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DEVELOPMENT OF DISASTER KNOWLEDGE MEASUREMENT INSTRUMENT FOR VISITORS IN VOLCANIC TOURISM AREAS

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ABSTRACT

This study aims to develop an instrument to measure the disaster knowledge of the visitors of volcanic disaster-prone tourism area. This study is a design and development research, using test development procedure stated by Oriondo & Dallo-Antonio. The test development procedures are (1) designing or drafting test, (2) field testing, (3) measuring validity, (4) measuring reliability. The field test was done by online test on 123 respondents that were sampled by convenience sampling. The test instrument analysis was done by expert judgement, the objective validity test based on Rasch Model and the reliability test based on K-20 reliability test. The objective validity and reliability test were done using Quest program. The test results showed that the instruments are valid and reliable. The objective validity test showed that 31 items on the instruments fit with Rasch model with the items range of INVIT MNSQ score are 0.88-1.11 and the items range of OUTFIT T are -1 to +1.2. The item reliability score is 0.96 and the case reliability score is 0.59. Based on the validity and reliability tests results, the instrument is qualified to measure the volcanic disaster-prone tourism area visitors' disaster knowledge.

Keywords: *Disaster knowledge, Instrument development, Tourism area, Volcanic.*

INTRODUCTION

Indonesia is a country that has a variety of natural tourist attractions because it has various beautiful natural landscapes. However, this natural tourist attraction followed by the risk of natural disasters. Indonesia is one of the disaster-prone countries (BNPB, 2012). In 2018 and 2019 alone, BNPB recorded 2,573 and 1,426 natural disasters in Indonesia (www.bnpb.go.id).

The tourism industry is susceptible to crises and disasters (Mair, Ritchie, & Walters, 2016). One of the natural tourist attractions in Indonesia that has a major disaster risk is the volcanic area. Indonesia's geographical location on the Ring of Fire causes Indonesia to have many active volcanoes. The Mount Merapi disaster-prone area in Sleman Regency, Special Region of Yogyakarta (DIY) is a tourism area with high number of visitors.

Mount Merapi as one of the most active volcanoes in the world has a very high threat of eruption (Surono, Jousset, Pallister, Boichu, Buongiorno, Budisantoso, Costa, Andreastuti, Prata, Schneider, Clarisse, Humaida, Sumarti, Bignami, Griswold, Carn, Oppenheimer, &

Lavigne, 2012; Thouret, Lavigne, Kelfoun, & Bronto, 2000). Even though it is prone to disasters, the tourism sector in this area, especially in Disaster Prone Areas (KRB) II and KRB III, is developing progressively and has become an important source of income for local communities after the large eruption of Mount Merapi in 2010 (BNPB, 2012).

The number of visits to the disaster-prone tourism area of Mount Merapi is always high even when Mount Merapi is on alert status. Meanwhile, the threat of Mount Merapi eruption may increase due to the increase in the number of local residents and the development of tourism around the area (Widodo and Hastuti, 2019). The condition of disaster-prone tourism areas with very diverse tourist characteristics can cause a high risk of disaster for visitors, especially when a disaster occurs (World Tourism Organization, 1998).

The disaster-prone tourism area of Mount Merapi is equipped with an early warning system in case of disaster, but this is far from enough. Sukhyar (2020), explained that a good early warning system alone is not enough to prevent fatalities. Moreover, according to Wibowo et al. (2016), based on GIS analysis, the early warning system sirens have not reached all disaster-prone areas of Mount Merapi yet. Thus, more efforts are also needed to ensure that people at risk have readiness and resilience in facing the threat of volcanic eruptions. People at risk are people who live or carry out activities in disaster-prone areas, including tourist visitors.

One of the relevant actions to ensure readiness and resilience in facing the disaster threats for visitors as people at risk is to measure the level of disaster knowledge and awareness of the visitors. The knowledge of disaster risk is a critical factor in disaster preparedness (LIPI and UNESCO/ISDR, 2006). Preparedness is a series of activities carried out to anticipate disasters through organizing the appropriate and effective steps (Republik Indonesia, 2007). The knowledge of disaster includes general knowledge of disasters; disaster warnings, symptoms/signs of a disaster; and actions when a disaster occurs.

Several studies related to measuring disaster awareness and disaster knowledge for people at risk in vulnerable tourism area include: knowledge and disaster awareness of Parangtritis beach tourists (Aini & Helfi, 2019), description of community disaster preparedness knowledge in Garut (Agustini, Ayu, & Sandra. 2020), and public awareness of the tsunami disaster in Banten (Sari & Dessy, 2022).

Most of the research related to disaster awareness and knowledge was carried out using open interview instruments, as well as self-assessment using a Likert scale. There is no instrument for measuring disaster knowledge through an objective test instrument yet, especially for people at risk in volcanic areas. The test instruments can measure knowledge more objectively based on predetermined standards compared to the perception of one's knowledge. Based on the introduction, this research will develop a test instrument to measure the visitor's knowledge about disasters in disaster-prone volcanic tourism area.

RESEARCH METHODS

This research is a Design and Development research to develop a test instrument. The test instrument development procedure follows the test creation procedures suggested by Oriondo & Dallo-Antonio (1984), namely: (1) test design, (2) field testing, (3) determining validity, and (4) determining reliability.

The samples that were used in the field test trials were taken from an infinite population and were determined using the convenience sampling method, which is determining samples based on certain criteria (Sugiyono, 2020). The inclusion criteria were the purpose of the respondents who had visited the disaster-prone tourist area of Mount Merapi for tourism, were over 17 years old, and had visited in the last 5 years. Based on these criteria, the samples of 123 people were obtained.

The data analysis was done by testing the validity and reliability of the instrument. Instrument validity was carried out by testing logical validity by expert judgement, and empirical validity by the field test validity result. The empirical validity tests and instrument reliability tests were carried out using the Quest program. Empirical validity test of the instrument is based on the Item Response Theory (IRT) Rasch Model (Mardapi, 2012). All items are considered as fit to the model and are declared valid at a 5% confidence level if the means of INFIT MNSQ value is close to 1.0 and the standard deviation is close to 0.0. Apart from that, an item is declared fit to the model if the INFIT and OUTFIT MNSQ value is in the

range of 0.77 to 1.30 (Adam & Kho, 1996) and the OUTFIT t value is in the range of -2 to +2. The instrument reliability test used the K-20 reliability test for dichotomous items. The reliability criteria were based on the reliability criteria according to Istiyono (2018), which were: r value <0.2 (very low), 0.2 < r <0.4 (low), 0.4 < r 0.6 (medium), 0.6 < r <0.8 (high), 0.8 < r <1 (very high).

RESEARCH RESULTS

The disaster knowledge test instrument for visitors of the Mount Merapi disaster-prone tourism area consists of 41 knowledge test items on the Guttman scale. The Guttman scale consists of questions with two answers of choice (right or wrong). If the answer is correct, it is valued as 1 and if the answer is wrong it is valued as 0. The Guttman scale was chosen because the answer choices are firm and consistent (Arikunto, 2017). Indicators of disaster knowledge for volcano tourism visitors are explained in Table 1.

Table 1. Indicators of Disaster Knowledge for Volcano Tourism Visitors

Disaster Knowledge Component	Indicators
General Knowledge (LIPI and UNESCO/ISDR, 2006; Sutton and Tierney, 2006; Raja, Hendarwan, and Sunardi, 2017)	1. Recognize the volcanic eruptions as catastrophic events. 2. Mention the material produced when a volcano erupts. 3. Know the threat of active volcanoes. 4. Know the threat of volcanic eruption. 5. Estimate the direct impacts caused by volcanic eruption disasters. 6. Estimate other threats from large volcanic eruptions. 7. Knowing the unpredictability of the volcanic eruptions. 8. Understanding tourism areas that are prone to volcanic eruptions. 9. Explain the threats in disaster-prone tourism areas. 10. Assess the risks of tourism activities in disaster-prone areas. 11. Recommend things that should be in tourism areas prone to volcanic disasters. 12. Interpreting threats in the disaster-prone volcanic tourism area. 13. Determine a safe place during a volcanic eruption. 14. Know the main causes of volcanic eruptions. 15. Mention natural signs that may occur before a volcanic eruption.
Disaster Warning, sign of disaster occurrence (LIPI and UNESCO/ISDR, 2006; Sutton and Tierney, 2006; Raja et al., 2017)	1. Interpret the natural signs of a volcanic eruption and decide what self-preservation actions must be taken. 2. Determine what action to take when hearing an early warning. 3. Analyze the volcanic eruption that occurred and decide on self-saving actions that must be taken.
Actions when a Disaster Occurs (LIPI and UNESCO/ISDR, 2006; Sutton and Tierney, 2006; Raja et al., 2017)	1. Determine self-saving actions in buildings when hearing early warnings of volcanic eruptions. 2. Recognize the volcanic eruptions as catastrophic events.

Source: Primary Data Analysis, 2023.

The instrument was validated by 2 experts who were a volcanic disaster expert and an instrument expert. Based on the results of the expert judgment, it is necessary to revise the items before conducting a field trial. Input from the expert validators and instrument experts includes the relevance of required disaster items, readability, and the relevancy of the item to the measurement objectives. After the instrument was revised, then it was tested for empirical validity and reliability in a field test.

The empirical validity test was carried out with the Quest program based on the Rasch Model to see the suitability of the items to the Model. The results of the validity analysis test in Table 2 showed that the mean of INFIT MNSQ before item elimination is 1 with deviation 0.08. The mean of OUTFIT MNSQ is 1.11 with deviation 0.59. Both INFIT MNSQ and OUTFIT MNSQ fulfill Rasch Model criteria which is the INFIT and OUTFIT score close to 1 with deviation close to 0. The mean of INFIT T is -0.07 with deviation 1.19 while the mean of OUTFIT T is 0.14 with deviation 1.01. Both INFIT T and OUTFIT T fulfill the fitness criteria of Rasch Model which is -2 to +2. The range of INFIT MNSQ is 0.84 to 1.18. This range of INFIT MNSQ score passed the Rasch Model criteria that is 0.77 to 1.33. The range of OUTFIT MNSQ is 0.47 to 4.20 is not fit with Rasch Model because it is outside the range of 0.77 to 1.33. There are also 4 items that unfit with Rasch model because they had perfect scores.

Based on the result, there are items that do not fit with Rasch Model, therefore, the items were analyzed individually to know which item that were unfit with Rasch Model. The result of individual item analysis shown that there are 4 items with perfect scores (items 23, 24, 25, 26). There are also items with MNSQ OUTFIT values outside of the Rasch Model fitness range of 0.77-1.33 (items 11, 31, 34), items with INFIT T value outside of the Rasch Model fitness criteria of -2 to +2 (items 9, 28, 39), and (4) items with the OUTFIT T value do not fit with Rasch Model fitness criteria (item 11). The 10 items that did not fit with the model (items no. 9, 11, 23, 24, 25, 26, 28, 31, 34, 39) were then removed.

Table 2. Results of Item Analysis Before and After Item Elimination (A=0.05)

Criteria	Item estimate before items elimination	Item estimate after items elimination
Mean and SD of INFIT MNSQ	1 ± 0.08	1 ± 0.06
Mean and SD of OUTFIT MNSQ	1.11 ± 0.59	1 ± 0.16
Mean and SD of INFIT t	-0.07 ± 1.19	0.04± 0.62
Mean and SD of Outfit t	0.14 ± 1.01	0.04 ± 0.64
Range of INFIT MNSQ	0.84 to 1.18	0.88 to 1.11
Range of OUTFIT MNSQ	0.47 to 4.20	-1 to +1.2
Item perfect score	4	0

Source: Primary Data Analysis, 2023.

After the unfit items were removed, the value of Means and deviation of INFIT MNSQ is 1 ± 0.6, Means and deviation of OUTFIT MNSQ is 1.06 ± 0.16, Means and SD of Infit t is 0.04 ± 0.62, Means and SD of Outfit t is 0.04 ± 0.64, and there is no item with perfect score.

The value of INFIT MNSQ for each item is in the range of 0.88-1.11, and the value of OUTFIT T for each item is on the range of -1 s/d +1.2. These values means that all of the criteria fit with Rasch Model. The reliability test results showed that the reliability value for items after item elimination is 0.97 and the reliability value for case/person is 0.59.

DISCUSSIONS

The importance of visitor's knowledge about disaster alongside infrastructure, and emergency response system, are vital to the disaster preparedness of a tourism area. Cakar and Aykol, (2023) research showed that pre-existing disaster knowledge shapes tourists' decision-making during unforeseen incident. Knowledge about potential risks, evacuation routes, and basic survival skills instigate a sense of danger and control, enabling visitors to respond effectively in the face of danger. Sharifpour et al. (2014) further emphasize the correlation between knowledge and perceived risk, with informed individuals demonstrating greater preparedness and less anxiety amidst

disaster scenarios. Therefore, the development of a high-quality standardized test to measure visitor's knowledge about disaster in a tourism area is important.

Instruments that have a good quality can measure precisely the object or subject being measured according to the purpose of the measurement. The quality criteria for the instrument can be analyzed by the validity and reliability of the instrument. In this instrument, the validity analyses were logical validity and empirical validity analysis. Logical validity measures the accuracy of the instrument's content through the judgment of the experts, who are a volcanic disaster expert and an instrument expert. Empirical analysis was analyzed based on item responses (Item Response Theory) using the Rasch Model (Mardapi, 2012; Sumintono, and Widiharso, 2015).

Based on the result of the test validity, 5 criteria fit with Rasch Model, while 2 criteria did not. The criteria that unfit with Rasch Model are the Range of OUTFIT MNSQ of the questionnaire items in general, and the existence of items with perfect scores. High value of outfit means-square means that there are items with high outliers as the result of a few random responses by low performers (Linacre, 2002). Items with perfect scores means that the items are too easy or they contain questions about general knowledge that is known generally, thus the question can be answered correctly by all respondents. Based on that result, the items were analyzed individually to determine which item that did not fit with model.

Table 3. Items fitness with Rasch Model

No	Item (Statement in Indonesian)	Fitness
1	*Semua gunung api aktif berpotensi untuk erupsi.*	Fit
2	*Erupsi gunung api dapat diperkirakan waktu terjadinya.*	Fit
3	*Erupsi gunung api termasuk kejadian bencana.*	Fit
4	*Tempat wisata yang saya kunjungi (di atas) dekat dengan sumber bencana tetapi tidak termasuk kawasan rawan bencana.*	Fit
5	*Tempat wisata pasti terjamin aman meskipun termasuk kawasan rawan bencana.*	Fit
6	*Ketika mengalami erupsi, gunung api mengeluarkan magma, abu vulkanik dan tanah subur.*	Fit
7	*Penyebab utama terjadinya erupsi gunung api adalah gempa bumi.*	Fit
8	*Ancaman utama saat terjadi erupsi gunung api adalah banjir lahar dingin.*	Fit
9	*Anda sedang di kawasan lereng Gunung Merapi dan mendengar suara gemuruh padahal tidak mendengar adanya peringatan bencana, maka Anda akan memilih untuk segera menghubungi petugas daripada meninggalkan lokasi.*	Unfit
10	*Jika melihat fenomena seperti gambar di bawah, maka Anda lebih memilih untuk menunggu informasi dari petugas daripada segera meninggalkan lokasi.*	Fit
11	*Pada erupsi Gunung Merapi yang pernah terjadi, awan panas adalah hal yang paling mengancam.*	Unfit
12	*Terjadinya erupsi gunung api dapat menyebabkan dampak langsung berupa peningkatan kesuburan tanah.*	Fit
13	*Terjadinya erupsi gunung api dapat menyebabkan dampak langsung berupa penambahan daya tarik wisata.*	Fit
14	*Terjadinya erupsi gunung api dapat menyebabkan dampak langsung berupa kerusakan lingkungan.*	Fit
15	*Terjadinya erupsi gunung api dapat menyebabkan dampak langsung berupa kerusakan bangunan.*	Fit
16	*Terjadinya erupsi gunung api dapat menyebabkan dampak langsung berupa korban jiwa manusia.*	Fit
17	*Erupsi gunung api yang besar dapat memicu terjadinya bencana lain seperti gempa bumi dan tsunami.*	Fit
18	*Jika Gunung Merapi memiliki ancaman bencana erupsi, maka aktivitas wisata "menyaksikan erupsi gunung api dari jarak dekat tanpa tour guide" termasuk kegiatan berisiko.*	Fit
19	*Jika Gunung Merapi memiliki ancaman bencana erupsi, maka aktivitas wisata "menyaksikan erupsi gunung api dari jarak dekat dengan pendampingan tour guide" termasuk kegiatan berisiko.*	Fit

No	Item (Statement in Indonesian)	Fitness
20	*Jika Gunung Merapi memiliki ancaman bencana erupsi, maka aktivitas wisata "menelusuri bekas jalur aliran lava erupsi gunung api tanpa tour guide" termasuk kegiatan berisiko.*	Fit
21	*Jika Gunung Merapi memiliki ancaman bencana erupsi, maka aktivitas wisata "menelusuri bekas jalur aliran lava erupsi gunung api dengan didampingi tour guide" termasuk kegiatan berisiko.*	Fit
22	*Jika destinasi wisata di kawasan Gunung Merapi memiliki risiko bencana, "peta wisata" akan Anda butuhkan saat tanggap darurat.*	Fit
23	*Jika destinasi wisata di kawasan Gunung Merapi memiliki risiko bencana, "Informasi ancaman bencana" akan Anda butuhkan saat tanggap darurat.*	Unfit
24	*Jika destinasi wisata di kawasan Gunung Merapi memiliki risiko bencana, "informasi teknik menyelamatkan diri" akan Anda butuhkan saat tanggap darurat.*	Unfit
25	*Jika destinasi wisata di kawasan Gunung Merapi memiliki risiko bencana, "peta jalur evakuasi" akan Anda butuhkan saat tanggap darurat.*	Unfit
26	*Jika destinasi wisata di kawasan Gunung Merapi yang Anda kunjungi memiliki risiko terkena bencana, maka ancaman bencana yang mungkin terjadi adalah "hujan abu vulkanik".*	Unfit
27	*Jika destinasi wisata di kawasan Gunung Merapi yang Anda kunjungi memiliki risiko terkena bencana, maka ancaman bencana yang mungkin terjadi adalah "lontaran material panas".*	Fit
28	*Jika terjadi erupsi gunung api, tempat aman yang Anda pilih untuk menyelamatkan diri adalah "bangunan beratap".*	Unfit
29	*Jika terjadi erupsi gunung api, tempat aman yang Anda pilih untuk menyelamatkan diri adalah "jauh dari jalur aliran sungai".*	Fit
30	*Jika terjadi erupsi gunung api, tempat aman yang Anda pilih untuk menyelamatkan diri adalah "lapangan terbuka".*	Fit
31	*"Terjadi gempa kecil dengan intensitas sering" adalah tanda-tanda alam akan terjadinya erupsi gunung api.*	Unfit
32	*"Terjadi kebakaran lahan" adalah tanda-tanda alam akan terjadinya erupsi gunung api.*	Fit
33	*"Terjadi banjir lahar" adalah tanda-tanda alam akan terjadinya erupsi gunung api.*	Fit
34	*Jika mendengar peringatan dini, tindakan yang akan Anda lakukan adalah "bergegas meninggalkan lokasi menuju jalur evakuasi".*	Unfit
35	*Jika mendengar peringatan dini, tindakan yang akan Anda lakukan adalah "jika di dalam ruangan, segera keluar dari bangunan".*	Fit
36	*Jika mendengar peringatan dini, tindakan yang akan Anda lakukan adalah "jika di luar ruangan, segera mencari bangunan beratap untuk berlindung".*	Fit
37	*Jika mendengar peringatan dini bencana erupsi gunung api saat berada di dalam bangunan, yang akan Anda lakukan adalah "tetap tenang dan segera berlari menuju pintu keluar mencari pertolongan".*	Fit
38	*Jika mendengar peringatan dini bencana erupsi gunung api saat berada di dalam bangunan, yang akan Anda lakukan adalah "tetap tenang dan segera bergegas untuk meninggalkan kawasan secepat mungkin".*	Fit
39	*Jika mendengar peringatan dini bencana erupsi gunung api saat berada di dalam bangunan, yang akan Anda lakukan adalah "tetap tenang di dalam bangunan agar terhindar dari material erupsi gunung api".*	Unfit
40	*Jika mendengar peringatan dini bencana erupsi gunung api saat berada di dalam bangunan, yang akan Anda lakukan adalah "tetap tenang di dalam bangunan sambil menunggu instruksi dari pihak yang berwenang".*	Fit
41	*Jika mendengar peringatan dini bencana erupsi gunung api saat berada di dalam bangunan, yang akan Anda lakukan adalah "tetap tenang di dalam bangunan dan segera mencari update informasi melalui radio".*	Fit

Source: Primary Data Analysis, 2023.

The individual item performance on the field test in Table 3 showed that, 10 out of 41 items did not fit with the Rasch Model. The items were not fit with Rasch Model criteria because: (1) they have perfect scores (items 23, 24, 25, 26 in table 3), (2) have MNSQ OUTFIT values outside the range 0.77-1.33 (items 11, 31, 34 in table 3), (3) INFIT T is outside the range of -2

to +2 (items 9, 28, 39), and (4) the OUTFIT T value is outside the range of -2 to +2 (item 11 in table 3). Adam and Kho (1996) explained that all items will fit with Rasch Model if the means of INFIT MNSQ and OUTFIT MNSQ close to 1.0 and their deviation is close to 0. Regarding the value of infit t and outfit t, all items will fit with model if the value of the means is close to 0 and the deviation is close to 1.0. When the INFIT MNSQ and OUTFIT MNSQ do not fit with model, each item can be analyzed to know the item fitness to the model. The items considered fit with model if the value of the tested item's MNSQ is between 0.77-1.33 (Setyawarno, 2017).

The items with perfect scores prove that the questions are too easy so that all respondents are able to answered them correctly, thus resulting in the failure on measuring the respondents difference in ability. The items with mnsq outfit and outfit t value outside of the fitness range means that the items are sensitive to the outliers, or the unfitness of the difficulty of an item with a person's ability to answer and vice-versa. A case in which this could happen is when outfit reports underfit for lucky guesses and careless mistakes. The items with infit T outside of the fitness range said to be more sensitive to inlier, means that it will react to the peculiar pattern of responses to items targeted on the person, and vice-versa (Linacre, 2002). The items that were unfit with model can be removed to increase the fitness of the whole instrument. In this research, 10 items that did not fit with Rasch Model fitness criteria were removed.

After removing the unfit items, the value of OUTFIT MNSQ of the instrument rose to -1 to1.2. Furthermore, the value of INFIT MNSQ for each item is in the range of 0.88-1.11, and the value of OUTFIT T for each item is on the range of -1 s/d +1.2. It means that each of the 31 items are valid and fit with Rasch Model. Each item will be considered fit with Rasch Model if the value of item INFIT MNSQ is in the range 0.77-1.33 and the value of OUTFIT t is in the range of -2 s/d +2 (Adam & Kho, 1996). The empirical validity results are proven by the goodness of fit of the instrument items with the Rasch Model criteria. Based on the analysis results, the value of INFIT MNSQ, OUTFIT MNSQ, INFIT t, and OUTFIT t showed that all 31 qustionnaire's items in table 3 after eliminating the unfit items, fit with the Rasch Model.

The reliability test results showed that the reliability value for items after item elimination is 0.97 and the reliability value for case/person is 0.59. It means that the item reliability is in a special category, while the test reliability is in the sufficient category (Istiyono, 2018). The reliability test measures the consistency of the instrument in measuring the respondent's abilities (Istiyono, 2018). The results of the reliability test showed that the instrument can measure respondents' abilities well and reliably.

Based on the results of the validity and reliability tests, this test instrument can be used to measure the knowledge of the visitors on the disaster-prone volcanic tourism area. The results of this test instrument can be used for subsequent research in measuring the disaster knowledge of visitors in disaster-prone volcanic tourism area as a first step action to ensure the readiness and resilience of the visitors as people at risk in disaster-prone volcanic tourism area. This instrument can also be used by tourism and disaster stakeholders to collect information related to the disaster knowledge of disaster-prone volcanic tourism visitors as a basis for preparing mitigation and preparedness for disasters.

CONCLUSIONS

Based on the research results, it was concluded that the 31 items in the instrument can be used to measure the disaster knowledge of the visitors in disaster-prone volcanic tourism areas. The instrument that can produce meaningful results should be valid and reliable. The instrument is proven to pass logical validity, and empirical validity test in form of fitness with Rasch model, exhibited high item reliability, and demonstrated sufficient case reliability, thereby establishing its suitability for measuring disaster knowledge of visitors in disaster-prone volcanic tourism area. As the result, the test instrument will contribute to a better understanding of visitor preparedness for potential risks in volcanic tourism area.

RECOMMENDATIONS

The instrument developed in this research can be used on future research to measure disaster knowledge of visitors in disaster-prone volcanic tourism area as one aspect in disaster mitigation.

For future research, it would be beneficial to expand the sample size in future research, as

this study was conducted only with visitors to the disaster-prone tourism area of Mount Merapi. The instrument can also be developed further by incorporating different scale for more comprehensive results.

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