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FLOOD PREPAREDNESS INTENTION AMONG PAHANG RESIDENTS: AN EXTENSION OF THE THEORY OF PLANNED BEHAVIOR

Mohd Rozaimy Ridzuan[1],[2], Jamal Rizal Razali[1*], Noor Amira Syazwani Abd Rahman[2], Soon-Yew Ju[2]
[1]Centre for Human Sciences, Universiti Malaysia Pahang, Pahang Darul Makmur, Malaysia
[2]Faculty of Administrative Sciemce & Policy Studies, Universiti Teknologi MARA (UiTM) Pahang Branch, Raub Campus, 27600, Raub, Pahang Darul Makmur
*Corresponding author: *jamalrizalrazali@ump.edu.my*

Abstract

Frequent occurrences of flooding in Malaysia lead to significant loss of lives and property. Pahang, located in the East Coast Region, is particularly vulnerable to severe floods, especially during the monsoon season. Predicting the flood situation in Pahang is challenging as it can unexpectedly affect previously unaffected areas. If the residents of Pahang are conscious of their susceptibility to floods, they are more inclined to make necessary preparations. This study examined the relationship between attitude (ATT), subjective norms (SN), perceived behavioral control (PBC), perceived susceptibility (SUC), and flood preparedness intention (INT) among 200 Pahang residents. An extension of the Theory of Planned Behavior (TPB) was developed and tested using the Structural Equation Modeling (SEM) technique with Partial Least Squares (PLS). A positive relationship was found between the independent variables and dependent variable except for perceived behavioral control. It is hoped that this study can contribute to the body of knowledge regarding flood preparedness in Malaysia, particularly Pahang, Malaysia. This study is also anticipated to assist policymakers in formulating specific policies concerning initiatives aimed at equipping individuals to confront flood situations.

Keywords: perceived susceptibility, flood preparedness intention. trust on public protection, disaster risk reduction, Pahang.

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Introduction

Human life has been profoundly impacted by climate change, with a succession of natural calamities like floods, earthquakes, droughts, tornadoes, landslides, and other such events. One of the most common and expensive hydrometeorological dangers, flooding affects people all over the world and destroys homes, businesses, and livelihoods. Approximately 7 million lives were lost and over USD 9.6 trillion in economic damages were caused by flooding between 1900 and 2022 (Emergency Events Database (EM-DAT), 2022). The increased severity and frequency of flooding in our world today and in the future have been attributed to population growth, unplanned urbanization, settlement development in flood-prone areas, and climate change (Alfieri et al., 2016; Tellman et al., 2021; Vitousek et al., 2017). Floods have plagued Malaysia frequently causing many families to lose their houses. Aside from that, the floods have made many residents fearful and phobic whenever it rains excessively in their living areas (Ridzuan et al., 2022). Apurv et al. (2015) highlighted that the coastal region of Pahang in Peninsular Malaysia is greatly impacted by the cold weather from the north and strong winds. Besides that, this area along the coast receives substantial levels of rainfall during the early and mid-monsoon periods. Notably, the period from November to January brings about destructive floods in this region of the nation. From November to March, Peninsular Malaysia experiences the northeast monsoon and its intense rainfall, which always results in floods, especially along the east coast. One of the states hit hard by the flood was Pahang (Elfithri et al., 2017).

Although individuals recognize the dangers posed by natural hazards and try to prepare for them (Rostami-Moez et al., 2020), their levels of preparedness are low (Murray & Watson, 2019; Titko & Ristvej, 2020). Hence, there is a need to study factors influencing Pahang residents to prepare for floods. The purpose of this research is to use the Theory of Planned Behavior (TPB) and an enhanced model that includes perceived susceptibility to predict whether Pahang residents will take steps to ensure their homes are prepared for a flood. In this study, the TPB served as the overarching theoretical framework. Direct application of the TPB for disaster preparedness evaluation has been demonstrated (Samah et al., 2019). When it comes to emergency and natural disaster preparation, the TPB model is yet to be established as one of the most prominent models (Paek et al., 2010). However, the TPB has not been employed in any studies to inquire into people's intentions regarding disaster preparation in Pahang. Besides that, Samah et al. (2019) argued that the TPB model needs revisions because many aspects of disaster preparedness cannot be reduced to the model's three core variables. To ascertain the level of flood readiness among the people of Pahang, this research improved the TPB model by adding a new construct which is perceived susceptibility (SUC).

Literature Review

The Theory of Planned Behavior (TPB) is well-suited to explain flood preparedness intentions because it provides a comprehensive framework for understanding the factors that influence individual decision-making and behavioral intentions concerning a specific action, such as preparing for floods. Attitude, subjective norms, and perceived behavioral control significantly affect safe behavior intention in the context of TPB and disaster preparedness (Najafi et al., 2017). An individual's attitude is formed when they evaluate the benefits and drawbacks of behavior in light of their expectations and whether those outcomes are desirable (Ajzen, 1985; Ajzen, 1991; Zaremohzzabieh et al., 2020). Many research (e.g., Ong et al., 2021, Hoffman & Muttarak, 2017, Zaremohzzabieh et al., 2021) discovered that attitude strongly influenced their respondents to have flood preparedness intention. The second independent variable of the study is subjective norms (SN), which refer to a person's perception of societal pressure to act in a certain way. An individual's decision to act is influenced by the opinions, expectations, and degree of compliance of those to whom he or she is close.

The third independent variable is perceived behavioral control (PBC). It describes how capable an individual feels they are of carrying out a specific behavior. PBC is higher when people believe they have a greater ability to undertake a behavior or more relevant resources and chances (Ajzen, 2006; Ham et al., 2015). According to research (Najafi et al., 2017; Kahlor et al., 2019), individuals who feel they have some say over their actions are more likely to be prepared. Finally, this research develops an extension of the idea of planned behavior called perceived susceptibility. Perceived susceptibility refers to the risk that an individual may suffer mental, bodily, or emotional harm as a result of an event or condition (Gerrard, 2020). According to Weinstein (1998), recognizing one's perceived susceptibility is a process that begins with denial and progresses via awareness of the threat and acceptance of one's vulnerability. Perceived susceptibility was found to significantly and positively affect the likelihood that people would take part in preventative measures (Masuda et al. (2018).

Based on the explanation above, it can be inferred that individuals with positive attitudes towards flood preparedness are more likely to intend to prepare for floods. Additionally, if an individual perceives that their family, friends, and community consider flood preparedness important, they are more likely to have a higher intention to engage in such activities to align with the expectations of those around them. Individuals are also more likely to prepare for floods when they believe they have the necessary resources, skills, and knowledge to do so effectively. Lastly, individuals are more likely to prepare for floods if they perceive themselves to be at a higher risk of experiencing a flood (perceived susceptibility). This perception can serve as a motivator for them to take action and prepare for potential flood events. The following hypotheses were formulated in this investigation based on this model.

H1: There is a positive relationship between attitude (ATT) and flood preparedness intention (INT).
H2: There is a positive relationship between subjective norms (SN) and flood preparedness intention (INT).
H3: There is a positive relationship between perceived behavioral control (PBC) and flood preparedness intention (INT).
H4: There is a positive relationship between perceived susceptibility (SUC) and flood preparedness intention (INT).

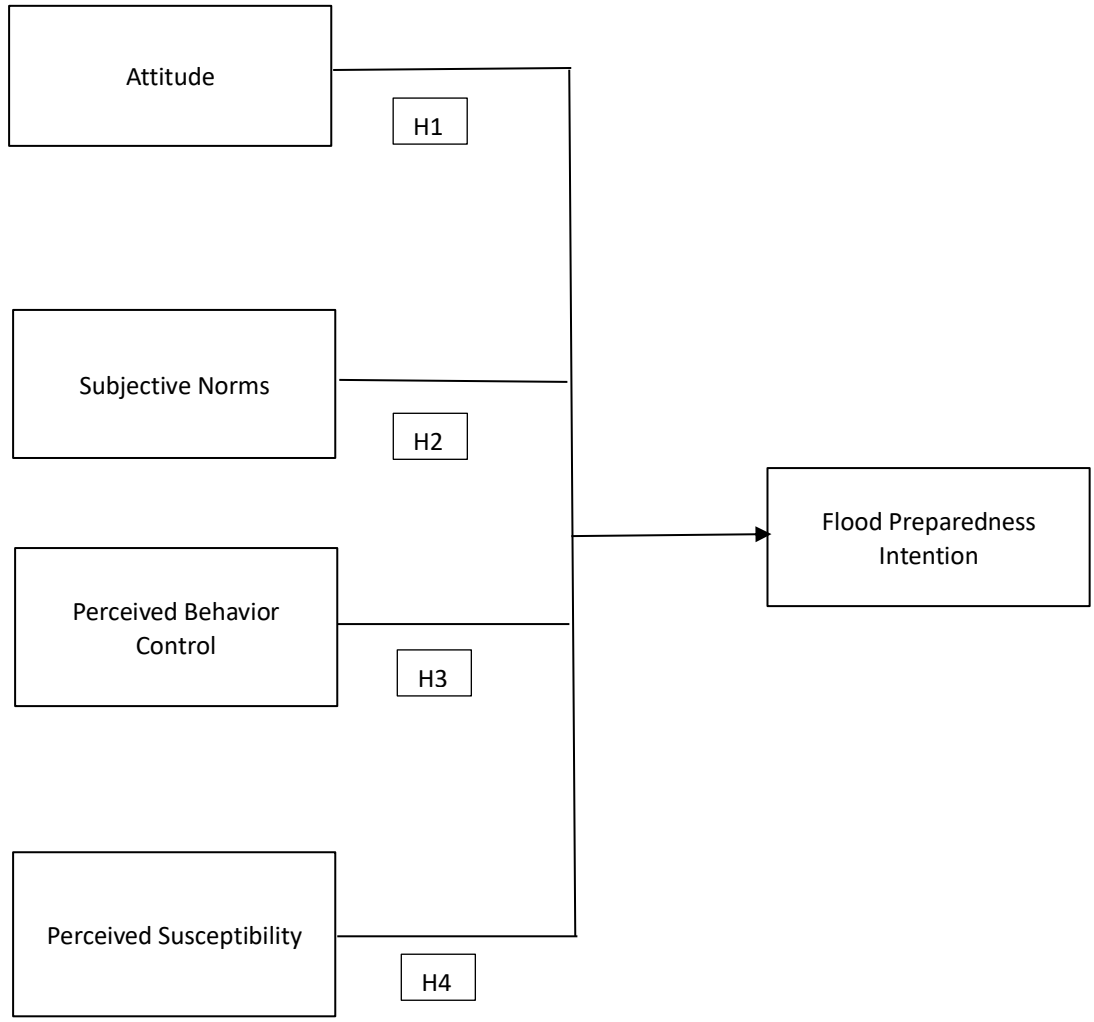

Figure 1. Research Framework

Methods

Purposive sampling was performed in this investigation and the locals of Pahang were of particular interest. For one month, the questionnaire was distributed via social media platforms like Facebook and WhatsApp, using Google Forms. The number of predictors was factored into the calculation of the sample size's statistical significance. The measuring model needs to meet both convergent and discriminant validity criteria. Convergent validity is often established when the loading is at least 0.50, the average variance extracted (AVE) is at least 0.5, and the composite reliability (CR) is at least 0.7 (Hair et al., 2019). Convergent validity is not an issue in this study, as shown by Table 2, which displays that outer loading, AVE, and CR are all more than the threshold values. When that condition was met, the model's discriminant validity was examined. If the heterotrait-monotrait ratio (HTMT) values are less than 0.9, then the test has no discriminant validity issue (Franke & Sarstedt, 2019). Table 3 shows that all the outcomes are less than the intended 0.9, hence it meets the HTMT requirement. In light of these findings, it can be concluded the model met the discriminant validity requirements of the tested constructs and items.

Table 1 shows the demographic profile of the respondents. The first variable in the table is gender. Out of the total sample size of 200 participants, 71 (35.5%) identified as male, while 129 (64.5%) identified as female. The majority of participants identified as Malay, with 122 individuals, accounting for 61.0% of the sample. The Chinese ethnicity was represented by 35 participants, constituting 17.5% of the sample. The Indian ethnicity had 42 participants, making up 21.0% of the sample. Only one individual (0.5%) fell into the "Others" category. The highest education variable indicates the educational attainment of the participants. Among the respondents, 70 (35.0%) reported having completed schooling as their highest level of education. Undergraduates constituted the largest group, with 93 participants, accounting for 46.5% of the sample. Postgraduates were represented by 37 individuals, making up 18.5% of the sample. The last variable in the table pertains to the types of community participants belonged to. Out of the total sample, 40 individuals (20.0%) identified as belonging to a rural community. Suburban communities were represented by 59 participants, accounting for 29.5% of the sample. The largest group was individuals from urban areas, comprising 101 participants, or 50.5% of the sample.

Table 1. Demographic profile of the respondents

Variable		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

Result and Discussion

Before analyzing the structural model, the researchers first made sure there were no collinearity issues with the measurement model by running a multicollinearity test. The values of the variance inflated factor (VIF) were used to test for collinearity; these values needed to be below the cutoff value of 5 (Hair et al., 2017). All VIF values in Table 4 were less than 5, hence there was no collinearity issue with the predictor variables. The bootstrapping method was then used to test the hypotheses.

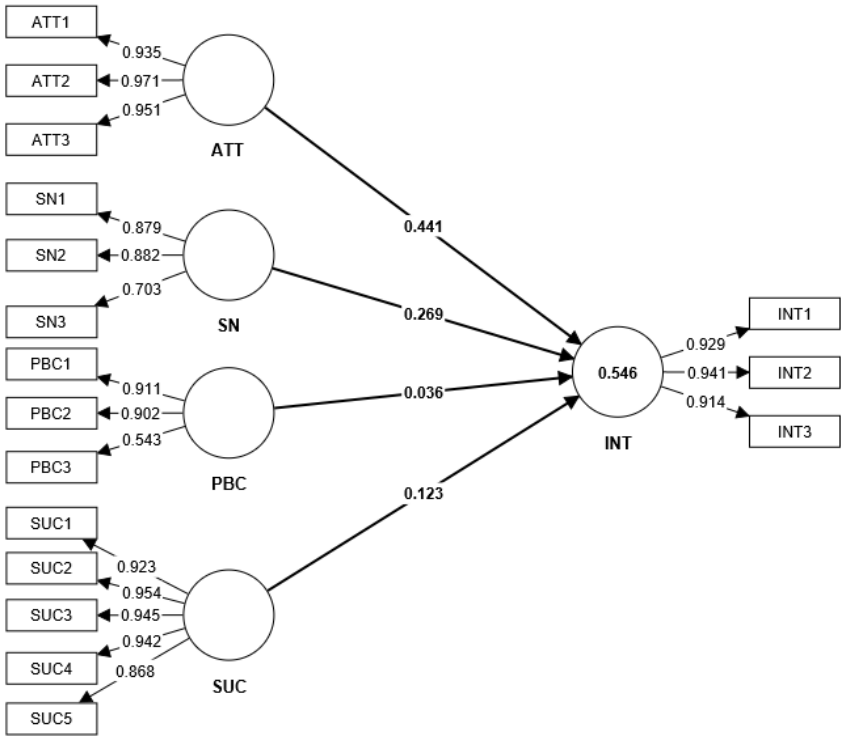

Figure 2. Research findings

Table 5 provides the results of hypothesis testing, whereby all direct effect hypotheses were supported excluding hypothesis 3. As for H1 whereby it was posited that attitude (ATT) has a positive influence on flood preparedness intention (INT), the results showed a positive relationship ($\beta = 0.441$, $t = 5.586$: lower level (LL) = 0.317, upper level (UL) = 0.574, $p < 0.001$). Therefore, H1 was supported. For H2, it was suggested that subjective norms (SN) positively influence INT, and the results showed that PE had a positive relationship with INT ($\beta = 0.269$, $t = 3.274$: LL = 0.128, UL = 0.396, $p < 0.001$). Therefore, H2 was supported. Regarding H3, it was proposed that perceived behavioral control (PBC) positively influences INT, and the results showed that PBC had no positive relationship with INT ($\beta = 0.036$, $t = 0.547$: LL = -0.073, UL = 0.143, $p > 0.005$). Therefore, H3 was not supported. Regarding H4, it was suggested that perceived susceptibility (SUC) positively influences INT, and the results showed that SUC had a positive relationship with INT ($\beta = 0.123$, $t = 2.339$: LL = 0.038, UL = 0.210, $p < 0.05$).

The extended TPB model's findings show that Pahang inhabitants can benefit greatly from adopting a more prepared mentality and more flexible subjective norms about flood preparedness. This finding is in line with the findings of numerous other studies, which have found a strong relationship between attitudes and the likelihood that individuals and households will take measures to mitigate the effects

of natural disasters like earthquakes (Ong et al., 2021) and floods (Budhathoki et al., 2020). In terms of subjective norms, the findings indicated that important people in the lives of Pahang residents influenced their willingness to take precautions against flooding. Ong et al.'s (2021) study found that people's willingness to take precautions against earthquakes could be influenced by subjective norms. This result agrees with the predictions of the TPB. Besides that, the health belief model (Becker & Rosenstock, 1984; Janz & Becker) also accounts for personal modifying variables, such as the effect of peers and others on behavioral intentions.

However, the study indicated that one's perceived behavioral control did not affect their intention to take flood preparation measures. This finding agrees with what Zaremohzzabieh et al. (2021) found in their research. A possible explanation was that in communal civilizations like Malaysia's, earthquake preparedness calls for group efforts rather than individual ones (Zaremohzzabieh et al., 2021). According to Bandura (1986), people are social creatures that look to their peers for help in resolving conflicts and achieving personal growth. Palm (1999) found that how people thought others would react to a crisis affected their reactions and how seriously they took the risk. In a society where each person is seen as part of a web of relationships rather than an autonomous entity, group norms, and regulations, rather than individual perceptions, should guide risk-averse behavior. In addition, the study discovered a favorable correlation between perceived susceptibility and flood preparedness intention. People are more likely to take safety measures against flooding if they perceive they are at greater risk.

Table 2. Convergent validity

Constructs	Items	Loading	CR	AVE
ATT	ATT1	0.935	0.967	0.907
	ATT2	0.971		
	ATT3	0.951		
INT	INT1	0.929	0.949	0.861
	INT2	0.941		
	INT3	0.914		
PBC	PBC1	0.911	0.839	0.646
	PBC2	0.902		
	PBC3	0.543		
SN	SN1	0.879	0.864	0.681
	SN2	0.882		
	SN3	0.703		
SUC	SUC1	0.923	0.968	0.859
	SUC2	0.954		
	SUC3	0.945		
	SUC4	0.942		
	SUC5	0.868		

Table 3. The heterotrait-monotrait ratio (HTMT)

	ATT	INT	PBC	SN	SUC
ATT					
INT	0.730				
PBC	0.718	0.573			
SN	0.713	0.710	0.726		
SUC	0.412	0.463	0.317	0.545	

Table 4. Full collinearity results

Constructs	SUC	ATT	INT	PBC	SN
VIF	1.368	2.429	2.202	1.746	2.362

Table 5. Direct path coefficient

Relationship	Beta	SE	t-value	P-value	VIF	f^2	LL	UL
ATT -> INT	0.441	0.079	5.586	0.000	2.000	0.214	0.317	0.574
SN -> INT	0.269	0.082	3.274	0.001	2.202	0.073	0.128	0.396
PBC -> INT	0.036	0.066	0.547	0.292	1.743	Nil	-0.073	0.143
SUC -> INT	0.123	0.053	2.339	0.010	1.335	0.025	0.038	0.210

Conclusion

Floods have been a persistent issue in numerous nations throughout history. Malaysia, including the state of Pahang, has not been exempt from the threat of flood disasters, with annual occurrences of such events. The consequences of these floods are not only loss of life but also extensive damage to homes and properties of Pahang residents. While it is impossible to prevent floods entirely, residents can mitigate their negative effects by preparing in advance. Consequently, this study aims to identify the factors that influence flood preparedness intention among Pahang residents. Attitude, subjective norms, and perceived susceptibility have all been found to positively affect flood preparedness intention, as stated above. However, perceived behavioral control was not found to influence flood preparedness intention. Pahang's locals are more inclined to take precautions against flooding if they think doing so will have a favorable impact on their lives and the lives of others. The results of this research can be used by policymakers to create flood-related policies that consider this crucial element by implementing initiatives to raise public knowledge about the significance of flood preparedness. People are more inclined to take precautions against flooding when they understand that doing so will have positive consequences for themselves and others. The government should promote the good actions of prepared people and stress the significance of societal norms of preparedness in the program. In addition, the government should think about rewarding people and places who take preventative measures against flooding. Rewarding those who take preventative action is possible through public acknowledgment, issuance of certificates, and provision of financial resources. Rewards can encourage people to follow the accepted norm and help them get ready for a flood. The government and community members should work to improve residents' perceived susceptibility to floods by disseminating accurate and up-to-date information about flood risks, historical flood events, and the potential impact of floods in the area. Brochures, websites, social media, and community meetings are just some of the ways that they can inform locals about the dangers to which they are exposed. The government, residential associations, citizens, and Non-governmental organizations (NGOs) will need to work together to implement all of the aforementioned steps to lessen the terrible effects of future floods.

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Author Contribution

Mohd Rozaimy Ridzuan – Conceptualization, writing, and data curation; Jamal Rizal Razali – Supervision, review & editing; Ju Soon Yew – Supervision and review; Noor Amira Syazwani Abd Rahman – Writing, citation, and references management.

Conflict of Interest

Authors declare no conflict of interest

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