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Correlation analysis of landslide disaster with land tenure (case study: Wonosobo Regency)

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Abstract: Indonesia is a country that often experiences various kinds of natural disasters, one of which is landslides. Wonosobo Regency is a district that is prone to landslides considering its geographical conditions with steep slopes and high rainfall. Landslides are disasters that are directly related to changes in soil and soil conditions. This is unconsciously related to land rights, one of which is land tenure. In this research, a correlation study was conducted to determine the relationship between the level of knowledge about landslides and the level of knowledge about land tenure. The test uses the Spearman rank test. The result of this research is that there is a relationship between the level of knowledge about landslides and the level of knowledge about land tenure.

Keywords: *Natural Disaster, Landslide, Land Tenure, Correlation, Wonosobo Regency*

Introduction

Indonesia is a country that is included in the tropics that have high rainfall and varied topography [1]. Many disasters that occur in Indonesia, one of which is a landslide disaster based on geological, geomorphological and climatological caused by natural and Human Factors [2]. Landslides can occur in areas with steep slopes, bare vegetation cover and high rainfall [3]. One area that often occurs and has the potential for landslides is Wonosobo Regency.

Wonosobo Regency which is located in Central Java Province in part of its territory is potentially threatened by landslides. Topographic factors are very bumpy, steep slopes and high rainfall in some areas is a trigger for the disaster [3]. There are 15 sub-districts in Wonosobo and there are about 100 villages in it that are prone to landslides [2]. It can be concluded that Wonosobo Regency is a regency that is vulnerable to landslides.

Researchers have previously conducted research related to the potential and vulnerability of landslides in Wonosobo Regency. Anita and Purwantoro (2011) have conducted research related to landslide vulnerability in Kejajar Sub-District of Wonosobo Regency. From this research, it can be seen the distribution of landslide vulnerability in Kejajar Sub-District, Wonosobo Regency [4]. Astuti et al. (2016) conducted research related to landslide risk in Tieng Village, Kejajar Sub-District, Wonosobo Regency. From the research, it can be seen that Tieng Village is a village with high landslide risk and the villagers are advised to be relocated [5]. Nugraha et al. (2015) conducted research mapping landslide threat level in Kejajar Sub-District, Wonosobo Regency. From these studies can be known areas that have low to high levels of vulnerability [3]. Fatiatun et al. (2019) conducted research on landslide disaster analysis and mitigation in Tieng Village. From this research, it can be seen that disaster mitigation was carried out in Tieng Village [2].

From this study, it has been explained and analyzed how the potential and level of vulnerability of landslides in Wonosobo Regency. However, please note that landslides are disasters that result in changes in soil conditions and related to land rights due to landslides. It is related to the management of land called Land Administration. According to Williamson et al. (2010) there are four components related to land administration, namely land use, land tenure, land value, and land management [6]. One of the important components of land administration is related to land tenure. According to Dawidowicz and Zrobek (2017) Land Tenure is related to the rights and responsibilities or obligations of humans on land owned [7]. Therefore, the relationship between landslides and land tenure

needs to be known. To determine the relationship/correlation of landslides with land tenure needs to be done research on how the level of public knowledge about landslides and land tenure.

Method

The author(s) has to provide the sufficient information about the material and methodology. It should be stated clearly and completely. If the method is categorized as new procedures or refers to published paper which was not readily available for most readers, details methodology should be provided.

The method used in this study is a correlation study. Correlation study is essentially a study or study of the relationship between two variables in a situation or group of subjects. This is done to see the relationship between one symptom with another symptom, or one variable with another variable [8].

The first stage of the literature study. Literature study is a research conducted by researchers by collecting a number of books, magazines/scientific publications related to the problem and research objectives. This technique is done with the aim to reveal a variety of theories that are relevant to the problems being faced/researched as reference material in the discussion of research results [9].

In this study there is a temporary answer to the research or called the hypothesis [8]. There are two hypotheses: the working hypothesis or Ha and the null hypothesis or Ho. Ha is the formulation of hypotheses with the aim of making predictions about what events occur in a symptom that appears, while Ho is stating a similarity or absence of a meaningful difference between the two groups or more [8].

The sampling technique used is non-probability sampling. Non-probability sampling is a technique that does not give the same chance/opportunity for every element or member of the population to be selected to be sampled [10]. There are various techniques that are classified as non-probability sampling and the technique used in this study is purposive sampling. The sample in this study is Wonosobo people who live in areas prone to landslides. According to Gay et al. (2009) for descriptive method research, the number of samples at least 10% of the population, for a relatively small population of at least 20%, while for correlation research required a sample of 30 respondents [11]. Roscoe in Sugiyono (2012) states that a decent sample size in the study is between 30 to 500 [12].

Research instruments are tools or facilities used by researchers in collecting data to make their work easier and the results are better, more careful, complete, and systematic so that they are easier to process [13]. One of the research instruments is using questionnaire [14]. Questionnaire or questionnaire is an instrument in the form of a list of questions or written statements that must be answered or filled (selected) by the respondent in accordance with the instructions for filling [14]. The scale of measurement used in this study is using the guttman scale. Guttman scale is a scale used to obtain an affirmative answer from the respondent, that is, there are only two intervals such as "agree-disagree"; "Yes" No"; "True-False"; "Positive-Negative"; " never-never" and others" [15].

Validity test is a measure that shows the levels of validity or validity of an instrument [16]. Valid means that the instrument can be used to measure what is supposed to be measured [15]. Calculation of validity test using IBM SPSS application using Pearson product moment correlation. If the rcount> rtable with a significant level $\alpha = 0.05$, then it is declared valid, while if the rcount< rtable with a significant level $\alpha = 0.05$ or equal to the table and dk= n - 2, then it is declared invalid [15]. Normality test is a test to determine the normal or not a distribution of data that will be related to the selection of statistical tests [17]. Normality test is a test that aims to determine whether the independent and dependent variables have a normal distribution or not [18].

Bivariate analysis is an analysis that connects two variables, the independent variable and the dependent variable [19]. Bivariate analysis was used to determine the relationship of landslides and land tenure. Bivariate test used spearman rank correlation formula (spearman rho). Spearman Rank Correlation is used to measure the level or closeness of the relationship between two ordinal-Scale variables [20]. Requirements using spearman correlation Test need to be considered that the data is not normally distributed and the data is measured in ordinal Scale [21]. The result of interpretation of spearman rank analysis is as follows [22]:

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Table 1. Interpretation of Spearman Rho correlative hypothesis test

No.	Parameters	Value	Interpretation
1.	Correlation Strength	0.0 -< 0.2	Very weak
		0.2 -< 0.4	Weak
		0.4 -< 0.6	Medium
		0.6 -< 0.8	Strong
		0.8 -< 1.00	Verty strong
2.	P value	p < 0.05	there is a significant correlation between the two variables tested
		p > 0.05	there can be no meaningful correlation between the two variables tested
3.	Correlation direction	+ (positive)	unidirectional, the greater the value of one variable, the greater the value of other variables
		- (negative)	in the opposite direction, the greater the value ofone variable, the smaller the value of the other variables

Source: [22]

Results And Discussion

From the results of the validity test using IBM SPSS, it was found that the data is valid and significant correlation at the level of 0.01. Cronbach's alpha is shown in **Table 2**.

Table 2. Cronbach's Alpha Value

Cronbach's Alpha	N of Items
.963	17

Cronbach's Alpha is a measure of reliability that ranges from zero to one [23]. Cronbach's Alpha is shown in Table 3.

Table 3. Cronbach's Alpha Value Table

Cronbach's Alpha Value	Reliability Level
0.0 – 0.20	Less reliable
>0.20 – 0.40	Rather reliable
>0.40 – 0.60	Quite Reliable
>0.60 – 0.80	Reliable
>0.80 – 1.00	Highly reliable

Source: [23]

It can be seen from the results of the validity test conducted, the research instruments used are very reliable, with a value of cronbach's alpha 0.963.

Normality Test Results

Normality test selected using Shapiro-Wilk. The selection is based on the number of samples to be tested. When the sample is used more than 50 is used Kolmogorov-Smirnov, when the sample is used less than 50 is used Shapiro-Wilk [24]. In this study the number of samples used is less than 50, then using Shapiro-Wilk. The results of the normality test can be seen in **Table 4**.

Table 4. Normality test results

	Shapiro-Wilk		
	Statistic	df	Sig.
Landslide	.801	33	.000
Land Tenure	.807	33	.000

In **Table 4** can be seen in the value of Sig. obtained a value of 0.000. It can be said that it meets the normality or normally distributed assumption if in the Shapiro-Wilk test the sig value is > 0.05, while the non-normally distributed one has a sig < 0.05. So, from the results of the normality test, the data obtained are not normally distributed.

Spearman Rank Test Results

Table 5. Spearman Rank test results table

		Landslide	Land Tenure
Landslide	Correlation Coefficient	1.000	.923**
	Sig. (2-tailed)	.	.000
	N	33	33
Land Tenure	Correlation Coefficient	.923**	1.000
	Sig. (2-tailed)	.000	.
	N	33	33

From the test results obtained spearman rank Correlation Coefficient of 0.923. In the interpretation of the data is done by looking at its strength based on corrleation criteria in the following **Table 6**.

Table 6. Interpretation Of The Correlation Coefficient

Coefficient Interval	Correlation Value
0.00 – 0.199	Very Low
0.20 – 0.399	Low
0.40 – 0.599	Medium
0.60 – 0.799	High
0.80 – 1.000	Very High

From spearman rank test results obtained a correlation coefficient of 0.923 and a positive value so that the relationship between the two variables unidirectional and very high correlation. It can be interpreted that the higher the knowledge about landslides, the more knowledge about land tenure. Significance value or Sig. (2-tailed) from Table 5 by 0.000. The error rate used is 0.05. When the Sig results. (2-tailed) less than 0.05 then

there is a meaningful correlation [25]. It can be interpreted that there is a meaningful relationship between landslide variables to land tenure.

Conclusions

Questionnaire in this study is valid and reliable. Analysis of this study using spearman rank test because the data is not normally distributed. From the results of the spearman rank test, it was found that there is a relationship between the level of knowledge of landslides and the level of knowledge of land tenure.

Conflicts of interest

There are no conflicts to declare

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