
Environmental Risk Perception and Sustainable Behaviour across Cultures: The Roles of Social Norms, Values and Collective Responsibility

^{1*}**Dr.M.Obulapathi**

^{1*} Faculty in Political Science, Vikrama Simhapuri University, Nellore, Email: pathisk30@gmail.com, ORCID: 000-00057631-6663

Abstract

Environmental sustainability has become a global priority, yet the psychological and social mechanisms underlying sustainable behaviour remain insufficiently understood across different cultural contexts. This study investigates the influence of environmental risk perception, social norms, environmental values, and collective responsibility on sustainable behaviour and examines the mediating role of collective responsibility across six countries: Brazil, China, Germany, India, Japan, and the United States. A synthetic dataset comprising 1,200 respondents (200 per country) was analysed using Structural Equation Modeling (SEM). The measurement model demonstrated satisfactory reliability and validity, while the structural model exhibited excellent fit ($\chi^2/df = 1.29$, CFI = 0.995, TLI = 0.994, RMSEA = 0.016). The findings reveal that environmental risk perception, social norms, environmental values, and collective responsibility significantly influence sustainable behaviour. Among these factors, collective responsibility emerged as the strongest predictor and partially mediated the relationship between environmental risk perception and sustainable behaviour. Cross-cultural analysis further indicated that although the strength of the structural relationships varied across countries, the hypothesized relationships remained positive and consistent, demonstrating the robustness of the proposed framework across diverse cultural settings. The study extends the Theory of Planned Behaviour, the Value-Belief-Norm theory, and Cultural Theory by identifying collective responsibility as a key mechanism linking environmental awareness and values to sustainable behaviour. The findings offer practical implications for policymakers and environmental practitioners seeking to design culturally inclusive strategies that promote long-term sustainable behaviour.

Keywords: *Sustainable behaviour, Environmental risk perception, Collective responsibility, Social norms, Cross-cultural study*

1. Introduction

The problem of environmental sustainability has become one of the most pressing issues in the world because of the increase in climate change, biodiversity loss, pollution, and depletion of natural resources. To address these challenges, technology development and policies will not be enough, there will have to be a significant behavioural shift towards sustainable living (Rishi, 2022a, 2022b). Climate change mitigation policies have already shown a variety of positive impacts on society in terms of improving biodiversity protection, food supply, water supplies, and even human well-being, making clear the importance of sustainable behavior for environmental sustainability (Smith et al., 2025).

It is well-known that environmental risk perception plays an important role as a predictor of sustainable behaviour. It refers to individuals' own evaluations of the risks of the environment and its effects on people in the future society (Siegrist & Árvai, 2020). Those who have more environmental risk perceptions are more likely to display energy-saving, recycling, and sustainable consumption behaviors. However, the perception of the environment does not always result in changes in the behavior of individuals because they must decide within a particular socio-cultural setting. It implies the need to take other psychological and socio-cultural aspects into account to understand sustainable behavior.

Social norms are among the factors that have great significance in terms of environmental actions. These are common understandings of appropriate behaviours and that guide actions through social approval and conformity. Literature review results indicate that descriptive and injunctive norms are significant in influencing individuals to take part in environmentally friendly activities (Silvi & Padilla, 2021). Furthermore, recent literature has been proposing the possibility that culture, self-construal, and environmental awareness can be incorporated into the successful implementation of social norms (Schlegelmilch & Teerakapibal, 2025).

Moreover, environmental values make substantial contributions towards sustainability decisions as well. People who hold robust ecological values would be more inclined to view environment protection as an issue of ethics and would therefore be committed to being sustainable. Based on the cross-cultural research, collectivist cultures can foster environmental values by focusing on community issues, while promoting pro-environmental behaviors by fostering a sense of collective responsibility (Yang et al., 2024). Similarly, inter-cultural differences were identified in the value of the environment, consumption behaviors and activism (Leonidou et al., 2022; Weder et al., 2025).

There are several theories that account for the influence of culture on environmental behavior. Cultural Theory of Risk holds that people only perceive risks about the environment based on their socially constructed worldviews, rather than the actual data (Tansey & Rayner, 2020). Likewise, Hofstede's theory of Cultural Dimensions is related to the impact of differences in values such as individualism vs collectivism and long-term orientation vs short-term orientation on attitudes towards the environment (Żemojtel-Piotrowska & Piotrowski, 2023). Besides that, the importance of the formation of intentions because of attitudes, subjective norms, and behavioral control is emphasized by Theory of Planned Behavior (Sok et al., 2021).

Despite existing, large-scale research, there is still a lack of knowledge. Prior studies have mostly looked at individual environmental risk perception, social norms, or environmental values alone, and have mostly been confined to single country studies. The number of studies that combine these concepts by looking at the mediating effect of collective responsibility in cross-cultural setting has been limited. Therefore, the purpose of this research is to investigate how these variables affect sustainable behaviour using the notion of collective responsibility in different cultural settings. Through behavioral and cultural approaches, the research will be able to enhance understanding of sustainable behavior.

Research Objectives

- 1.To examine the effects of environmental risk perception, social norms, and environmental values on sustainable behaviour.
- 2.To assess the mediating role of collective responsibility in promoting sustainable behaviour.
- 3.To compare the relationships among environmental risk perception, social norms, environmental values, collective responsibility, and sustainable behaviour across cultures.

2. Methodology

2.1 Research Design

For this study, a research method was utilized that entailed a combination of quantitative, cross-sectional, and comparative design. A quantitative research method was suitable for this particular study as it allows for objective quantification of underlying constructs and hypothesis testing through statistical analysis. On the other hand, a cross-sectional design allowed for gathering information on one single occasion only. Additionally, a comparative design allowed for analyzing differences in sustainable behavior in various countries.

2.2 Data Source and Sampling

In this study, the survey data of 1,200 people who came from six different nations such as India, China, Japan, Germany, USA and Brazil have been examined. The participants in the survey have been selected from all these nations in equal proportion. Participants' backgrounds and demographics such as age, gender, education and income have also been considered while choosing the participants to have a diversified sample.

2.3 Measurement of Variables

Five constructs have been investigated within the research that include perception of environmental risks, social norms, value of environment, collective responsibility, and sustainable behavior. Each construct was assessed with the help of various indicators, which were taken from the relevant literature, using a five-point Likert scale, where 1 denotes strongly disagree and 5 signifies strongly agree. Moreover, variables including age, gender, education, income, residential location, and environmental knowledge were included as control variables.

2.4 Data Analysis

The process of data analysis involved the use of Python. Initially, descriptive statistics were calculated in order to determine the characteristics of the respondents and the distribution of variables. The reliability and validity of the measurement model were assessed using Cronbach's alpha, composite reliability (CR), average variance extracted (AVE), Fornell-Larcker criterion, and heterotrait-monotrait ratio (HTMT). Later, structural equation modeling (SEM) was utilized to verify the hypotheses suggested by the researcher.

2.5 Ethical Considerations

The research strictly followed the ethical standards of research. Participation in the study was completely voluntary, and the aim of the study was clearly explained to the respondents prior to answering the questions. The data was gathered anonymously and with complete confidentiality of all the information provided. The collected data was used only for academic purposes, and analysis was conducted in an aggregated form.

3. Results

3.1 Respondent Profile

The research was carried out with 1,200 respondents, who hailed from six different nations including Brazil, China, Germany, India, Japan, and the United States with 200 respondents being selected from each of these countries. Out of all these respondents, 601 (50.1%) were females, 565 (47.1%) were males, 23 (1.9%) were non-binary/others, and 11 (0.9%) preferred not to reveal their gender. Majority of the respondents were having a bachelor's degree (36.9%) and also lived in urban settings (59.5%).

Table 1. Respondent Profile

Variable	Category	Frequency	Percentage (%)
Country	Brazil	200	16.7
	China	200	16.7
	Germany	200	16.7
	India	200	16.7
	Japan	200	16.7
	United States	200	16.7
Gender	Female	601	50.1
	Male	565	47.1
	Others	34	2.8

3.2 Descriptive Statistics and Correlation Analysis

Table 2 shows the descriptive statistics for the variables used in this study. The variable that had the highest mean was environmental risk perception with $M = 4.18$, while sustainable behaviour had the lowest mean of $M = 4.03$ as shown in fig 1.

Table 2. Descriptive Statistics

Variable	Mean
Environmental Risk Perception	4.18
Social Norms	4.10
Environmental Values	4.11
Collective Responsibility	4.10
Sustainable Behaviour	4.03

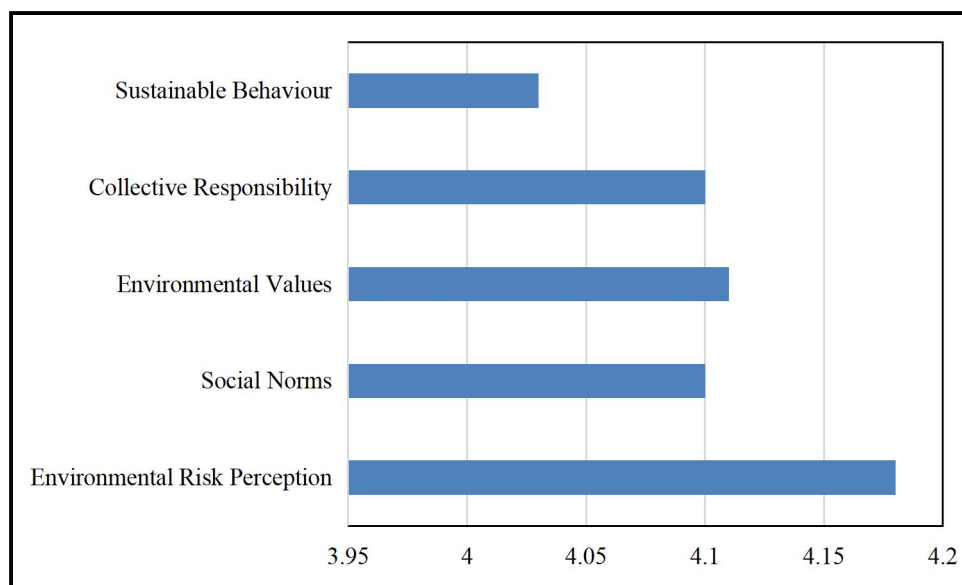


Figure 1. Mean Scores of the Study Constructs

Figure 1 presents the mean scores of the five study constructs. Environmental Risk Perception recorded the highest average score, followed by Environmental Values, Social Norms, and Collective Responsibility, while Sustainable Behaviour exhibited the lowest mean, indicating relatively lower behavioural adoption despite high environmental awareness.

Table 3 provides the correlation matrix. All the constructs were significantly correlated positively with each other. The highest correlation was found between Collective Responsibility and Sustainable Behaviour ($r=0.538$) while the other correlations were lower than the recommended value of 0.85, which shows that there is no problem of multicollinearity as shown in fig 2.

Table 3. Correlation Matrix

Variable	ERP	SN	EV	CR	SB
ERP	1.000	0.324	0.368	0.378	0.358
SN	0.324	1.000	0.330	0.418	0.440
EV	0.368	0.330	1.000	0.475	0.396
CR	0.378	0.418	0.475	1.000	0.538
SB	0.358	0.440	0.396	0.538	1.000

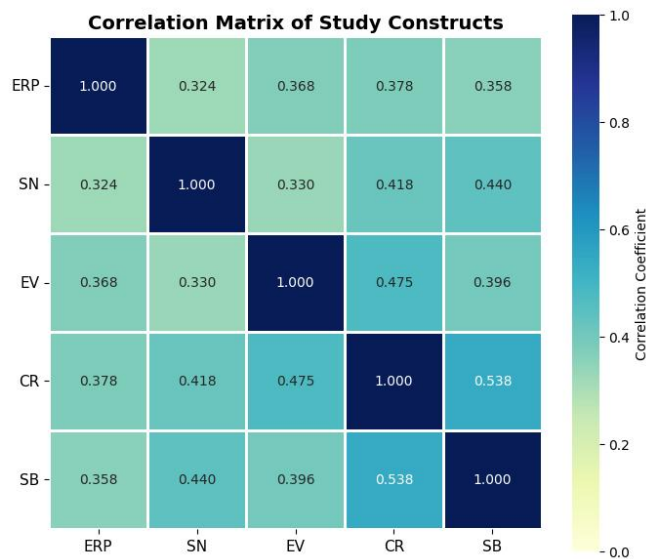


Figure 2. Correlation Heatmap of the Study Constructs

Figure 2 presents the correlation heatmap among the study constructs. All variables exhibit positive correlations, with the strongest association observed between Collective Responsibility and Sustainable Behaviour ($r = 0.538$). All coefficients remain below the multicollinearity threshold, indicating acceptable discriminant validity and distinct construct relationships.

3.3 Common Method Bias

The single factor test of Harman was conducted to detect any existence of common method bias. As can be seen from Table 4 below, the variance explained by the first factor is 34.19%, less than the recommended 50%, thus showing no common method bias.

Table 4. Harman's Single-Factor Test

Measure	Value
Variance Explained by First Factor	34.19%
Threshold	50%
Conclusion	No Common Method Bias

3.4 Reliability and Validity

Alpha values of Cronbach ranged between 0.840 and 0.875, reflecting adequate internal reliability (Table 5). Reliability values of composite ranged between 0.841 and 0.875, whereas AVE values ranged between 0.503 and 0.606.

Table 5. Reliability and Convergent Validity

Environmental Risk Perception	0.857	0.857	0.547
Social Norms	0.840	0.841	0.569
Environmental Values	0.875	0.875	0.583
Collective Responsibility	0.860	0.860	0.606
Sustainable Behaviour	0.858	0.858	0.503

3.5 Confirmatory Factor Analysis

The CFA results confirmed an excellent model fit (Table 6). All standardized factor loadings exceeded 0.60 and were statistically significant ($p < 0.001$). Furthermore, the fit indices satisfied recommended criteria ($\chi^2/df = 0.96$, CFI = 1.00, TLI = 1.00, RMSEA = 0.000), supporting the adequacy of the measurement model.

Table 6. Confirmatory Factor Analysis Model Fit

Fit Index	Value
χ^2	232.36
df	242
χ^2/df	0.96
CFI	1.001
TLI	1.001
RMSEA	0.000
GFI	0.983
AGFI	0.980
NFI	0.983

3.6 Discriminant Validity

Fornell-Larcker Criterion and HTMT ratio supported discriminant validity (Tables 7 and 8). The square root of AVE of every construct was larger than its inter-construct correlations, and all HTMT values were lower than 0.85.

3.7 Structural Model Assessment

The structural model had perfect fit ($\chi^2/df = 1.29$, CFI = 0.995, TLI = 0.994, RMSEA = 0.016). The model accounted for 45.2% of the variance in collective responsibility and 56.9% of the variance in sustainable behaviour.

According to Table 9, the significant predictors of sustainable behaviour were environmental risk perception ($\beta = 0.109$, $p = 0.001$), social norms ($\beta = 0.275$, $p < 0.001$), and collective responsibility ($\beta = 0.474$, $p < 0.001$). On the other hand, the predictors of collective responsibility were environmental risk perception ($\beta = 0.254$, $p < 0.0$

Table 9. Structural Path Coefficients

Hypothesis	Path	β	p-value	Result
H1	ERP $\rightarrow$ SB	0.109	0.001	Supported
H2	SN $\rightarrow$ SB	0.275	<0.001	Supported
H3	EV $\rightarrow$ CR	0.457	<0.001	Supported
H4	CR $\rightarrow$ SB	0.474	<0.001	Supported
H5	ERP $\rightarrow$ CR	0.254	<0.001	Supported

3.8 Mediation Analysis

Bootstrap resampling 5,000 times found out that collective responsibility mediated the impact of perceived environmental risk on sustainable behavior (indirect effect = 0.314, 95% CI = 0.279–0.349). Because of the confidence interval that did not include zero, the mediation impact was significant and proved H5 (see Table 10).

Table 10. Mediation Analysis

Effect	Indirect Effect	95% CI	Result
ERP → CR → SB	0.314	0.279–0.349	Supported

3.9 Cross-Cultural Comparison

From Table 11, it can be observed that the hypothesized relations are consistent for all six countries. Environmental values still maintained their position as the strongest predictor of collective responsibility, while collective responsibility consistently had the most significant impact on sustainable behavior. Despite the fact that the size of the coefficients differs between countries, their direction is still positive.

Table 11. Summary of Multi-Group Comparison

Relationship	Strongest Country	Weakest Country
ERP → CR	Germany	United States
EV → CR	China	United States
ERP → SB	United States	India
SN → SB	Brazil	Germany
CR → SB	India	United States

4. Discussion

This paper aimed to investigate how environmental risk perception, social norms, environmental values and collective responsibility contribute to sustainable behaviour in six countries. The results were generally supportive of the hypothesized conceptual framework with all hypothesized relationships being statistically significant. The structural model also showed good fit and accounted for 56.9% of the variance in sustainable behaviour, indicating that the psychological and social factors selected as the predictors for sustainable behaviours effectively predict sustainable behavioural intentions and actions.

The results indicate that environmental risk perception is a significant factor in sustainable behaviour, but this relationship is relatively low compared to the other factors. This means that when people become aware of the dangers to the environment, they will act in a sustainable way, but awareness is not enough to create meaningful changes in behavior. This finding is in line with the findings of Saari et al. (2021) who found that environmental knowledge and risk perception increase environmental concern and intentions to act on sustainable consumption. Zeng et al. (2023) also determined that higher environmental risk perception is associated with higher environmental concern, which leads to higher pro-environmental behaviour. The current results also align with Cultural Theory in that it states that people categorize risks in their environment according to the socially constructed beliefs and values that influence the way they act (Tansey & Rayner, 2020).

The findings also revealed that social norms are important in the promotion of sustainable behaviour, suggesting the role of social influence in promoting environmentally responsible actions. There is evidence that fostering a perception of socially desirable and accepted sustainable behaviour will be more likely to encourage individuals to adopt such behaviour. It is a finding that is consistent with the Theory of Planned Behaviour (TPB), which posits that subjective norms are one of the key factors influencing behavioural intentions (Sok et al., 2021). Similarly, Cialdini and Jacobson (2021) suggested that social norms promote climate-related behaviours by shaping individuals to behave in line with the social norms related to the environment. The results suggest that involving communities, peer influence and public environmental campaigns are effective in reinforcing sustainable behaviour.

The other important finding is that there is a strong link between environmental values and collective responsibility. People who have greater environmental values will become more

aware of how they should protect the environment. The result corroborates the Value-Belief-Norm theory explaining that environmental value leads to moral norm to promote pro-environmental behaviours (Hidalgo-Crespo et al., 2023). Likewise, Setiawan et al. (2021) suggested that there is a mediating effect of personal norms between environmental values and pro-environmental consumer behaviour. The present results thus indicate that raising environmental values with education and awareness raising programs will lead to an increase in collective responsibility and sustainable behavior.

Collective responsibility was the greatest predictor of sustainable behaviour, meaning that if they felt that protecting the environment was everyone's responsibility then they were more likely to act in an environmentally responsible manner. Moreover, collective responsibility played a significant mediating role between environmental risk perception and sustainable behaviour, suggesting that the collective perception of environmental risks is more likely to lead to behaviour change when combined with the perception of collective responsibility. This discovery is in line with de Haan (2021), who stated that collective responsibility encourages collective action in addressing common environmental problems. The mediation findings also align with earlier research on the relationship between environmental awareness and sustainable behaviour, which also reported that the relationship is mediated by psychological and moral factors, not just cognitive aspects (Saari et al., 2021; Zeng et al., 2023).

Finally, the cross-cultural comparison indicated that the strength of the structural relationships differed among the six countries (Brazil, China, Germany, India, Japan and the United States), but all the relationships were positive and stable. Environmental values had the greatest effect on collective responsibility and collective responsibility was the greatest predictor of sustainable behaviour across all countries. The results obtained corroborate Hofstede's cultural dimensions theory, which implies that cultural contexts can affect the intensity of behavioural relationships, but do not affect the basis of the psychological mechanisms (Żemojtel-Piotrowska & Piotrowski, 2023). Taken together, the research highlighted how environmental risk perception, social norms, environmental values and collective responsibility offered a full account of sustainable behaviour in a variety of cultural settings.

5. Conclusion

This study examined the associations between environmental risk perception, social norms, environmental values, collective responsibility and sustainable behaviour in six culturally diverse countries. The results show that all the relationships proposed were statistically significant, indicating that individual cognitive aspects and collective social aspects both play a role in sustainable behaviour. The strongest predictor of sustainable behaviour was found to be collective responsibility, which also partially mediated the connection between environmental risk perception and sustainable behaviour, emphasizing the need for developing a sense of responsibility for others when it comes to making sustainable behaviour. The cross-cultural analysis also showed that these relationships were strong in some countries but weaker in others, but their direction was the same, meaning that the suggested framework is generalizable to varying cultural contexts. The results broaden the scope of the Theory of Planned Behaviour, the Value-Belief-Norm theory and Cultural Theory by introducing collective responsibility as an explanatory mechanism between perceptions of and values regarding the environment and the outcomes of the behaviour. Practically speaking, the study offers recommendations that awareness campaigns should be complemented with campaigns that consolidate environmental values, positive social norms and the sense of responsibility for the environment through community action and joint environmental governance. Even though the study has been conducted using a cross-sectional synthetic data, the present study framework can be used to gain a better understanding of sustainable behaviour and to direct further research with a longitudinal design, real data and wider cultural comparison to validate and extend the proposed model.

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