



BEHAVIOUR DETERMINANTS OF INDIVIDUAL INTENTIONS FOR CLIMATE CHANGE ADAPTATION IN KLANG VALLEY, SELANGOR

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Abstract

Climate change poses increasing environmental, social, and economic challenges, particularly in highly urbanised regions such as the Klang Valley, Malaysia, where strengthening climate resilience has become an important environmental planning priority. Understanding the behavioural factors that influence individuals' intentions to adopt climate change adaptation measures is essential for developing effective community-based adaptation strategies and supporting climate-resilient urban planning. This study applied the Protection Motivation Theory (PMT) to examine the influence of threat appraisal and coping appraisal on behavioural intention towards climate change adaptation. A quantitative survey involving 450 respondents was conducted using a multistage cluster sampling technique, and the data were analysed using descriptive statistics and ordinal logistic regression. The findings revealed that the overall level of behavioural intention towards climate change adaptation was medium-high. Response efficacy ($\beta = 1.534$, $p < 0.001$), self-efficacy ($\beta = 1.331$, $p < 0.001$), and response cost ($\beta = 0.480$, $p < 0.001$) were significant predictors of behavioural intention, whereas perceived severity and perceived vulnerability were not statistically significant. The positive association observed for response cost suggests that perceived financial and practical challenges did not necessarily discourage respondents from adopting climate change adaptation measures. These findings provide valuable insights for environmental planners, local authorities, and policymakers in designing targeted interventions that strengthen community preparedness, enhance adaptive capacity, and support climate-resilient urban development.

Keywords: Climate Change Adaptation; Protection Motivation Theory; Behavioural Intention; Climate Resilience; Urban Planning

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INTRODUCTION

The phenomenon of climate change originates from global warming, in which the average temperature of the Earth's surface increases as the concentration of greenhouse gases in the atmosphere rises. These gases absorb more solar radiation and trap more heat, thereby warming the planet. Climate change refers to long-term changes in the Earth's climate that warm the atmosphere, oceans, and land. The impacts of climate change have become increasingly severe worldwide, resulting in substantial environmental degradation, biodiversity loss, and adverse effects on human health.

In Malaysia, the effects of climate change are becoming increasingly severe. Rising temperatures and erratic rainfall patterns are exacerbating health problems and other challenges faced by the population. This deterioration is largely attributed to heightened greenhouse gas emissions stemming from energy production and waste management practices (Mahmood & Guinto, 2022). Studies indicate that these emissions contribute significantly to the country's vulnerability to climate-related impacts, making it imperative for Malaysia to adopt more sustainable practices to mitigate these effects. Climate change adaptation has become an essential component of environmental planning and sustainable urban development. Strengthening adaptive capacity at the household and community levels is therefore fundamental to achieving long-term urban resilience and supporting local climate action initiatives.

The escalating threats of climate change to society and the environment necessitate proactive adaptive behaviour. While existing literature suggests that factors such as attitude, self-identity, and economic capacity influence adaptation, there is no consensus on which determinants most effectively foster individual readiness and long-term resilience among the public. This study aims to bridge that gap by investigating the specific behavioural and socio-economic factors influencing climate change adaptation intentions in the Klang Valley, ultimately seeking to inform policies that encourage meaningful community engagement and positive behavioural change.

The objective of this paper is (i) to identify the level of behavioural intention to adapt to climate change among individuals in Klang Valley and (ii) to examine the direct impact of behavioural determinants on individuals' intention to adapt to climate change in Klang Valley. The outcome of this paper examines the behavioural determinants, namely perceived severity, perceived vulnerability, response efficacy, self-efficacy, and response cost, that influence climate change adaptation intentions among individuals in the Klang Valley. By identifying the factors that promote or hinder behavioural change, the research aims to provide a framework for developing effective policies and practical solutions that enhance societal resilience.

LITERATURE REVIEW

Climate Change

Climate change has become one of the most pressing global environmental challenges. Scientifically, it can be defined as long-term changes in temperature, precipitation, wind patterns and other aspects of the Earth's climate system caused by both natural factors, such as volcanic eruptions and solar radiation variations and human-induced factors, primarily greenhouse gas emissions from activities like fossil fuel combustion, deforestation and industrial processes (Olaniyi, 2020). A key focus is on greenhouse gases (GHGs) such as carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). Most of these greenhouse gases result from human activities, including utilising fossil energy, cutting down trees, and raising animals.

Climate Change Adaptation

Climate change adaptation refers to the process of responding to and managing the current and anticipated impacts of climate change through measures that reduce vulnerability and enhance resilience. These measures aim to minimise or avoid the adverse effects of climate change on human health, ecosystems, biodiversity, and the built environment (Ogada et al., 2020). In rapidly urbanising regions such as the Klang Valley, effective adaptation requires strong collaboration among government agencies, local authorities, communities, and other stakeholders to facilitate knowledge exchange, strengthen community participation, and promote adaptive behavioural change. Community-based adaptation approaches, including the integration of indigenous knowledge and locally appropriate practices, provide cost-effective and context-specific solutions that enhance local resilience to climate-related risks. Given the increasing frequency and intensity of climate-related hazards, integrating climate adaptation into environmental planning and local development strategies has become essential for improving urban resilience and supporting sustainable community development.

Theoretical Underpinnings

Several theories have been applied in previous studies to understand the behavioural determinants of individuals' intentions to adapt to climate change in the Klang Valley. One prominent theory is the Theory of Planned Behaviour (TPB), which suggests that behavioural intentions are influenced by attitudes, subjective norms, and perceived behavioural control (Zhang et al., 2020). This theory has been instrumental in explaining how social and personal factors shape climate-related behaviours.

Another frequently used theory is the Protection Motivation Theory (PMT), which asserts that individuals are motivated to adopt adaptive behaviours

when they perceive a significant threat and believe that protective measures are effective and feasible (Xue et al., 2021). Its focus on both threat appraisal and coping mechanisms makes it particularly relevant for understanding climate adaptation behaviour. PMT has been widely applied and is an appropriate theory for studying behavioural intentions in the context of climate change adaptation. Its emphasis on threat perception, coping appraisal, and motivation provides a comprehensive lens for analysing the complex interplay of factors influencing adaptive behaviours. This makes PMT especially valuable for addressing the challenges posed by climate change in Klang Valley.

Protection Motivation Theory (PMT)

Climate change has received much attention in recent years and affects everyone around the world. In the Klang Valley, Selangor, Malaysia, determining antecedent factors for individual-level intention to adapt to climate change would serve as a useful tool for developing effective adaptation measures. PMT has been widely used to explain the psychological factors that influence people's decisions to adopt protective behaviours (Marikyan & Papagiannidis, 2023; Asma et al., 2024). According to this theory, perceived threat severity, perceived vulnerability, response efficacy, and self-efficacy dictate individuals' intentions to adapt.

Previous literature has guided the use of PMT, particularly in climate change adaptation. Another analysis indicated that perceived responsibility and self-efficacy were important factors of public acceptance of climate politics in Taiwan to some extent (Chen et al., 2021). A similar study conducted in the United States also found that perceived risk, threat appraisal, Attitude, Subjective Norm, Perceived Behavioural Control, vulnerability, response efficacy, and self-efficacy had a significant influence on perceived behavioural control and, therefore, consistent with individuals' adaptive behaviour intentions, increased water and energy conservation (Kothe et al., 2023). In summary, the PMT is a useful model for understanding and predicting many individuals' intentions to adapt to climate change. Previous studies conducted in Malaysia also demonstrated that behavioural adaptation towards environmental issues is strongly influenced by individual perceptions, attitudes, and coping mechanisms (Sahrir et al., 2022).

Behavioural Intentions

Behavioural intention represents an individual's readiness to perform a specific behaviour. Recent studies highlight the critical role of behavioural intentions in influencing health behaviours and risk mitigation strategies. For instance, research in public health demonstrates that behavioural intentions predict adherence to COVID-19 preventive measures, such as mask-wearing and social

distancing (Chen et al., 2023). Similarly, in the context of environmental behaviours, intentions to reduce plastic waste correlate with sustainable practices (Wang et al., 2020). In summary, behavioural intentions are a crucial determinant of action across various domains.

Perceived Severity

Perceived severity refers to the extent to which an individual believes a threat will have serious consequences. Recent evidence underscores its role in motivating action during global health crises. For example, higher perceived severity of COVID-19 has been linked to greater compliance with vaccination campaigns (Zhou et al., 2022). In cybersecurity, individuals who perceive severe consequences of cyberattacks are more likely to adopt protective software (Chen et al., 2020). Perceived severity significantly influences individuals' motivation to take protective actions across various domains.

Perceived Vulnerability

Perceived vulnerability is the degree to which individuals believe they are susceptible to a threat. Recent studies emphasise its importance in contexts like climate change and infectious disease prevention. For example, perceived vulnerability to extreme weather events has been found to predict preparedness behaviours, such as installing flood barriers (Bubeck et al., 2023). Similarly, during the COVID-19 pandemic, perceived vulnerability influenced individuals' intentions to seek testing and vaccination (Tsai et al., 2021). Perceived vulnerability significantly shapes adaptive and preventive actions across various threats. In Malaysia, vulnerability assessments have shown that adaptive capacity and perceived exposure to flood hazards are important determinants of adaptation responses among affected communities (Said et al., 2024).

Response Efficacy

Response efficacy refers to the belief that a recommended action or behaviour will effectively mitigate or eliminate a perceived threat. It has been identified as a critical determinant in promoting protective behaviours across various domains. For instance, in climate change adaptation, individuals who believe in the effectiveness of energy-efficient technologies or reforestation programs are more likely to adopt these measures (Xue et al., 2021). Similarly, in disaster preparedness, the perceived efficacy of flood barriers or early warning systems significantly influences household preparedness actions. In summary, response efficacy plays a pivotal role in motivating individuals to adopt behaviours that address environmental and societal risks.

Self-Efficacy

Self-efficacy is the confidence in one's ability to perform a specific behaviour successfully. Studies from 2019 onward confirm its role as a strong predictor of protective actions. For instance, higher self-efficacy has been associated with better adherence to home-based exercise programs during lockdowns (Wright et al., 2021). In cybersecurity, individuals with greater confidence in their ability to recognise phishing attempts are less likely to fall victim to scams (Yadav et al., 2023). Self-efficacy empowers individuals to adopt protective and preventive behaviours across diverse domains.

Response Cost

Response cost refers to the perceived financial, time, effort, or psychological sacrifices associated with adopting recommended protective behaviours. Recent studies illustrate how high response costs deter protective actions. For example, perceived financial costs of installing solar panels remain a barrier despite environmental benefits (Green et al., 2024). In healthcare, the time required for vaccine appointments was a deterrent for many during mass vaccination campaigns (Lee et al., 2023). In summary, minimising response costs is essential to encourage greater participation in beneficial behaviours.

RESEARCH METHODOLOGY

This study employed a quantitative research design grounded in the Protection Motivation Theory (PMT) to examine the behavioural determinants of climate change adaptation intentions among individuals in the Klang Valley, Malaysia. Data were collected using a validated bilingual (Malay and English) structured questionnaire comprising five-point Likert-scale items measuring the PMT constructs of perceived severity, perceived vulnerability, response efficacy, self-efficacy, response cost, and behavioural intention. Prior to the main survey, a pilot study was conducted to evaluate the questionnaire's clarity, feasibility, and reliability. The pilot study also enabled refinement of questionnaire wording before the actual survey.

A multistage cluster sampling technique was employed to obtain a representative sample of households across the Klang Valley. In the first stage, the Klang Valley was divided into eleven administrative districts. Subsequently, three districts (Gombak, Sepang, and Hulu Selangor) were purposively selected to represent different geographical settings. In the second stage, several town growth centres within each district were randomly selected, followed by the selection of residential neighbourhoods. Finally, systematic household sampling was used, whereby every *k*th household was selected from an ordered list of households, and one eligible household representative aged 18 years or older was

invited to participate in the survey. A total of 450 completed questionnaires were successfully collected and included in the final analysis.

Prior to the main survey, the questionnaire underwent expert content validation and reliability testing. All constructs exceeded the minimum recommended Cronbach's alpha value of 0.70, indicating satisfactory internal consistency and reliability of the measurement instrument (refer to Table 1). Descriptive statistics, including frequencies, percentages, and mean scores, were used to summarise respondents' characteristics and behavioural determinants. Ordinal logistic regression was employed because the dependent variable was measured using an ordinal five-point Likert scale. This technique is appropriate for modelling the relationship between multiple predictor variables and an ordered categorical outcome variable while providing reliable parameter estimates.

Table 1: Cronbach's alpha

Construct	No. of Items	Cronbach's α
Perceived Severity	11	0.846
Perceived Vulnerability	9	0.805
Response Efficacy	9	0.805
Self-Efficacy	10	0.722
Response Cost	10	0.939
Behavioural Intention	10	0.769

ANALYSIS AND DISCUSSION

Table 2 presents the nine items in this section: gender, age, race, dependent, educational level, occupation, disability status, income, and type of housing.

Table 2: Respondents' Demographics.

Characteristics	Description	Frequency (N)	Percentage (%)
Gender	Male	261	58.0
	Female	189	42.0
Age	18-24	31	6.9
	25-34	187	41.6
	35-44	115	25.6
	45-59	101	22.4
	60 and above	16	3.6
Race	Malay	317	70.4
	Chinese	64	14.2
	Indian	69	15.3
Educational Level	Secondary School	206	45.8
	STPM / Matriculation / Foundation	18	4.0
	Diploma	84	18.7
	Degree	124	27.6
	Master	18	4.0
	PhD	0	0.0

Characteristics	Description	Frequency (N)	Percentage (%)
Income Level	≤ RM 2560	169	37.6
	RM 2 560 - RM3 439	110	24.4
	RM 3 440 - RM 4 309	80	17.8
	RM 4 310 - RM 5 249	40	8.9
	RM 5 250 - RM 6 339	33	7.3
	RM 6 340 - RM 7 689	15	3.3
	RM 7 690 - RM 9 449	3	0.7
Type of Housing	Shop lot	10	2.2
	Flat House	68	15.1
	Terrace house	207	46.0
	Village house	128	28.4
	Condominium	17	3.8
	Apartment	20	4.4

Table 2 summarises the socio-demographic characteristics of the 450 respondents involved in this study. The respondents were predominantly male (58.0%), with the largest proportion aged 25-34 years (41.6%), indicating that the sample was largely composed of economically active adults. Most respondents were Malay (70.4%) and had attained secondary school education (45.8%), while 27.6% possessed a bachelor's degree. In terms of monthly household income, the largest share earned RM2,560 or less (37.6%), reflecting a predominantly low- to middle-income population. Regarding housing characteristics, terrace houses constituted the largest residential category (46.0%), followed by village houses (28.4%) and flats (15.1%). Collectively, these findings indicate that the respondents represent an urban population with diverse socio-economic backgrounds, providing an appropriate basis for examining behavioural intentions towards climate change adaptation in the Klang Valley.

The level of behavioural intention to adapt to climate change among individuals in Klang Valley.

The first objective of this study was to determine the level of behavioural intention to adapt to climate change among individuals in the Klang Valley. Mean score analysis was conducted to evaluate the level of each PMT construct and behavioural intention using the interpretation proposed by Nunnally and Bernstein (1994). Based on Nunnally and Bernstein (1994), mean scores were interpreted as follows: low (1.00–2.00), medium-low (2.01–3.00), medium-high (3.01–4.00), and high (4.01–5.00).

Table 3: Results of Mean Score

Behavioural Determinants	Mean Score	Category
Perceived Severity	3.76	Medium-High
Perceived Vulnerability	3.57	Medium-High
Response Efficacy	3.98	Medium-High

Behavioural Determinants	Mean Score	Category
Self-Efficacy	3.84	Medium-High
Response Cost	3.78	Medium-High
Behavioural Intention	3.86	Medium-High

Table 3 shows that all PMT constructs and behavioural intention recorded mean scores within the medium-high category, indicating generally positive perceptions and intentions towards climate change adaptation among respondents. Response efficacy recorded the highest mean score ($M = 3.98$), followed by behavioural intention ($M = 3.86$) and self-efficacy ($M = 3.84$), indicating that respondents perceived climate adaptation measures to be effective and expressed confidence in their ability to implement them. Response cost also recorded a medium-high mean score ($M = 3.78$), suggesting that respondents recognised financial and practical constraints associated with climate change adaptation, although these constraints were not perceived to substantially discourage adaptation intentions. Meanwhile, perceived severity ($M = 3.76$) and perceived vulnerability ($M = 3.57$) also fell within the medium-high category, reflecting respondents' awareness of climate-related risks, although perceived vulnerability recorded the lowest mean score among all constructs. These descriptive findings provide an initial understanding of respondents' perceptions towards climate change adaptation. However, descriptive statistics alone do not determine whether these behavioural determinants significantly influence adaptation intention. Therefore, ordinal logistic regression analysis was subsequently performed to examine the significance and relative contribution of each PMT construct in predicting behavioural intention towards climate change adaptation.

Behavioural Determinants Influencing Climate Change Adaptation Intention

Ordinal logistic regression analysis was performed to examine the influence of the Protection Motivation Theory (PMT) constructs on individuals' behavioural intention to adapt to climate change in the Klang Valley. Prior to interpreting the regression coefficients, the overall model fit and goodness of fit were assessed to determine the model's suitability.

Table 4: Goodness-of-fit

Test	Chi-square	p
Pearson	15105.553	<0.001
Deviance	2452.725	1.000

As presented in Table 4, the deviance goodness-of-fit statistic was not statistically significant ($p = 1.000$), indicating that the fitted model adequately represented the observed data. Therefore, the ordinal logistic regression model

was considered appropriate for examining the relationship between the PMT constructs and behavioural intention to adapt to climate change.

Following confirmation of the model adequacy, the parameter estimates were examined to determine the influence of each behavioural determinant on climate change adaptation intention. The regression coefficients, Wald statistics, significance values, and 95% confidence intervals are presented in Table 5.

Table 5: Parameter Estimates

	Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Threshold							
Behavioural Intention – Disagree	10.431	2.078	25.192	1	.000	6.357	14.504
Behavioural Intention – Neutral	12.278	2.019	36.972	1	.000	8.320	16.236
Behavioural Intention – Agree	15.268	2.049	55.506	1	.000	11.251	19.285
Behavioural Intention – Strongly Agree	19.386	2.105	84.808	1	.000	15.260	23.512
Location							
Perceived Severity	-.084	.185	.206	1	0.910	-.447	.279
Perceived Vulnerability	.015	.130	.013	1	0.650	-.240	.270
Response Efficacy	1.534	.182	70.943	1	<0.001	1.177	1.891
Self-Efficacy	1.331	.159	69.653	1	<0.001	1.018	1.644
Response Cost	.480	.135	12.730	1	<0.001	.217	.744

The ordinal logistic regression analysis revealed that response efficacy ($\beta = 1.534$, $p < 0.001$), self-efficacy ($\beta = 1.331$, $p < 0.001$), and response cost ($\beta = 0.480$, $p < 0.001$) were significant predictors of behavioural intention towards climate change adaptation. In contrast, perceived severity ($\beta = -0.084$, $p = 0.910$) and perceived vulnerability ($\beta = 0.015$, $p = 0.650$) were not statistically significant. Among the significant predictors, response efficacy demonstrated the strongest positive association with behavioural intention, followed by self-efficacy and response cost.

The direct impact of behavioural determinants on individuals' intention to adapt to climate change in Klang Valley

The findings indicate that response efficacy and self-efficacy were significant positive predictors of behavioural intention to adapt to climate change. These results suggest that individuals were more likely to adopt adaptation measures when they believed that such measures were effective and had confidence in their ability to implement them. The findings are consistent with recent studies

demonstrating that efficacy beliefs play a central role in promoting climate adaptation behaviour. For example, van Valkengoed et al. (2024) found that self-efficacy and outcome efficacy were directly associated with stronger intentions to adapt and actual adaptation behaviour, whereas climate risk perception alone was insufficient to predict adaptation actions. Similarly, the non-significant effects of perceived severity and perceived vulnerability observed in the present study suggest that recognising climate-related risks alone may not be sufficient to motivate adaptive behaviour unless individuals also believe that adaptation measures are effective and that they possess the capability to implement them. These findings reinforce the importance of strengthening coping appraisal, rather than relying solely on threat communication, to encourage climate change adaptation.

Response cost was identified as a significant positive predictor of behavioural intention ($\beta = 0.480$, $p < 0.001$), where higher perceived response costs are generally expected to reduce individuals' motivation to undertake protective actions. Rather than indicating that higher costs encouraged adaptation, the findings suggest that respondents remained willing to adopt climate change adaptation measures despite perceiving financial, time, and practical constraints. One possible explanation is that the perceived effectiveness of adaptation measures and respondents' confidence in implementing them outweighed the perceived implementation costs. Given that response efficacy and self-efficacy recorded the largest regression coefficients in this study, coping appraisal appears to have exerted a stronger influence on behavioural intention than perceived barriers. This interpretation is also consistent with van Valkengoed et al. (2024), who concluded that efficacy beliefs directly promote adaptation behaviour, while risk perceptions mainly influence adaptation through their effects on efficacy beliefs rather than independently. From an environmental planning perspective, these findings suggest that climate adaptation strategies should prioritise strengthening adaptive capacity through community-based adaptation programmes, household flood preparedness initiatives, practical training, and local climate action programmes coordinated by local authorities to enhance community resilience and support climate-resilient urban planning.

CONCLUSION

This study examined the behavioural determinants influencing individuals' intentions to adapt to climate change in the Klang Valley, Malaysia, using the Protection Motivation Theory (PMT). The findings revealed that the overall level of behavioural intention towards climate change adaptation was medium-high, indicating that respondents generally demonstrated a favourable willingness to adopt adaptive measures. Among the PMT constructs, response efficacy and self-efficacy emerged as the strongest predictors of behavioural intention, suggesting

that individuals were more likely to engage in adaptation when they believed that adaptation measures were effective and had confidence in their ability to implement them. In contrast, perceived severity and perceived vulnerability did not significantly influence behavioural intention, indicating that awareness of climate-related risks alone is insufficient to encourage adaptive behaviour without strong efficacy beliefs.

Interestingly, response cost was identified as a significant predictor of behavioural intention. Although respondents perceived financial, time, and practical challenges associated with climate change adaptation, these perceived costs did not appear to discourage their intention to undertake adaptive actions. This finding suggests that the perceived effectiveness of adaptation measures and individuals' confidence in implementing them may outweigh the constraints associated with adaptation, highlighting the dominant role of coping appraisal in shaping behavioural intention.

From an environmental planning perspective, the findings provide important implications for strengthening climate resilience at the community level. Rather than focusing solely on raising awareness of climate change risks, local authorities and environmental planners should prioritise programmes that enhance individuals' adaptive capacity, improve confidence in implementing adaptation measures, and strengthen community preparedness. Practical initiatives such as household flood preparedness programmes, heat-health awareness campaigns, water conservation practices, community-based adaptation programmes, and locally coordinated climate action plans can encourage greater public participation in climate change adaptation while supporting resilient and sustainable urban development.

Despite its contribution, this study is limited to respondents residing in the Klang Valley and focuses primarily on behavioural determinants within the PMT framework. Future research should expand the geographical scope to other regions of Malaysia, incorporate additional psychological and contextual factors, and examine actual adaptation behaviour using longitudinal or mixed-method approaches to provide a more comprehensive understanding of climate change adaptation.

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