Dissemination of Disaster Communication Technology Through a Slid slide Early Detection Tools in Sonyo Hamlet, Jatimulyo Village, Kulon Progo District

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ABSTRACT

When a natural disaster occurs, effective disaster communication involving communication and information technology is an important thing that must be done to the community in the disaster-affected area. When the landslide disaster occurred in Soyono Jatimulyo Hamlet, Kulon Progo, in 2016 the community the role of community leaders such as the Hamlet Head was very vital, especially in terms of disaster communication to the hamlet community. However, based on the observation that the head of the hamlet as a disaster communicator, he still has limitations when carrying out the function of a disaster communicator, especially in terms of the use of communication and information technology and still needs to improve disaster mitigation capabilities. Priority problems are 1. Limited disaster communication technology, 2. Lack of disaster mitigation capabilities. Community empowerment methods as solutions to the proposed problems are: 1. Making disaster communication tools in the form of landslide early detection tools that can assist in disaster communication, 2. Community-based disaster mitigation training. The result of this service is the empowerment of the people of Dusun Sonyo Jatimulyo Kulon Progo in carrying out their vital duties as disaster communicators through landslide detection tools and an 80% increase in disaster mitigation capabilities of the Dusun Soyo Jatimulyo Kulon Progo community.

KEYWORDS
Community Empowerment;
Landslide Disaster;
Padukuhan Soyono

1. Introduction

When a natural disaster occurs, effective disaster communication involving communication and information technology must be carried out. In this case, the priority issues that must be addressed regarding the KIKK are Communication, Information, Coordination and Cooperation. This is absolutely necessary because it requires updating information quickly, precisely, and accurately. The need for information regarding the location of victims, the number of victims and data collection on the needs of victims are urgently needed to make it easier for officers and volunteers when helping the victims because in the field with conditions of panic, anxiety and fear, they are prone to confusion of information and the distribution of logistical assistance that is not evenly distributed which causes disaster management to become difficult slow. Landslide disasters have been studied by previous researchers which are used as a reference for community service. Second largest landslide event recorded in the world: Lessons from landslides triggered during and after the 2018 Mw Papua New Guinea earthquake researched by Tanyaş

[1]. The study of the characteristics and mechanism of the Guizhou Shuicheng landslide based on InSAR and UAV data was studied by Jiao [2]. The luminescence dating of the dam lake formed by the Ashegong landslide in the northeastern Tibetan Plateau was investigated by Guo [3]. The variation of the area affected by landslides under the control of ground motion and topography was investigated by Tanyaş [4].

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The factors controlling the spatial distribution of coseismic landslides triggered by the Ludian Mw 6.1 earthquake in China were investigated by Zou [13]. Uncertainty patterns in landslide susceptibility prediction modeling: The effects of different landslide boundaries and spatial shape expressions were investigated by Huang [14]. An assessment of landslide evolution based on InSAR and real-time monitoring of a large reactivated landslide, Wenchuan, China was investigated by Xie [15]. Reservoir susceptibility to landslides and strategies to improve slope stability in the Three Gorges Reservoir Area: Zigui Basin as an example were investigated by Li [16]. Modeling the impact of seismically induced landslides on basin sediment yields, dynamics and connectivity was investigated by Xie [17]. The landslide triggered by the 2018 Palu 7.5 Mw supershear earthquake in Indonesia was studied by Zhao [18]. InSAR-based detection method for mapping and monitoring slow-moving landslides in remote areas with rugged and mountainous terrain: Application to Nepal researched by Bekaert [19]. Recognition and mapping of landslides in mixed forest environments from aerial LiDAR data were studied by Görüm [20].

Evaluating the use of landslide databases in spatial planning in mountain communes (Polish Carpathians) was studied by Bucała [21]. The Rissa and post-tsunami landslide mobility modeling was investigated by Liu [22]. Building landslide hazard indicators with machine learning and ground surface models was investigated by [23]. The landslide disaster in Ehime Prefecture due to the July 2018 heavy rain event in Japan was investigated by Mori [24]. Prediction of the state of landslide evolution and bottom-level control based on multi-task learning was investigated by Sun [25]. Melting in bed faults: Understanding the initiation and movement of the Daguangbao landslide triggered by the 2008 Wenchuan Earthquake (Ms = 8.0) was studied by Cui [26]. The estimation of the three-dimensional rupture surface geometry of a deep landslide using a landslide inventory and high-resolution topographic data was investigated by Bunn [27]. Evaluating the volume of a seismic avalanche cluster by partitioning based on the direction of flow was studied by Fan [28]. Effect of Permeability on Multiple Structural Landslide Stability with Different Interfacial Morphology of Deposit Layers: Case of Three Gorges Reservoir Area, China studied by Luo [29]. Inferring the threshold for precipitation of landslide activity from dendrochronological data and long-term rainfall: A case study on unstable slopes in Karpenciny, Poland studied by Wistuba [30]. Integrating principal component analysis with statistically based models for causal factor analysis and landslide vulnerability mapping: A comparative study of the loess plateau area in Shanxi (China) was investigated by Tang [31]. A landslide susceptibility assessment along the Araniko Highway in Poiqu/Bhote Koshi/Sun Koshi Area, Nepal Himalayas was investigated by Nepal [32].

Reconstruction of modeling and frequency distribution of rock size from a young landslide (<5 Myr) located on the Simud Vallis floor, Mars was studied by Pajola [33]. The kinematics and geological control of the deep landslide affecting the historic center of Buonalbergo, southern Italy was investigated by Guerriero [34]. Estimating the volume of deep landslides and mass transportation in the Basihlan watershed, Taiwan was studied by [35]. Shallow landslide mapping with object-based image analysis of unmanned aerial vehicle data was investigated by Comert [36]. Landslide hazard assessment using an analytical hierarchical process (AHP): A case study of National Highway 5 in India was investigated by Panchal [37]. The landslide triggered by the 2018 Lombok earthquake series, Indonesia was studied by Zhao [38]. The effect of basin morphometric parameters on the physical-based rainfall threshold for shallow landslides was investigated by Marin [39]. Massive landslides and deep gravitational tilt deformation in the Czech Flysch Carpathians: A new LiDAR-based inventory studied by Pánek [40].

When the landslide disaster shown in Fig. 1 occurred in Soyo Jatimulyo Hamlet, Kulon Progo, in 2016 the role of community leaders such as the Hamlet Head was very vital, especially in terms of disaster communication to the hamlet community. However, based on the observation that the head of the hamlet as a disaster communicator still has limitations when carrying out the function of a disaster communicator, especially in terms of the use of communication and information technology and still needs to improve disaster mitigation capabilities.

Fig. 1. The condition of Soyo Jatimulyo Hamlet in Kulon Progo during the Landslide Disaster

Referring to the situation analysis and based on the results of the discussion of the community service team with the community of Dusun Sonyo Jatimulyo Kulon Progo , priority issues and contribution of community service are as follows: 1) Limitations of disaster communication technology used in landslide disaster communication in the Dusun Sonya Jatimulyo Kulon Progo community 2) Need to be improved disaster mitigation capabilities for the people of Dusun Soyo Jatimulyo Kulon Progo , the Head of Dukuh when a landslide occurs as the vanguard can carry out disaster mitigation, preparedness, response, and recovery so as to reduce the number of casualties.

2. Method

The concept of people-centered development (People-Centered Development) views people's initiatives as the most important development resource and views material and spiritual well-being as goals to be achieved. Efforts to implement people-centered development are carried out through empowerment.

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In accordance with the Soyo Padukuhan problem, the methods and stages of implementing community service to partners are as follows:

2.1. Preparation Stage

- Observation and Interview
  The purpose of this activity is to find out the real condition of Soyo Village and to explore the constraints or problems faced by partners in a more specific and technical manner.
- Needs Identification
  At this stage, the service team coordinates to determine the needs that partners need to be able to solve the problems they face.
- Focus Group Discussion (FGD)
  After the problems and needs of partners are identified, the service team and partners determine several priority problems that will be solved through this program.

2.2. Implementation Stage

- Design, manufacture of disaster communication tools in the form of landslide early detection tools.
- Operational assistance This stage includes several trainings related to partner operational activities such as disaster mitigation training, training on the use of landslide early detection tools.
- Technology implementation The technology to be implemented includes disaster communication tools in the form of landslide early detection tools.
- Monitoring and Evaluation Phase, as well as Feedback. Monitoring and evaluation is carried out with the aim of finding the limitations of the programs that have been implemented which will later become feedback for improving technology implementation in the future. This activity was carried out for 2 times during the community partnership service program, namely monitoring and evaluation in the middle of the program and monitoring and evaluation at the end of the program.
- Planned follow-up of community partnership program The next plan will be to partner with other disaster care communities so that this application can be widely used.

2.3. Monitoring and Evaluation Phase, as well as Feedback

Monitoring and evaluation is carried out with the aim of finding the limitations of the programs that have been implemented which will later become feedback for improving technology implementation in the future. This activity was carried out for 2 times during the community partnership service program, namely monitoring and evaluation in the middle of the program and monitoring and evaluation at the end of the program. Mid-program monitoring and evaluation focuses on implementing the technology that has been implemented, namely disaster mitigation training and operational assistance related to the IoT-based monitoring system warning application.

2.4. Community Partnership Program Follow-Up Plan

This is the development of an IoT-based warning system monitoring application. The next plan is to partner with other Avalanche disaster care communities so that this application can be widely used.

3. Results and Discussion

3.1. Making a Disaster Communication Tool in the Form of an Early Detection Tool for Land slides

The limitations of disaster communication technology used in disaster communication in Sonyo Jatimulyo Kulon Progo Hamlet, currently there is no special tool for disaster communication and limited tools in detecting the occurrence of landslides, so that when carrying out disaster communication to affected communities it is sometimes hampered, especially when monitoring related Landslide prone area in Soyo, Kulon Progo. In this community service program, a Landslide Early Detection tool was made that can help Soyo Jatimulyo Hamlet in Kulon Progo to mitigate landslides and can communicate disaster before a disaster occurs to residents to move quickly. This tool was designed by Dr. Iswanto, S.T., M.Eng as a member of the service team as well as a Lecturer of Electrical Engineering at UMY is shown in Fig. 2. The picture shows that in the landslide early detection tool using a disaster communication system and IoT technology.

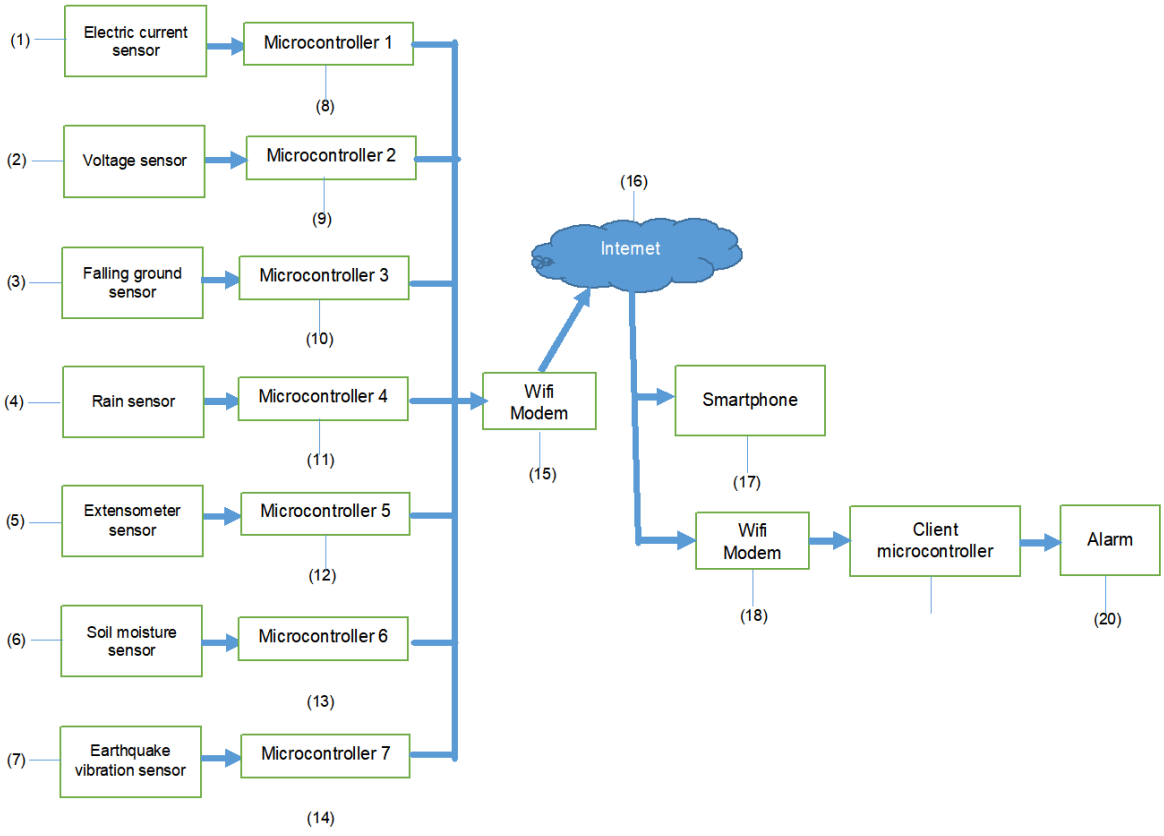

Fig. 2. Overview of Disaster Communication Science and Technology through Landslide Early Detection Tools

3.2. Disaster Mitigation Training for the People of Dusun Soyo Jatimulyo Kulon Progo

The justification for the community service team with partners of Duduk Sonyo Jatimulyo Kulon Progo concluded that there is still a lack of awareness of disaster mitigation in the community, so that the community-based disaster mitigation training shown in Fig. 3 needs to be improved in disaster mitigation for administrators and members of Hamlet Soyo Jatimulyo Kulon Progo so that when a disaster occurs, the Soyo Jatimulyo hamlet of Kulon Progo as the vanguard can carry out disaster mitigation, preparedness, response, and recovery so as to reduce the number of fatalities in the event of a landslide.

Fig. 3. Community Disaster Mitigation Training in Dusun Soyo Jatimulyo Kulon Progo

The picture shows that the counseling is carried out face-to-face by observing health protocols, namely maintaining distance, using masks, and washing hands. The community partnership service training material was delivered by Dr. Adhianty Nurjanah, S.Sos., M.Si with the theme Community-Based Disaster Mitigation Communication as the head of service and lecturer in Communication Studies. The training was held on May 8, 2021. As with the health protocols, the implementation of this training had a limited number of participants but the program ran smoothly.

3.3. Tool Grant

Soyo Jatimulyo Hamlet in Kulon Progo is indispensable when serving as the Sar Team in search and rescue when a landslide occurs. The assistance grants shown in Fig. 4 are given to partners according to partners' needs such as cinsaw equipment (saw tools), flashlights, headlamps and early detection tools as an effective tool for Hamlet Soyo Jatimulyo Kulon Progo in assisting the evacuation and rescue process of victims in the event of an accident. Landslide disaster.

Fig. 4. Tool Grants Provided

The picture shows that the tool grant provided is an effort by the community service team to contribute to solving problems that are urgently needed by the community, especially community service partners, namely Padukuhan Soyo.

4. Conclusion

The conclusion from this community service is that empowering people who care about landslides through Padukuhan Sonyo, Kulon Progo has succeeded in making disaster communication tools in the form of landslide early detection tools and Community-Based Disaster Mitigation Training activities to carry out disaster mitigation, preparedness, response, and recovery so that they can reduce the number of fatalities. Disaster communication tools in the form of early detection tools reduce the limitations of disaster communication technology which can reduce the risk of casualties due to landslides. Through this training and application development, it is hoped that Padukuhan Sonyo can become a pilot project in dealing with landslides and the surrounding community. In supporting the ease of disaster communication in Soyo Hamlet, the service team provided goods assistance in the form of an early detection tool grant for cinsaw and a center. Suggestions for the next service program are the need for capacity building for volunteers from Padukuhan Soyo so that when carrying out disaster communication before, during, and after a disaster occurs, they can communicate effectively to each member and the community. So that it can form an increase in the commitment of the management and the community in improving the quality of communication and disseminating information related to disasters so as to reduce the high number of victims of landslides in Kulon Progo.

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Author Contribution

The concept of people-centered development (People-Centered Development) views people's initiatives as the most important development resource and views material and spiritual well-being as goals to be achieved.

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Conflict of Interest

The authors declare no conflict of interest.

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