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Deciphering the Flood Puzzle of Community Participation, Attitudes, and Flood Preparedness Intention Through the Lens of SOR Theory

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Abstract Climate change exacerbates the frequency and intensity of natural disasters, including floods, through alterations in precipitation patterns, sea level rise, and increased extreme weather events. In Malaysia, Pahang is one of the states particularly susceptible to the amplified impact of climate change on floods. Rising temperatures, changing rainfall patterns, and sea level rise pose significant threats to the state's vulnerability to catastrophic inundations. Investigating the factors that influence flood preparedness intention among residents is urgently needed to develop targeted and effective strategies that enhance community resilience, mitigate the impact of climate-induced disasters, and ensure the safety and well-being of the population in the face of escalating environmental challenges. By utilising the Stimulus–Organism–Response (SOR) theory, this study aimed to examine the mediating effect of attitude toward flood preparedness on the relationship between community participation and flood preparedness intentions. This purposive study collected data from 200 Pahang residents. Statistical Package for the Social Sciences (SPSS) and Smart Partial Least Squares (SmartPLS) version 4 were employed to test four hypotheses of the study. This study revealed that community participation does not have a positive relationship with flood preparedness intention. However, community participation was positively associated with attitudes toward flood preparedness. Additionally, attitudes were found to be positively associated with flood preparedness intention. Furthermore, the study found that attitudes positively mediate the relationship between community participation and flood preparedness intention. Significantly, this study contributes theoretically and practically to the field of disaster management by providing insights into the intricate dynamics of community participation, attitude towards flood preparedness, and flood preparedness intention. Thus, it informs the development of

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targeted interventions that foster a resilient and prepared community in the face of escalating climate-related challenges in Pahang and similar regions.

Keywords: community participation, attitude towards flood preparedness, flood preparedness intention, SOR theory, Pahang

1. INTRODUCTION

Floods have evolved as a ubiquitous global problem and are one of the most destructive natural disasters on a global scale (Adhikari et al., 2023). In Malaysia, The National Disaster Management Agency (NADMA) (2018) has reported that floods are consistently documented as the most prevalent disaster events on an annual basis. The frequency of flooding events, in comparison to other natural occurrences, suggests that the aforementioned event is a yearly phenomenon consistently transpiring in Malaysia (Nor Diana & Atikah, 2023).

Every year, monsoon floods lash Malaysia's east coast, wreaking havoc on residents, particularly those living along riverbanks, which are regarded as the most vulnerable and high-risk locations (Nurul Ashikin et al., 2021). Pahang, situated along the coastal regions of Peninsular Malaysia, experiences a profound impact from both the northern cool weather patterns and high-velocity winds. Furthermore, this coastal area sees enormous amounts of rainfall throughout the early and mid-monsoon season, and notably, rainfall between November and January creates severe floods in this state (Apuv et al., 2015). The Pahang River basin is the state's major catchment area, with yearly flood events occurring every year (Nurul Ashikin et al., 2021). Floods generate huge financial losses for the nation, as well as extensive damage to agricultural land and cattle (Tang, 2019). Mohammed Nawi et al. (2021) asserted that the potential for floods to interrupt social and economic activity, in addition to causing harm to lives and property, has made their occurrence a major national concern in Malaysia.

The government's role is essential in enhancing community resilience, but it also requires coordinated and comprehensive efforts involving all stakeholders (Mulia & Handayani, 2024). Therefore, it is highly recommended that citizens take necessary precautions to lessen the impact of floods. Previous research has shown that being well-prepared for disasters is essential for reducing the impacts of such events (Murray & Watson, 2019; Shah et al., 2019; Titko & Ristvej, 2020). However, Gammoh et al. (2023) stated that developing nations are more susceptible to the effects of natural disasters since they are not well prepared for such risks. An effective flood preparedness strategy is critically needed due to the increasing frequency and severity of flood disasters. Community participation (Li & Liu, 2020; Jang et al., 2016), attitudes (Wang & Tsai, 2022; Gumasing & Sobrevilla, 2023), and disaster preparedness intention (Najafi et al., 2017) stand out among the numerous aspects that impact the effectiveness of such strategies. It is undeniable that community participation is vital in the collective social construction of risk attitudes (Paton & McClure, 2013).

Scholars are urged to examine factors influencing flood preparedness intention so that the findings will offer new insights to policymakers and other stakeholders, enabling the design of specific forms of intervention. However, there are relatively few empirical studies on the determinants of disaster preparedness in developing countries, such as those by Muttarak and Pothisiri (2013) and Hoffman and Muttarak (2017), with limited research conducted in specific contexts like Malaysia (Noorhashirin et al., 2016).

Furthermore, Ng (2022) emphasised that the majority of past studies on disaster preparedness behaviour lacked a solid theoretical foundation. Therefore, this study adopts the Stimulus–Organism–Response (SOR) theory developed by Mehrabian and Russell (1974) to investigate the factors influencing flood preparedness intention among Pahang residents. The study operationalises community participation as the 'stimulus', attitude towards flood preparedness as the 'organism', and flood preparedness intention as the 'response'.

While attitude has been frequently employed as a mediator in previous studies (e.g., Zhang et al., 2023; Garg & Joshi, 2018; Zheng et al., 2020), the existing literature has provided limited evidence regarding the mediating role of attitude in the association between community participation and preparedness intention, particularly in the context of flood-related scenarios. This study aims to enhance the model's predictive power by deciphering the relationship between community participation and flood preparedness intention, incorporating attitude towards flood preparedness as a mediator. Given the persistent concern about floods for Pahang residents, this research examines how these three factors interact in the region. In order to create well-rounded solutions that align with Pahang's distinct social, cultural, and environmental context, it is crucial to understand the factors that influence flood preparedness intentions.

2. LITERATURE REVIEW

2.1 Stimulus–Organism–Response Theory

The SOR theory was first introduced in 1974 by Mehrabian and Russell. This theory proposed that stimuli (S) from an individual's environment could affect the cognitive and affective response (O), leading to behavioural response (R) (Mehrabian & Russell, 1974). The SOR concept explains that the variable representing the organism could also be a mediator in the study (Lockwood & Pyun, 2019). Ngah et al. (2021) contended that the SOR theory provides researchers with the ability to customise their model according to the specific setting of their study as long as it remains consistent with the basic stimulus-organism-response notion.

The SOR theory has found extensive use in consumer research (Islam et al., 2018; Liu et al., 2016), marketing, and tourism (Wu et al., 2020). The application of SOR theory in the context of disasters has primarily centred on panic buying during disasters (Singh et al., 2022; Li et al., 2021), tourist behaviour following earthquake disasters (Pahrudin et al., 2023), and the relationship between disasters and tourist preferences (Khalid et al., 2023), as indicated by the

review of previous literature. Scholars have not yet extensively focused on studying residents' flood preparedness intentions using the SOR theory. Hence, this study employed the SOR theory to illuminate how factors like community participation and attitudes toward flood preparedness influence residents' intentions to adopt and implement effective measures in anticipation of potential floods. The study findings aim to bridge the existing gap in the literature and contribute to the development of more informed and context-specific strategies for enhancing flood preparedness among Pahang residents.

The SOR framework derived from environmental psychology, provides a valuable lens through which we can understand the interplay of community participation, attitudes towards flood preparedness, and flood preparedness intention. This theoretical framework posits that external stimuli influence internal cognitive and affective processes (organisms), which, in turn, shape behavioural responses.

Community participation serves as the external stimulus. Initiatives such as workshops, drills, and awareness campaigns actively engage individuals in the collective effort to enhance community resilience. Attitudes are internal cognitive and affective processes that are influenced by external stimuli. In this case, individuals' attitudes towards flood preparedness (O) are shaped by their engagement in community participation activities (S). Flood preparedness intention represents the observable behavioural response to the internal cognitive and affective processes (O) influenced by external stimuli (S). The positive or negative attitudes formed during community participation initiatives influence individuals' intentions to engage in flood preparedness measures.

2.2 Hypothesis Development

2.2.1 Community Participation and Flood Preparedness Intention

Disaster preparedness is essential for reducing the risks and impacts of natural disasters, and community participation has been identified as a key factor in influencing individuals' preparedness intentions. Community participation can positively influence an individual's intention to prepare for a disaster, as disaster risk communication is strengthened among community members (Abunyewah et al., 2020). Sagala et al. (2009) found that community-level factors, such as community participation, play a more significant role than individual-level factors in predicting disaster preparedness intentions. This suggests that, in culturally collectivistic societies, preparedness is primarily a collective effort, driven by the sharing of ideas and values among community members. These findings highlight the positive impact of community participation on individuals' disaster preparedness intentions and highlight the importance of fostering community engagement as a key strategy in disaster management.

In line with this, past studies (Zaremohzzabieh et al., 2021; McGee & Russell, 2003; Paton et al., 2005) have identified community participation as a significant predictor of disaster preparedness intentions. Based on the explanation above, it can be construed that community

participation is not only a vital component of individual preparedness but also a crucial determinant in shaping collective resilience in the face of disasters. By fostering a sense of shared responsibility and facilitating communication among community members, engagement at the community level can effectively enhance preparedness intentions. Thus, it can be hypothesised that:

H1: Community participation is positively associated with flood preparedness Intention.

2.2.2 Community Participation and Attitude Towards Flood Preparedness

Community participation pertains to the continuous exchange of information between members of the community and authorities on issues related to flooding (Abunyewah et al., 2020). Individuals' attitudes and beliefs will probably undergo a favourable transformation when involved in a participatory process characterised by active discussion and interaction (Castelloe et al., 2002).

Jamshidi et al. (2016) discovered that community participation has a substantial influence on individuals' attitudes toward earthquake preparedness. Previous research (e.g., Choi & Sirakaya, 2005; Perdue et al., 1987) has shown that community participation is positively connected with individuals' attitudes toward tourism development. Community engagement promotes communication and interaction among citizens, companies, and authorities. Improved communication can lead to a better knowledge of tourism's benefits and challenges, resulting in a more favourable overall attitude.

According to Novak et al. (2019), community participation includes a variety of actions that help the public understand the causes and repercussions of a disaster. Individuals' attitudes can be shaped by their participation in community activities, which provides them with direct experiences, information, and exposure to diverse ideas. The introduction of participatory disaster management, which includes multiple communication procedures and methods, has tremendous potential to improve disaster preparedness outcomes, aligning with the broader goal of reducing global catastrophe risk (Abunyewah et al., 2020). Thus, the following hypothesis is put forth:

H2: Community participation is positively associated with attitude towards flood preparedness.

2.2.3 Attitude toward Flood Preparedness and Flood Preparedness Intention

Attitude represents an individual's assessment of the benefits or drawbacks associated with a specific behaviour (Zaremohzzabieh et al., 2021). When individuals perceive the outcomes of behaviour as favourable or unsatisfactory, they tend to develop a positive or negative attitude (Wang & Tsai, 2022). Numerous studies have confirmed the correlation between attitudes and

intentions regarding disaster preparedness (Wang & Tsai, 2022). Additionally, Hoffman and Muttarak (2017) proposed that people's attitudes toward disaster risks may influence their intentions to undertake preventive measures.

Ong et al. (2021) conducted a study indicating that attitudes impact individuals' intentions to prepare for earthquake catastrophes. Moreover, farmers who harbour negative views about flood preparedness are less inclined to take preventive measures against them (Budhathoki et al., 2020). Zaremohzzabieh et al. (2021) found that personal views towards earthquake preparedness positively influenced an individual's inclination to engage in earthquake preparedness activities. In their study, Gumasing and Sobrevilla (2023) examined the factors influencing the adoption of protective behaviour among individuals in the Philippines. Their research revealed a significant correlation between individuals' attitudes and their propensity to participate in preparedness measures for natural disasters. Given these considerations, the hypothesis is formulated as:

H3: Attitude toward flood preparedness is positively associated with flood preparedness intention.

2.2.4 Attitude Towards Flood Preparedness as a Mediating Variable

Community participation significantly contributes to the preparedness process in multiple ways. Firstly, it serves as a means of interactive information dissemination. Active engagement in the community correlates with increased feelings of communal belonging and a heightened sense of accountability towards fellow community members. This frequently results in an increased awareness of the necessity to make arrangements, as individuals feel a social obligation to take care of themselves during a catastrophe and be ready to assist others in society (Becker et al., 2012). Active and involved individuals in community events are more inclined to converse and engage in discussions, leading to an improved favourable attitude towards specific behaviours (Castelloe et al., 2002).

Jamshidi et al. (2016) discovered that community participation has a substantial influence on individuals' attitudes toward disaster preparedness. Wang and Tsai (2022) contend that individuals possess a positive attitude toward a certain behaviour when they believe that the behaviour will bring positive outcomes. In this context, individuals may develop positive attitudes towards flood preparedness if they believe that such preparation will bring positive outcomes, such as saving lives and properties.

As revealed by past studies (Ong et al., 2021; Zaremohzzabieh et al., 2021), individuals who hold positive attitudes toward flood preparedness are more likely to prepare for floods. Additionally, previous studies (e.g., Li & Liu, 2020; Adhikari et al., 2023) found that community participation influences individuals' disaster preparedness intentions. Based on this explanation, it can be inferred that attitude serves as a mediating variable between community participation and flood preparedness intention. Hence, it is posited that:

H4: Attitude towards flood preparedness positively mediates the relationship between community participation and flood preparedness intention.

Figure 1 illustrates the research framework of the study.

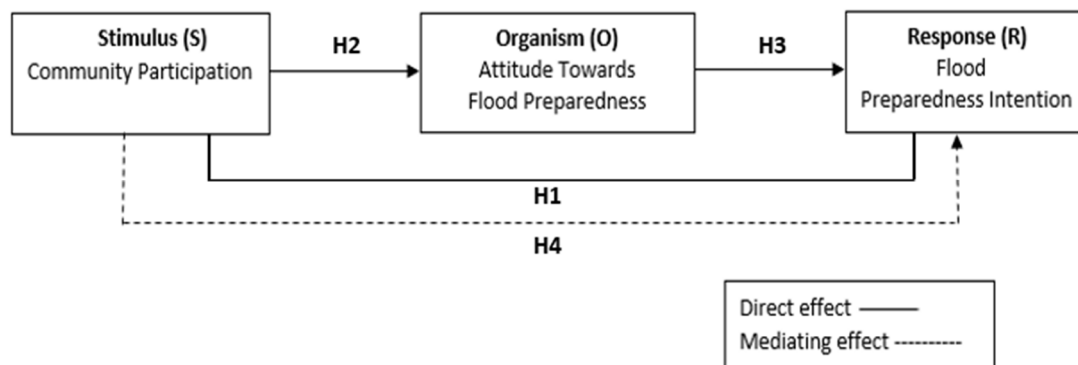


Figure 1. Research framework

3. RESEARCH METHODOLOGY

This study employed purposive sampling technique and cross-sectional studies to achieve the research objectives and answer the research questions. This study employed purposive sampling due to the unavailability of a comprehensive list of residents in Pahang, Malaysia. G*Power 3.1.9.7 was utilised to calculate the minimum sample size required for this study. Following the rule of thumb outlined by Gefen et al. (2011), with a power of 80%, a medium effect size, and $p = 0.05$, the G*Power analysis indicated that a minimum of 68 respondents is needed for a model with 2 predictors. Sample size was not an issue for this study, as a total of 200 completed questionnaires were returned for analysis. The study utilised Smart Partial Least Squares (SmartPLS) 4 and the Statistical Package for the Social Sciences (SPSS) to analyse the collected data. Three constructs of the study, namely attitude, community participation, and flood preparedness intention, were measured using the Likert Scale.

A single-source data approach can lead to common method variance, and researchers are advised to consider procedural and statistical analysis procedures to address this issue (Podsakoff et al., 2003). In terms of the procedural approach, different scales were employed for attitude (5-point Likert Scale), community participation, and flood preparedness intention (7-point Likert Scale). Additionally, respondents were briefed about the purpose of the data collection and informed about the voluntary nature of participating in this study. They were also informed about the importance of providing sincere responses to ensure the accuracy of the data. The data collection for this study was conducted online using a Google Form, ensuring an efficient and accessible method for gathering responses from Pahang residents. The link to

the Google Form was disseminated through several Facebook Groups specifically for residents living in Pahang, targeting a wide and relevant audience. To ensure the eligibility of respondents, a filtering question was embedded at the beginning of the questionnaire, allowing only individuals who met the criteria—Pahang residents, aged 18 and above, and residing in flood-prone areas—to proceed with the survey. This approach ensured that the data collected was relevant and representative of the target population, thereby enhancing the reliability of the study's findings.

Pre-test and pilot-test studies were also conducted to ensure the reliability and validity of the data. The measurements for the three variables in this study were as follows: attitude towards flood preparedness was assessed using three items (ATT1, ATT2, ATT3) adapted from Ng (2022); community participation was measured with five items (CP1, CP2, CP3, CP4, CP5) adopted from Ejeta et al. (2016); and flood preparedness intention was evaluated through three items (INT1, INT2, INT3) adapted from Ng (2022). The details of each item are presented in Table 1.

Table 1. The Measurement items of the study

Variables	Codes	Items
Attitude towards flood preparedness	ATT1	My attitude toward making preparation for flood is effective.
	ATT2	My attitude toward making preparation for flood is useful.
	ATT3	My attitude toward making preparation for flood is beneficial.
Community participation	CP1	I have worked with others on something to improve community life.
	CP2	I participate in local activities or events (e.g., festivals, fetes, fairs).
	CP3	I have contributed money, food or clothing to local causes, charities, and others in my community.
	CP4	I have attended public meeting on community issues.
	CP5	I have been involved in volunteering activities intended to benefit my community (e.g., fundraising, clean-up days, making drainage systems, local groups and Scouts).
Flood preparedness intention	INT1	I expect to make preparation for a flood.
	INT2	I plan to make preparation for a flood.
	INT3	I will make preparation for a flood.

In terms of hypotheses development, Rungtusanatham et al. (2014) clarified how formal hypotheses for mediation effects should be developed and proposed two primary approaches: the segmentation and transmittal approaches. In the segmentation approach, three hypotheses should be formulated: H1) The independent variable (X) affects the mediator (M), H2) The mediator (M) affects the outcome variable (Y), and H3) The mediator (M) mediates the relationship between X and Y (Memon et al., 2018). In contrast, the transmittal approach requires only one hypothesis, stating that the mediator (M) mediates the relationship between X and Y, without separately addressing the relationships between X and M, and M and Y (Memon et al., 2018). Rungtusanatham et al. (2014) highlighted that regardless of whether one

opts for the segmentation or transmittal approaches, researchers are urged to hypothesise and test the direct effect (c') when supported by theoretical or empirical evidence. Therefore, the present study utilised the segmentation approach to develop the hypotheses, and four hypotheses were formulated, as shown in Figure 1.

4. FINDINGS OF THE STUDY

4.1 Demographic Profile of the Respondents

At the outset, 216 questionnaires were collected from the Pahang respondents. After eliminating questionnaires deemed illegitimate due to straight-lining issues, 200 cases remained suitable and useable for analysis. Table 2 provides a comprehensive overview of the respondents. Of the validly returned questionnaires, 129 (64.5%) were completed by female respondents, compared to 71 (35.5%) completed by male respondents. Regarding ethnic composition, Malays comprised the largest proportion at 61.0%, followed by Chinese at 17.5%, Indians at 21.0%, and a minor ethnic group classified as 'Others' at 0.5%. A significant proportion of the respondents held undergraduate degrees (46.5%), followed by those with postgraduate degrees (18.5%) and school-level degrees (35.0%). Urban areas were the most significantly represented at 50.5%, followed by rural communities (20.0%) and suburban communities (29.5%).

Table 2. Demographic profile of the respondents

Variable	Items	Frequency (n)	Percentage (%)
Gender	Male	71	35.5
	Female	129	64.5
Ethnicity	Malay	122	61.0
	Chinese	35	17.5
	Indian	42	21.0
	Others	1	0.5
Highest Education	Schools	70	35.0
	Undergraduates	93	46.5
	Postgraduates	37	18.5
Types of community	Rural Community	40	20.0
	Sub-urban	59	29.5
	Urban	101	50.5

4.2 Measurement Model

4.2.1 Reliability and Convergent Validity Analyses

This study underwent a two-step process in data analysis, namely the measurement model and structural model analyses. The measurement model analysis was carried out first to examine construct reliability, convergent validity, and discriminant validity. Construct reliability was assessed by measuring the composite reliability (CR), while convergent validity was evaluated through outer loading and average variance explained (AVE). The threshold

values for loading are 0.5, AVE is 0.5, and CR is 0.7 (Hair et al., 2017). As depicted in Table 3, all constructs exceeded the minimum values for CR (0.7), outer loading (0.5), and AVE (0.5), indicating that the convergent validity of the study was established.

Table 3. Reliability and Convergent Validity Analyses

Construct	Indicators	Outer Loading	CR	AVE
ATT	ATT1	0.935	0.967	0.907
	ATT2	0.971		
	ATT3	0.951		
CP	CP1	0.835	0.928	0.719
	CP2	0.874		
	CP3	0.825		
	CP4	0.824		
	CP5	0.881		
INT	INT1	0.927	0.949	0.860
	INT2	0.939		
	INT3	0.917		

Note 1: CR – Composite reliability, AVE - Average variance explained.

Note 2: ATT – Attitude, CP – Community participation, INT – Flood preparedness intention

4.2.2 Discriminant Validity

Once convergent validity was established, this study proceeded to the next analysis, which assesses discriminant validity. The discriminant validity analysis was performed to examine the extent to which an indicator represents only an individual construct and measures how distinct the construct is from others in the study (Gholami et al., 2013). As suggested by Henseler et al. (2015), this study utilised the Heterotrait-Monotrait (HTMT) ratio to assess discriminant validity. As shown in Table 4, the HTMT values for attitudes, community participation, and flood preparedness intention were below 0.85, as recommended by Kline (2011). Therefore, it is believed that the constructs of the study are distinct from each other; hence, discriminant validity has been established.

Table 4. Discriminant Validity Assessment

Construct	ATT	CP	INT
ATT			
CP	0.337		
INT	0.730	0.288	

Note: ATT – Attitude, CP – Community participation, INT – Flood preparedness intention.

4.3 Structural Model

4.3.1 Common Method Bias

Structural model analysis was performed to test the hypotheses of the study. Before conducting the analysis, researchers are required to examine whether the study data is free from common method bias (CMB) issues. CMB occurs when the same respondents simultaneously

answer the predictor and criterion variables. Addressing this issue is crucial to prevent questionable findings in a study (MacKenzie & Podsakoff, 2012). As depicted in Table 5, the full collinearity analysis found that the Variance Inflation Factor (VIF) values for all constructs are below the threshold value of 3.3, as suggested by Diamantopoulos and Siguaw (2006). Thus, collinearity is not an issue for this study.

Table 5. Full-collinearity Testing

Construct	ATT	CP	INT
VIF	1.969	1.115	1.911

Note 1: VIF – Variance inflated factor

Note 2: ATT – Attitude, CP – Community participation,
INT – Flood preparedness intention.

4.3.2 Hypothesis Testing

This study then analysed the structural model to examine the direct relationships among the variables (H1, H2 and H3) and the indirect relationship (H4) using a bootstrapping procedure with 10,000 resamples. Table 6 depicts the results of the structural model analysis, including beta values (β), standard errors (SE), t -values, p -values, effect sizes (f^2), VIF, lower bounds (LL), and upper bounds (UL). The findings of this study, when interpreted in the context of Pahang residents, reveal how local socio-cultural and community factors shape the relationships between community participation, attitude, and flood preparedness intention. The first hypothesis suggests that community participation has no positive relationship with flood preparedness intention ($\beta = 0.056$, $t = 1.235$, $p > 0.05$), indicating that Pahang residents do not perceive community participation as a significant factor influencing their intention to prepare for floods. This finding implies that community participation alone is insufficient to drive intentions for flood preparedness in the state.

The second hypothesis suggests that community participation has a positive relationship with attitude ($\beta = 0.314$, $t = 4.785$, $p < 0.05$), highlighting that residents in Pahang who actively engage in local activities—shaped by cultural norms, local governance, and community networks—develop more positive attitudes toward flood preparedness. This relationship is particularly significant given the diverse ethnic composition of Pahang, where Malays, Chinese, and Indians may exhibit different levels of community engagement based on cultural practices and historical experiences with disasters.

The third hypothesis indicates that attitude has a strong positive relationship with flood preparedness intention ($\beta = 0.671$, $t = 13.502$, $p < 0.05$), suggesting that those with more favourable attitudes towards flood preparedness, influenced by their community participation, are more likely to intend to take flood preparedness actions. Finally, the fourth hypothesis reveals that attitude positively mediates the relationship between community participation and flood preparedness intention ($\beta = 0.211$, $t = 4.460$, $p < 0.05$), demonstrating that community involvement fosters positive attitudes, which in turn increase the intention to prepare for floods. This mediating effect is particularly shaped by Pahang's community dynamics and the ethnic-

specific ways in which preparedness is perceived and acted upon, reflecting the context-dependent nature of the study.

One of the indicators to examine whether there is a mediating effect is examining whether the upper and lower confidence intervals do not have zero (Preacher & Hayes, 2008). Table 6 shows that the indirect effect in hypothesis 4 does not have zero between the upper and lower confidence interval, indicating that such a hypothesis was supported. Hence, H2, H3, and H4 were supported.

Zhao et al. (2010) introduced five typologies of mediations and non-mediations: Complementary mediation, Competitive mediation, Indirect-only mediation, Direct-only nonmediation, and No-effect nonmediation. The findings of the present study are best related to indirect-only mediation, as the mediated effect ($a \times b$) exists, but there is no direct effect. This can be interpreted to mean that the relationship between community participation and flood preparedness intention is fully explained through the mediator (attitude towards flood preparedness), with no independent effect from the direct path. This suggests that attitude towards flood preparedness is the sole mechanism through which community participation influences flood preparedness intention, highlighting the critical role of attitude as a mediator in shaping the outcome, while the direct effect of community participation on flood preparedness intention is negligible or nonexistent.

Additionally, Cohen (1988) set the standards for effect sizes at 0.02, 0.15, and 0.35, representing small, medium, and large effects, respectively. Table 6 shows that community participation had a small effect on attitude ($f^2 = 0.109$) meanwhile attitude had a large effect on flood preparedness intention ($f^2 = 0.775$). Figure 2 illustrates the hypothesis testing results of the study.

Table 6. Hypothesis Testing

Hypothesis	Path	Beta	SE	t-value	p-value	f^2	VIF	LL	UL
H1	CP→INT	0.056	0.045	1.235	0.108	-	1.109	-0.020	0.128
H2	CP→ATT	0.314	0.066	4.785	0.000	0.109	1	0.199	0.415
H3	ATT→INT	0.671	0.050	13.502	0.000	0.775	1.109	0.581	0.745
H4	CP→ATT →INT	0.211	0.047	4.460	0.000	-	-	0.132	0.286

Note: ATT – Attitude, CP – Community participation, INT – Flood preparedness intention.

4.3.3 Predictive Power Analysis

In the context of Pahang residents, the predictive capability of the model can be assessed by utilising the PLSpredict technique introduced by Shmueli et al. (2016), which evaluates the ability of Partial Least Squares Structural Equation Modeling (PLS-SEM) to make accurate predictions at the individual case level. This approach, which uses a holdout-sample-based method, generates predictions for both items and constructs, such as attitude and flood preparedness intention, specific to Pahang's residents. As shown in Table 7, the PLS RMSE values for these constructs were lower than those of the naive linear regression model (LM),

indicating stronger predictive power within this specific community context. This suggests that, in Pahang, the model effectively predicts individuals' attitudes towards flood preparedness and their intentions to engage in preparedness behaviours, reflecting the impact of local socio-cultural factors and community involvement. The lower RMSE values demonstrate that the relationships between community participation, attitude, and flood preparedness intention are not only robust but are specifically relevant to the unique demographic and cultural characteristics of Pahang, enhancing the context-dependence of the study's findings.

Table 7. Predictive power analysis

	PLS RMSE	LM RMSE	PLS-LM	Q^2_{predict}
ATT1	0.869	0.890	-0.890	0.068
ATT2	0.883	0.898	-0.898	0.066
ATT3	0.807	0.826	-0.826	0.082
INT1	1.450	1.478	-1.478	0.033
INT2	1.442	1.462	-1.462	0.042
INT3	1.315	1.342	-1.342	0.065

Note: ATT – Attitude, INT – Flood preparedness intention.

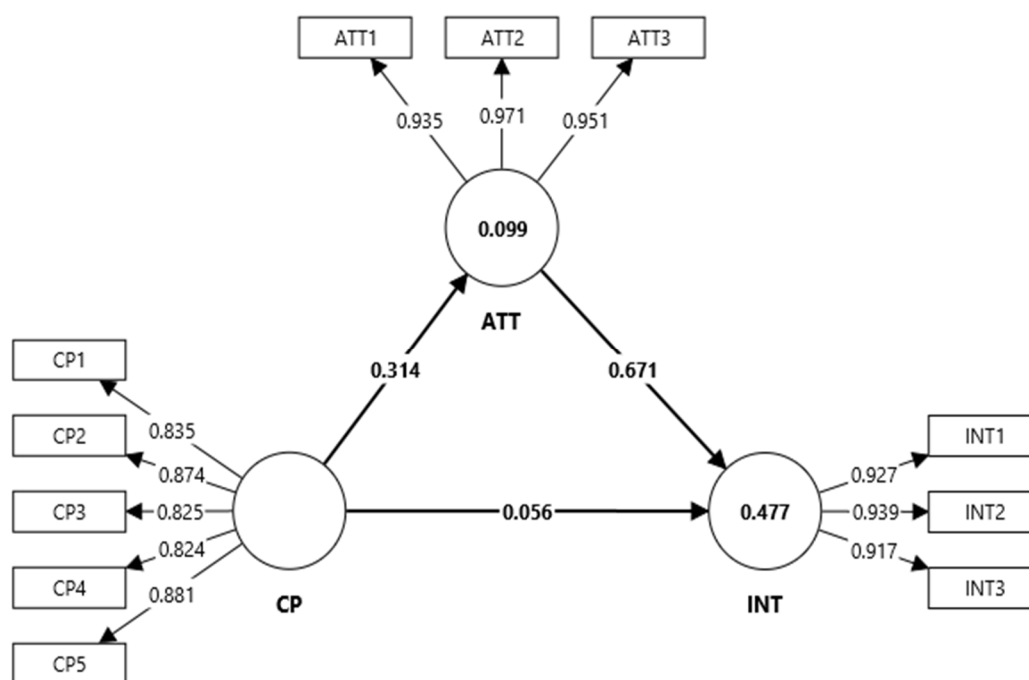


Figure 2. Hypothesis testing results of the study

5. DISCUSSION

The present study has confirmed that community participation does not have a positive impact on flood preparedness intention, suggesting that residents of Pahang do not view community involvement as a key factor in shaping their intentions to prepare for floods. Hence, H1 was not supported. Residents of Pahang may not be fully aware of the potential benefits of

community participation in flood preparedness. If community initiatives or programs are not effectively communicated or do not actively engage residents, they may not perceive community involvement as a direct influence on their preparedness intentions. The present study also found that community participation positively affects Pahang residents' attitudes toward flood preparedness, supporting H2. This finding is consistent with Jamshidi et al. (2016), who found that individuals actively engaging in community activities are more likely to develop a positive attitude toward flood preparedness. In the context of Pahang, where community ties and local participation are influenced by diverse cultural and social factors, the role of community involvement in shaping attitudes is particularly significant. Novak et al. (2019) further assert that community participation involves various activities that deepen the public's understanding of disaster origins and impacts. In Pahang, the active interaction among residents in local events, volunteer work, and communal efforts significantly boosts their positive attitudes toward the benefits of flood preparedness. This reflects a context-dependent dynamic, where the social fabric and community-oriented activities in Pahang elevate the residents' perceptions of the importance and effectiveness of proactive flood mitigation measures. Thus, the relationship between community participation and attitude toward flood preparedness is not only supported by theory but is also deeply rooted in the specific socio-cultural and community characteristics of Pahang.

This study also revealed that attitude toward flood preparedness positively affects flood preparedness intention among Pahang residents, supporting H3. This suggests that individuals in Pahang with more favourable attitudes toward flood preparedness are more likely to express a stronger intention to take proactive measures in anticipation of future flood events. This finding aligns with Ridzuan et al. (2024), who similarly observed that positive attitudes lead to higher preparedness intentions. However, it is noteworthy that this study differs from previous research, such as Ng (2022), who found no significant association between attitude and intention in extreme circumstances, like during typhoons. The context of Pahang, where residents frequently face flood risks and are influenced by local socio-cultural and environmental factors, may explain this difference. In Pahang, flood preparedness is often perceived as a community-driven, practical necessity, and individuals' attitudes towards it are more strongly linked to their intention to act. This highlights the context-dependent nature of the findings, where the specific flood risk experiences of Pahang residents play a critical role in shaping their attitudes and preparedness intentions, in contrast to other extreme disaster scenarios like typhoons.

In terms of the mediation effect (H4), this study revealed that attitude towards flood preparedness positively mediates the relationship between community participation and flood preparedness intention among Pahang residents. Specifically, the influence of community participation on flood preparedness intention is channeled through the mediating role of individuals' attitudes toward flood preparedness. It is interesting to note that the findings of the study are suitable to be associated with indirect-only mediation, as the mediated effect ($a \times b$) exists, but there is no direct effect. It shows that the attitude towards flood preparedness plays a vital role as the mediating variable, highlighting its central position in shaping the relationship

between community participation and flood preparedness intention. This suggests that fostering positive attitudes towards flood preparedness can enhance the effectiveness of community-based initiatives, even in the absence of direct influence from community participation alone.

This finding suggests that community participation operates indirectly by shaping attitudes, which subsequently influence preparedness intentions. In Pahang, where community-driven efforts are central to addressing local flood risks, individuals actively engaged in community-based flood preparedness initiatives are more likely to develop positive attitudes toward such measures. These favourable attitudes, shaped by the collective experiences and shared values of the Pahang community, contribute to a heightened intention to take proactive preparedness actions. This supports the SOR theory, which emphasises the interaction between external stimuli, internal processes, and behavioural responses. In this context, community participation serves as the external stimulus, triggering cognitive and emotional responses in residents that result in a shift toward more positive attitudes and increased flood preparedness intentions. The context of Pahang—where local knowledge, cultural norms, and communal solidarity play a significant role—amplifies the impact of community participation on attitudes and intentions, illustrating how the theory applies specifically to the region's unique socio-cultural dynamics.

Furthermore, the validation of the SOR theory in the context of flood preparedness strengthens the theoretical framework for understanding and predicting individuals' responses to community-level interventions in Pahang. This study highlights the importance of adopting a comprehensive approach that not only focuses on the immediate influence of external stimuli, such as community participation, but also considers the underlying cognitive and emotional processes that facilitate and enhance the effectiveness of these stimuli. In Pahang, where communal values and local knowledge play a pivotal role in addressing flood risks, the confirmation of the SOR theory highlights the necessity of addressing both external and internal factors in the preparedness process. As researchers and practitioners aim to improve community resilience to flooding in the state, recognising the indirect impact of community participation on attitudes becomes crucial. By targeting and shaping individuals' attitudes and emotional responses, interventions in Pahang can be more effectively designed to foster a resilient and proactive community, better equipped to respond to the challenges posed by frequent floods. This context-dependent approach emphasises the role of local social dynamics and community engagement in enhancing flood preparedness and resilience in Pahang.

5.1 Contributions of the Study

This research makes substantial contributions both theoretically and practically. From a theoretical perspective, the study enriches scholars' understanding of the complex dynamics involved in flood preparedness behaviour, particularly within the context of Pahang. Despite the acknowledged importance of community participation toward flood preparedness intention, limited studies have explored the factors influencing flood preparedness intention among

residents using the SOR framework. By confirming and expanding upon the SOR framework, this research advances existing theoretical models, offering in-depth insights into the relationship between community participation, attitudes, and flood preparedness intention.

The current study introduces a new SOR model to investigate the impact of community participation and flood preparedness intention through the attitude toward flood preparedness among residents in Pahang. By incorporating a novel combination of factors into the SOR model, this study enriches the model, providing a more comprehensive explanation for the willingness of Pahang residents to prepare for floods. The findings indicate that community participation can predict both attitudes toward flood preparedness and flood preparedness intention within a single research model. Furthermore, this study validates that the attitude toward flood preparedness positively mediates the relationship between community participation and flood preparedness intention. Hence, the present study significantly contributes to the body of knowledge regarding factors influencing flood preparedness intention.

Past researchers (e.g., Ubaidillah et al., 2022; Hoffman & Muttarak, 2017) have asserted that studies related to disasters are very limited in developing countries compared to developed countries. By undertaking this study in the context of Malaysia, the present study contributes to the currently limited literature on disaster preparedness studies by examining the role of community participation and attitude toward flood preparedness in flood preparedness intention. Hence, this study adds contextual contributions, highlighting aspects of community participation, attitude toward flood preparedness, and flood preparedness intention which, to the authors' knowledge, is the first of its kind study conducted in Pahang, Malaysia. Another significant contribution of the study is that it has confirmed previous knowledge that community participation is positively associated with attitude toward flood preparedness and the attitude toward flood preparedness is positively associated with flood preparedness intention.

From a practical standpoint, the findings of this study provide actionable guidance for policymakers, government agencies, especially the National Disaster Management Agency (NADMA), and community leaders in designing and implementing effective flood preparedness interventions. The identified relationships between community participation, attitudes, and preparedness intentions offer a roadmap for targeted strategies aimed at enhancing community resilience. These practical implications underscore the significance of tailored approaches that consider the unique socio-cultural and environmental factors influencing flood preparedness in Pahang.

Furthermore, this research contributes to the existing body of literature on disaster management, specifically in regions prone to flooding. The insights gained from this study can inform the development of evidence-based policies and practices, facilitating more informed decision-making processes at both local and national levels. By bridging the gap between theory and practice, this research strives to enhance the overall preparedness and adaptive

capacities of communities vulnerable to flood events, thereby promoting a more resilient and secure future.

5.2 Limitations and Future Research

Despite the strength of the presented results, the authors recognise several limitations within this study. The study utilised purposive sampling due to the absence of a comprehensive list of Pahang residents, limiting the generalisability of its findings. Non-probability sampling methods, such as purposive sampling, often lack representativeness because certain elements of the population may be systematically excluded (Lynch Jr., 1982; Ferber, 1977; Stuart, 1976). However, obtaining a perfectly representative sample is often impractical (Cheah et al., 2021), and challenges such as unequal selection probabilities, non-response, and non-coverage further complicate this process (Kalton & Flores-Cervantes, 2003). According to Calder et al. (1981), representativeness is less critical in theoretical application research, where the focus is on testing hypotheses and evaluating theoretical frameworks rather than generalising findings to the broader population. Thus, this study prioritises the validity of theoretical effects over sample generalisability, making representativeness a secondary concern (Calder et al., 1981; Cook et al., 1979). Future studies could aim to use probability sampling methods, such as random sampling, to improve the representativeness and generalisability of the findings. This would help address the limitations of purposive sampling and provide a broader view of the population in Pahang. Conducting longitudinal research could provide deeper insights into how theoretical effects evolve over time, ensuring that the findings are robust across different periods and contexts.

6. CONCLUSIONS

The importance of disaster preparedness, particularly flood preparedness, is critical in mitigating the adverse effects of disasters at the individual, community, and national levels. In the case of Pahang residents, who are frequently exposed to flood risks, embracing flood preparedness behaviour is vital for fostering resilience, minimising flood impact, and ensuring the well-being of the community. This study has found that community participation plays a significant role in shaping attitudes toward flood preparedness, highlighting the value of collective efforts in enhancing disaster preparedness. Additionally, attitudes toward flood preparedness were shown to positively influence individuals' intentions to take proactive measures, underlining the psychological and emotional factors that drive preparedness behaviour. Importantly, this study emphasises the mediating role of attitudes in the relationship between community participation and flood preparedness intention, illustrating that community engagement indirectly fosters positive attitudes, which in turn strengthen the intention to act.

The measurements for the three key variables in this study were carefully crafted to capture the relevant aspects of flood preparedness behaviour and community involvement. Attitude towards flood preparedness was measured through three items assessing individuals' perceptions of the effectiveness, usefulness, and benefits of flood preparation. Flood preparedness intention was gauged using three items that examined individuals' expectations, plans, and intentions to prepare for floods. Community participation was assessed through five items that focused on residents' involvement in activities aimed at improving community life, such as collaboration on community projects, participation in local events, contributing to charitable causes, attending public meetings, and volunteering for community initiatives.

The context of Pahang, with its unique socio-cultural dynamics and frequent flood risks, plays a significant role in shaping these behaviours and attitudes. The findings suggest that in Pahang, community participation and collective action are key factors in fostering a culture of preparedness. The emphasis on local engagement, communal solidarity, and shared experiences in flood-prone areas reinforces the effectiveness of the SOR theory in this context. By recognising the indirect influence of community participation on attitudes and intentions, this study underscores the need for interventions that target both external factors (community involvement) and internal factors (individual attitudes) to enhance flood preparedness. These insights contribute to a deeper understanding of how community-based strategies can be effectively applied to improve disaster resilience in Pahang and similar flood-prone regions.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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