

# Analysis Community's Coping Strategies and Local Risk Governance Framework in Relation to Landslide

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**Abstract** Analysis of people perception and analysis of the coping strategy to landslides are the two elements that are essential to determine the level of preparedness of communities to landslides. To know the preparedness of government and other stakeholders in facing landslide, the analysis risk governance framework was required. A survey using questionnaires with random sampling was applied to assess the level of people perception and people coping strategy related to landslide. Analysis of risk governance framework was done at the district and sub-district level. The study found that people perception related with landslide dominated by high and moderate level. Age and education are two factors that influence the people's perception to landslide. Local people applied four types coping strategy, which are: economic, structural, social and cultural coping strategy. Totally, 51.6% respondents have high level, 33.3% have moderate level and only 15.1% respondents that have low level of coping strategy. The factors that influence the level of coping strategy are education, income and building type. Analysis of risk governance framework is limited to the three components including stakeholder involvement, risk management and risk communication. Based on the data analysis, the level of stakeholder involvement at the district scope was categorized on the moderate till high and the level of stakeholder involvement at sub-district level was categorized on the high level. Generally, the risk management of Karanganyar was categorized on the moderate level and high level and the risk management in Tawangmangu was categorized on the moderate level. There are some elements must be improved on the risk governance framework, those are data management, the pattern of relationships among stakeholders, increased participation of NGOs, constructed and updated landslide risk map, enhancement of microfinance role in helping the community when disaster strikes and dissemination of information about the landslide to the local community.

**Keywords:** Landslide perception, coping strategies, risk governance framework

**Abstrak** Analisis persepsi masyarakat dan analisis strategi mengatasi longsor adalah dua elemen yang penting untuk menentukan tingkat kesiapan masyarakat terhadap longsor. Untuk mengetahui kesiapan pemerintah dan pemangku kepentingan lainnya dalam menghadapi longsor, diperlukan untuk analisis kerangka tata kelola risiko bencana. Metode survei menggunakan kuesioner dengan random sampling diterapkan untuk menilai tingkat persepsi masyarakat dan strategi penanggulangan yang berkaitan dengan bencana longsor. Analisis kerangka tata kelola risiko dilakukan di tingkat kabupaten dan kecamatan. Studi ini menemukan bahwa persepsi masyarakat terkait dengan longsor didominasi tingkat tinggi dan sedang. Usia dan pendidikan adalah dua faktor yang mempengaruhi persepsi masyarakat terhadap longsor. Masyarakat setempat dikelompokkan menjadi empat jenis strategi penanggulangan, yaitu: ekonomi, struktural, sosial dan budaya strategi bertahan. Sebanyak 51,6% responden memiliki tingkat tinggi, 33,3% memiliki tingkat yang moderat dan hanya 15,1% responden yang memiliki tingkat rendah dalam strategi penanggulangan bencana. Faktor-faktor yang mempengaruhi adalah pendidikan, pendapatan dan jenis bangunan. Analisis kerangka tata kelola risiko terbatas pada tiga komponen, termasuk keterlibatan pemangku kebijakan, manajemen risiko dan komunikasi risiko. Berdasarkan analisis data, keterlibatan pemangku kepentingan di lingkup kabupaten dikategorikan tingkat pada moderat sampai tinggi dan tingkat keterlibatan pemangku kepentingan di tingkat kecamatan dikategorikan pada tingkat tinggi. Secara umum, manajemen risiko di Karanganyar dikategorikan pada tingkat moderat dan tingkat tinggi dan manajemen risiko di Tawangmangu dikategorikan pada tingkat moderat. Ada beberapa elemen harus ditingkatkan pada kerangka tata kelola risiko, yaitu manajemen data, pola hubungan antara para pemangku kepentingan, peningkatan partisipasi LSM, disusun dan diperbaruinya peta risiko longsor, peningkatan peran keuangan mikro dalam membantu masyarakat ketika terjadi bencana, dan penyebaran informasi tentang tanah longsor bagi masyarakat setempat.

**Kata kunci:** persepsi longsor, strategi penanganan, kerangka tata kelola risiko

## I. Introduction

One of hazards occurred frequently in Indonesia is landslide. Generally, landslides mostly occurred in rural

areas with hilly topography and close to volcanoes. It is commonly found that the soil condition in this area is fertile with significant amount of water resources and the beautiful panorama to life. Therefore, most of the landslide prone areas have been developed as the villages or cities with high population density. As the results, thousands of people died several thousands of

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houses damages and thousand hectares of land buried due to landslide disasters [Karnawati et al., 2013].

Karanganyar is one of the regency in Indonesia that frequently struck by landslide. Some of the Karanganyar's districts are located close to Lawu Volcano which makes the areas susceptible to landslide. Landslides occurred in several sub-districts, for instance Karangpandan, Ngargoyoso, Matesih, Tawangmangu, Jatiyoso, Jumapolo, Jenawi, Kerjo and Jumentono. Two major landslide events were occurred in Tawangmangu Sub-district on December 27th, in Tengkluk Village and Tawangmangu Village. A landslide event in Tengkluk Village has resulted in the collapse of 33 houses and a landslide event in Tawangmangu village caused 34 people died. The driving factors of the event were high intensity rainfall, morphological conditions, slopes and land use changes [Prawiradisastra, 2008].

In order to minimize damages, it is necessary to assess and manage areas that are susceptible to landslides. Local people who live in prone areas have coping strategy dealing with landslides and take actions that should be done to minimize the damages. Various local institutions both governmental and non governmental institutions carry out disaster management strategies. Risk governance analysis is one of tools to know the level readiness of stakeholder to cope of hazard in their area. This research focused on local scale both district level and sub-district level and emphasizes on analysis of people perception, analysis of community's coping strategies and analysis of risk governance framework related to landslide in study area.

## 2. The Methods

Analysis risk governance framework was conducted on district scope in Karanganyar District and sub-district scope in Tawangmangu Sub-district. Karanganyar is located between 110°40" - 110°70" east longitude and 7°28" - 7°46" south latitude. Karanganyar Regency bordered by Sragen Regency at the north, East Java Province at east, Wonogiri and Sukoharjo Regency at the south and Surakarta and Boyolali Regency at the west [BPS, 2011]. Karanganyar District is one of the districts in Central Java Province that have a high susceptibility to disaster. Base on the record data that published by Regional Disaster Mitigation Agency [2012], during 2011 recorded 34 landslide events, 15 windstorms events, 3 flood events and 29 events of fire disasters.

Tawangmangu Sub-district is located close to Lawu Volcano that has highest altitude 3,265 meters above sea level. Most of the areas (65%) are located on a steep relief with a slope more than 35%. The study area mainly consists of soil depth of more than 90 cm and dominated by sandy soil that makes this area susceptible to landslide [Wati et al., 2010]. Settlement and agricultural land use are the most rapid developed land use in study area. Based on modified data from Wati et al. [2010] which was collected from the village

office, sub-district office and field survey showed the landslides events in Tawangmangu from 2005 till 2010 as many as 42 times that spread in all villages in Tawangmangu Sub-district.

Primary data including community perception and coping strategies was taken in Tengkluk Village and Tawangmangu Village. The area of Tawangmangu Village is 337,39 Ha consist of 6.84 Ha paddy field, 177,24 dry land and the rest 153,30 Ha for others purposes. There are five sub-villages in Tawangmangu, consist of Tawangmangu, Nano, Beji, Nglurah, and Ngledoksari and divided to 12 Rukun Warga and 51 Rukun Tetangga (BPS, 2012). The wide area of Tengkluk is 810.78 Ha; consist of 45.51 Ha paddy field; 248,50 dry land and the rest 516.77 Ha for others purposes. Tengkluk Village consists of 4 sub-villages; there are Plalar, Guyon, Sodong and Selere, 12 RW and 36 RT. The number of people in Tengkluk Village is 3,716 people consist of female 1,864 people and male 1,852 people [BPS, 2012]. This research applied a case study approach that took place at four sub-villages in Tengkluk Village consisting of Plalar Sub-village, Guyon Sub-village, Sodong Sub-village and Salere Sub-village and one sub-village in Tawangmangu village namely Ngledoksari Sub-village. Type of research is survey method with the household as the unit of analysis. Random sampling technique was applied to take sample of respondents from the population. By sampling method, the characteristic of population will be known. The information collected from the respondents was analyzed using statistical method. Analysis risk governance framework was conducted to determine the level of stakeholder involvement, disaster management systems and communication patterns among stakeholders in disaster management activities. Analysis of risk governance framework was done at district and sub district scope.

Primary data is data collected and observed directly in the field. The primary data in this study include: (1) Questionnaire data and interviews with head offices were conducted to 24 agencies in Karanganyar and six agencies in Tawangmangu, (2) Questionnaire data and interviews conducted on the population by 93 respondents to obtain data about perception, coping strategy and the people acceptance to landslide risk reduction programs by the government and other stakeholders. The questions included close question with "agree" until "not agree" and open question to give opportunity for respondent to explore their opinion. The answer scored using Linkert scale as 5 if "fully agree" until 1 if "fully not agree", (3) Small group discussion with the head of sub-village to determinate sub-villages boundary and historical landslide data includes location of landslide, damage / casualties caused by landslides and the magnitude of the landslide. Data processing was done after the data collection in the field is completed. Some of the activities carried out at this stage are: (1) Data tabulation, (2) Data scoring (Table 1), and (3) Data digitizing.

The data analysis process included several techniques, as follow: (1) Descriptive statistics analysis was used to analyze characteristic of respondents including age, income, household size, gender, marital status, education, occupation, building type and landslide, (2) Linear regression analysis was applied to know the factors influencing landslide risk perception, people coping strategy and people acceptance, (3) Cross-tabulation analysis also known as contingency table analysis, is most often used to know the level of respondent's perception, people coping strategy and people acceptance in each village (Plalar, Sodong, Guyon, Salere and Ngledoksari), (4) The chi-square statistic was used to determine the difference of the level of dependent variables (people perception, people coping strategy and people acceptance) within five sub-villages (Guyon, Plalar, Salere, Sodong and

Ngledoksari).

The respondents were distributed proportionally by considering the number of household in each sub-village. According to Sugiyono [2007], the amount of respondent can be determined using formula:

$$S = \frac{N \cdot P \cdot Q \cdot \lambda^2}{d^2(N-1) + P \cdot Q \cdot \lambda^2}$$

Where:

$\lambda^2 = \text{Error standard} = 1$

$d = \text{Standard deviation} = 0.05$

$P = Q = \text{Probability} = 0.5$

$S = \text{Total sample}$

$N = \text{Population}$

Based on the Sugiyono's formulation, the number of sample for every village can be seen on the Table 2.

Table 1. Scoring to the Variable of Characteristic of Respondents

No	Criteria	Score	Type of data
1.	Age (year)	20 - 29 is 1 ; 30 - 39 is 2 ; 40 - 49 is 3 ; 50 - 59 is 4 ; > 60 is 5	Ordinal
2.	Gender	Male is 1 ; Female is 2	Nominal
3.	Education	Elementary school or under is 1 ; Junior high school is 2 ; Senior High School is 3 ; University is 4	Ordinal
4.	Occupation	Farmer is 1 ; Trader is 2 ; Civil servant is 3 ; Private sector is 4 ; Others is 5	Nominal
5.	Income per-month	Under minimum regional wage is 1 ; up to minimum regional wage is 2	Ordinal
6.	Building type	Permanent is 1 ; Semi permanent is 2 ; Not permanent is 3	Nominal
7.	Landslide experience	Never is 1 ; Once is 2 ; Twice is 3 ; More than twice is 3	Ordinal
8.	Household size	1 - 2 is 1 ; 3 - 4 is 2 ; 5 - 6 is 3 ; > 6 is 4	Ordinal
9.	Level of perception	Low is 1 ; Moderate is 2 ; High is 3	Ordinal
10.	Level of coping strategy	Low is 1 ; Moderate is 2 ; High is 4	Ordinal
11.	Level of people acceptance	Low is 1 ; Moderate is 2 ; High is 5	Ordinal

Table 2. Sampling Unit Determination

No	Village	Sub-village	Number of Household (%)	Percentage	Number of Samples
1.	Tawangmangu	Ngledoksari	235	17	(17/100)*93=16
2.	Tengklik	Plalar	210	15	(15/100)*93=14
		Guyon	249	18	(18/100)*93=16
		Sodong	378	27	(27/100)*93=25
		Selere	339	24	(24/100)*93=22
Total			1,411	100	93

According to Heryanti [2010], risk perception has been influenced by two groups of variables: situational factors and cognitive factors. Situational factors were measured using analysis of characteristic of respondent and cognitive factors were measured using analysis of people knowledge related to landslide. Characteristic of respondents comprises; age, gender, education, household size, occupation, income, building type and the experience of the landslide. Totally, the amount of samples that must be taken are 93 respondents, consists of 69% were men and 31% were women. The age of respondents is ranging from 23 to 82 years old, 41% respondents were between 23 and 39 years old, 45 % were 40 to 59 years old and 13% were 61 years old or older. Based on the monthly income, 48 % of the respondents reported monthly incomes were lower than Rp 846,000.00 and 52% more than Rp 846,000.00. As regards level of education, 55% of respondents had attended elementary school or below, 23% junior high school, 17% senior high school and 5% had a university degree. Regarding the occupation types, at the time of data collection 46% of the sample were farmer, while 11% were trader and self-employed, 4% were civil servant, 20% were private employees and 18% have non-permanent occupation. The size of the surveyed households was dominated by the household with the 3 to 4 of family member (58%), followed by 5 to 6 member with 24% of respondents, 14% with 1-2 member and 4% with more than 6 member. Most of respondents have permanent building (70%), 17% semi permanent and 13% of respondent have non-permanent house.

Regarding on the landslide experience, the majority of respondents (50%) experienced the landslide more than twice, while 24% respondents were twice and 26% respondent have once experienced in landslide

White [1973] defines perception as process by which individuals organize exterior stimuli in order to form some concept of an event or situation. According to Westen and Kingma [2011] the level of risk perception depend on their personal situation, cultural and religious background, social background, economic level, political background, level of awareness, media exposure, other risks and risk reduction situation. People perception about risk plays an important role to know how the people anticipate the negative impact of landslides occurrences. By knowing the people perception the responses of local people to survive and to cope from landslides in the future can be identified.

Perceptions regarding the definition of landslides, most respondents (40%) answered that mass of rock and soil were the main fallout, while the location of the landslide occurred dominated in steep slopes area with 68% respondents. Type landslides that have occurred in the study area were "topple" with (47%). Perception population regarding the major physical losses caused by landslides is house damage (71%), while the non-physical losses are mainly trauma (66%). Based on the Table 3, it can be seen that the level of people perception related with landslide dominated in high and moderate level.

Totally, 46.2% respondents have moderate level of risk perception, 47.3% have high level and only 6.5%

Table 3. Cross Tabulation Between People Perception and Sub-village

Count		Sub_village					Total
		Guyon	Plalar	Salere	Sodong	Ngledoksari	
People_perception	Low	0	1	3	1	1	6
	Moderate	11	6	11	6	9	43
	High	5	7	8	18	6	44
Total		16	14	22	25	16	93

Table 4. Chi-square Tests of People Perception

	Chi-Square Tests		
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.911a	8	.115
Likelihood Ratio	13.616	8	.092
Linear-by-Linear Association	.682	1	.409
N of Valid Cases	93		

a. 5 cells (33.3%) have expected count less than 5. The minimum expected count is .90.

respondents that have low level of perception. On the high level of perception, the highest percentage is 72% respondents in Sodong Sub-village. The highest percentage of the moderate level of perception in Guyon Sub-village with 68.8% respondents and on the low level of perception, the highest percentage is 13.6% respondents in Salere Sub-village. Spatial distribution of the level of respondent's perception to landslide was displayed on the Appendix 1.

Chi-square test is used to determine the difference of people perception related to landslide within five sub-villages (Guyon, Plalar, Salere, Sodong and Ngledoksari. The null hypothesis (H0) stated that there is no difference of people perception in five sub-villages. The result from the test as mentioned on the Table 4.

The decision making was determined by looking at the value of significance probability (P-value). Null hypothesis is accepted if the P-value > 0.05, and null hypothesis is rejected if P-value < 0.05. From Table 3, it can be seen that the value of Asymp. Sig. (2-sided) is 0.115 or more than 0.05 (0.115 > 0.05), the decision is

H0 is accepted, meaning that there was no differences of people perception related to landslide within five sub-villages.

The multiple linear regression analysis was used to determine the factors that influence the level of people perception related to landslide. Correlations test as a part of regression analysis output was conducted to determine the factors associated with level of people perception. The results of correlation analysis are presented in the Table 5.

The null hypothesis used in this analysis is independent variables (age, gender, education, occupation, income, household size, building type and landslide experience) do not have a correlation with the dependent variable (people perception). Decision-making is based on the null hypothesis that will be accepted if the value of Sig. (1-tailed) > 0.05. From calculations process using SPSS software can be seen that there are five variables that have a sig. (1-tailed) < 0.05, those are age, education, occupation, income, household size and building type. It can be concluded

Table 5. Correlation Analysis of People Perception

Correlations	
Independent variable	Sig. (1-tailed)
Age	.000*
Gender	.080
Education	.000*
Occupation	.003*
Income	.000*
household size	.048*
Building_type	.000*
Landslide_exp	.235

Table 6. Coefficients of People Perception

Coefficients <sup>a</sup>					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error			
(Constant)	2.314	.359		6.443	.000
Age	-.178	.044	-.346	-4.074	.000*
Gender	-.097	.107	-.074	-.912	.364
Education	.313	.061	.478	5.128	.000*
Occupation	.001	.029	.003	.034	.973
Income	.175	.103	.143	1.688	.095
Household_size	.007	.059	.008	.112	.911
Building_type	.030	.086	.035	.348	.729
Landslide_exp	-.034	.053	-.047	-.655	.514

a. Dependent Variable: People\_perception

Table 7. Cross Tabulation Between Level of Coping Strategy and Sub-village

Count		Coping_strategy * Sub_village Crosstabulation					Total
		Sub_village					
		Guyon	Plalar	Salere	Sodong	Ngledoksari	
Coping_strategy	Low	1	4	4	5	0	14
	Moderate	9	7	7	5	3	31
	High	6	3	11	15	13	48
Total		16	14	22	25	16	93

Table 8. Chi-square Tests of People Coping Strategy

Chi-square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	17.701 <sup>a</sup>	8	.024*
Likelihood Ratio	20.112	8	.010
Linear-by-Linear Association	5.914	1	.015
N of Valid Cases	93		

a. 6 cells (40.0%) have expected count less than 5. The minimum expected count is 2.11.

that the variables that have a correlation with the local people perception are age, education, occupation, income, household size and building type. Table 6 is the result of coefficients test. Coefficients test as a part or linear regression analysis output was conducted to determine the influence of one by one independent variable with the dependence factor.

The null hypothesis stated that partially the independent variables not have significant influence with the level of people perception. A method for decision-making is done using a probability value (P-value) 0.05. If the significance value > 0.05, null hypothesis is accepted. Base on the Table 6, can be seen there are only two variables that have significant influence to the people perception, that are age and education. Findings from this study indicated that two predictor variables, age and education, have a significant influence with the variation of local people perception to landslide.

Coping strategies refer to the application of indigenous knowledge in the face of hazards such as landslides Twigg (2004). People who live in susceptible areas have specified strategy to deal with disaster and to adapt with environment around it. An analysis of the level of coping strategy for communities in disaster-prone areas is essential to reduce the negative impact caused by the disaster. Coping Strategy that be conducted by local people related with landslide can be performed in the scope of household and community. Economic coping strategy undertaken by household focused on increasing income. Structural coping strategy focused on strengthening building, social coping strategies focused on participate on social gathering activities such

as "pengajian" and "arisan". Coping strategy conducted by communities consisted of economic coping strategy that focused on strengthening "koperasi" institutions and "arisan", structural / technological coping strategy is focused on the improvement of public facility such as roads and water channel. Social coping strategy focused on night patrol activities, "pengajian" and meetings in order to assist people who affected by landslides.

Totally, 51.6% respondents have high level, 33.3% have moderate level and only 15.1% respondents that have low level of coping strategy. At high levels of coping strategy (Table 7), the highest percentage is Ngledoksari Sub-village with 81.3%. At moderate levels, Guyon Sub-village is the highest percentage with 56.3% respondents and at a low level, dominated by respondent in Plalar Sub-village with 28.6% respondents. Spatial distribution of the level of respondent's coping strategy to landslide was displayed on the Appendix 2. The chi-square test is used to determine the difference of people coping strategy related to landslide within five sub-villages (Guyon, Plalar, Salere, Sodong and Ngledoksari). Null hypothesis stated there is no difference of people coping strategy in five sub-villages.

Based on the value of significance probability (P-value), can be seen that the value of Asymp. Sig. (2-sided) is 0.024 or less than 0.05 ( $0.024 < 0.05$ ), meaning that there was a difference level of people coping strategy in five sub-villages (Table 8).

There are several factors that pre-assumed have a correlation with the level of coping strategy comprise age, gender, education, occupation, income, household size, building type and landslide experience. The results of correlation analysis are presented in Table 9.

Table 9. Correlation Analysis of People Coping Strategy

Correlations	
Independent variable	Sig. (1-tailed)
Age	.000*
Gender	.000*
Education	.000*
Occupation	.389
Income	.000*
household size	.063
Building_type	.000*
Landslide_exp	.027*

The null hypothesis stated that independent variables do not have a correlation with the dependent variable. Decision-making is based on the null hypothesis that will be accepted if the value of Sig. (1-tailed) > 0.05. From calculations process using SPSS software can be seen that there are six variables that have a sig. (1-tailed) < 0.05, which are age, gender, education,

income, building type and landslide experiences. It can be concluded that the variables that have a correlation with the people coping strategy are age, gender, education, income, building type and landslide experiences. Table 10 is the result of coefficients test that was conducted to determine the influence of one by one independent variable with the dependence factor.

The null hypothesis stated that partially the independent variables not have significant influence with the level of people coping strategy (dependent variables). The decision-making is done using a probability value (P-value) 0.05. If the significance value > 0.05, null hypothesis is accepted. Base on the Table 5.12 can be seen there are only three variables that have significant influence to the level of people coping strategy, that are education, income and building type.

Governments together with other stakeholders undertake a wide range of programs to prevent the occurrence of landslides and to minimize the negative impact because of landslide. The types of coping strategy conducted by the government and NGOs sometimes are not match with local people expectations. So, it is necessary to analyze the public acceptance of coping

Table 10. Coefficients of People Coping Strategy

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.625	.368		7.140	.000
Age	.004	.045	.007	.100	.920
Gender	-.096	.109	-.061	-.879	.382
Education	.195	.063	.248	3.116	.003*
Occupation	-.032	.030	-.071	-1.067	.289
Income	.366	.106	.250	3.455	.001*
Household_size	.047	.060	.047	.793	.430
Building_type	-.511	.088	-.497	-5.823	.000*
Landslide_exp	-.098	.054	-.113	-1.829	.071

a. Dependent Variable: Coping\_strategy

Table 11. Cross Tabulation the Level of People Acceptation and Sub-village

Count		People_ acceptance * Sub_village Crosstabulation					Total
		Sub_village					
		Guyon	Plalar	Salere	Sodong	Ngledoksari	
People_ acceptance	Low	9	7	7	7	1	31
	Moderate	6	5	10	13	1	35
	High	1	2	5	5	14	27
Total		16	14	22	25	16	93

Table 12. Chi-square Test of People Acceptation

	Chi-Square Tests		
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	37.119a	8	.000*
Likelihood Ratio	35.487	8	.000
Linear-by-Linear Association	19.854	1	.000
N of Valid Cases	93		

a. 4 cells (26.7%) have expected count less than 5. The minimum expected count is 4.06.

strategy conducted by the government and other stakeholders. The level of public acceptance to the landslide risk reduction programs shown in the Table 11.

Spatial distribution of the level of respondent's acceptance to landslide risk reduction program was displayed on the Appendix 3. Chi-square test is used to determine the difference of people acceptance related to landslide risk reduction programs within five sub-villages (Guyon, Plalar, Salere, Sodong and Ngledoksari). Chi-square test used the null hypothesis (H0) which stated that there is no difference level of people acceptance in five sub-villages.

The result from the test as mentioned on the Table 12. Base on the value of significance probability (P-value), can be seen that the value of Asymp. Sig. (2-sided) is 0.00 or less than 0.05 ( $0.00 < 0.05$ ) meaning that there was a differences level of people acceptance in five sub-villages. There are several factors that pre-assumed have a correlation with the level of people acceptance comprise age, gender, education, occupation, income, household size, building type and landslide experience. The result from correlation analysis as mentioned in the Table 13.

Table 13. Correlation of People Acceptation

Correlations	
Independent variable	Sig. (1-tailed)
Age	.000*
Gender	.091
Education	.011*
Occupation	.411
Income	.017*
Household size	.447
Building_type	.194
Landslide_exp	.000*

The null hypothesis stated that independent variables do not have a correlation with the dependent variable. Decision-making is based on the null hypothesis that will be accepted if the value of Sig. (1-tailed)  $> 0.05$ . From calculations process using SPSS

software can be seen that there are four variables that have a sig. (1-tailed)  $< 0.05$ , which are age, education, income and landslide experiences. It can be concluded variables that have a correlation with the people acceptance are age, education, income and landslide experiences. Coefficients table is one of output from linear regression analysis which is used to know the influence of one by one independent variable with the dependence variable. The coefficients table as mentioned in the Table 14.

The null hypothesis stated, partially the independents variables not have significant influence with the independent variables. The decision-making is done using a probability value 0.05. If the significance value  $> 0.05$ , null hypothesis is accepted. Base on the Table 13, can be seen there are only three variables that have significant influence to the people acceptance on landslide risk reduction programs, those are age, gender and landslide experience.

The correlations between perception and coping strategy people were known by statistical calculation using correlation analysis see Table 15.

Based on the Table 15 can be explained that the correlation coefficient between perception and people coping strategy is 0.535. Correlation coefficient is higher than 0.5 indicates that the correlation between perception and coping strategy is strong. A positive correlation coefficient shows the correlation between people perception and coping strategy is directly proportional means that the raise of the perception will follow the increasing of the coping strategy.

Null hypothesis (H0) states that there is no correlation between people perceptions and people coping strategy. Analysis using the value of significance probability (P-value) states that H0 is accepted if the probability  $> 0.05$ , and H0 is rejected if probability  $< 0.05$ . From Table 6.21, it can be seen that the value of Asymp. Sig. (2-sided) is 0.000 or less than 0.05 ( $0.000 < 0.05$ ), the decision is H0 is rejected, meaning that there was significant correlation between perception people and people coping strategy.

From Table 16, it can be seen that the correlation coefficient between perception and people acceptance is -0.255. Correlation coefficient is close to null shows that the correlation between people perception and

Table 14. Coefficients Value of Variables of People Acceptation

Model	Coefficients <sup>a</sup>			t	Sig.
	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta		
(Constant)	2.915	.597		4.880	.000
Age	.227	.073	.341	3.128	.002*
Gender	-.423	.178	-.249	-2.382	.019*
Education	.021	.102	.025	.209	.835
Occupation	.085	.048	.177	1.767	.081
Income	-.253	.172	-.160	-1.469	.146
Household_size	.068	.097	.062	.701	.485
Building_type	.097	.143	.087	.677	.500
Landslide_exp	-.382	.087	-.406	-4.371	.000*

a. Dependent Variable: People\_acceptation

Table 15. Correlation Between People Perception and Coping Strategy

		Correlations	
		People_perception	Coping_strategy
People_perception	Pearson Correlation	1	.535**
	Sig. (2-tailed)		.000
	N	93	93
Coping_strategy	Pearson Correlation	.535**	1
	Sig. (2-tailed)	.000	
	N	93	93

\*\* . Correlation is significant at the 0.01 level (2-tailed).

people acceptance are weak. Negative values of correlation coefficient indicate the correlation between people perception and people acceptance is inversely proportional, means that the raise of the people perception will follow the declining of the people acceptance.

Analysis using the value of significance probability (P-value) stated that the the value of Asymp. Sig. (2-sided) is 0.014 or less than 0.05 (0.014 < 0.05), meaning that there was a significant correlation between people perception and people acceptance. The two methods of decision-making produced the same conclusion that there was a significant correlation between people perception and people acceptance. From the Table 6.23, it can be seen that correlation coefficient between people coping strategy and people acceptance is -0.085. The value of correlation coefficient is close to null shows that the correlation between people coping strategy and people acceptance is very weak. Negative correlation coefficient values indicate the relationship between people coping strategy and

people acceptance is inversely proportional, means that the raise of the people coping strategy will follow the declining of the people acceptance.

Analysis using the value of significance probability (P-value) stated that the value of Asymp. Sig. (2-sided) is 0.419 or greater than 0.05 (0.419 > 0.05), meaning that there was no correlation between people coping strategy and people acceptance. Finally, the two methods of decision-making produced the same conclusion that there was no correlation between people coping strategy and people acceptance (Table 17).

### 3. Result and Discussion

Governance is the processes and institutions, both formal and informal, that guide and restrain the collective activities of a group (Nye and donahue, 2000 cited from lomagin, 2010). According to the IRGC (2011), risk governance framework consists of five basic components include a pre-assessment, risk management, risk appraisal, tolerability and acceptability judgment and risk communication. In tis research, analysis of

Table 16. Correlation Between People Perception and People Acceptation

		Correlations	
		People_perception	People_acceptation
People_perception	Pearson Correlation	1	-.255*
	Sig. (2-tailed)		.014
	N	93	93
People_acceptation	Pearson Correlation	-.255*	1
	Sig. (2-tailed)	.014	
	N	93	93

\*. Correlation is significant at the 0.05 level (2-tailed).

Table 17. Correlation Between People Perception and People Acceptation

		Correlations	
		People_acceptation	Coping_strategy
People_acceptation	Pearson Correlation	1	-.085
	Sig. (2-tailed)		.419
	N	93	93
Coping_strategy	Pearson Correlation	-.085	1
	Sig. (2-tailed)	.419	
	N	93	93

risk governance framework is limited to the three components including stakeholder involvement, risk management and risk communication. Analysis of risk governance framework at the district scope and sub-district scope was done using a questionnaire tools with close-ended question and depth interviews with stakeholders, both government and non government institution.

Based on the data analysis, the level of stakeholder involvement at the district level showed that the level of stakeholder involvement on disaster activities in Karanganyar is moderate till high. Base on the data analysis, 45.8% of respondents stated that stakeholder involvement in Karanganyar District categorized in the moderate level, 37.5% respondents stated that the level of stakeholder involvement of the risk governance framework is high and the rest (16.7%) respondents stated that stakeholder involvement of the risk governance framework is low. On the sub-district scope, 50% of respondents stated that stakeholder involvement in Tawangmangu Sub-district categorized in the high level, 41.7% respondents stated that the level of stakeholder involvement of the risk governance framework is moderate and the rest (8.3%) respondents stated that the level of stakeholder involvement at sub-district level is low.

Based on the data analysis was known that 45.8% of respondents stated that risk management at

Karanganyar categorized into high and moderate and 8.3.5% respondents stated that the risk management in Karanganyar categorized on the low level. On the sub-district scope, 37.5% of respondents stated that risk management level in Tawangmangu Sub-district categorized in the high level, 50% respondents stated that the level of risk management is moderate and the rest (12.5%) respondents stated that the level of risk management at sub-district level is low.

Based on the data analysis can be explained that 50% of respondents stated that risk communication in Karanganyar District categorized as moderate level, 33.3% respondents have opinion that risk communication among stakeholders categorized into high level and 16.7% of respondents stated that risk communication among stakeholders was categorized on the low level. On the sub-district scope, 25% of respondents stated that risk communication level in Tawangmangu Sub-district categorized in the high level, 62.5% respondents stated that the level of risk management of the risk governance framework is moderate and the rest (12.5%) respondents stated that the level of risk management at sub-district level is low.

Analysis on the components of risk governance framework that need to be improved shows that on the stakeholder involvement, improvement must be done on the three elements, those are data management, the pattern of relationships among

stakeholders and increased participation of NGOs in disaster activities. There are two elements that need improvement on the risk management component; those are constructed and updated landslide risk map and enhancement of microfinance role in helping the community when disaster strikes. Improvements to the risk communication component must be done to the dissemination of information about the landslide to the local community.

#### 4. Conclusion

The research related to people perception on landslide becomes important because by knowing the people perception about landslide will be known the response of people to survive and to cope from landslide in the future. People's perception of landslides at the research site categorized on the high and moderate levels. Thus, the level of people's knowledge related to landslides can also be categorized in the high and moderate. The level of people's perception of landslides was influenced by two factors, those are education and age. The higher of education level of respondents, the higher of perception level, whereas the older age of respondent, the lower of perception level related to landslides.

There was a positive correlation between people perception and people coping strategy, meaning that the raise of the perception will follow the increasing of the coping strategy. The high level of people perception related to landslides have affected the level of people coping strategy will be high. Coping Strategy that be conducted by local people related with landslide can be performed in the household scope and community scope. On the household scope, coping strategies focusing on increasing income by selling agricultural product, strengthening building, applied soil conservation on agricultural land and participate in pengajian and arisan. On the community scope, coping strategies focusing on strengthening koperasi and arisan, construct public facilities such as roads, water channel, installation of gabion and retaining wall, night patrol activities and held traditional ceremony was called Ruwahan and Suroan. The levels of coping strategy influenced by the level of education, income and building type. The increasing levels of people education will be followed by increase of people knowledge to the various types of coping strategies. It will have an impact on the raise of public awareness both individuals and community in applying the various coping strategies to deal with landslides. Income and building type are an indicator of social economic of respondents. The higher the income indicate the higher coping strategies levels. The higher levels of income also affects the type of building. People with high income levels would build permanent houses that made of brick and concrete. The permanent house has a higher strength

than semi-permanent or not permanent building. So that, people with permanent building has a lower level of vulnerability than the people who live in the non-permanent or semi-permanent building.

Society either individually or in groups have done various coping strategy to prevent the occurrences of landslides in the future and to minimize negative impacts due to landslides. Beside the local community, government and non-government organizations are also implementing coping strategies to reduce the risk of landslides. Landslide risk reduction program conducted by the government and non-government sometimes does not in line with the wishes and expectations of the people who live in landslide prone areas, so that, it is necessary to analyze of the level of public acceptance to the landslide risk reduction programs undertaken by government and non-government organizations. The government as a main actor and the owner of authority on disaster mitigation conducted various landslide risk reduction programs that carried out before, during and after landslide occurrences. Landslide risk reduction programs conducted by the government and non-government organizations have to evaluate in order to avoid overlapping of programs and to minimize miss communication among stakeholders. Analysis of risk governance framework is one of tools that can be used to evaluate the governance of disaster within the district and sub-district scope. In this research, there are three elements of risk governance framework that analyzed including the stakeholder involvement, risk management and risk communication.

The results of analysis is showed that stakeholder involvement at Karanganyar District categorized in the moderate level and at Tawangmangu Sub-district categorized in the high level. Risk management at Karanganyar categorized at the high and moderate level and at Tawangmangu Sub-district categorized in the high level. Risk communication in Karanganyar District categorized as moderate level and at Tawangmangu Sub-district categorized in the high level. There are several components that need to be improved including data management, the pattern of relationships among stakeholders, participation of NGOs in disaster activities, constructed and updated landslide risk map, enhancement of microfinance role in helping the community when disaster strikes and enhancement of dissemination about landslide to the local community.

#### Acknowledgement

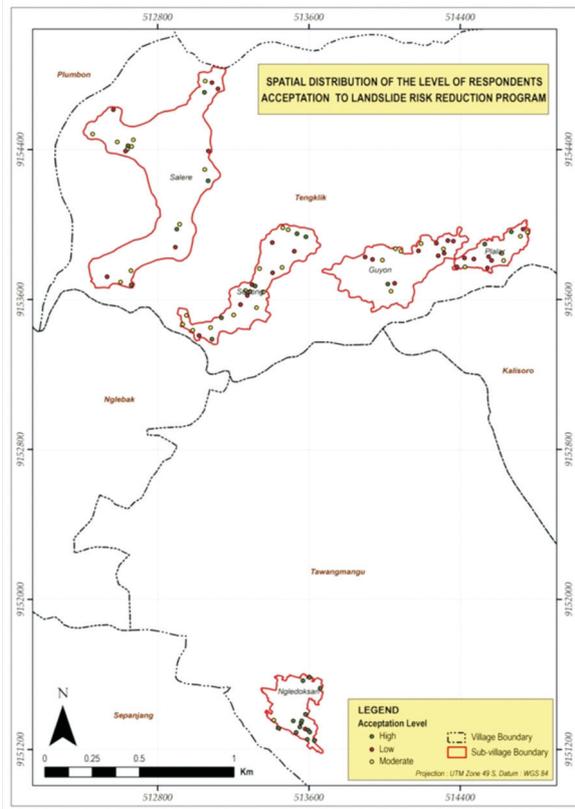
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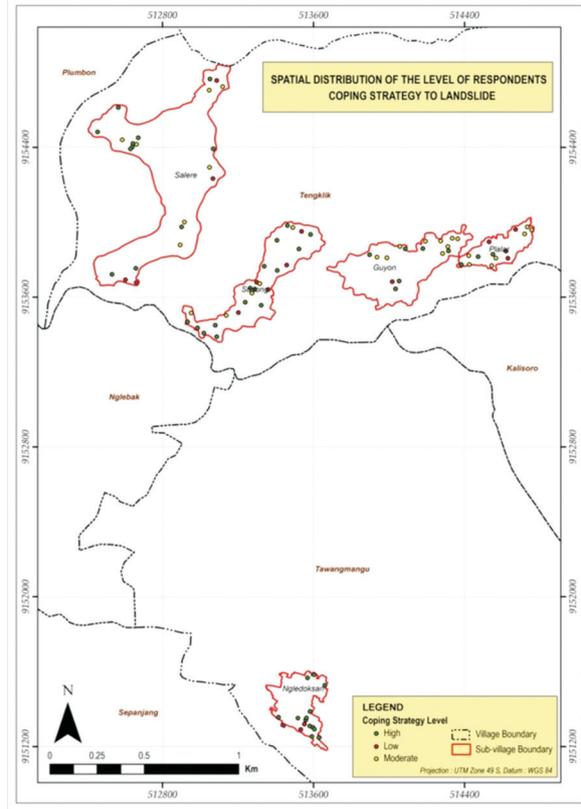
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APPENDICES

Appendix 1. Spatial Distribution of the Level of Respondent's Perception to Landslide



Appendix 2. Spatial Distribution of the Level of Respondent's Coping Strategy to Landslide.



Appendix 3. Spatial Distribution of the Level of Respondent's Acceptation to Landslide Risk Reduction Program.

