EARTHQUAKE DISASTER MITIGATION THROUGH SOCIALIZATION AND TRAINING ON BUILDING STRUCTURE PLANNING FOR STUDENTS OF SMKN 4 TANGERANG

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ABSTRACT

Building awareness of disaster preparedness by all components of society, including schools is very necessary considering the condition of Indonesia which is geographically located in an area with a high level of vulnerability to disasters. In relation to disaster management efforts in Indonesia, Vocational High Schools as part of the public sphere must have a real role in building community resilience through the disaster preparedness school program. The implementation of this community partnership program uses a Knowledge Transfer approach through socialization, mentoring and training activities, Technology Transfer (TT) through participatory mapping activities, and Diffusion of Science and Technology through the creation of an Early Warning System (EWS) and WebGIS based on digital applications that can assist partners in understanding disaster with the use of technology. The evaluation was carried out by conducting a social impact questionnaire, especially increasing the empowerment and knowledge of partners in knowing Jabodetabek areas/locations that have potential disaster hazards with the results of increasing partners' knowledge about disaster-prone locations, safe zones, gathering points, and evacuation routes by 80-90% as well as increasing the skills of the participants in the use of the EWS application.

Keywords: Disaster Prepared School, Natural Disaster, Disaster Mitigation, Early Warning System Mentoring And Training

1. BACKGROUND

Indonesia is one of the countries that has a high level of vulnerability to natural disasters. Based on 2018 World risk report data, Indonesia ranks 36th out of 172 countries most prone to natural disasters in the world(Hadi, Agustina and Subhani, 2019). Based on these scientific facts, Indonesia needs to really prepare for natural disasters. The community needs to have high awareness regarding disaster mitigation in order to reduce disaster risk including the number of fatalities. For example, hundreds of thousands of deaths have been recorded after natural disasters such as earthquakes that have occurred in Indonesia. The high number of casualties and property losses is an indication of the low preparedness of stakeholders (multi-stakeholders) in dealing with natural disasters.

Early Warning System (EWS) is a system designed to monitor, detect, and provide early warning of natural disasters. EWS is a series of systems to notify residents or communities in an area of signs of the onset of natural events, which can be in the form of disasters or other natural signs.(Mohanty *et al.*, 2019). EWS is one way to mitigate disaster with the help of technology, with early warning it is hoped that it can reduce potential hazards and losses that may arise from the impact of disasters.(Marchezini *et al.*, 2018). Activities that can be carried out before a disaster can be in the form of education to increase awareness of disasters (disaster awareness)(Education and Training Agency, 2016). In relation to disaster management, an early warning system is very useful in pre-disaster activities that include prevention, mitigation, preparedness and warning activities in an area.

Disaster is an event or series of events that threaten and disrupt people's lives and livelihoods caused, both by natural factors and/or non-natural factors as well as human factors, resulting in human casualties, environmental damage, property losses, and psychological impacts. (UU NO.24 Of 2007). Disaster risk in most parts of Indonesia can be reduced by reducing the magnitude of the threat (hazard) and the level of vulnerability (vulnerability) and increasing community capacity (capacity)(Amri and Al, 2016). However, it is not possible to reduce hazard in certain types of disasters such as earthquakes, tsunamis and volcanic eruptions, so what can be done is to reduce vulnerability and increase capacity. Efforts to reduce vulnerability can be done by increasing the ability of the community in the physical, social and environmental sectors, while efforts to increase capacity can take the form of community preparedness, early warning, and mitigation.

Earthquakes, tsunamis, volcanic eruptions, floods, landslides, and hurricanes are facts of life that humans must accept wherever they are. These disasters are difficult for humans to prevent or stop. So, the best thing we can do is to ensure that as many people as possible are prepared for this inevitable natural factor. Because preparedness is often a determinant of our safety when facing natural disasters. Throughout 2020, the Banten, Jakarta and West Java regions were rocked by tectonic earthquakes. The results of the BMKG analysis show that this earthquake has a strength of M = 5.2 which was later updated to M = 4.9. Due to the typography of the Jabodetabek area which is included in

disaster-prone areas, it is hoped that there will be a disaster mitigation system as a first step in providing early warning to rural communities, so this activity aims to design and build an EWS that can be used by the community as an early warning system in disaster mitigation.

Factors that influence disaster preparedness include knowledge of disaster preparedness, attitudes in disaster preparedness, policies and guidelines, plans for disaster emergencies, disaster warning systems, and resource mobilization(Hastuti, Haryanto and Romadhani, 2020). The provision of simulation training is very important to increase community preparedness for disaster hazards, the better and more frequent disaster simulation training is carried out, the more prepared to face disasters(Hastuti, Haryanto and Romadhani, 2020). There are several service activities that carry out mentoring activities for the use of applications, namely: (Wahid, Parenreng and Yasdin, 2020), (Nugroho and Suryandari, 2020) and the implementation of a warning system (Widiawan, Purnomo and Kautsar, 2017) which aims to transfer knowledge to the community. One form of socialization of disaster awareness culture is through the Disaster Preparedness School. School students feel the need to receive lessons on preparedness regularly and continuously. At school, students spend more than six hours daily. Therefore, disaster education for cultural mitigation, especially those that lead to the type of disaster in the area, is considered the most important thing to do. The purpose of implementing this community partnership program is to use a Knowledge Transfer approach through socialization and training activities, Technology Transfer (TT) through participatory mapping activities, and Diffusion of Science and Technology through the creation of digital application-based EWS, as well as training on the use of applications. This service activity also involves students of the Architectural Engineering Study Program, Budi Luhur University

2.   METHOD

To solve the problems faced by partners in disaster preparedness, the methods used in this community service activity are in the form of observation, counseling, discussion, training and mentoring. A clear and measurable method of implementing PPM activities can assist in the smooth process of implementing PPM activities. The target audience for PPM activities are Vocational High School Students with a concentration of specialization on Buildings, Building Drawings and Electricity. It is hoped that in addition to students gaining knowledge about the Early Warning System (EWS), they can also plan earthquake-resistant building structures. The stages of implementing PPM activities for EWS application assistance to Vocational High School 4 Tangerang Students, include: 1) The initial stage in implementing PPM activities is data collection. The types of data collected in this activity are primary data and secondary data. Primary data collection uses interview techniques with school administrators, as well as observation techniques in the school area of SMKN 4 Tangerang. Documentation at the time of coordination with the school management can be seen in Figure 1 below:

Figure 1. Documentation During Coordination of Licensing PPM Activities
Source: Researcher, 2022

This activity will be used as a basis for designing the extension, training and assistance needed by partners; analysis of the initial situation and coordination with the school to determine the schedule and location of activities. A general picture of the PPM location is shown in Figure 2 below:
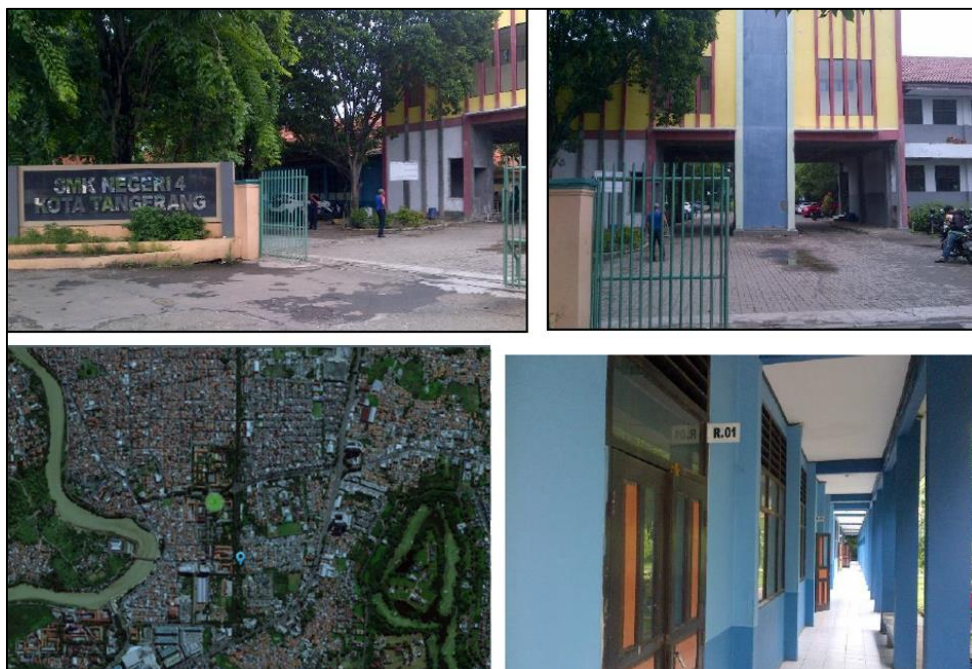
Figure 2. Location Of SMKN 4 Tangerang City And Building Facilities
Source: Survey results, 2021

2) From the data collection carried out, it is necessary to deepen the characteristics of the location and make a map of the school situation, selection of gathering points, routes and installation of evacuation routes; 3) Based on the stages of data collection and identification of problems with PKM partners, the team then plans service activities in the form of a Safe Zone Map, Evacuation Path Map, then designs and builds an early warning system application to create disaster-safe village tourism. After that, conduct EWS application counseling and training on disaster management. Preparedness socialization by providing understanding to students and teachers about the meaning of disaster, types of disaster, disaster risk reduction, disaster vulnerability and general explanation of SMKN 4 Tangerang Tangguh Disaster. 4) Evaluation phase aims to determine the suitability of the solution to the problems faced by PKM partners. In this case, the service team conducted a comparative analysis of the students' knowledge levels through the distribution of questionnaires before and after socialization.

3.   RESULTS AND DISCUSSION

Socialization of Natural Disaster Preparedness

Preparedness is one part of the disaster management process and in the current concept of disaster management, increasing preparedness is one of the important elements of pro-active disaster risk reduction activities, before a disaster occurs. The early warning system is an important part of the community preparedness mechanism, because warning can be an important key factor connecting the preparedness and emergency response stages. Theoretically, if an early warning is delivered on time, then an event that can cause a catastrophic disaster can be minimized.

The early warning system is a series of systems to notify the occurrence of natural events, which can be in the form of disasters or other natural signs. Early warning to the public on disasters is an act of providing information in language that is easily digested by the community. In critical situations, in general, early warning which is the delivery of information is manifested in the form of sirens, gongs and so on. is so that the academic community can respond to the information quickly and accurately. The alertness and speed of the public's reaction is needed because of the limited time from when the information is issued to the time (allegedly) the disaster will occur. Critical conditions, limited time, major disasters and saving residents are factors that require early warning. The earlier the information is submitted, the less time for the population to respond.

This natural disaster preparedness socialization activity was attended by 5 teachers of Construction and Property Engineering expertise with specialization in Building Modeling and Information Design, Construction and Property Business, Building Construction, Sanitation and Nurses and 50 students. This activity is carried out online at the time of the activity during the covid 19 pandemic. The activities can be seen in Figure 3 below:
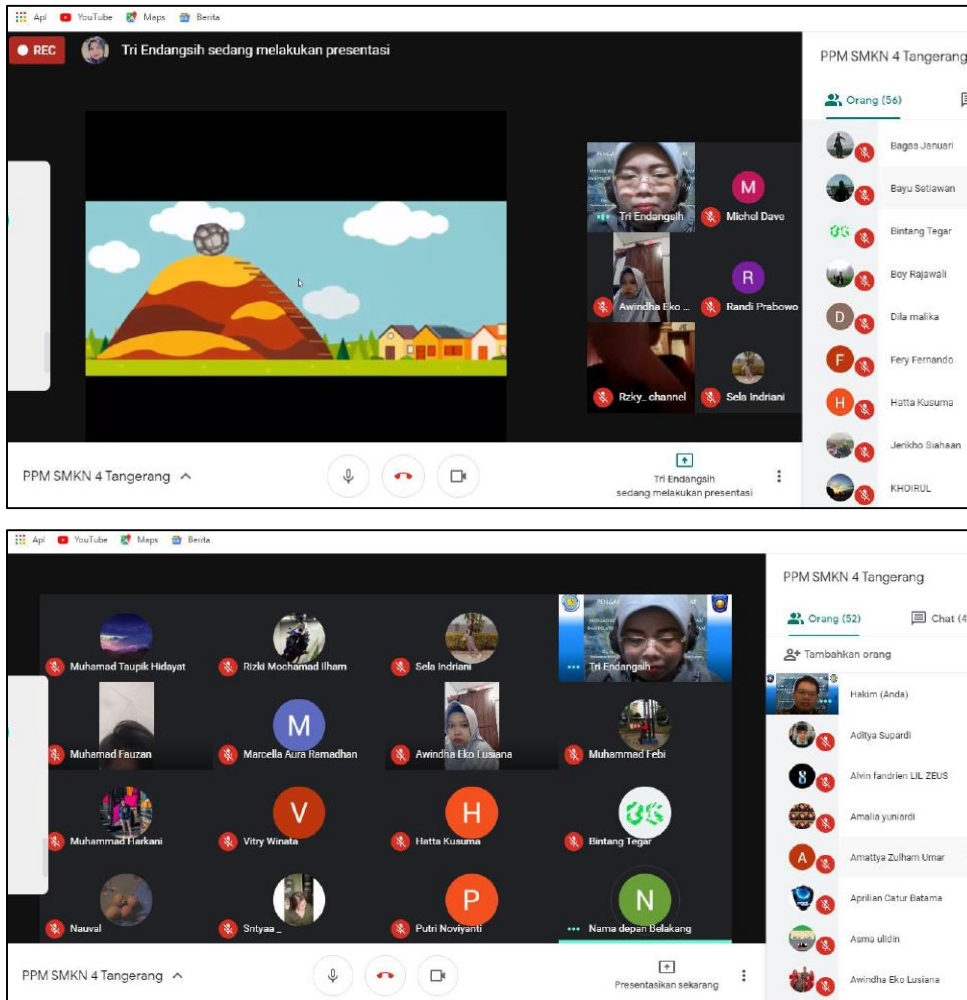
Figure 3. Socialization Activities Through Online Media
Source: Researcher, 2022

In addition to an explanation of the preparedness of natural disaster mitigation, this activity also explained about the planning of gemba-resistant buildings. This is done to provide additional insight into passive risk management since the building was designed. Examples of materials related to earthquake-resistant structures can be seen in Figure 4 below:

Figure 4. Earthquake-Resistant Building Reinforcement Requirements
Source: Researcher, 2022

Implementation of EWS Application Assistance

The implementation of the EWS application assistance was attended by teachers and students of SMKN 4 Tangerang with the agenda of delivering material on the use of the EWS application by the PPM Team as well as material for introducing disaster potential. Disaster training and teaching the introduction of disaster potential, and emergency response. The EWS application assistance activity aims to transfer knowledge to students about the use of the EWS application as well as to teachers in supporting an understanding of disaster management and SMKN 4 Tangerang which is responsive and alert to disasters. To find out the potential for natural disasters through the Magma Indonesia application, the display of this application can be seen in Figure 5 below:
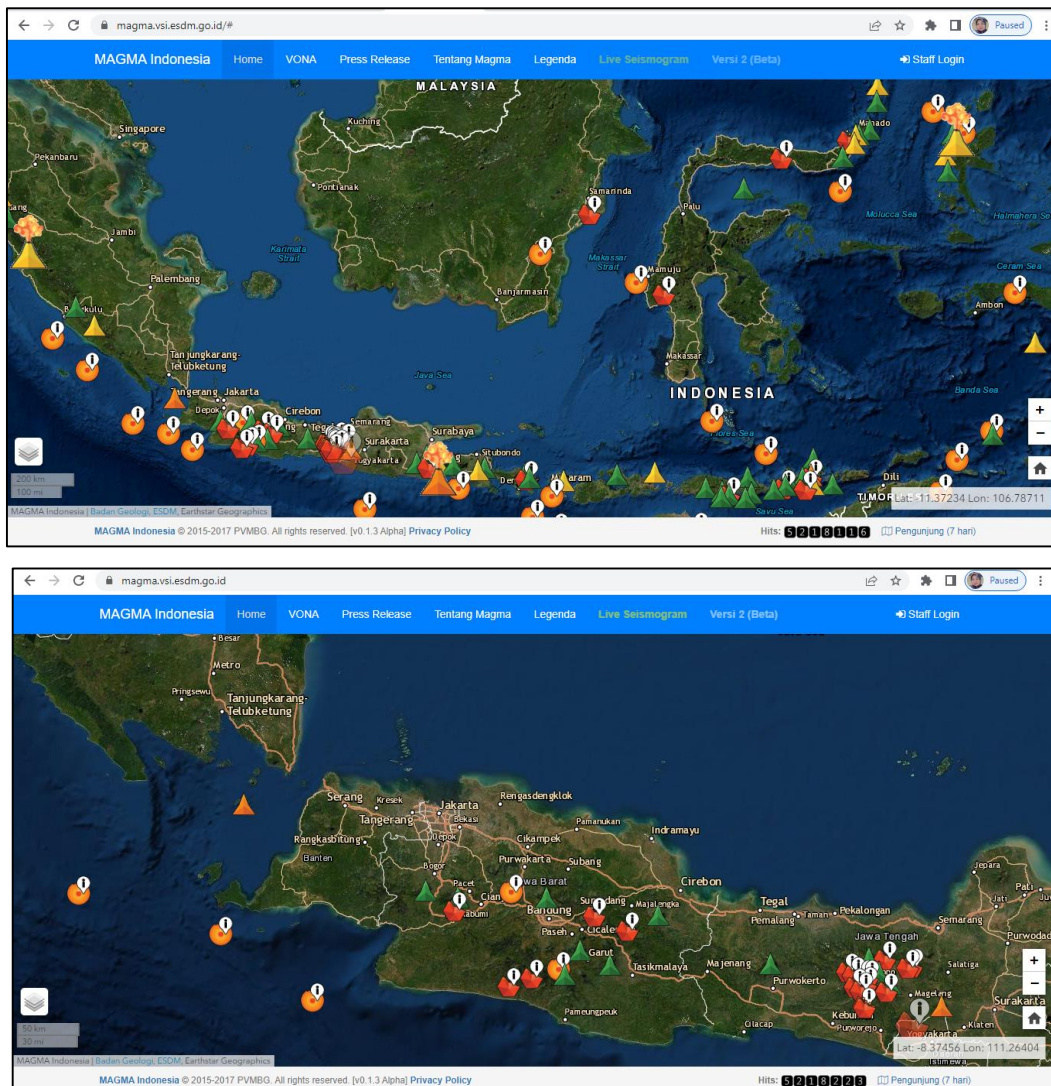

Figure 5. MAGMA Indonesia application display
Source: https://magma.vsi.esdm.go.id/

MAGMA Indonesia (Multiplatform Application for Geohazard Mitigation and Assessment in Indonesia) is a multi-platform application (web & mobile) in a network containing integrated geological disaster information and recommendations (volcanoes, earthquakes, tsunamis, and ground movements) which is presented to the public in quasi-real time and interactive. This system was built and developed independently by PNS of the Center for Volcanology and Geological Hazard Mitigation (PVMBG) since 2015 using the latest open-source-based technology. MAGMA Indonesia includes applications used internally/employees (data analysis and reporting) and external/public (information and recommendations). The main principle of MAGMA Indonesia is to convert data into information and recommendations that are easily understood by the general public.

Besides MAGMA Indonesia, another application used to detect natural disasters is BMKG Info, a mobile application based on Android and iOS that provides information on weather, climate, air quality, and earthquakes that occur in various regions in Indonesia. Information not related to Meteorologi, Klimatologi, dan Geofisika. Displays weather forecasts up to the sub-district level, airport weather, maritime weather, and impact-based weather throughout

Indonesia. Displays Climate information which includes Rainless Days, Forecasts, and Rain Analysis in all regions of Indonesia. The BMKG Info application displays Air Quality (PM 2.5) information in several cities and regencies in Indonesia; and displays information on the occurrence of an earthquake M > 5.0 (along with the potential for a tsunami), Felt, and Real-time in all regions of Indonesia. With some content that is displayed not only earthquake disasters, this application is called the Multi-Hazard Early Warning System. The display of the BMKG Info application can be seen in Figure 6 below:
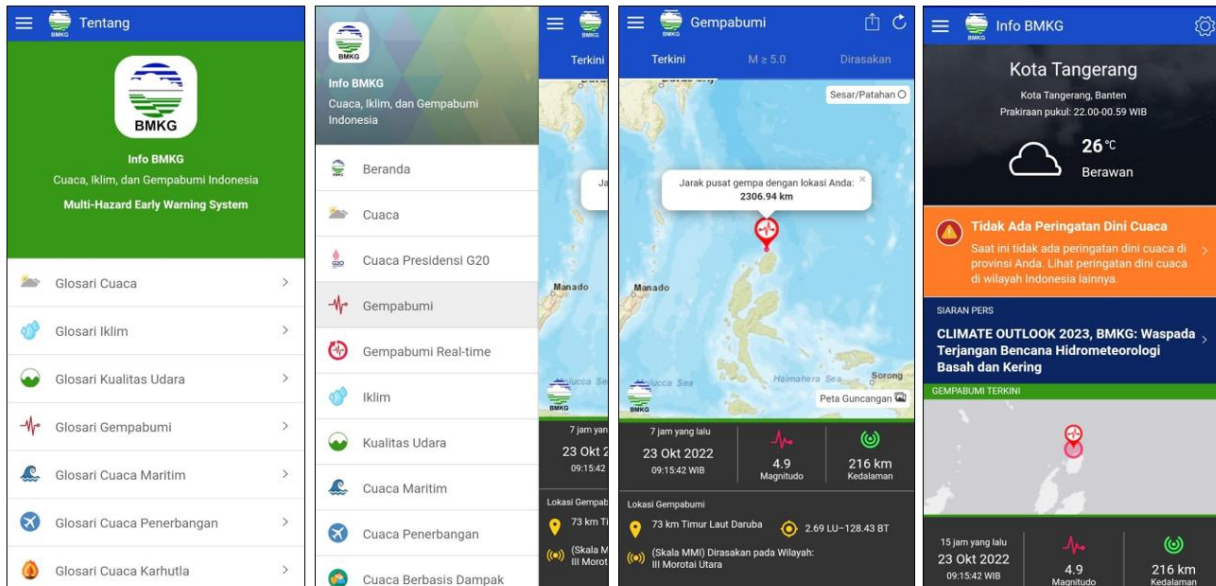

Figure 6. BMKG Application as a Multi-Hazard Early Warning System
Source: Info BMKG, 2022

4.   CONCLUSION

Preparedness in dealing with earthquake natural disasters is a necessity for all stakeholder elements. Both the government community, the community and the school community must continue to strive to improve their preparedness, especially regarding the readiness of physical infrastructure followed by knowledge, attitudes and skills in emergency response. From the implementation of PPM activities that have been carried out on school managers and students of SMKN 4 Tangerang, it can be concluded that the mentoring participants, namely students of SMKN 4 Tangerang, already know disaster-prone areas and locations, safe zones, evacuation routes, and gathering point locations as evidenced by the results. evaluation showed an increase in understanding of 80-90%. School managers and students of SMKN 4 Tangerang can take advantage of the disaster EWS feature. Evaluate the benefits of this activity through a questionnaire to increase the ability and skills to use the EWS application. The community is skilled in handling disasters in order to produce students who are prepared for disasters, the academic community feels safe and comfortable when carrying out teaching and learning activities.

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