



VISITOR'S PERCEPTIONS OF HIGHLAND NATURAL DISASTERS RISK IN BATU, EAST JAVA, INDONESIA: BASED ON GEO- PSYCHOLOGICAL APPROACH

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Abstract

Highland areas have many natural resources that serve as the main tourist attractions; however, there is a risk of natural disasters. Batu Tourist City, located in a highland area in East Java, Indonesia, is prone to various natural disasters, including landslides, floods, and flash floods throughout the year. Visitors become particularly vulnerable to disasters because they generally do not understand the risks of the areas they visit. The research aims to analyse visitors' risk perceptions (VRP) regarding adapting and surviving natural disasters in the highland tourist area. Visitors' risk perceptions (VRP) are based on geographic and psychological approaches, which comprise prior experience (PE), risk management knowledge (RMK), self-adaptability (SA), and tourism risk, such as physical (PR), service risk (SR), and environmental risks (ER) elements. Through quantitative research, the researcher tested 398 samples and 18 hypotheses using partial least squares structural equation modelling (PLS-SEM). Bootstrapping analysis was used for structural models and measurement. The results show a positive influence of PE and RMK on the VRP of tourism. In contrast, SA had a significant effect on visitor psychology but did not positively influence the VRP of tourism. This indicated that psychologically, visitors' awareness, ability to recover from difficulties, and tendency to embrace a positive perspective on safety do not depend on their sensitivity to potential risks. This research concluded that visitors who have RMK exhibit good VRP but not SA. This is contradictory because VRP are linked to psychology, which requires SA when facing natural disaster risks in tourist areas.

Keywords: Geo-Psychological Approach, Highland Tourism Risk, Tourism Resilience, Visitor Risk Perception

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INTRODUCTION

Highland tourism is known for its distinctive and beautiful attractions, but it is also vulnerable to natural disasters. The most significant disasters encompass landslides and flash floods resulting from land conversion or direct natural phenomena (Chen et al., 2020). This study conducted a comprehensive investigation of visitors' risk perceptions (VRP), as they are also vulnerable to the possible dangers posed by natural disasters in the surrounding areas (Blešić et al., 2022). Previous studies have examined VRP and discovered that a lack of preparedness results from unperceived risks (Rittichainuwat et al., 2018). This presents a complex issue for visitors who are influenced by negative VRP of disasters and are more likely to seek out other locations that offer relatively higher perceived safety (Liu et al., 2021).

The primary objective of this study is to analyse VRP in terms of adapting and surviving natural disasters in the highland tourism area, especially in Batu City, East Java, Indonesia. According to regional spatial analysis findings, Batu City is prone to a variety of natural disasters, including forest fires, landslides, flash floods, and droughts (Suprpto et al., 2022). One of the most severe flash flood disasters happened at the end of 2021, damaging and drowning various tourist access locations, including Gunung Picung Adventure Park (BNPB, 2021). These conditions suggest that active and future visitors must have risk management knowledge (RMK) of disasters and the ability to take decisive actions in critical situations (Liu et al., 2021).

Previous research suggests that VRP comprised three views, which were 1) subjective feeling, 2) objective evaluation, and 3) the cognition threshold portion of the negative consequences that may occur during travel mostly related to their psychological condition (Cui et al., 2016; Liu et al., 2021). Various factors influence VRP, including socio-demographic aspects such as age, occupation, and education (Blešić et al., 2022; Khan et al., 2019). Visitors' risk perceptions (VRP) are generated from online reviews and information (Liu et al., 2021), prior experience (PE) with disasters (Fountain & Cradock-Henry, 2020), self-protective measures informed by RMK (Sasaki et al., 2022), and the risk tolerance level (Blešić et al., 2022). One of the instruments used to assess an individual's psychological capacity to tolerate disaster risk is known as The Psychological Preparedness for Disaster Threat Scale (PPDTS) (McLennan et al., 2020; Türkdoğan Görgün et al., 2023). In previous studies, this scale has been applied to tourist visitors by considering both subjective risk parameters and objective risks related to hydro-meteorological hazards (Blešić et al., 2022).

The author refers to the PPDTS scale by considering the effectiveness of the results of previous VRP analyses related to subjective and objective feelings in previous studies. This research also focuses on visitors' knowledge of tourist locations' geographical conditions because literacy of appropriate

geographical conditions can increase RMK (Kamil et al., 2020). Therefore, this research emphasises determining the psychological conditions of tourists (subjective and objective risks of visitors) (Blešić et al., 2022) by integrating geographic approaches (spatial, environmental and regional) (Fournier & Knafou, 2013) based on the Psychological Preparedness for Disaster Threat Scale (McLennan et al., 2020).. Since this combination has rarely been used in prior studies, researchers have decided to refer to it as the Geographical and Psychological Preparedness for Disaster Threat Scale (GPPDTS).

LITERATURE REVIEW

Visitor Risk Perceptions (VRP)

Visitors' risk perceptions (VRP) encompass three types of perspectives: subjective assessments, objective evaluations, and cognitive processes that extend over the potential positive or negative consequences that may arise during the trip (Cui et al., 2016). Subjective assessments can be categorised into two main factors: 1) demographic variables, such as age, gender, education, location of residence, and income, and 2) individual cognitive capacity, which includes personality, information beliefs, values, and psychological preparation (Blešić et al., 2022; Cui et al., 2016). Objective evaluations prioritise physical risks (PR) when evaluating natural tourism resources or beautiful areas, such as land views, water views, biological landscapes, and climate views, followed by equipment risks and performance risks (Cui et al., 2016). Prior studies on VRP examine objective aspects such as PR, financial risk, and service risk (SR) while also suggesting that future research should consider environmental risks (ER), such as geographical conditions or location of residence (Blešić et al., 2022).

Tourists tend to prioritise visible risks rather than those that are not directly visible (Cui et al., 2016). The discussion of expected VRP is deliberately avoided or often not prioritised in order to mitigate excess concern (Cohen, 2009; Wang et al., 2019). Furthermore, in addition to earlier studies that examine objective, subjective, and cognitive factors, researchers also analyse ER as part of the investigation of VRP. Understanding and effectively addressing safety concerns and ER is crucial for implementing effective precautions (Wang et al., 2019).

Highland Tourism Risk

Highland tourism encompasses travel and leisure activities that occur on high-situated lands, typically associated with mountainous areas (Ólafsdóttir & Runnström, 2013). Mountain areas typically offer beautiful scenery, amazing natural beauty, and unique facilities and are exceptionally popular with tourists (Nepal & Chipeniuk, 2005). The popularity of travelling to places with mountains has significantly grown over the years, leading to an increased discussion

regarding the advantages and disadvantages for the environment, culture, and mountain communities (Mutana & Mukwada, 2018).

Disasters in mountainous tourist areas are frequently overlooked because of the revenue and profits associated with tourism (Chen et al., 2020), even though some risks can be used as opportunities to provide benefits from different perspectives (Bachri et al., 2015). Geological disasters, such as landslides, debris flows, floods, and flash floods, are common risks in hilly and mountainous areas (Bachri et al., 2024; Chen et al., 2020). This condition relates to the concept of risk, specifically because of uncertain circumstances regarding events, results, and the extent of damage caused by natural disasters (Bachri et al., 2022). Therefore, this research expected that the risk associated with mountain tourism is the potential occurrence of events that may threaten the safety of visitors who visit mountainous areas.

Tourism Resilience

Tourism resilience refers to the collective efforts by tourism companies, destinations, communities, and individual visitors to adapt, adjust, and react to various forms of change and disruption (Hall et al., 2017). This resilience is necessary due to the lack of preparation among several stakeholders and individual visitors' high vulnerability to natural disasters (Cahyanto & Pennington-Gray, 2015; Rittichainuwat et al., 2018). Resilience is highly beneficial for tourists when it comes to navigating uncertainty since it involves comprehending both current environmental dangers and possible future risks (Espinero et al., 2017).

Previous works have viewed VRP in terms of PR, encompassing worries for personal safety, family safety, perceptions following the observation of warning signs, and even subjective evaluations of environmental conditions (Blešić et al., 2022). Service risks (SR), in addition to PR, are crucial in ensuring infrastructure and safety service availability; thus, stakeholders must actively pursue this aspect (Chan et al., 2020; Yang & Guo, 2023). Environmental risks (ER) depend on visitors' knowledge of the tourist location and their perception of environmental vulnerability (disaster-prone tourism destinations) (Hao et al., 2022; Sumarmi et al., 2021). The resilience of tourists should prioritise addressing this ER, given that the areas they frequent are typically unfamiliar (Liu et al., 2021). In addition, environmental danger has a significant role in determining the escalating risk of natural tourism, thus necessitating tourists' awareness of this issue (Cui et al., 2016).

Geo-Psychological Approach

A geographical approach as an education subject is necessary to comprehend environmental issues (Utaya et al., 2023) and provide solutions in disaster-prone

tourism destinations (Bachri et al., 2024). The geographical approach to tourism comprises the standards of tourist attractions, their growth, and the geographical aspects of stakeholders (tourists, guides, enterprises, among others) (Fournier & Knafou, 2013). Research on physical factors, such as geology and geomorphology (Bayrak & Teodorovych, 2020), land conversion (Chen et al., 2020), and the impact of weather (Blešić et al., 2022) are all connected with the geographical approach. However, this study will specifically focus on accessibility as it relates to safety infrastructure.

Psychological preparedness for disaster risk primarily focuses on cognitive factors related to risk awareness and understanding, having knowledge about environmental dangers, and developing adaptive responses, particularly in terms of emotional self-awareness and self-adjustment (McLennan et al., 2020). The Psychological Preparedness for Disaster Threat Scale (PPDTS) is a commonly used method for assessing individuals' level of preparedness for disasters. It measures factors such as awareness of potential dangers, adaptive responses, self-awareness, and emotional self-control (Blešić et al., 2022; Türkdöğän Görgün et al., 2023).

The correlation between geographical knowledge and psychological preparedness of visitors in danger-prone tourism is due to the fact that tourists' protective conduct is influenced by their VRP of danger and self-efficacy (Blešić et al., 2022). Self-adaptability (SA) is also a resilience component that can keep the system secure, stable, and orderly during external disruptions and crisis conditions, and it has good "anti-vulnerability" and "self-adaptability" to establish and sustain self-stability (Blešić et al., 2022). Therefore, this research uses the evaluation of VRP, highland tourism risk, PE, RMK, and SA to provide a perspective on tourism risks, including the direct/indirect effects determined using structural equation models (SEM).

RESEARCH METHODOLOGY

The research is based on the Batu tourist city in East Java, Indonesia (The research location map can be seen in figure 1). Data was collected from four locations: 1) Selecta Heritage Park, 2) Coban Putri, 3) Coban Talun, and 4) Paralayang area. Data collection was comprised of a simple random sampling approach and estimation method (Hong, 1998). Simple random sampling was used to build a sample of 398 visitors as respondents. All respondents were informed that the questionnaire was anonymous and that participation was voluntary. The methodology and information points gathered guarantee that the sample is representative.

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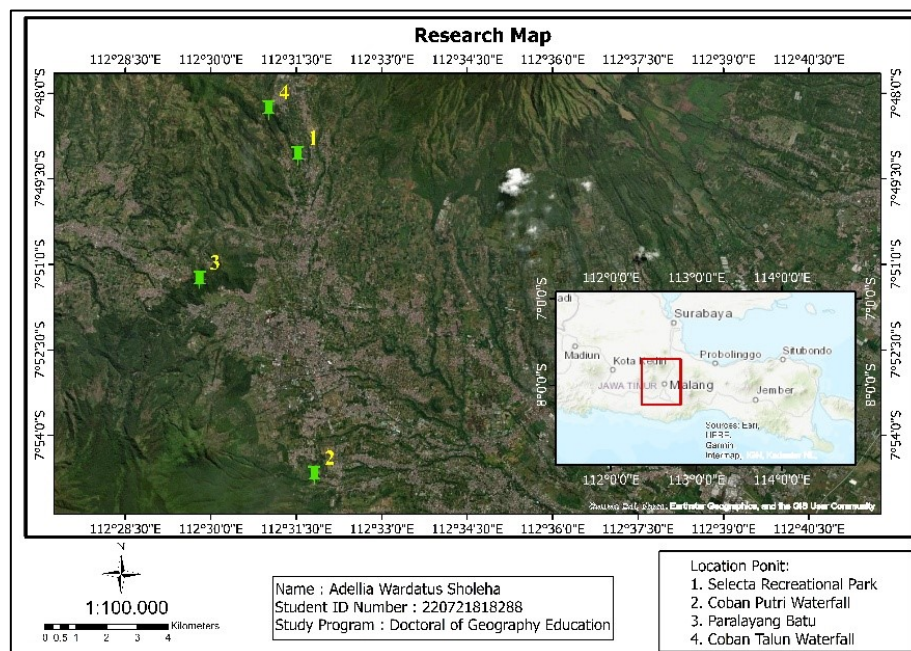


Figure 1. Research Location Map

Source: Author, 2025

The objective of this study is to evaluate VRP of disaster risks in tourist areas, focusing on their understanding of the geographical and psychological factors associated with these risks. The assessment is differentiated based on one independent variable (PE), two moderating variables (RMK and SA), and three dependent variable dimensions (PR, SR, and ER). The indicator as a whole is reflective, and each assessment has several answer options that were scored based on the Likert scale.

In SEM-PLS, researchers need to perform two analysis steps, namely 1) measurement model testing and 2) structural model testing (Hair et al., 2019). The measurement model tests include assessing outer loading, composite reliability (CR), average variance extracted (AVE), and discriminant validity (DV) using the Fornell-Larcker Criterion and the heterotrait-monotrait (HTMT) ratio. The indicators evaluated using outer loading should have values >0.70 , CR should be >0.60 , AVE should be >0.05 , and the HTMT ratio should be <0.90 (Hair et al., 2019). The second structural model test is used to approve hypothesis testing by evaluating R^2 , direct/indirect effect, T , and P using the bootstrapping method and a coefficient product approach (Rasoolimanesh et al., 2023). $R^2=0.75$, 0.50 , and 0.25 can be considered substantial, moderate, and (Hair et al., 2019). Hypothesis evaluation and acceptance are based on T exceeding the T -

Table values ($N=398 \Rightarrow 1.649$) and $P < 0.05$ (Significant Level 0.05 in one-tailed test) (Rasoolimanesh et al., 2023).

ANALYSIS AND DISCUSSION

The findings of this study were derived from valid data collected from 398 respondents. Information was gathered from 124 males and 274 females. The respondents' mean ages were 18-30 for 294 respondents, 31-40 for 27 respondents, 41-50 for 41 respondents, 51-60 for 18 respondents, and >61 for 10 respondents; all respondents were Indonesian. There were four education levels: 226 respondents had a bachelor's degree, 130 respondents had senior high school education, 23 respondents had postgraduate education, and 19 respondents had junior high and elementary school education. There were 249 visitors with an income $\leq$ IDR 250,000; moreover, 91 earned IDR 2,500,000-4,000,000, 36 earned IDR 4,000,000-6,000,000, and 22 earned >IDR6,000,000 based on their age and level of education. The respondents' demographic data comprises the following: 173 respondents are from Malang Regency, 174 respondents from outside Malang (particularly East Java), and 51 respondents from outside East Java.

The results demonstrate that convergent reliability and validity have been proven for all reflective constructs, thereby supporting the continued examination of the proposed model. The evaluation results of the measurement model are shown in Table 1. The researcher also completed the measurement model with the DV test using the Fornell-Larcker criterion and HTMT ratio (Tables 2 and 3).

Table 1. The Assessment Results of the Measurement Model

Latent Variable (Construct) and Reflective Indicators		Outer Loadings	CR	AVE
Prior Experience (PE)			0.801*	0.670*
PE(1)	Experience with previous disaster	0.730		
PE(2)	Information regarding previous disaster	0.899		
Physical Risk (PR)			0.831*	0.552*
PR(1)	Worry about the safety of family and colleagues	0.703		
PR(2)	Worry about your safety during visit	0.771		
PR(3)	Worry about disaster risk in a natural tourist area	0.720		
PR(4)	Concerned after see disaster warning signs	0.775		
Environmental Risk (ER)			0.882*	0.713*
ER(3)	Perception of visiting highland during raining season	0.859		
ER(4)	Perception of sloping condition could trigger threat	0.878		
ER(5)	Perception of steep trails make difficult to keep safe	0.794		
Service Risk (SR)			0.864*	0.679*
SR(2)	Perception availability of danger signs	0.807		
SR(3)	Perception about accessibility easy to avoid disasters	0.854		
SR(4)	Perception of safety infrastructure (ex. alarm sound)	0.810		
Risk Management Knowledge (RMK)			0.862*	0.675*

Latent Variable (Construct) and Reflective Indicators		Outer Loadings	CR	AVE
RMK(5)	Familiar with disaster warning systems	0.806		
RMK(6)	Understanding indications before disaster occur	0.831		
RMK(7)	Could identify natural preparedness material	0.827		
Self-Adaptability (SA)			0.894*	0.628*
SA(1)	Ability to control feelings in difficult situations	0.750		
SA(2)	Ability to overcome anxiety and fear	0.797		
SA(3)	Ability to think openly when under pressure	0.793		
SA(5)	Understanding to take an action in difficult situation	0.809		
SA(6)	Ability to avoid disasters occur	0.813		

Source: SEM-PLS analysis using SmartPLS (Author, 2023)

Table 2. The Discriminant Validity (DV) using Fornell-Larcker Criterion

Construct	ER	PR	PE	RMK	SA	SR
ER	0.845					
PR	0.464	0.743				
PE	0.066	0.001	0.819			
RMK	0.179	0.167	0.259	0.822		
SA	0.066	0.077	0.205	0.497	0.793	
SR	0.059	0.195	0.027	0.341	0.288	0.824

Note: All significant

Source: SEM-PLS analysis using SmartPLS (Author, 2023)

Table 3. The Discriminant Validity (DV) using Heterotrait-Monotrait (HTMT) Ratio

Construct	ER	PR	PE	RMK	SA	SR
ER						
PR	0.597					
PE	0.101	0.119				
RMK	0.229	0.207	0.384			
SA	0.085	0.106	0.291	0.601		
SR	0.139	0.241	0.205	0.439	0.350	

Note: All significant

Source: SEM-PLS analysis using SmartPLS (Author, 2023)

The results of hypothesis testing involving indirect effects demonstrate a correlation that is comparable to direct effects. The SA variable, classified as a moderate variable, is affected by PE and RMK. Then, it also affects the remaining risk variables, H12, H13, H14, H16, and H18, all of which are rejected. In contrast, only the indirect effect (H17) relating to the relationship between RMK, SA, and SR is accepted. The results of hypothesis testing are presented in Table 4.

Table 4. The Results of the Hypothesis Testing

Hypothesis		Direct/Indirect effect	T-Value	P-Value	Supported
H1	PE -> RMK	0.259	5.699	0.000	Yes
H2	RMK -> PR	0.171	2.670	0.004	Yes
H3	RMK -> SR	0.263	4.398	0.000	Yes
H4	RMK -> ER	0.193	3.556	0.000	Yes
H5	PE ->RMK->PR	0.044	2.265	0.012	Yes
H6	PE ->RMK->SR	0.068	3.367	0.000	Yes
H7	PE ->RMK->ER	0.050	2.675	0.004	Yes
H8	PE -> SA	0.082	1.924	0.027	Yes
H9	SA -> PR	-0.008	0.106	0.458	No
H10	SA -> SR	0.158	2.398	0.008	Yes
H11	SA -> ER	-0.030	0.506	0.307	No
H12	PE -> SA ->PR	-0.001	0.088	0.465	No
H13	PE -> SA ->SR	0.013	1.430	0.077	No
H14	PE -> SA ->ER	-0.002	0.460	0.323	No
H15	RMK -> SA	0.476	10.829	0.000	Yes
H16	RMK -> SA -> PR	-0.004	0.106	0.458	No
H17	RMK -> SA -> SR	0.075	2.354	0.009	Yes
H18	RMK -> SA -> ER	-0.014	0.500	0.309	No

Note: T>1.645 and P<0.05 are significant.

Source: SEM-PLS analysis using SmartPLS (Author, 2023)

The acceptance or rejection of this hypothesis is additionally determined by *T* and *P* in accordance with the primary data that was acquired. A positive correlation is indicated by positive values in the original sample (direct/indirect effect), while the opposite is true for negative values. Graph 1 displays the results of hypothesis testing.

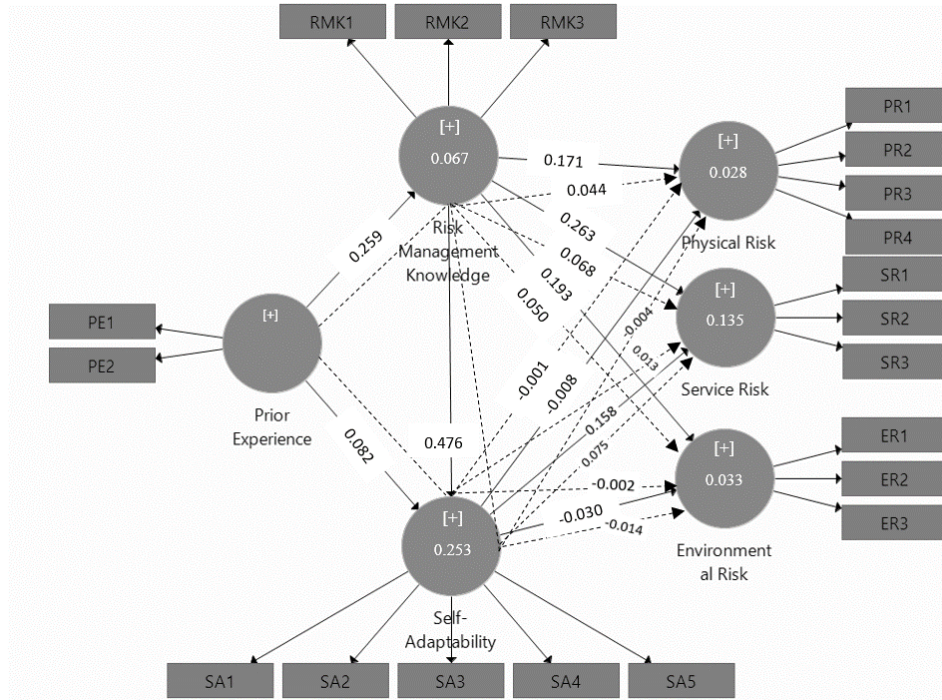


Figure 2. The Final Model as a Result of the Hypothesis Testing

Source: SEM-PLS analysis using SmartPLS (Author, 2023)

Note: Solid arrows indicate direct effects while dashed arrow indicate indirect effects

Initial assessments indicated that the visitors' PE had a significant effect on the moderator variables (RMK and SA) with various levels of influence. The direct effect evaluation yielded positive results for hypotheses H1, H8, and H15, indicating that the results were accepted. The hypothesis is supported by the direct effect values, indicating a correlation between PE and RMK (0.259), PE and SA (0.082), and RMK and SA (0.476) (Graph 1).

The results of this research align with prior studies indicating that acquiring RMK can enhance individuals' ability to recognise and prepare for both PR (Blešić et al., 2022) and ER (Bayrak & Teodorovych, 2020). The highest valued element is the utilisation of RMK to reduce SR, with a score of 0.263. Visitor expectations play a significant role in determining this value since they require not only the presence of tourism support infrastructure but also safety and evacuation infrastructure. Thus, the assessments of H2, H3, and H4 are considered to be valid.

The PE and RMK positively affect physical VRP, as evidenced by the acceptance of H5. Physical risk (PR) is composed of four primary elements:

personal safety, family safety, visiting decisions, and the influence of warning signs suggesting potential hazards. Prior experience (PE) and RMK can increase vulnerability to specific risks during visits (Liu et al., 2021).

Although this does not occur frequently, visitors expect that when they see warning or danger indicators, stakeholders have provisions for enough evacuation resources (Chan et al., 2020). According to feedback from multiple visitors, it can be inferred that while the environment of the visited location is dangerous, they have confidence in the management's ability to anticipate potential disasters; thus, they perceive the management's preparation to be optimal (Chan et al., 2020). Therefore, H6 and its related indicators are accepted.

Visitors' risk perceptions (VRP) regarding environmental aspects is determined by several elements, such as 1) the season or time of visit (both during rainy and dry seasons), 2) the conditions of the slope, and 3) the steepness of the road. Researchers explored the hypothesis to determine the impact of RMK and PE on environmental VRP. The findings indicate that increased awareness of ER is correlated with PE and RMK (Blešić et al., 2022; Liu et al., 2021), supporting the acceptance of H7.

There are differences in the evaluation of disaster risk-related SA. H9 is rejected because SA and the PR of visitors (individuals) have a negative relationship. The rejection of this hypothesis aligns with the lack of correlation between tourists' ability to feel secure or excessively at ease in disaster-prone areas. The probability of a natural disaster threatening visitors and their families will decrease if they possess a sense of assurance, peace, good conditions, and optimism to a fair extent. This is because when individuals feel secure and self-assured, they are likely to adopt a positive attitude, which can lead to reduced perceived threat of potential dangers (Rasoolimanesh et al., 2023).

Then, the assessment of SA and SR generated positive findings; consequently, H10 was accepted. The acceptance of this hypothesis is directly related to the extent to which tourists perceive the safety of the area to be primarily influenced by the ease of accessing it by road. Their level of trust in managing disaster risks is strongly linked to the ease of accessing infrastructure and rescue routes. Thus, H10 can be rejected if visitors fail to react to risk in the presence of warning signs, difficult routes, or insufficient infrastructure.

Most tourists are assured that they can stay safe from environmental hazards once they are aware that the required infrastructure (roads and warning signs) is in place. Therefore, the findings of the study indicate that H11 is rejected. Researchers are also interested in the potential for tourists' adaptation to change during the rainy season and how this may affect their initial VRP. Environmental VRP are unaffected by perceptions of safety (Bird & Gísladóttir, 2020; Fountain & Cradock-Henry, 2020).

The study has demonstrated that the indirect effects on H12, H13, and H14 have been rejected, showing that SA does not simultaneously receive and give influence. Table 4 demonstrates that PE has a general impact on SA (refer to H8); however, the significance of this effect is quite small (0.082). The findings indicate that PE with disasters can enhance visitors' capacity to adjust to challenging situations. This conclusion aligns with other studies indicating that individuals with PE exhibit a high level of comfort and may disregard potential risks (Bird & Gísladóttir, 2020).

Prior studies have demonstrated that an individual's RMK level impacts VRP in the tourism industry. The direct influence of risk awareness on SA has the highest value (0.476) when compared to other direct and indirect influences. Hypothesis 15 (H15) is accepted based on this value. This hypothesis proposes a significant correlation between awareness and SA, which refers to SA and the influence of RMK (Blešić et al., 2022).

The impact of SA on VRP yielded varied outcomes. The rejection of H16 and H18 suggests that while SA is significantly affected by RMK, VRP of tourism are not significantly influenced by the correlation between the two. The link between the impact of RMK and visitor attention remains unaffected by any variables other than SR. Only H17 is recognised because the relationship between RMK and SA does not have an impact on PR and ER.

The correlation between SA, PE, and RMK suggests that visitors may not recognise the signs of disaster risk in tourism locations. In fact, the psychological condition of individuals has a substantial role in their decision-making and the arrangement of their schedules (Blešić et al., 2022; Rasoolimanesh et al., 2023). Furthermore, the fact that visitors are aware of SR indicates that they frequently focus on external factors or the expectations of management when it comes to safety measures (Yang & Guo, 2023). However, suppose a dangerous tourist location only relies on warning signs and depends on external factors. In that case, it is necessary to enhance tourists' awareness of their vulnerabilities and the potential harm to the ecosystem.

CONCLUSION

This study investigated VRP in relation to tourism risks in Batu Tourism City using a geographical-psychological approach. As a result, 11 hypotheses (H1, H2, H3, H4, H5, H6, H7, H8, H10, H15, and H17) were accepted and seven hypotheses (H9, H11, H12, H13, H14, H16, and H18) were rejected. The accepted hypotheses consist of a positive relationship between PE and RMK on visitor tourism risk attention. At the same time, the rejected hypotheses did not prove a significant relationship between PE and SA to the attention of visitor tourism risk.

In general, the findings of this research add to the knowledge regarding VRP in Indonesian areas prone to the dangers of natural disasters. This study addressed the lack of research by integrating psychological process variables (attention, perception, memory, thinking, and language skills), ER (geomorphological approach and human-environmental interaction), and individual SA (personality traits and emotional control) to enhance the knowledge of the effects on VRP. Concerning the results of research that do not show significance between SA and VRP, there is a critical need for openness regarding tourist areas and providing educational information regarding risky tourism. For further research, it is necessary to give attention to the peak season with a large number of visitors, collect data during the rainy season, and incorporate financial risks to predict different results/influences.

ACKNOWLEDGEMENT

This research is supported and funded by the Ministry of Education, Culture, Research, and Technology of Republic Indonesia through the PMDSU scheme in 2023 No. Contract 036/E5/PG.02.00.PI/2023) and as well as the Visiting Research Attachment Programme at Universiti Sains Malaysia (2023). The authors declare that there is no conflict of interest regarding the publication of this article.

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Received: 4th February 2025. Accepted: 19th May 2025