Identification of Factors for Assessing Regional Readiness Level in Disaster Management in Sleman Regency

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Abstract. Sleman Regency has a large volcanic eruption potential. For example, the eruption of Mount Merapi that occurred in 2010. The management of the emergency response to the eruption of Mount Merapi is still reactive and responsive. The Regional Government has not been able to manage the emergency response period effectively and efficiently both concerning victim handling, and disaster logistics management. This caused delays in handling victims, both first aid to victims, division of tasks between institutions and volunteers during the emergency response period, and disaster logistics management. Therefore, the government needs to assess the level of regional readiness level in management disasters. This study aims to identify factors that influence the level of regional readiness level to manage the natural disaster emergency response. The research method used was an in-depth interview with the Head of the BPBD Sleman Regency. The results of this study can be identified by 11 factors and 50 indicators that will be used in assessing the level of regional readiness in handling natural disaster emergency response.

1. Introduction
Mount Merapi is one of the most active mountains in the world for its relatively short periodic and high intensity of eruption around 3 - 7 years [1]. The biggest eruption of Mount Merapi occurred in 2010 with 3 times bigger eruption power than the previous one with the launch of glowing cloud with the radius of 14.5 km. According to the Badan Nasional Penanggulangan Bencana (BNPB) - National Emergency Response - Mount Merapi eruption occurred lasted for 14 days since October 26, 2010. Based on the data of BNPB on the eruption of Mount Merapi in 2010, it recorded 277 deaths and missing, 186 injured and 159,977 people were evacuated.

In 2013, the eruption of Mount Merapi reoccurred, yet none was killed, it, however, costed 700 people evacuated. Based on the document of Rencana Aksi Rehabilitasi dan Rekonstruksi Pasca Erupsi Merapi (Rehabilitation and Reconstruction Planning Post Merapi Eruption) in 2010-2013, the damage caused by the eruption affected the sector of settlement, infrastructure, telecommunication, electricity, and energy as well as clean water. It was recorded that 2,636 houses were heavily damaged and not habitable, 156 houses with medium damaged, and 632 houses were lightly damaged, therefore, in total there were 3,424 houses in the area of Special Region of Yogyakarta damaged by the eruption of Mount Merapi. Phreatic eruption occurred on May 11, 2018, it caused evacuation from the affected...
area within the radius of 5 kilometres (3.1 mills) from the volcano. On May 21, 2018 based on the monitor of the Balai Penyelidikan dan Pengembangan Teknologi Kebencanaan Geologi (BPPTKG) - the centre of investigation and technology development of geological disaster - and PVGMBG, the status of Merapi rose from normal to alert.

According to PVMBG, the type of Mount Merapi eruption was cyclical and it would reoccur in a certain period of time, so that Mount Merapi has a periodic potential disaster. Therefore, the local government must be ready in handling the eruption [2, 3, 4, 5, 6]. The local emergency response (BPBD) Sleman area, Special Region of Yogyakarta is government institution that has the duty to deal with the disasters occur within the province of Special Region of Yogyakarta. According to [7], 2011 about BPBD, one of the duties of BPBD is to mitigate the disaster defined as a set of efforts to minimize the disaster risks through organizing as well as through effective and efficient steps. In its implementation, however, from the interview with the Chief of Bidang Pencegahan dan Kesiapsiagaan - Unit of Prevention and Readiness - of BPBD Sleman as well as the Head of Executor in facing the disaster, the disaster handling implemented by BPBD is still responsive and not preventive. In its implementation, BPBD tried to improve its preventive readiness in executing various programs aimed to anticipate the disasters. However, the lack of knowledge and understanding from the people about the disaster especially the risk of Mount Merapi eruption often made the preventive steps taken by BPBD could not run as it should. As the consequence, the handling and the prevention went back to responsive and the readiness of BPBD has become critical to be concerned. The readiness of many aspects of risks needs to be improved by BPBD to minimize the disaster effects.

The readiness of the area in preventing the disasters must refer to the National Disaster Prevention System written on [8] about the Prevention of Disaster and its derivative regulations. Besides, the readiness of the area must also be seen on its international scale. Sendai Framework for Disaster Risk Reduction 2015-2030 is a Framework for Disaster Risk Reduction post 2015 which has been adopted in the third World Conference to Disaster Risk Reduction, conducted on March 14-18, 2015 in Sendai, Miyagi, Japan. This framework represented unique opportunities for all nations to be made as one of the basic reference in capacity building or readiness [9]. Framework Sendai is in the continuation of Hyogo Framework for Disaster Risk Reduction 2005-2015. This research aims to study the local readiness in handling the period of emergency response referring to the Sendai Framework and the Act No. 24, 2017 which then was ratified into Rencana Nasional Penanggulangan Bencana (RENAS) - the National Plan of Disaster Management - 2015-2019. This action planning and Sendai framework are used by BNPB and BPBD as the achievement indicator reference in disaster management [10]. The study of local readiness must also be able to map the local general capacity for the existing threat of disaster within an area and it could recognize the level of readiness of each existing parameter [11].

2. Research Methodology
2.1. System characteristics
The Alert system must be taken into account in disaster management. In international level, within 15 years, there must be a conference among the countries related to the framework that would be used in managing the risk of disaster. The framework produced was a 15 years’ period of agreement, which admit that the country plays important role in disaster risk management. The role could be shared among the local government, private institutions, etc. In national level, BNPB has been an institution that has the authority to arrange the framework of national scaled disaster management system. In the arrangement of the national scaled framework, it should always refer to the framework of international scaled disaster management where it would be adjusted with the condition or the need of each area through BPBD which directly related to the rural location or local people. To support the need of handling mechanism or the disaster management, there would be formed an indicator of readiness for each area. On such system, BPBD carries a task to execute the indicators of readiness that have been set. The implementation of readiness in risk disaster management and handling has become an important factor for a region for to have better anticipation steps in emergency response [12, 13, 14].
2.2. The development of research variable
The variable of this research refers to RENAS 2015-2019 and Sendai Framework for Disaster Risk Reduction 2015-2030. This framework represents unique opportunities for all countries where this framework is could made as one of the basic references in capacity building or readiness [9]. The criteria and sub-criteria of the research are presented in Table 1.

Table 1 Research Variable

| No | Priority Focus                                           | Indicator                                                                 | Reference |
|----|----------------------------------------------------------|---------------------------------------------------------------------------|-----------|
| 1  | Strengthening the legal framework of disaster management | The Revision of Act No 24, 2007 about Disaster Management.                  | [10]      |
|    |                                                          | Harmonization of other rules that have been applied under the act of disaster management. |           |
|    |                                                          | The Improvement of Technical Rules in Disaster Management.                |           |
|    |                                                          | The Improvement of the implementation of legal framework for conducting disaster management. |           |
| 2  | Prioritize the disaster risk reduction in development    | Prioritizing the disaster risk reduction and the adaptation of climate change related to the disaster in terms of development. | [10]      |
|    |                                                          | Monitoring, evaluation, and update of RENAS PB integrated with the related sectors. |           |
|    |                                                          | Developing information system for RENAS PB implementation.                |           |
| 3  | The improvement of multi-party partnership in disaster management | Strategy development of the human resource and the implementation for the disaster management concerning the local wisdom and adaptive towards climate change, gender, and vulnerable group. | [10]      |
|    |                                                          | Strengthening independence and sustainable partnership in conducting disaster management. |           |
|    |                                                          | Strengthening PRB forum nationally, locally and thematically as a media to share information in the execution of disaster management. |           |
|    |                                                          | Strengthening and empowering education institutions and association of expertise in the field of disaster as an education |           |
| No | Priority Focus                                                                 | Indicator                                                                 | Reference |
|----|--------------------------------------------------------------------------------|---------------------------------------------------------------------------|-----------|
|    | media and safety culture development.                                          |                                                                            |           |
|    | Strengthening and improving the role of volunteers in management disaster.     |                                                                            |           |
| 4  | Good Governance in the field of disaster management                           | Meeting the Minimal Service Standard related to disaster management.       | [10]      |
|    |                                                                                 | Improving the capacity of human resources within the related institutions conducting disaster management. |           |
|    |                                                                                 | Improving the facilities that support the institutions for disaster management. |           |
|    |                                                                                 | Management support and the accountability of technical implementation of disaster management. |           |
| 5  | The Improvement of preventing activities and disaster mitigation               | Improving the building capacity and community in preventing and mitigating disaster. |           |
|    |                                                                                 | Strengthening research and technology and the application of its results for the effectiveness of prevention and mitigation of disaster as well as knowledge and understanding sharing in the level of local, national and international. |           |
|    |                                                                                 | Updating the Study of Disaster Risk by strengthening its information system in national scale. | [10]      |
|    |                                                                                 | Optimizing the maintenance of resources as well as spatial plan in order to prevent and mitigate disaster. |           |
|    |                                                                                 | Maintaining disaster mitigation in synergy with the adaptation of climate change as well as considering the vulnerable group and local wisdom. |           |
| 6  | The improvement of readiness and the emergency response for disaster           | The combination of effort in disaster risk reduction with the emergency response. |           |
|    |                                                                                 | The establishment of early warning system for multi danger disaster.        |           |
|    |                                                                                 | The expansion of the scope area of the early warning system for disaster.   |           |
|    |                                                                                 | The establishment of the national and local disaster readiness capacity.    |           |
|    |                                                                                 | The acceleration of the establishment of facilities and logistics as well as distribution in emergency response. | [10]      |
|    |                                                                                 | Strengthening *Satuan Reaksi Cepat* (SRC) - Quick Response Unit of Indonesia’s disaster management. |           |
|    |                                                                                 | Strengthening and local guidance to strengthen the mechanism of emergency response towards disaster based on the priority of |           |
| No | Priority Focus | Indicator | Reference |
|----|----------------|-----------|-----------|
| 5  | No Priority Focus | Indicator | Reference |
| 7  | Increasing the capacity of post-disaster recovery | Strengthening the mechanism of recovery support at the scale of international and national. | [10] |
|    |                | Combining the conduction of post-disaster recovery by reducing the disaster risks. | |
|    |                | Optimizing Rehabilitation and Reconstruction in all aspects. | |
|    |                | Building the character and the sustainability of the people to aware of disaster. | |
| 8  | Understanding the disaster risks | Encouraging the collection, management and access to the information of risks. | [9] |
|    |                | Utilization of location based-data. | |
|    |                | Optimizing statistic in handling the damage and loss. | |
|    |                | Increasing the people’s awareness about the understanding of PRB. | |
| 9  | Strengthening the risk management | Prioritizing & integrating PRB in all sectors. | [9] |
|    |                | Adopting strategy and applying the strategy to reduce disaster risks and its planning based on the target set. | |
|    |                | Empowering the local area through regulation and financial to coordinate with the civilian, community as well as the citizens to maintain the risks. | |
|    |                | Formulating the applicable public policy which aims to overcome the issue of preventing or relocating the people’s housing in the high risk area. | |
| 10 | PRB Investment for Resilience | Allocating the resources needed, including financial and logistic in all level government to develop and to execute the strategic policy of disaster risk reduction, planning and the rules in all relevant sector. | [9] |
|    |                | Increasing the critical infrastructure. | |
|    |                | Integrating PRB within fiscal instrument & risk sharing as well as transfer. | |
|    |                | Increasing business sustainability, either from the people’s professions or the efforts from many parties. | |
|    |                | Protecting and supporting the conservation of cultural institutions and the objects collected as well as other historical sites, cultural heritage and religious related matters. | |
| 11 | Increasing risk | Readiness and policy, planning, as well as programs within the | [9] |
2.3. Respondent of the research
The respondents of this research are the competent parties about in the issue of determining the awareness of disaster risk handling in BPBD Sleman, DIY, so that the respondents in this research are the stakeholders of BPBD Sleman.

3. Result and Analysis
The validation either an indicator is chosen or not based on the questionnaires given to the Chief of the Field of Prevention and Awareness, The Chief of Disaster Mitigation Section, and the Chief of Disaster Awareness. Some indicators are not chosen because it is not the authority of the local government or BPBD in its implementation. Table 2 presents some variables for the chosen and not chosen criteria.

| No | Priority Focus                                           | Indicator                                                                                       | Appropriateness |
|----|----------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------|
| 1  | Strengthening the legal framework of disaster management | The Revision of Act No 24, 2007 about Disaster Management.                                      | No              |
|    |                                                          | Harmonization of other applied rule under the soul of the act of disaster management.          | No              |
|    |                                                          | Improvement of Technical Rules of Disaster Management.                                        | Yes             |
|    |                                                          | Improvement of implementation of legal framework in conduction the disaster management.        | Yes             |
| 2  | Prioritizing the disaster risk reduction within the development | Prioritising the disaster risk reduction and the adaptation towards climate change related to the disaster within the development. | Yes             |
|    |                                                          | Monitoring, evaluating, and the updating RENAS PB integratedly with the related sectors .      | No              |
|    |                                                          | Development of information system to implement RENAS.                                          | No              |
| 3  | Increasing the multi-party partnership in disaster management | Development of community empowering strategy and its implementation for the disaster sustainability considering local wisdom and the adaptivity towards the climate change, gender, and the vulnerable group. | Yes             |
|    |                                                          | Strengthening for independence partnership and the                                           | Yes             |
| No | Priority Focus | Indicator | Appropriateness |
|----|----------------|-----------|-----------------|
| 4  | Good Governance in the field of disaster management | Sustainability of the conduction of disaster management. | Yes |
|    | Strengthening the National, local, and thematic PRB forum as the media to share each other in handling the disaster management. | Yes |
|    | Empowering and strengthening the educational institution and the associations of expertise of disaster as the educational media and the development of safety culture | Yes |
|    | Strengthening and improving the role of volunteers in disaster management. | Yes |
| 5  | The increasing effectiveness in preventing and disaster mitigation | The fulfilment of Minimum Service Standard related to the disaster management. | Yes |
|    | The improvement of capacity of human resources within the institution related to the handling of disaster management. | Yes |
|    | The improvement of facilities supporting the institution for disaster management. | Yes |
|    | The support of management and accountability of technical implementation of disaster management. | Yes |
| 6  | Improvement of the awareness and the handling of disaster management | The increasing capacity of institution and the community in preventing and mitigating the disaster. | Yes |
|    | Strengthening research and knowledge and technology and its application for the effectiveness of prevention and mitigation of disaster as well as to share knowledge and understanding in the local, national, and international level. | No |
|    | The Update of Disaster Risk Study by strengthening its information system in national scale. | No |
|    | Optimizing the maintenance of resources as well as the layout to prevent and mitigate the disaster. | Yes |
|    | The maintenance the synergy of disaster mitigation and the adaptation of climate change as well as considering the vulnerable group and local wisdom. | Yes |
|    | The combination of the disaster risk reduction efforts with the emergency response. | Yes |
|    | The development of early warning system for multi danger. | Yes |
|    | The area expansion of early warning system. | Yes |
|    | Capacity building of national and local disaster awareness. | Yes |
|    | The acceleration of facility and logistic development or distribution in emergency response | Yes |
| No  | Priority Focus                     | Indicator                                                                 | Appropriateness |
|-----|-----------------------------------|---------------------------------------------------------------------------|-----------------|
| 8   | Understanding disaster risks      | Encouraging the collection, management and access towards the information of risk.  | Yes             |
|     |                                   | The utilization of location-based data.                                   | Yes             |
|     |                                   | Optimizing the statistics in handling the damage and loss.                | Yes             |
|     |                                   | Improving the awareness of the community towards the understanding of PRB. | Yes             |
| 9   | Strengthening the risk management | Prioritizing and integrating PRB in all sectors.                          | Yes             |
|     |                                   | Adopting the strategy and applying disaster risk reduction strategy and its planning based on the target. | Yes             |
|     |                                   | Empowering the local area through rules and financially to coordinate with the civilian, the community as well as with the citizens to maintain the risk. | Yes             |
|     |                                   | Formulating the applicable public policy aiming to overcome the issues of prevention and relocation of the people’s housing in the area to have the risk of disaster. | Yes             |
| 10  | PRB Investment for Resilience     | Allocating the resources needed, including financial and logistic in all level of government for the development and implementation of strategy of policy of disaster risk reduction, planning, and the rules in all relevant sectors. | Yes             |
|     |                                   | Increasing the critical infrastructure.                                   | Yes             |
|     |                                   | Integrating PRB into the fiscal instrument & risk sharing as well as transfer. | Yes             |
|     |                                   | Improving the business sustainability, either from the profession of the people or from the efforts of many | Yes             |
This research aims to identify the indicator used in assessing the readiness of the area in handling the emergency response and the recovery period post-natural disaster. Based on the validation result in BPBD Sleman Regency, some indicators were not appropriate with the role of such board in local level. The indicator denied was the one that had become the responsibility and the role of BNPB or central government. The indicator denied was the revision of Act No. 24, 2007 about Emergency Response; harmonization other rules that have been applied under the act of emergency response; monitoring, evaluation, and the update of RENAS PB integrated with the related sectors; the development of information system of RENAS PB implementation; strengthening research and knowledge and technology and the application of its result for the effectiveness of prevention and mitigation of disaster as well as sharing the knowledge and understanding in the local, national, and international level; the update of Disaster Risk Study with the strengthening information system in national scale; and the strengthening mechanism of recovery support in international and national scale.

Indicators that have become the role of central government, would further be pulled out from the indicator of assessing local readiness in handling emergency response period in Sleman Regency, Province of Special Region of Yogyakarta.

4. Conclusion
This research identifies the indicator assessing the readiness of the area in natural disaster emergency response period. The indicator of this research is developed referring to RENAS 2015-2019 and Sendai Framework for Disaster Risk Reduction 2015-2030. The indicator denied was the revision of the Act, No. 24, 2007 about the Emergency Response; the harmonization of other rules applied under the act of emergency response; monitoring, evaluation, and the update of RENAS PB integrated to the related sectors; development of RENAS PB implementation information system; strengthening research and knowledge and technology and the application of its result for the effectiveness of the prevention and the mitigation of disaster as well as to share the knowledge and understanding in the level of local, national and international; the update of Disaster Risk Study by strengthening its information system in national scale; and the strengthening the mechanism of recovery support in international and national scale. Further research would build the assessment of the local readiness in handling the emergency response towards natural disaster in Sleman Regency, Province of Special Region of Yogyakarta.
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