Determinants of The Community's Understanding of Disaster Mitigation: Case of Tsunami In Banda Aceh

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Abstract. This research aims to know-how education, media information, event frequency and type of event affect the community's understanding of disaster mitigation. Primary data has collected from the survey which was conducted in 2011 in Banda Aceh, around six years after the tsunami disaster December 26 2004. This survey did when the sustainability reconstruction program for tsunami post-disaster had been implementing in Aceh in the range of April 16, 2009, to December 31 2012, after its emergency response and reconstruction programs ended on April 16 2009. The research method used is a verification survey with 223 respondents as a sample. The Questionnaire is analyzed using multiple linear regression to test the hypothesis. Qualitative analysis enriches this survey by collecting and evaluating the related documents. Overall, all variables have an influence of 68% on the community's understanding of disaster mitigation. The media information affects the community's understanding of disaster mitigation significantly, while the education, event frequency, and type of event do not affect the community's understanding of disaster mitigation significantly. The originality lies in the integration model of causality theories from the previous ones and uses multiple linear regression to test the model. The limitation is in the number of variables and the object. This fact implies enriching knowledge in the social sciences and as a basis for further new research models of disaster management. It also implies practical people who implement related variables.

Keywords: education, media information, event frequency, type of event, community's understanding

1. Introduction

Natural disasters seem to have become a part of the Indonesian people's lives lately. Based on data from the Forum for the Environment (WALHI) in November 2010 (as quoted by the Republik Daily, March 2010), 83% of Indonesia's territory is prone to natural disasters ranging from floods, landslides, earthquakes, tsunamis, typhoons, volcanic eruptions, to Forest fires. Data from the National Disaster Management Agency (BNPB) states, as of January-September 2010 from a total of 354 disaster-prone areas, high-level tsunami potential areas were recorded as many as 175 and 179 moderate tsunami-prone areas. Even BNPB noted that from 1629 to 2010 or within 381 years, the tsunami had occurred 171 times in Indonesia. BNPB data also states that 83% of Indonesia's
regions are disaster-prone, and 80% are ecological disasters. Meanwhile, in the last six years the Meteorology, Climatology and Geophysics Agency recorded significant earthquake activity in Indonesia, namely the 9.1 magnitude earthquake in Aceh accompanied by the tsunami in 2004, the 8.7 magnitude earthquake in Nias in 2005, the 6.3 magnitude earthquake in Yogyakarta on 2006, 7.4 SR earthquake in Tasikmalaya in 2009, 7.6 SR earthquake in Padang in 2009, and 7.2 SR earthquake accompanied by a tsunami in Mentawai.

Among the list of disasters, a benchmark for disasters in Indonesia is a 9.1 magnitude earthquake that occurred in Aceh in 2004. The earthquake remains one of the strongest in modern history. In the book Aceh Rehabilitation and Reconstruction Agency (BRR) Nias (2009) states that in less than half an hour after the earthquake, a tsunami immediately followed, destroying the coast of Aceh and the surrounding islands up to 6 kilometres inland. A total of 126,741 people died where 93,285 people were declared missing. Around 500,000 people lost their homes, 139,195 houses were destroyed or badly damaged. In the public sector, at least 669 government building units, 517 health centres, and hundreds of educational facilities were destroyed.

At present Aceh has reawakened not only in the field of economic and social infrastructure but also in the field of disaster mitigation to minimize the impact of disasters if the same thing happens again in the future. One of the most instrumental parts of mitigation is information handling. The tsunami handles disaster information in Aceh Province and the Tsunami and Disaster Mitigation Research Center (TDMRC) established on October 30, 2006, at Syiah Kuala University. The existence of TDMRC aims at increasing the quality of research resources, advocate for government in making policies, collect and provide the best data by accelerating the process of collecting appropriate data relating to the impact of disasters. Besides, TDMRC also contributes to increasing public knowledge about disasters, collaborating with researchers, and other research institutions in disaster research.

There is a lack of official data on how TDMRC disseminates information to the broader public. Many Acehnese people of Aceh do not know what disaster mitigation is and what should be done by the community in the event of another tsunami disaster. TDMRC has carried out various ad hoc and routine activities as part of the disaster risk reduction campaign. This activity was carried out by TDMRC itself and in collaboration with related institutions in Banda Aceh in particular and the Province of Aceh in general. We do not know whether the activities have been running optimally and if all information has been appropriately conveyed. We also ignore whether the community has understood mitigation information, and what factors influence the understanding is not well known.

The community level of understanding of disaster mitigation is strengthened by a survey conducted by Disaster Risk Reduction-Aceh (DRR-A) with the UNDP TDMRC called the Baseline Survey for Disaster Risk Reduction Public Awareness (DRR). The results of this survey indicate that most people still have weak knowledge about things such as; village information centre for disasters, evacuation routes, escape buildings, early warning systems, training and disaster counselling, and some basic knowledge about disaster mitigation. Although various activities have been carried out, essential information dissemination is still needed as stated in the concept of knowledge management so that in the future this process can provide optimal results that can reduce risk if a disaster occurs again.

Bergeron in his book Essential Knowledge (2003) mentioned that there are five aspects of intellectual capital assets of each individual and this will affect the understanding of knowledge management, namely Attitude, Competencies, Education, Knowledge, and Skills. In a knowledge management implementation, the organization requires training following their education and capabilities. The knowledge management implementers in this book are called knowledge workers; they are in charge of distributing knowledge, both internally and externally, by also taking into account the target's educational level. In the case of TDMRC, considering the target is the wider community, the education in question is the education of the target, which is expected that individuals who have a good understanding of disaster mitigation will spread to other individuals in their groups. According to Boomer (2004), knowledge management is a process of embracing knowledge as a strategic asset to continuously drive business profits and consider the company's approach to identifying, capturing, evaluating, increasing, and sharing its intellectual capital.
Probst, Raub, and Romhardt (2001) also stressed the importance of communication to make knowledge management a routine activity and a reliable information centre. Probst said the frequency or intensity of communication would increase the knowledge and skills of the target. If in an organization's knowledge is delivered regularly and regularly, it will create an atmosphere conducive to sharing, giving birth to a culture of discussion, and making the knowledge delivered more easily absorbed. In the case of TDMRC, socialization plays a vital role in dissemination, where socialization includes tacit knowledge sharing activities between individuals. The term socialization is used because tacit knowledge is disseminated through joint activities. Thus, in some instances, tacit knowledge can only be disseminated if someone feels free to become someone greater who has tacit knowledge from others.

Probst, Raub, and Romhardt (2001) stated the method of socialization or type of event in knowledge management also determines the success of knowledge management itself. Apart from being formal, such as seminars, training, or special education also includes informal activities such as informal discussions, outdoor activities, or retreat, and outbound activities. Davenport and Prusak (1998) in Soetiarso (2007) explained that the general goal of a knowledge system in six cycles, namely creating knowledge, capturing knowledge, capturing knowledge, storing knowledge, processing knowledge, and disseminating knowledge.

Based on the explanation above, the research model that can be formulated is:

\[
\begin{align*}
X_1 & \quad \text{Level} \\
X_2 & \quad \text{Type of Media} \\
X_3 & \quad \text{Frequency} \\
X_4 & \quad \text{Event} \\
\end{align*}
\]

\[Y = \text{Community Understanding of Mitigation of Tsunami}\]

Figure 1. Research Paradigm

In this study, the hypotheses to be submitted are as follows:
H1 = education level affects people's understanding of disaster mitigation significantly.
H2 = type of media affects the community's understanding of disaster mitigation significantly.
H3 = frequency of dissemination affects community understanding of disaster mitigation significantly.
H4 = type event affects the community's understanding of disaster mitigation significantly.

2. Method

The 2004 tsunami disaster hit around 18 districts in Aceh Province. The regencies/municipalities with the most significant damage and losses were Aceh Besar and Banda Aceh districts. This study only takes a sample in the Municipality of Banda Aceh in the year 2011. The sample selection technique is based on the number of people per district taken proportionally with an average quota
of 0.1% of the total population in each sub-district. Furthermore, the sample is selected by stratified random sampling with sample selection techniques carried out by convenience technique, namely by deliberately and simultaneously conducting the selection and distribution of questionnaires directly to respondents in easily accessible places. The table below explains the number of samples that are taken in each district.

| No | Sub-district    | Total Population | Total Respondent |
|----|-----------------|------------------|------------------|
| 1  | Baiturahman     | 34,674           | 35               |
| 2  | Kuta Alam       | 46,371           | 46               |
| 3  | Meuraxa         | 14,426           | 14               |
| 4  | Syiah Kuala     | 31,616           | 32               |
| 5  | Lueng Bata      | 20,968           | 21               |
| 6  | Kuta Raja       | 10,448           | 10               |
| 7  | Banda Raya      | 20,875           | 21               |
| 8  | Jaya Baru       | 22,093           | 22               |
| 9  | Ulee Kareng     | 21,775           | 22               |
|    | Total           | 223,246          | 223              |

Source: Population Info (Info Kependudukan Maret), 2010

In this research, the authors build constructs from the previous theories to measure each variable. For the education variable, the researchers build backfill indicators, namely: educational background; high level of education information is provided through educational institutions; information dissemination uses education as a basis. For the variable of information media, indicators used are the choice of information media, ease of access to the media used, attractive media packaging, and proper media usage. For the variable of event frequency, indicators are measured, namely influence on people's understanding, dependence on the type of event, and optimal frequency. For the type of event variable, the indicators used are providing community understanding of disaster risks, involving all levels of society; knowledge of activities, and knowledge of media that contains disaster mitigation information.

The data collected is primary data and secondary data. Primary data is obtained through questionnaires distributed in the study sample. Enriching the research, secondary data is also used, namely information from various publications and report data from TDMRC itself and related parties related to this research. In detail, the data is collected through the distribution of external questionnaires. Data from the questionnaires are opinions, and the respondents' answers are changed to quantitative by using percentage and Likert scale. Each question for each variable has the same number and weight of answers.

Secondary data is used in the form of TDMRC activity data, organizational policies, and information from various literature and publications related to the scope of research to strengthen research analysis. This analysis is used to determine the relationship between public understanding of disaster information with variables, namely; education, information media, event frequency, and types of activities. This is measured by Likert scale. The regression model used is multiple linear regression (multiple regression) because the independent variable is more than one. By referring to the multiple linear regression model, the form of the regression equation can be formulated as follows:

\[ Y = b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + e \]

\( Y \) = Community’s Understanding of Disaster Mitigation
\( X_1 \) = Education
\( X_2 \) = Information Media
X3 = Event frequency
X4 = Type of event
b1, b2, b3 = Regression Coefficient
e = Error Term

3. Result

Regression analysis was performed on one dependent variable (Y), namely community understanding of disaster mitigation on four independent variables, namely education (X1), type of information media (X2), frequency of information dissemination (X3), and type of event (X4). The results are explained below.

**Table 2. Determination Coefficient**

| Model | R  | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|----|----------|-------------------|---------------------------|
| 1     | .290 | .084     | .068              | .49263                    |

From the table above, one can see that the Adjusted R² is 0.068. This value indicates that the independent variables in this study explain 68.00% of the community's understanding of disaster mitigation (variable Y). Other matters outside this study explain the remaining 32.00%.

To find out the magnitude of the effect of each independent variable on the dependent variable, SPSS produces the following table;

**Table 3. Regression Result**

| Model | Unstandardized Coefficients | Standardized Coefficients | t    | Sig. |
|-------|-----------------------------|---------------------------|------|------|
|       | B                            | Std. Error                | Beta |      |
| (Constant) | 2.158                     | .328                      | 6.569 | .000 |
| X1     | .026                        | .067                      | .027  | .385 | .700 |
| X2     | .160                        | .078                      | .154  | 2.055| .041 |
| X3     | .115                        | .078                      | .108  | 1.472| .143 |
| X4     | .083                        | .067                      | .093  | 1.242| .215 |

From the table above, the regression equation is obtained \( Y = 0.027X1 + 0.154X2 + 0.108X3 + 0.093X4 \), with the explanation as follows.

- H1 rejected. The t value for X1 is 0.385 while \( t \) table is 1.65 (\( t_{\text{count}} < t_{\text{table}} \)) at the level of \( \alpha = 0.05 \) and df = 222. As one of the bases for disseminating information on disaster mitigation, education affects somehow the understanding of disaster mitigation information.
- H2 received. The t value for X2 is 2.055 while \( t \) table is 1.65 (\( t_{\text{count}} > t_{\text{table}} \)) at the level of \( \alpha = 0.05 \) and df = 222. Information media used in the dissemination of disaster mitigation information influences (significantly) the understanding of disaster mitigation information.

In this case, the increase in information media (X2) as one of the bases for the dissemination of mitigation information will cause an increase of 0.154 in the understanding of mitigation information (Y). This finding is in line with Cong and Pandya (2003) that stated the technology
covers all processes in knowledge management. It is not a matter of how existing technology is, but how to choose the right technology for knowledge management itself. Meanwhile, Turban et al. (2008) described that the systematics of information management starts from the data. Further, it creates information, and it transforms to be knowledge. This indicates that information media is an essential factor to create a community's understanding of disaster mitigation.

- **H3** is rejected. The t value for X3 is 1.472 while t table is 1.65 (t count < t table) at the level of α = 0.05 and df = 222. The event frequency as one of the bases for disseminating disaster mitigation information influences (but not significantly) the understanding of disaster mitigation information.

- **H4** is rejected. The t value for X4 is 1.242 while t table is 1.65 (t count < t table) at the level of α = 0.05 and df = 222. This means that the type of event as one of the bases for disseminating disaster mitigation information influences (but not significantly) the understanding of disaster mitigation information.

These findings show that only information from the media that can affect the community's understanding of disaster mitigation. This implies to the managers related that it is essential to take action in driving information media appropriately. The community will be more aware of disaster through the right information media, without being influenced by their education, the event frequency, and the type of event that is related to disaster mitigation.

4. **Conclusion**

The result shows that: 1. Education is one of the bases for disseminating disaster mitigation information, does not significantly influence the understanding of disaster mitigation information; 2. Media is one of the bases for disseminating disaster mitigation information influences the understanding of disaster mitigation information; 3. The event frequency as a basis for disseminating disaster mitigation information does not significantly influence the understanding of disaster mitigation information. 4. The type of event as one of the bases for disseminating disaster mitigation information does not significantly influence the understanding of disaster mitigation information. These all findings are the verification of the previous theories, which means that this research is a development model from the causality theories. This model integrates several models from the past and is an update, with the new object. It implies an enrichment of knowledge in the academic area and can be a basis to develop other research in the further. Other than that, this model also impacts the techniques implemented by managers who are related to the variables, especially the object of this case, TDMRC, to pay more attention to the variables that affect its community’s understanding of mitigation.

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