



Strengthening Creative Industries through Technology and Disaster Risk Mitigation

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Abstract. This research explores how the creative economy actors work in the Mount Merapi disaster area understand the risks of volcanic disasters, whether they are able to mitigate risks well. This study reflects the performance of creative economy actors through individual community attributes and aspects of disaster risk reduction. The results of the study show that individual profiles such as marital status, education level, and income are factors that determine the decisions of MSME in Sleman Regency in carrying out disaster mitigation. Likewise, with easier access to information via the internet and social media, MSMEs are able to better mitigate disasters. The creative industry in Sleman Regency has also mitigated the risk of natural disasters that can affect business continuity

Keywords: creative industries, MSMEs, information technology, disaster risk mitigation

1 Introduction

Society as a community that lives in a place needs to recognize potential disasters that could occur where they live [1]. Apart from school communities, village communities, in this case village institutions, are also very important to increase their capacity for disasters. Potential disasters at tourist locations need to be considered and understood, so that tourists will feel safe if at any time a disaster occurs at that location. The need for collaboration between agencies, both government and society, will be very helpful in reducing the risk of disasters that occur [2]. Increasing community preparedness capacity by recognizing the potential for disasters in tourist areas will increase community awareness of disasters that occur. The Ministry of Tourism and Creative Economy states that natural tourist destinations cannot be separated from disaster mitigation. Tourism areas are expected to be required to have a disaster resilient tourism development plan based on the vulnerability of the region [3]. Disaster risk reduction is not only the responsibility of tourism managers or village governments as owners of tourist attractions, but requires Pentahelix collaboration consisting of the private sector, government, community, academics and media to play a role in disaster management [4].

Sustained development of the creative economy is carried out with the concept of resilience [5], namely maintaining the resilience of economic, social, environmental and institutional systems and behavior by empowering all potential economic resilience. This is in order to face economic uncertainty and disaster challenges by anticipating all factors that cause the creative economy to be vulnerable for the sake of sustainable development of the creative economy so that it has economic resilience. Sleman Regency, as an area directly bordering Mount Merapi, is vulnerable to the impacts of this disaster. The government and various related institutions have made disaster mitigation and management efforts to protect the community and reduce the risks posed by the eruption of Mount Merapi. Mitigation is defined as actions taken before a

disaster occurs with the aim of minimizing or eliminating the impact of a disaster on society and the environment [6]. Disaster mitigation is a series of actions taken to reduce risks, minimize impacts, and prepare for disasters [7].

This research tries to understand this further and explores how creative economy actors on the slopes of Merapi understand disaster risks. This research tries to reflect the performance of creative economy actors through individual community attributes and disaster risk reduction aspects. The state of the art of this research lies in the collaboration of disaster research with strengthening the creative economy sector which has not been done before in the disaster-prone area of Merapi. Much research has been conducted on disasters, but only focuses on the preparedness of individual communities living in disaster-prone areas of Merapi [5], Sinabung and Kelud [8], Semeru [9], and German et al [10] in the Philippines.

2 Literature Review

The Merapi disaster in Sleman Regency refers to a series of disasters related to the eruption of Mount Merapi in the area. Mount Merapi is one of the most active volcanoes in Indonesia and is located on the border of Sleman Regency with Magelang Regency and Klaten Regency, in the Special Region of Yogyakarta. The eruption of Mount Merapi can cause various disasters, including volcanic eruptions, lava and hot clouds [11]. Volcanic eruptions can produce dangerously hot lava flows, emitting smoke, volcanic ash and incandescent rocks thrown into the air. Lava is a flow of hot mud that occurs when rain dissolves volcanic material that has accumulated on a mountain slope, while hot clouds are bursts of hot gas, dust and rock that are trapped on a mountain slope and move quickly down the mountain slope.

Mitigation efforts include monitoring the activity of Mount Merapi through observation and a sophisticated early warning system, evacuating residents in danger zones when there is a threat of eruption, as well as providing evacuation sites and necessary logistics. Apart from that, the government also provides outreach to the public regarding mitigation measures and preparation for disasters. After the eruption, disaster management efforts were carried out, including cleaning and restoring affected areas, providing assistance to victims, as well as relocating or diverting residents from high-risk areas to safer places. Collaboration between the government, research institutions, volunteers and local communities is very important in dealing with disasters. With awareness of risks and preparedness in facing disasters, it is hoped that we can reduce the negative impacts caused and protect the safety and welfare of the people in the region [12].

People-centered approach is important in disaster mitigation [13]. Involving individuals in making decisions related to risk is a form of responsibility, empowerment and active community participation in disaster mitigation. However, it is not easy to eliminate the disaster trauma experienced by individuals, so they are vulnerable to possible exposure to subsequent natural disasters [14]. Likewise, society's apathy towards disaster preparedness is because natural disasters are something that will happen and no human being can stop disasters [15]. For this reason, it is important to provide understanding to the public about the need for disaster mitigation efforts so that the risks posed are lower, the community is even able to adapt quickly after a disaster and the economy can recover more quickly.

Technology plays an important role in disaster mitigation efforts. Utilization of disaster information can be in the form of digital technology innovation to make early action and preparedness effective in maintaining national security, especially in relation to post-disaster

dynamic political event forecasting. A strategy for developing innovation in natural disaster prediction systems is urgently needed to develop natural disaster prediction systems in accordance with the concept of society 5.0. As is the case, the use of Artificial Intelligence, Machine Learning and Deep Learning technology. As well as internal and cross-agency collaboration and synergy (pentahelix).

The creative economy is a concept that includes various economic activities which involve the production, distribution and utilization of creativity, intellectual skills and knowledge. This is an economic sector that is growing rapidly and has various industries and subsectors, such as arts and culture, media and entertainment, design, architecture, fashion, culinary, information and communication technology and other creative industries. Technology is a key factor in production, ICT and the creative economy are one of the most widely used technologies in this industry. The presence of ICT has established a pattern of working, producing and distributing more efficiently which has resulted in greater fierce market competition finding ways to produce at competitive costs in the market. IT in the corporate world is not only used as a means for transactions, but also used as a way to introduce economic benefits.

Different from other industries, the creative economy does not only use technology as a tool to achieve efficiency, but as a source of productivity. In the context of the creative economy, technology is one of the creative platforms, that is, creative economic actors not only use IT as a tool to reduce costs in the process of generating or creating income, but also as a basis for creativity in production. Sleman Regency continues to strive to improve the quality of development and management of the creative economy in its region. This is considering the fairly rapid development of the creative economy in recent years. Sleman Regency has three superior sub-sectors out of 17 creative economy sub-sectors. Apart from the video, film and animation sub-sectors, there are also the performing arts sub-sectors and the bamboo crafts sub-sector. For this reason, future management of the creative economy must be able to reach all 17 subsectors of the creative economy.

3 Research Methods

Research data was obtained using a survey method through questionnaires distributed to MSMEs in the creative economy sector who live on the slopes of Mount Merapi. Research data analysis is logistic regression, which is a data analysis technique that uses mathematics to find the relationship between two data factors. It then uses this relationship to predict the value of one of these factors based on the other factors. Predictions usually have a limited number of outcomes, such as yes or no. In this study, logistic regression is used to assess which sub-variables in the individual profile are significant predictors of disaster risk mitigation in society.

$$\text{Risk Mitigation} = \beta_0 + \beta_1 \text{Gender} + \beta_2 \text{Marital} + \beta_3 \text{Edu} + \beta_4 \text{Income} + \beta_5 \text{Tech} + \beta_6 \text{Creative} + \varepsilon \quad (1)$$

Risk Mitigation is disaster risk mitigation by MSMEs (mitigating risk=1, not mitigating risk=2). Gender (male=1, female=0). Marital refers to marital status (married=1, not married=0). Edu indicates education level (primary education=1, secondary education=2, higher education=3). Tech is social media and internet activities (active = 1, inactive = 0). Creative indicates the MSME business sector (creative industry=1, others=0).

4 Results and Discussion

Community vigilance in disaster-prone areas is very important to minimize risks and reduce the impact of disasters. Community vigilance in the disaster-prone areas is a joint responsibility between the government, local authorities and the community itself. By increasing awareness, planning and preparation, communities can be better prepared to face disasters and protect themselves and those around them. In the context of disaster mitigation, the use of appropriate technology and innovation continues to develop. This aims to improve understanding, monitoring, early warning, risk reduction, disaster management and public awareness. By utilizing technology effectively, we can strengthen disaster mitigation efforts and protect human lives and assets from the threat of disaster.

Table 1. Regression results

Dependent Variable: RISK MITIGATION
 Method: ML - Binary Logit (Newton-Raphson / Marquardt steps)
 Convergence achieved after 4 iterations
 Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-0.977145	0.658106	-1.484785	0.1376
GENDER	0.233620	0.382654	0.610525	0.5415
MARITAL	1.917816	0.476133	4.027902	0.0001
EDU	1.110358	0.334275	3.321692	0.0009
INCOME	0.763620	0.176284	4.331769	0.0000
TECH	1.113620	0.412344	2.700710	0.0069
CREATIVE	0.948950	0.365224	2.598272	0.0094
McFadden R-squared	0.252743	Mean dependent var		0.590000
S.D. dependent var	0.493068	S.E. of regression		0.418496
Akaike info criterion	1.081575	Sum squared resid		33.80186
Schwarz criterion	1.197016	Log likelihood		-101.1575
Hannan-Quinn criter.	1.128292	Deviance		202.3150
Restr. deviance	270.7434	Restr. log likelihood		-135.3717
LR statistic	68.42846	Avg. log likelihood		-0.505787
Prob(LR statistic)	0.000000			
Obs with Dep=0	82	Total obs		200
Obs with Dep=1	118			

Table 2. Goodness-of-fit evaluation

Goodness-of-Fit Evaluation for Binary Specification
 Andrews and Hosmer-Lemeshow Tests
 Grouping based upon predicted risk (randomize ties)

	Quantile of Risk		Dep=0		Dep=1		Total Obs	H-L Value
	Low	High	Actual	Expect	Actual	Expect		
1	0.0281	0.2102	20	17.5052	0	2.49476	20	2.85029
2	0.2102	0.3367	15	14.9970	5	5.00301	20	2.4E-06
3	0.3635	0.4081	10	12.1405	10	7.85948	20	0.96036
4	0.4081	0.5058	8	10.7617	12	9.23828	20	1.53432
5	0.5105	0.6073	10	8.57642	10	11.4236	20	0.41370
6	0.6073	0.6614	6	7.13980	14	12.8602	20	0.28298
7	0.6767	0.7692	4	5.12850	16	14.8715	20	0.33396
8	0.7692	0.8769	5	3.37570	15	16.6243	20	0.94028
9	0.8769	0.9474	3	1.72777	17	18.2722	20	1.02538
10	0.9474	0.9967	1	0.64733	19	19.3527	20	0.19856
	Total		82	82.0000	118	118.000	200	8.53984
H-L Statistic			8.5398			Prob. Chi-Sq(8)	0.3826	
Andrews Statistic			30.0900			Prob. Chi-Sq(10)	0.0008	

In general, in areas that have experienced earthquakes, there is a chance that the disaster will recur. It will be very possible if Mount Merapi will experience an eruption due to a volcanic earthquake. Efforts to mitigate natural disasters are not only carried out at the time of post-disaster but must start at pre-disaster and disaster response activities. As a preventive activity, disaster mitigation at the pre-disaster stage will greatly help to reduce the risk of disaster impacts, especially in disaster-prone areas. Based on the results of the study, it shows that individual profiles such as marital status, education level, and income are factors that determine the decisions of MSME actors in Sleman Regency in carrying out disaster mitigation. Likewise, with easier access to information via the internet and social media, MSMEs are able to better mitigate disasters. The creative industry in Sleman Regency has also mitigated the risk of natural disasters which could affect business continuity.

5 Conclusion

Creative economic development covers various aspects, including social and disaster aspects. Overall, the development of the creative economy not only has economic benefits, but also has a positive impact in social and disaster aspects. This includes community empowerment, cultural preservation, increasing social welfare, post-disaster recovery, innovation and adaptation, and increasing community resilience.

The creative economy has an important role in building resilience to disasters. In the context of this research, the creative economy has been proven to be able to reduce economic, social and environmental risks associated with disasters. The creative economy contributes to community empowerment in facing disasters. Community participation in creative economic activities can strengthen local capacity in managing risks and increasing adaptation to disasters. Technological innovation also plays an important role in increasing the efficiency and sustainability of the creative economy sector, such as the use of environmentally friendly technology and digital-based solutions.

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