective of the reconstruction is to rebuild in the long term permanently some or all physical and non-physical facilities and infrastructure, along with all institutional systems and services damaged by the disaster, so that conditions are restored and their functions run well and the community can be better protected from various disaster threats [5].

The Indonesian government in the community-based housing sector rehabilitation and reconstruction regulations is designed with community organizing strategies and relies on initiatives and community initiatives (participatory development) without abandoning local wisdom. Especially for Community Direct Assistance (Bantuan Langsung Masyarakat/BLM) implemented through community empowerment in Community Groups (Pokmas) [6]. Community-based construction projects pose many risks in their implementation. Critical risk has been identified into 6 categories, namely project initiation, community contribution and participation, budget and finance, skilled personnel, material procurement and technical supervision and quality control. To manage these risks, it is necessary to plan, assess and mitigate in the future [7]. In Indonesia this community-based method was first applied in Aceh Province after the 2004 earthquake and tsunami disaster and was considered successful in its implementation so that it is also applied to other regions such as Nias,
Yogyakarta, Central Java and West Sumatra. Insufficient funding for reconstruction contributes to the slow progress of reconstruction in the housing sector. After almost four years after the disaster, housing reconstruction is still ongoing in West Sumatra [8].

Activities carried out at the time of community-based housing reconstruction in the original location (on-site) post-earthquake disaster in Pidie Jaya District in 2017 consists of program socialization, verification and validation of house damage data, finalization of data on recipients of housing assistance and formation community based (Pokmas), Pokmas training, identification of needs / technical surveys, preparation of Housing Construction Technical Document (Dokumen Teknis Pembangunan Perumahan/ DTPP), verification of technical documents & determination of the funding for Housing Assistance (Bantuan Dana Rumah/BDR), submission of funds disbursement, implementation of housing construction and accountability of funds [9]. The pre-construction period referred to in this study is from the program's socialization activities up to the submission of funds disbursement, while the implementation of the house and the accountability of funds are included in the construction of the house.

Traditionally, pre-construction is the initial planning and engineering carried out by the project team so that the project can run according to the agreement in the contract, such as defined project scope, schedule, costs, methods of implementation, identifying potential problems as early as possible with the most efficient use of resources. Pre-construction efforts finally help the owner determine whether the project can work or not. As for post-disaster projects in Indonesia, pre-construction is carried out in accordance with local government policies and after the emergency response period ends. The most common measure of the success of a post-disaster reconstruction project is the speed at which a damaged housing can be rebuilt [10].

Many important risks of managing community-based construction projects are in the pre-construction phase, such as unconfirmed sources of funding, lack of technical facilities, lack of consensus, lack of cooperation, non-conformance with standard specifications, inability to recruit skilled workers, unavailability of skilled workers, labor incompetent, a long tender process, and a lack of scheduled work [11]. In line with this, many problems with implementing community-based approaches in post-disaster contexts have also been found in the pre-construction phase, such as inappropriate policies regarding reconstruction strategies, lack of understanding of the meaning of community-based programs, coordination and communication problems, and lack of database systems [7, 12, 13]. There are 12 most dominant factors of 32 Critical Success Factors (CSFs) in the pre-construction phase of community-based post-disaster housing that have been implemented in Indonesia, namely transparency and accountability, followed by appropriate reconstruction policies / strategies, understanding community-based methods, gathering trust from the community, facilitator capacity, good coordination and communication, adequate funding availability, implementing capacity, significant level of community participation / control, involvement of all community members, involvement of all community members, success in identifying damage, and government support [14]. Success factors can be indicated by identifying specific factors that create problems or areas that have risks that affect the success of the project.

3. Methodology

The method of data collection was done by collecting secondary data from the BPBD of Pidie Jaya Regency, namely documents relating to the reconstruction of the post-disaster housing sector in Pidie Jaya Regency. Primary data consists of respondent data and data on factors that influence the slow start of housing construction during the pre-construction period. In this study the statements in questionnaire are limited to the activities included in the implementation of pre-construction namely starting from program socialization to the community, conducting verification & validation of data on the level of damage to houses, formation and training of community group, design and funding. The data was obtained from dissemination of questionnaire to respondents consisting of 10 people from BPBD, 10 people from management consultants consisting of 3 leaders and 7 facilitators, and 30 people from community group. Determination of respondents using the snowball method where several respondents told potential respondent researchers. The distribution and collection of
questionnaires is done by visiting respondents directly to the research location that lasts for 3 months, starting in April 2018 and ending July 2018. All respondents were those directly involved in the reconstruction of houses after the earthquake in Pidie Jaya District. The questionnaire is conducted in closely manner with a Likert rating scale, namely (1) very bad; (2) Bad; (3) medium; (4) Good; (5) very good.

Data processing method uses the following steps:

1. Characteristics of respondents were analyzed using frequency distribution, namely grouping data or summary data tables that show the frequency / number of items / objects in each class that exists.

2. Data resulting from questionnaires about the factors of activities carried out during the pre-construction period. The activity is based on the perceptions of respondents with rating scales from very well done to very poor rating scales. These factors will find the value of validity by using multiple correlation formulas to determine whether or not the questionnaire is valid.

3. Next, a reliability test is conducted on the questionnaire to determine whether the questionnaire can be used more than once, at least by the same respondents who will produce consistent data so that questions can be reabeled to be submitted.

4. After the questionnaire is distributed, the data from the respondents' answers are calculated using the mean.

5. The next stage is the results of the study used for descriptive analysis of the results obtained to describe the conditions of pre-construction influenced by several factors in its implementation so that the construction of houses after the disaster was identified to be late.

6. Guided interviews with selected respondents consist of 2 people from BPBD Pidie Jaya Regency, 2 people from Management Consultants and 2 people from the community to obtain further information about the results that have been obtained from the factors of activities that affect the implementation of post-disaster housing pre-service in Pidie Jaya Regency.

4. Analysis and discussion

The results of secondary data analysis and interviews with the timing of the pre-construction of post-disaster housing in Pidie Jaya Regency can be seen in the figure below. Figure 1 explains that the rehabilitation and reconstruction period for housing starts since the end of the emergency response transition period, which is March 20, 2018. At this stage BPBD identified the level of damage to the house in collaboration with a team from Syiah Kuala University.

After the emergency transition period ended, housing rehabilitation and reconstruction activities were carried out by the BPBD of Pidie Jaya Regency, one of which was the procurement of a Regional Management Consultant conducted in May 2018. As many as 2 Regional Management Consultants who signed a contract with BPBD in Pidie Jaya Regency which began in August 2017 and ended in July 2018. One of the tasks of the regional management consultant is to recruit facilitators, pre-service training and mobilization of facilitators and then the facilitator conducts program socialization and coordination activities up to 40% of the phase I funding disbursement. The pre-construction period is very long, roughly ± 11 months, which is calculated from the end of the emergency response transition period until the construction of the house begins. The period of construction of the house began in February 2018 after the completion of the phase I application for disbursement of funds. The Rehabilitation and Reconstruction period will end in 2019 based on regulations set by the Aceh Province government.
Figure 1. Flow chart for post-disaster activities

As many as 50 respondents who filled out the questionnaire in this study, the characteristics of respondents can be seen in the table below. Based on the characteristics of the respondents it can be explained that the respondents from the government and management consultants generally have a Bachelor degree and from the community there are those who have very low education, namely elementary school. Six respondents were identified from the community who had no experience in the construction sector. In general, Pokmas are not experienced in the construction sector, but in the characteristics of these respondents only identify that if the respondent knows little about how to build a house, then the experience will be between 1 and 5 years. Full description is shown in Table 1.

Table 1. Characteristics of Respondents

| No | Demographics                        | Total | Percentage |
|----|-------------------------------------|-------|------------|
| 1. | Group of respondents                |       |            |
|    | a. Government (BPBD)                | 10    | 20%        |
|    | b. Management Consultant            |       |            |
|    | Team Leader                         | 3     | 6%         |
|    | Facilitator                         | 7     | 14%        |
|    | c. Community                        |       |            |
|    | Head of Community Group (Pokmas)    | 4     | 8%         |
|    | Member of Pokmas                     | 26    | 52%        |
| 2. | Age of Respondents                  |       |            |
|    | 31 - 40 years old                   | 18    | 36%        |
|    | 41 - 50 year old                    | 22    | 44%        |
|    | >51 years old                       | 10    | 20%        |
| 3. | Education Attained                  |       |            |
|    | Elementary School                   | 7     | 14%        |
|    | Junior High School                  | 9     | 18%        |
|    | Senior High School                  | 9     | 18%        |
|    | Diploma                             | 1     | 2%         |
|    | Undergraduate                       | 24    | 48%        |
4. Experience in construction

| Year       | Number | Percentage |
|------------|--------|------------|
| 0 Year (Never) | 6      | 12%        |
| 1-5 Years   | 29     | 58%        |
| 5-10 Years  | 4      | 8%         |
| 11-15 Years | 8      | 16%        |
| >15 Years   | 3      | 6%         |

The results of data processing using statistical methods found that there were 26 factors of activities carried out during the pre-construction period. The activity is based on the perceptions of respondents with rating scales from very well done to very poor rating scales. The ranking sequence of these factors can be seen in the table below.

| Code | Factors                                                                 | Mean Score | Rank |
|------|-------------------------------------------------------------------------|------------|------|
| P1   | BPBD & facilitators coordinate at the District / Village level          | 4,180      | 4    |
| P2   | BPBD & facilitator socialize to the community                           | 4,160      | 5    |
| P3   | BPBD & facilitator build togetherness, solidarity and volunteerism     | 3,540      | 23   |
| P4   | BPBD & facilitator communicate well with the community                 | 3,620      | 22   |
| P5   | All communities participate in socialization & coordination            | 3,740      | 19   |
| P6   | Program socialization and coordination in accordance with the planned time | 3,940      | 13   |
|      | Mean                                                                    | 3,863      |      |
| P7   | BPBD conducts inventory & identification of damage                      | 3,920      | 14   |
| P8   | BPBD & facilitator verify & validate damage data                       | 4,040      | 8    |
| P9   | Communities participate in identification, verification & validation   | 3,900      | 15   |
| P10  | BPBD & facilitator conduct verification & validation fairly            | 4,020      | 9    |
| P11  | Inventory, verification & validation according to the planned time      | 3,860      | 16   |
| P12  | BPBD & facilitator validate data on time                               | 3,760      | 18   |
|      | Finalizing the data until the District Head decree is issued for the recipient of the house on time | 3,700      | 20   |
|      | Mean                                                                    | 3,886      |      |
| P14  | Selection of Head of Pokmas according to skills in the field of construction | 3,640      | 21   |
| P15  | Establishment of Pokmas according to the planned time                  | 3,960      | 12   |
| P16  | The selection of Pokmas and members is conducted openly                | 3,780      | 17   |
|      | Mean                                                                    | 3,793      |      |
| P17  | The facilitator makes the design of the house on time as planned        | 4,200      | 3    |
| P18  | The facilitator makes the budget plan of the house on time as planned   | 4,340      | 1    |
| P19  | The design plan and budget plan are consulted with the community       | 3,340      | 24   |
| P20  | Transparency and accountability to the community in setting funding     | 4,100      | 6    |
The government provides funding in accordance with the results of the validation of damage 4,240 2 
Disbursement of phase 1 (40%) funds on time 4,080 7 

Program training for the community
The facilitator trains the Pokmas 4,000 10
The training program is absorbed by the Pokmas 3,220 26
The training results can empower Pokmas 3,260 25
Training according to the specified time 3,980 11

From these 26 factors, the very low factor was the program training for the community or Pokmas, the design plan and budget plan consulted with the community, building togetherness, solidarity and volunteerism, communication, election of the Pokmas chairman, and finalizing the data until the decree from the recipient. The factors with the lowest mean value were identified that the activity was carried out with a moderate level in the Likert scale or meant that the activity had not been fully carried out very well and there must have been a very influential cause in the implementation of the post-disaster housing construction.

The results of the analysis were then asked again with several respondents in the form of guided interviews to find accurate information. From the results of interviews with respondents that from the procurement activities of the Regional Management Consultants included in the pre-construction activities carried out by the BPBD and those activities that proceeded as planned. The regional management consultant consists of 2 companies whose task is to coordinate with the parties involved in the implementation of Rehabilitation and Reconstruction, identifying and formulating activities, compiling general guidelines and showing technical implementation, preparing and controlling all activities and identifying and facilitating resolution of problems that occur in the implementation of Housing Sector Rehabilitation and Reconstruction. The results of the analysis of interviews with respondents found that many led to delays in the implementation of housing construction starting from the activity of recruiting facilitators, resulting in delayed activities. The scope of questions in guided interviews starts from the recruitment of facilitators to design and funding activities as outlined below.

**Recruitment of facilitators**
The recruitment of facilitators is the duty and responsibility of the Regional Management Consultant so that all regulations and procedures have been determined by the consultant but still coordinate with the BPPD of Pidei Jaya Regency. However, in its implementation it was impressed by the public that in the recruitment process it was carried out in a non-transparent manner such as excessive requirements, a non-transparent recruitment process including graduation announcements was only conducted through personal Short Message Service (SMS). There was dissatisfaction from the community towards the recruitment process which resulted in delays in issuing decrees on the determination of facilitators and subsequent activities such as training and facilitating facilitators too late too. From this fact, it is necessary to implement a better human resource procurement management system in the future so that it can reduce problems as has happened in Pidie Jaya District.

**Program socialization and coordination**
Program socialization and coordination were held together with BPBD and facilitators at the Subdistrict, village and community levels, but not all beneficiaries were present at the event so that after the program socialization and coordination program many people were dissatisfied and visited the BPBD of Pidie Jaya Regency, and not all can be serviced by BPBD, so it seems that communication between BPBD / facilitator and community is carried out with very limited time.
Inventory, verification and validation of damage data
The damaged house validation carried out by the facilitator experienced an increase in implementation time because the community was not satisfied with the results of the initial identification of house damage that had been carried out during the emergency response and transition. The damaged house validation carried out by the facilitator experienced an increase in implementation time because the community was not satisfied with the results of the initial identification of house damage that had been carried out during the emergency response and transition. This happens because there are some inaccurate data during the initial identification period and also due to a lack of knowledge of the category of damage to houses by the community. Program socialization to the community is very necessary so that it increases the knowledge and confidence that the results of identification and validation that have been done are correct. The number of houses that must be validated has increased from the original plan so that the number of Technical Facilitators that have been recruited is no longer sufficient as planned in the contract between the BPBD of Pidie Jaya Regency and the Regional Management Consultants. Validation of the level of damage to the house was carried out for a long time, resulting in delays in public testing activities and the issuance of Regent Decrees for recipients of houses, formation and training of Pokmas, preparation of Housing Development Technical Documents, design and budget plan.

Formation and training of Pokmas
The facilitator facilitates the community in choosing Pokmas leaders and members. Generally the leader of the Pokmas chosen is by deliberation between the community and its members without being seen from their expertise and skills in managing housing construction. The formation and training of the Pokmas is partially delayed due to the increase in the number of Pokmas from the original plan because of the additional validation of the level of damage to the house. The addition resulted in insufficient training funds planned. Pokmas training does not run effectively and efficiently so it is feared that it will affect the non-empowerment of the community in carrying out the process of building houses.

Design and funding
The task of the facilitator is to design and calculate the cost requirements based on the level of damage. The cost for a heavily damaged house is funded in the amount of Rp. 85,000,000 / House and a moderately damaged house of Rp. 20,000,000 / House. For houses categorized as heavily damaged, built with 2 reconstruction methods, the first method will be built from foundation work to finishing using 36 house type designs and uniform technical specs if identified all old buildings cannot function. While if a part of the house has been identified as functioning it will be heavily damaged, it will be designed according to the needs of the community but adjusted to the funding and technical specs that have been set. However, for the latter category in reality many people were dissatisfied with the design made by the facilitator and it was stated that the design made by the facilitator was not fully consulted with the community. Often changes in design based on the wishes of the people must be made a policy about its own technical specs. Not all community desires about the design can be accommodated by the facilitator and the average design results based on the results of the analysis of the field survey conducted by the facilitator not based on the wishes of the community so that the timing of the design and budget plan is exactly as planned.

5. Conclusion
The results of this study have identified that specific factors that create problems that affect the success of housing reconstruction at the pre-construction stage, namely: (1) recruitment of facilitators; (2) program training for the community; (3) formation of community organizations; (4) program socialization and coordination; (5) inventory, verification and validation of damage data; (6) design and funding. The dominant factors in the pre-construction are interrelated with each other because the problems that occurred at the beginning of the pre-construction period resulted in unavoidable delays
in the construction of houses during reconstruction. The results of the identification of these factors form the basis for practitioners, stakeholders and the community in managing post-disaster housing projects so that they can anticipate similar things in the implementation of reconstruction in the future.

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