Since 2002

Disaster Preparedness Model Development Community-Based Landslide

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Abstract

BACKGROUND: Preparedness is an effort carried out to anticipate the possibility of a disaster to avoid loss of life, loss of property, and changes in the life order of the community. Preparedness to face a disaster is a condition of individuals and groups who have physical and psychological abilities in dealing with disasters.

AIM: The purpose of the study was to develop a community-based landslide disaster preparedness model.

METHODS: This was a research and development research design, procedural model. The 1st year is the model development stage, the 2nd year is making module products, and the 3rd year is testing the effectiveness of module products. The population is all HH in the four major populations, 3498 HH. The sample size is 99 HH, the sampling technique is proportionate sampling technique. The independent variables are knowledge and attitude systems, policies and guidelines, intervening variable emergency response plans, early warning systems, and human resource mobilization, the dependent variable is disaster preparedness. The data collection instrument is a questionnaire. Statistical analysis is a structural model path analysis.

RESULTS: The results of the statistical analysis of the major paths of influence on preparedness are the influence of policies on preparedness 0.021165, mobilization of 0.458644, knowledge of attitudes 0.052477, early warning 0.232141, and emergency response plans 0.055921. The conclusion of this study is that efforts to reduce disaster risk through building community preparedness can be built through policies, knowledge and attitude systems, emergency response plans, early warnings, and resource mobilization.

CONCLUSION: The most dominant factor is the resource mobilization factor. The recommendation from the results of the study is that further research needs to explore other factors because the factors analyzed with low results are less than 50%.

Introduction

Indonesia's geological conditions have the potential for various natural disasters such as volcanic eruptions, earthquakes, and tsunamis. On the other hand, Indonesia, which has two seasons, also has the potential to experience droughts, floods, and landslides [1], [2].

As one of the areas prone to disasters, Magetan Regency has several subdistricts with high potential for disaster to occur. It is noted that one of the subdistricts that have a disaster risk is Poncol district. One of the potential disasters that can occur in Poncol district is a landslide. Genilangit village is one of the villages in Poncol district which often experiences natural disasters, with the dominant type of disaster, namely, landslides [3].

The national policy for disaster management is the Law of the Republic of Indonesia Number 24 of 2007 concerning disaster management [4], [5]. The policy explains that disaster management is the responsibility of the government (public sector), the private sector (private sector), and the community (collective action sector). The involvement of these three elements is very important, because disaster management is not only the responsibility of the government but also needs to be carried out by involving all elements in the community [5], [6].

Materials and Method

The purpose of the study was to develop a community-based landslide disaster preparedness model. This was a research and development research design, procedural model [7], [8]. The 1st year is the model development stage, the 2nd year is making module products, and the 3rd year is testing the effectiveness of module products. The population is all HH in the four major populations, 3498 HH. The sample size is 99 HH, the sampling technique is proportionate sampling technique. The independent variables are knowledge and attitude systems, policies and guidelines, intervening variable emergency response plans, early warning systems, and human resource mobilization,

the dependent variable is disaster preparedness. The data collection instrument is a questionnaire. Statistical analysis is a structural model path analysis [9].

Results

Before you begin to format your paper, first write and save the content as a separate text file. Keep your text and graphic files separate until after the text has been formatted and styled. Do not use hard tabs, and limit use of hard returns to only one return at the end of a paragraph. Do not add any kind of pagination anywhere in the paper. Do not number text heads-the template will do that for you.

Finally, complete content and organizational editing before formatting. Please take note of the following items when proofreading spelling and grammar:

Results of testing the outer model of research variable relationship structure

Testing of the outer model is based on the analysis of the initial model, the results obtained that all variables only have one indicator so that the outer loading of the indicator for each latent variable is perfect (1,000). This value is >0.600 so it can be interpreted that all indicators are valid to measure each variable.

Hypothesis testing

Output display

Testing the inner model starts from testing the significance between variables using the t-test. In this case, the influence between variables is significant if the t > 1.96. Figure 1 shows the results of the t-test with bootstrapping 1500 samples. It can be seen that there are several influence paths with a t < 1.96 (not significant). Thus, the influence path must be removed gradually starting from the lowest T value. Thus, the path that must be removed first is the path of policy influence on early warning (T value 0.160). Then, the second stage T test was carried out, as shown in Figure 2.
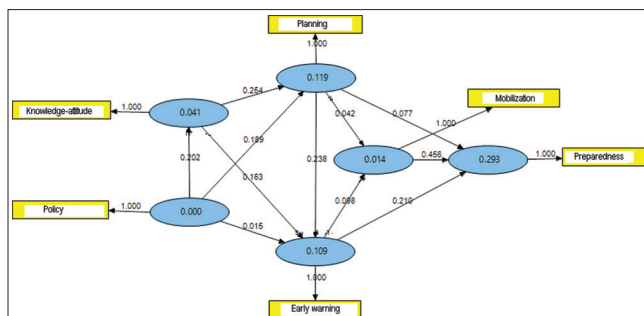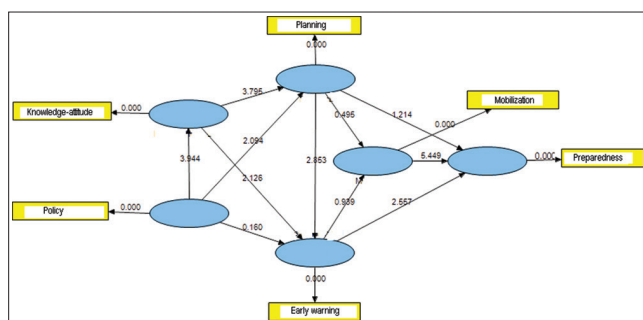

Figure 1: PLS-SEM output (Test Stage 1)

Figure 2: PLS-SEM output (Test Stage 2)

Figure 2 shows that in the second stage of the test, there are still several influence paths with a T value of < 1.96 (not significant). Thus, the influence path must be removed gradually starting from the lowest T value. Thus, the path that must be removed first is the path of the influence of the emergency response plan on mobilization (T value 0.487). Then, the second stage T-test was carried out, as shown in Figure 3.

Figure 3: PLS-SEM output (Test Stage 3)

Figure 3 shows that in the second stage of the test, there are still several influence paths with a T value of < 1.96 (not significant). Thus, the influence path must be removed gradually starting from the lowest T value. Thus, the path that must be removed first is the path of the influence of early warning on mobilization (T value 1.150). The second stage of the T-test is then carried out, as shown in Figure 4.
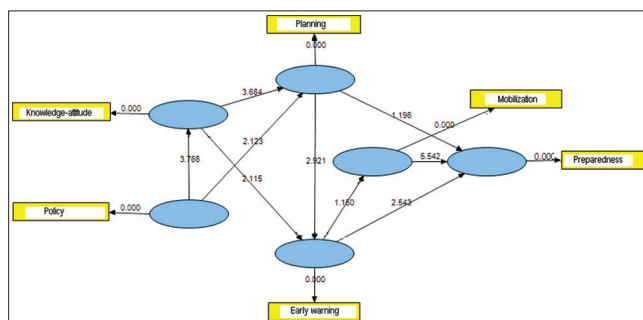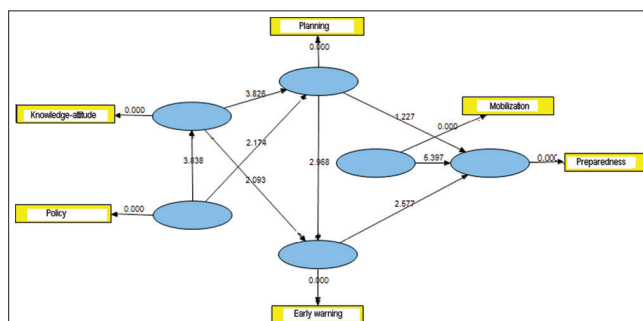

Figure 4: PLS-SEM output (Test Stage 4)

Figure 4 shows that in the second stage of the test, there are still several influence paths with a T value of < 1.96 (not significant). Thus, the influence path must be removed gradually starting from the lowest T value. Thus, the path that must be removed first is the path of the influence of the plan on preparedness (T value

1.227). The second stage of the T-test is then carried out, as shown in Figure 5.
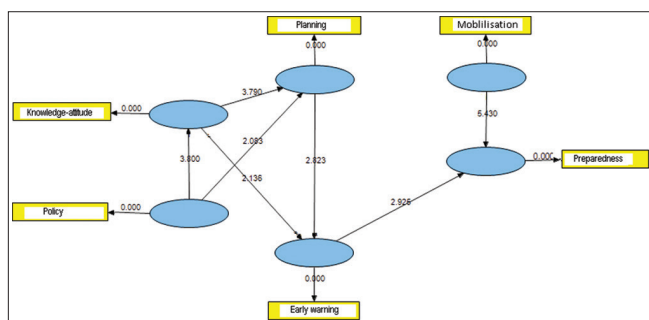

Figure 5: PLS-SEM output (Test 5 stage/final model)

Figure 5 shows that in the five stage tests, all influence paths have a T value > 1.96 (significant). Thus, the inner model testing is final. Furthermore, the value of the path coefficient of influence between variables is presented in Figure 6.
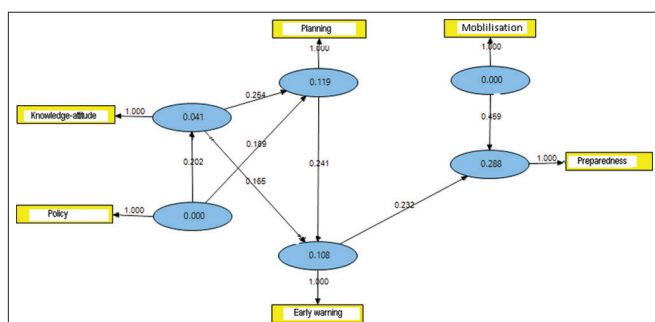

Figure 6: PLS-SEM-5 output (final model path coefficient)

Table 1 is the data from the analysis of the inner model (T value and path coefficient) showing the magnitude of the influence between variables with the largest influence value being the effect of mobilization on preparedness, which is 5.4%, with a path coefficient of 0.549. The second biggest influence is the policy factor on the knowledge and attitude system of 3.8% with a path coefficient of 0.202.

Table 1: Result of inner model analysis (T value and path coefficient)

Path of influence between variables	t-value	Path coefficient
Policy-->System knowledge and attitude	3.800	0.202
Policy-->Emergency response plan.	2.083	0.189
Knowledge and attitude system-->Emergency response plan	3.790	0.254
Knowledge and attitude system--->Early warning	2.136	0.165
Emergency response plan-->Early warning	2.823	0.241
Early warning->Preparedness	2.925	0.232
Mobilization-->Preparedness	5.430	0.459

The total effect of each variable on preparedness and the coefficient of determination of all factors on preparedness are presented in Table 2.

Table 2: The total effect of each variable on preparedness and the coefficient of determination of all factors on preparedness

Variable influence path	Total effect	R-square
Policy--->Preparedness	0.021165	28.78
Knowledge and attitude system-->Preparedness	0.052447	
Emergency response plan-->Preparedness	0.055921	
Early warning-->Preparedness	0.232141	
Mobilization-->Preparedness	0.458644	

Table 2 is the result of the total effect of each variable on preparedness and the coefficient of determination of all factors on preparedness. The picture of the magnitude of the influence on preparedness, the biggest factor is the factor of HR mobilization. When viewed from the overall influence of factors on preparedness, the R square value is 28.78, meaning that the level of influence is still low because it is still less than 50%.

Discussion

The discussion of the results of this study is.

Policy impact on preparedness

Policy factors also have a positive effect on the knowledge system of people's attitudes, these results indicate that policy strengthening is needed in building public awareness in efforts to reduce disaster risk [10]. The results of the study [10], [11], [13] on disaster risk reduction policies aim to develop a culture of disaster awareness.

According to Weichselgartner and Pigeon, explaining disaster risk reduction policies and practices require knowledge for appropriate decision-making and coordinated action [11], [13], [14]. Another opinion states that one of the existing policies and guidelines can be in the form of standard operating procedures for disaster [12], [15], [16], [17].

Effect of attitude knowledge system on preparedness

The system of knowledge and attitudes based on the results of path analysis shows that there is a positive influence on the landslide disaster preparedness plan [10]. Rika Nurain's research proved that there was a significant influence of the level of knowledge on disaster preparedness [18], [19], [20], [21]. According to Qirana, the results of the research conducted showed that there was a relationship between knowledge and preparedness behavior in dealing with disasters. The research of Novria Hesti explains factors related to the preparedness of midwives in dealing with disasters, including the level of knowledge [22]. Bukhari regarding earthquake disaster preparedness in the BLUD of the Aceh Government Mother and Child Hospital, it was found that there was a relationship between knowledge and earthquake disaster preparedness.

According to Febriana, education and experience are factors that can influence knowledge about disasters, namely the importance of disaster preparedness. Another point of view, according to

Maurice Eisenbruch (2020), explains that disasters based on local wisdom can strengthen cultural responsiveness to disaster prevention and management. Weichselgartner's, 2015, study related to knowledge in disaster management stated that the production and transfer of knowledge occur through social interactions that involve both explicit and tacit knowledge. Another opinion states that the system of knowledge and attitudes about disasters is the main reason for a person to carry out protection activities or existing preparedness efforts. The knowledge possessed affects the attitudes and concerns of the community to be ready and alert in anticipating disasters, especially for those who live in areas prone to disasters. Natural indicators of knowledge and attitudes of individuals/ households are basic knowledge that should be possessed by individuals including knowledge about disasters, their causes and symptoms, as well as what to do in the event of a flood (ISDR/UNESCO 2006). The knowledge and attitude of the community toward disasters can be seen from their knowledge of various preparedness actions that they should take.

Effect of emergency response plans on preparedness

The results of this study indicate that there is a positive effect of emergency response plans on disaster preparedness. The results of this study were also corroborated by Febriana, Didik Sugiyanto, and Yusya Abubakar who stated that emergency response factors were considered influential in community preparedness in disasters. Other factors as preparedness factors are attitudes, emergency response plans, and disaster warning systems. According to Ichwan Muis, Khairil Anwar explains that emergency planning is oriented toward the need to know what actions have been prepared for natural disasters. The results of research by Aldina *et al.*, the results of emergency response plans in this case involve aspects of emergency relief skills affecting community preparedness in disasters. Preparedness studies according to *et al.* (2018) explained that community preparedness in disasters is based on the disaster preparedness framework developed by LIPI in collaboration with UNESCO/ISDR including (1) knowledge and attitude system, (2) policies and guidelines, (3) emergency planning, (4) warning system, and (5) resource mobilization [19], [20], [23].

The opinion of Hitomu *et al.* explains that to prevent recovery disparities, it is important to support the recovery of individual households before the community begins the process, identify their priorities and urgent needs, and consider their environmental conditions during a disaster [24], [25].

According to Novria *et al.*, 2019, the implementation of training in disaster preparedness is the dominant factor in the preparedness of midwives in dealing with disasters [18], [26].

Effect of early warning on preparedness

This study proves that early warning factors affect community preparedness in landslide disasters [10]. Disaster early warnings that are built or available and affordable by the community can increase community preparedness in dealing with landslide disasters [17], [27]. Preparedness actions taken in this case are providing everything that aims to reduce disaster risk which includes providing information on disasters and spatial planning, providing rules in efforts to limit the opening of gardens and agricultural land, as well as erecting buildings around cliffs or slopes at the research location; provision of early warning systems, evacuation routes and evacuation locations; provision of life and property insurance, savings for preparation of funds for recovery after a disaster; provision of living necessities (logistics) in the event of a landslide at any time; and provision of disaster-based spatial planning rules [11], [14], [17].

Another opinion emphasizes the factors of the early warning system, attitude and knowledge system and emergency response plan carried out [14], [20], [23]. The opinion of Eni *et al*. explains that there are four factors in assessing preparedness in disasters, namely, attitudes, emergency response plans, and a disaster warning system with a high number of aspects, namely, the disaster warning system [23], [24].

The effect of HR mobilization on preparedness

The results of this study determine that the mobilization of human resources has a positive effect on preparedness in disaster risk reduction [10]. According to Rebekah PG, disaster risk reduction efforts which are part of disaster preparedness are very important. It is necessary to identify functional and technical capacities as an effort to reduce disaster risk [28], [29], [30]. Another opinion states that resources are the fifth parameter in community preparedness in disaster risk reduction [30]. Still according to Hidayat, 2018, the need for efforts to develop studies begins by conducting a study of critical factors that have a significant effect on community preparedness in dealing with disasters. The study was carried out using several approaches, namely, brainstorming, focus group discussions, clue card, and desk review. In this study, Ristrini *et al*. preparedness is a series of activities carried out to anticipate disasters through organizing, as well as through appropriate and efficient steps, policies, providing guidelines and directions, as well as coordinating health management activities due to disasters in their working areas [6], [17], [20].

The opinion of Hitomu *et al*. on the problem of disaster in the emergency response phase is that a very basic problem is aspects of refugees and food needs [25], [27], [30].

Conclusion

The conclusion of this study is that efforts to reduce disaster risk through building community preparedness can be built through policies, knowledge and attitude systems, emergency response plans, early warnings, and resource mobilization. The most dominant factor is the resource mobilization factor. The recommendation from the results of the study is that further research needs to explore other factors because the factors analyzed with low results are less than 50%.

Ethical Clearance: Research permit issued from the ethics commission of the Health Polytechnic Ministry of Health Surabaya, Indonesia.

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