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Voluntary Environmental Protection Behavior Of Employees – A Case Study Of Manufacturing Companies In Hai Phong City, Vietnam

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Abstract: *This study aims to understand how employees' voluntary environmental protection behaviors are affected by their perceptions of climate change, environmental responsibility, and perceived risks. Using protection motivation theory to explain the relationships between variables, the study gathered 1,284 responses from employees at manufacturing companies through a non-probability, convenience sampling method. Testing with PLS-SEM shows that perception of climate change, perceived risk of climate change, and environmental responsibility positively influence voluntary environmental protection behaviors. The relationship between voluntary environmental protection behaviors and perception of climate change is mediated by environmental responsibility. Additionally, the perception of climate change positively affects voluntary environmental protection through the mediating role of perceived risk of climate change. Based on these findings, proposed solutions are designed to help manufacturing companies encourage voluntary environmental protection among workers to support sustainable development goals.*

Keywords: *environmental responsibility, manufacturing companies, perceptions of climate change, perceived risk of climate change, voluntary environmental protection behavior.*

1. INTRODUCTION

Environmental protection behavior is not only a communal duty but also a crucial personal obligation given the increasingly severe impacts of climate change (Jilani et al., 2021). Since climate change significantly affects the planet through rising sea levels, harmful greenhouse gas emissions, and the depletion of natural resources, humans must take it seriously (Chaudhary, 2020). Therefore, research on environmental protection behavior has attracted interest from a wide range of stakeholders, including the public, corporations, and consumers, ever since.

While reducing the impacts of climate change is a shared responsibility for the community, employees also have a significant role. They directly help lessen negative effects on the environment and also indirectly contribute by informing customers about the company's environmental protection initiatives (Whitmarsh et al., 2021). Sharing knowledge is very effective, especially if employees are well-informed about environmental risks and responsibilities (Venghaus et al., 2022). Previous studies show that some of the critical factors that influence employees' environmental protection behavior are awareness, risk perception, and responsibility for the environment (Yilmaz et al., 2023). The relationship between perception of climate change and environmental protection behavior is also mediated by environmental responsibility and perceived risk of climate change, as previous research has confirmed (Yu et al., 2017).

In the context of rapid industrial growth, Hai Phong city has become a major industrial hub and seaport in Northern Vietnam, but it also faces numerous environmental challenges. Although Hai Phong's industrial parks have been equipped with centralized wastewater treatment systems, there remains a risk of discharging inadequate waste into the environment, which directly affects water quality in rivers and coastal areas (Nguyen et al., 2020; Pham, 2021). Additionally, the activities of the cement, building materials, mechanical, and shipbuilding industries continue to emit fine dust (PM2.5), SO_2, and NO_x, causing air quality in Hai Phong to frequently exceed the World Health Organization's recommended limits. Furthermore, hazardous waste from seaport operations and ship repairs, especially waste oil and oily sludge, is only partially collected (about 20-30%), posing a significant pollution risk to marine ecosystems and estuaries (Le & Tran, 2019). Given this situation, it is essential to study solutions that promote environmental protection behavior among manufacturing enterprises in Hai Phong City.

While some earlier research has explored individual environmental protection behaviors, most studies focus on students (Yilmaz et al., 2023; Yu et al., 2017; Dal et al., 2015). This study is based on protection motivation theory and examines environmental protection behavior among employees at road transport companies, considering the influence of climate change awareness, environmental responsibility, and

perceived climate change risks. The research also examines the mediating roles of environmental responsibility and perceived risk of climate change in the connection between awareness of climate change and environmental protection behavior. As a result, this study will help improve understanding of how employees in manufacturing companies act regarding environmental protection. Administrators can use the empirical evidence from the findings to develop policies that promote employee environmental protection behavior.

The article is organized into 6 sections. Section 1 is the introduction. Section 2 covers the theoretical background, models, and research hypotheses. Section 3 explains the research methods. Section 4 presents the study's results. Section 5 discusses the findings and their implications. Finally, part 6 includes the conclusion and some limitations of the study.

2. LITERATURE REVIEW

2.1. Analytical Framework

To explain predictors of risk-prevention behaviors, Rogers introduced the Protection Motivation Theory in 1975 (Bockarjova & Steg, 2014). The theory is a widely applicable framework. It suggests that individuals evaluate various advantages and disadvantages when making decisions. This process of consideration and judgment does not always need to be explicit or occur within conscious perception (Shafiei & Maleksaeidi, 2020).

People decide to engage in a certain behavior after weighing the benefits and drawbacks of different options and determining which is best for them. This type of comparison is conducted using the "threat appraisal" and "coping appraisal" processes (Wang et al., 2018). The cognitive process of "threat appraisal" begins with assessing the level of threat and includes "perceived severity" and "perceived vulnerability" (Boer & Seydel, 1996). The level of potential harm a person considers serious is called perceived severity of the threat, and the view of their susceptibility to harm is known as perceived vulnerability (Bockarjova & Steg, 2014). People use the "threat appraisal" process to assess the benefits or rewards of their current actions.

Protection motivation theory is used to describe pro-environmental behaviors (Shafiei & Maleksaeidi, 2020). Because it illustrates how various psychological processes and mechanisms can interact and serves as a reminder that these processes and mechanisms can all simultaneously lead to misestimation and inaction, this theory is constructive in analyzing pro-environmental behaviors (Bockarjova & Steg, 2014). This theory is applied in this study to evaluate the level of awareness and perceived risk that motivate environmental protection behavior influenced by environmental responsibility and the perceived risk of climate change. The proposed analysis framework is shown in Figure 1.

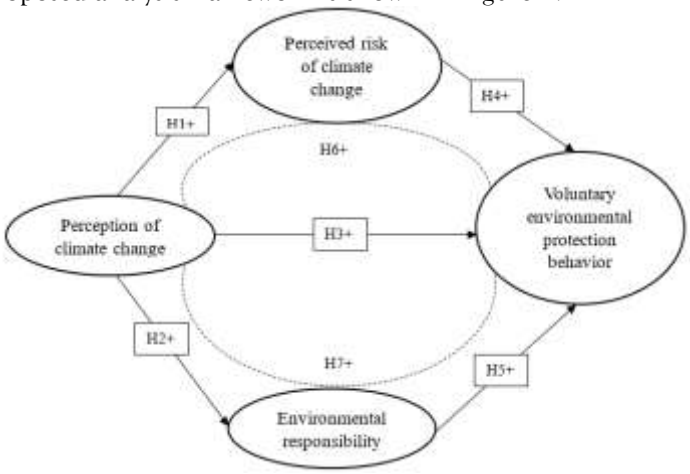

Figure 1. Analysis framework

Source: Recommended by the author

2.2. Hypothesis development

Environmental protection behavior is defined as actions that either help the environment or at least cause minimal harm to it. These actions are usually carried out by individuals or households (Bradley et al., 2020). When performed in a corporate setting, such behavior plays a vital role in promoting sustainable business development (Xie et al., 2019). Environmentally friendly actions in organizations are implemented in two main ways (Cheema et al., 2020). First, certain procedures must be followed by all

employees in the company. Second, voluntary actions are not always taken. Employees will act when they feel compelled to do so, according to the protection motivation theory. When people see that the health and lives of future generations are at risk due to climate change, they act voluntarily. The activities of road transport companies cause high pollution (Zailani et al., 2014). To promote sustainable development, environmental protection behavior should be supported through both voluntary and mandatory measures. This theory is used in this study to explain people's motivation to engage in voluntary environmental protection behavior driven by awareness of the harmful effects of pollution.

Perception of climate change can be defined as the extent to which individuals recognize, understand, and value climate change as a factor driving changes in bio-agronomic systems (Abbasi & Nawaz, 2020). To create a higher quality environment, raising perception of climate change involves expanding knowledge, developing values, changing attitudes, and enhancing skills and abilities (Shafiei & Maleksaeidi, 2020). It's commonly believed that educating about the causes of climate change is the first step, even though education by itself doesn't alter behavior. Nonetheless, it has been determined that perception is a crucial component in tackling the climate change issue (Halady & Rao, 2010).

One of the main focuses of studies on behavior related to environmental protection is the perceived risk of climate change (Bradley et al., 2020). Since manufacturing sectors directly contribute to environmental pollution, this issue is critical to them (Zailani et al., 2014). Perceived risk of climate change is the process of identifying and evaluating signals about uncertain occurrences from a variety of sources, as well as creating an opinion about the likelihood and seriousness of present or potential harm (Stevenson et al., 2014). Perceived risk of climate change has been assessed as an evaluation of the potential local, regional, and global health, economic, and environmental impacts of climate change (Arbuckle et al., 2015). Climate change poses serious risks to ecosystems and people (Venghaus et al., 2022). Given the numerous types, variations, and inconsistent links within environmental protection behavior, understanding its causes and effects is crucial (Kousar et al., 2022). Previous research has confirmed that perception of climate change has an impact on the perceived risk of climate change (Bockarjova & Steg, 2014; Abbasi & Nawaz, 2020). Thus, people's perception of risk will increase when they have a high perception of climate change (Yilmaz et al., 2023). Based on the above arguments, the subsequent research hypothesis is proposed as follows:

H1: Perception of climate change positively influences perceived risk of climate change.

Responsibility is one of three elements of corporate social responsibility. Environmental responsibility involves actions taken by humans to protect the environment. These actions are done voluntarily and are neither rewarded nor mandated by the organization's formal reward system (Han et al., 2019). According to Fatma et al. (2016), caring for and conserving the natural environment, minimizing the use of natural resources, utilizing renewable energy sources, and having a tendency to buy eco-friendly products are indicators of an individual's responsibility to the environment. It reflects personal moral principles and efforts to promote sustainable management while balancing the relationship between human society and the natural world (Abbasi & Nawaz, 2020). Although voluntary, this significantly contributes to the enterprise's environmental protection strategy and benefits the community (Kousar et al., 2022).

Previous research results have shown that perception of climate change has a positive effect on environmental responsibility (Jamelske et al., 2013; Yilmaz et al., 2023). As perception of the certainty of future climate change increases, respondents' behavior toward implementing policies to reduce climate change also increases (Jamelske et al., 2013). It shows that perception influences environmental responsibility. Based on the above arguments, the subsequent research hypothesis is proposed as follows:

H2: Perception of climate change positively influences environmental responsibility.

Raising perception about it is crucial for manufacturing companies to combat climate change (Yilmaz et al., 2023). Using solar energy, reducing gasoline use, investing in flexible funds, increasing reduction, reuse, recycling, and supporting climate change initiatives are examples of environmentally friendly behaviors that promote environmental protection (Halady & Rao, 2010). Previous studies have shown that perception of climate change positively influences environmental protection behavior (Halady & Rao, 2010; Dal et al., 2015). However, some research has also found that it can negatively affect environmental protection behavior (Lacroix & Gifford, 2018). They are from both competitive incentives and the high financial costs associated with environmental protection. Conversely, proponents of environmental protection behavior argue that employees act to safeguard the environment for two reasons: obligatory and voluntary. This study primarily focuses on perception because it examines

employees' voluntary behavior. Based on the above arguments, the subsequent research hypothesis is proposed as follows:

H3: Perception of climate change positively influences voluntary environmental protection behavior.

Perceived risk encompasses not only the perception of objective threats but also other factors, such as social and personal elements, which involve the risks related to climate change (Bradley et al., 2020). Employees' perceived risk from climate change comes from their awareness of the phenomenon, their observation of its symptoms, or their sense that the planet is warming and that this affects human health (Hidalgo et al., 2010). Even though numerous studies have demonstrated the negative impacts of climate change on the environment (Arbuckle et al., 2015; Khan et al., 2021), employees' perceptions of risk vary due to differences in knowledge (Hidalgo et al., 2010). According to protection motivation theory, people will take action after assessing the threats and feeling the severity of the problem (Boer & Seydel, 1996). When the threat of climate change is sufficiently perceived, people will behave more environmentally (Yu et al., 2017). Furthermore, the perceived risk of climate change is found to have the greatest influence on behaviors related to protecting the environment (Arbuckle et al., 2015). Based on the above arguments, the subsequent research hypothesis is proposed as follows:

H4: Perceived risk of climate change positively influences voluntary environmental protection behavior.

Being environmentally conscious is a way for companies to gain an advantage in today's competitive market (Liu et al., 2020). Since then, companies have encouraged employees to act morally (Loor-Zambrano et al., 2022). Acting responsibly toward the environment voluntarily is also a way for them to positively influence the organization (Ahmad et al., 2021). Therefore, an environmentally responsible organization can become a suitable place for employees to engage, stand out from others, and voluntarily participate in the organization's environmental programs and activities (Xie et al., 2019). Furthermore, employees will develop a stronger sense of loyalty that encourages them to create and implement environmental improvement and protection strategies. They respond by helping colleagues better integrate environmental concerns and propose new ways to protect the environment (Cheema et al., 2020).

Employees participate in environmental initiatives that promote sustainability (Cheema et al., 2020). Previous research has shown that responsibility toward the environment positively influences environmental protection behavior (Yilmaz et al., 2023). Environmentally conscious individuals believe that actions such as eco-friendly shopping, conserving resources, saving energy, suggesting ways to improve the environment, and properly disposing of waste are practiced both at home and at work (Venghaus et al., 2022). Based on the above arguments, the subsequent research hypothesis is proposed as follows:

H5: Environmental responsibility positively influences voluntary environmental protection behavior.

While environmental protection behavior is influenced by perceptions of climate change, perceived risk of climate change can vary depending on an individual's knowledge and understanding of this phenomenon (Drummond et al., 2018). The aspects that shape the perceived risk of climate change highlight the importance of employees having information, experience, and the ability to respond emotionally to external influences (Dal et al., 2015). The stronger the relationship between perception of climate change and environmental protection behavior (Yilmaz et al., 2023), the more perceived risk is confirmed to have a positive mediating role (Han et al., 2019). Based on the above arguments, the subsequent research hypothesis is proposed as follows:

H6: Perceived risk of climate change has a positive mediating role in the relationship between perception of climate change and environmental protection behavior.

Under pressure to protect the environment, the Vietnamese government has implemented numerous regulations to combat climate change. Companies have adopted corporate social responsibility (CSR) as a solution to this problem (Yu et al., 2017). If perceptions of CSR activities, including environmental responsibility, are heightened, positive behaviors will be triggered in employees (Allen & Craig, 2016). By learning and sharing environmental values, environmental responsibility will be promoted, and employees will also display environmentally friendly tendencies (Ahmad et al., 2021). The study by Han et al. (2019) argues that employees' perceptions of climate change affect their participation in environmental behaviors by mediating their perceived responsibility for those actions. Based on the above arguments, the subsequent research hypothesis is proposed as follows:

H7: Environmental responsibility has a positive mediating role in the relationship between perception of climate change and environmental protection behavior.

3. METHODOLOGY

3.1. Measurement scales

The study used the scale of Halady and Rao (2010) to measure perceptions of climate change, including six observed variables. The environmental responsibility scale, referenced from the study of Fatma et al. (2016), comprises six observed variables. The perceived risk of climate change scale is taken from Hidalgo et al. (2010), including six observed variables; the voluntary environmental protection behavior scale is referenced from Shafiei and Maleksaeidi (2020), with three observed variables.

The author conducted qualitative research by interviewing a focus group of 10 managers working at manufacturing companies in Hai Phong City to adjust the scale to be consistent with the context of Vietnam. First, the author presents to the members an understanding of the constructs in the research model. Next, the members discussed and shared their thoughts on calibrating the scale. At the end of the interview, a measurement scale with four constructs and 21 observation variables was adopted. The questionnaire items are measured on a 5-point Likert scale, with one being strongly disagree and five being strongly agree (Table 2).

3.2. Data collection and analysis

Data were gathered through questionnaires. The author used a convenience sampling approach, sending surveys to managers and employees at companies in the fields of mechanics, cement, metallurgy, textiles, glass, and plastics. The questionnaire was designed with Google Forms and distributed via a link or QR code. This method of data collection also facilitates easier response gathering and data entry into SmartPLS 4.0 software. The survey was conducted over 5 months, from March 2025 to July 2025.

The questionnaire was tested with 45 people before distributing it for the formal survey. The purpose of the test run is to make sure the questions are clear, without confusion or words that could lead to misunderstanding (Collins, 2003). In In SEM analysis, there is no minimum sample size requirement. However, according to Reinartz et al. (2009), when the sample size exceeds 100, the statistical power is considered acceptable. The larger the sample size, the more accurate the estimate. Therefore, the author surveyed 2,000 people, resulting in 1,284 valid responses, which is a response rate of 64.2%. The quite high response rate can be attributed to the fact that most respondents were willing to support. Table 1 outlines the sample's characteristics.

Table 1: Description of sample characteristics

Characteristics	Frequency	Ratio
Gender		
Male	863	67.21
Female	421	32.79
Age		
Under 35	527	41.04
35-40	248	19.31
40-45	289	22.51
Above 45	220	17.14
Job position		
Leader	352	27.41
Employee	932	72.59
Job experience		
Under 5	145	11.29
5-10	677	52.73
11-15	245	19.08
Above 15	217	16.90

Source: Analysis results from SPSS26

The study employs quantitative methods to test the model and hypotheses. Partial least squares structural equation modeling (PLS-SEM) is used because it offers high prediction accuracy, is suitable for business research, and provides management insights. The reflective model is chosen because the observed variables in this study are results derived from latent variables (Hair et al., 2012). There are two phases: the measurement model and the structural model. The first phase involves evaluating the measurement model, including outer loadings, reliability, convergent, and discriminant validity. The second phase consists of assessing the structural model, including multicollinearity, path coefficients, R^2, f^2, and Q^2.

4. FINDINGS

4.1. Measurement model

Table 2 shows the outer loading results of all observed variables measuring four constructs (perception of climate change, environmental responsibility, perceived risk of climate change, voluntary environmental protection behavior). Since the outer loading coefficients were higher than 0.708, all observed variables were retained (Hair et al., 2014). Therefore, all observed variables used to measure the four constructs meet the threshold.

Sign	Items	Outer loadings
Perception of climate change		
PCC1	I understand how climate change impacts human health.	0.784
PCC2	I am perceptive of the impacts of sea level rise.	0.803
PCC3	I notice some people try to conserve energy.	0.739
PCC4	I am aware of industry-wide efforts to use solar energy to conserve energy.	0.728
PCC5	I am aware of the industry using materials and technology that support climate change.	0.746
PCC6	I am aware of the leading initiative against climate change.	0.855
Environmental responsibility		
ER1	I use renewable energy in an eco-friendly and efficient way.	0.738
ER2	My concern is for preserving and respecting the natural world.	0.721
ER3	I'm willing to use, buy, or produce eco-friendly products.	0.790
ER4	I reduced my use of natural resources.	0.804
ER5	I discuss environmental practices with people.	0.735
ER6	I participate in the environmental certification program.	0.722
Perceived risk of climate change		
PR1	I believe we are currently experiencing climate change.	0.782
PR2	Some symptoms of climate change are already obvious to me.	0.719
PR3	I believe that this year's temperature is higher than last year's.	0.800
PR4	Rainfall has likely decreased recently.	0.724
PR5	There has been a rise in sudden, unpredictable changes and overall climate variability.	0.750
PR6	There will be some positive effects of climate change on the climate.	0.767
Voluntary environmental protection behavior		
VEPB1	I have taken part in environmental conservation efforts such as planting trees, waste separation, and recycling.	0.808
VEPB2	I try to conserve energy.	0.795
VEPB3	I am actively working to expand the environmental information about my surroundings.	0.797

Source: Analysis results from Smart PLS 4.0

The results in Table 3 show that all scales have Cronbach's Alpha greater than 0.7, the reliability of the scales is between 0.7 and 0.95, and the Average Variance Extracted is greater than 0.5 (Hair et al., 2021). The scales achieved reliability and convergent validity.

Table 3: Reliability and convergent validity

Scale	Cronbach's Alpha	CR	AVE
Perception of climate change	0.840	0.856	0.690
Environmental responsibility	0.815	0.825	0.603
Perceived risk of climate change	0.833	0.847	0.625
Voluntary environmental protection behavior	0.809	0.818	0.639

Source: Analysis results from Smart PLS 4.0

Table 3 also shows that the smallest square root value of AVE (0.777) is greater than the largest value of concept pair correlation (0.647). Table 4 indicates that the HTMT indexes between independent variables are all below 0.9 (Hair et al., 2021).

Table 4: Fornell-Larcker and HTMT

Scale	PCC	ER	PR	VEPB
PCC	**0.831**	0.604	0.401	0.537
ER	0.526	**0.777**	0.508	0.618
PR	0.647	0.462	**0.791**	0.495
VEPB	0.572	0.505	0.617	**0.799**

Notes: PCC = Perception of climate change, ER = Environmental responsibility, PR = Perceived risk of climate change, VEPB = Voluntary environmental protection behavior

Source: Analysis results from Smart PLS 4.0

4.2. Structural model

The highest VIF value, which is less than 3 (Hair et al., 2021), is 2.808 according to the SmartPLS analysis results. Table 5 indicates that multicollinearity is not present in the model.

Table 5: VIF

	ER	PR	VEPB
ER	1.000	1.000	2.683
PR			2.745
VEPB			2.808

Notes: ER = Environmental responsibility, PR = Perceived risk of climate change, VEPB = Voluntary environmental protection behavior

Source: Analysis results from Smart PLS 4.0

This study examines the positive effects of perception of climate change on (1) perceived risk of climate change, (2) environmental responsibility, and (3) voluntary environmental protection behavior. Additionally, the study explores the mediating roles of perceived risk of climate change and environmental responsibility between perception of climate change and voluntary environmental protection behavior.

The threshold for evaluating the PLS-SEM model and hypothesis follows the recommendations of Hair et al. (2021). The R2 and Q2 results in Table 7 show that the structural model is of good quality. Additionally, the path coefficients related to the influence of perception of climate change on perceived risk of climate change, environmental responsibility, and voluntary environmental protection behavior are significant at the 5% level. Furthermore, the perceived risk of climate change and environmental responsibility significantly influence voluntary environmental protection behavior. The data shows that perception of climate change has the strongest influence on voluntary environmental protection behavior (β = 0.374). It also influences environmental responsibility (β = 0.342) and perceived risk of climate change (β = 0.306). The findings also indicate that the voluntary environmental protection behavior is influenced by environmental responsibility (β = 0.316) and perceived risk of climate change (β = 0.303) (see Table 6).

Table 6: Results of testing the direct relationship

Hypothesis		β	t-value	p-value	Conclusion
H1	PCC → PR	0.306	2.038	0.001	Accepted
H2	PCC → ER	0.342	2.173	0.003	Accepted
H3	PCC → VEPB	0.374	2.321	0.030	Accepted
H4	PR → VEPB	0.303	2.084	0.000	Accepted
H5	ER → VEPB	0.316	2.243	0.002	Accepted

R^2 = 0.748, 0.725, 0.733; f^2 = 0.352, 0.410, 0,356; Q^2 = 0.218, 0.273, 0.251

Note: PCC = Perception of climate change, ER = Environmental responsibility, PR = Perceived risk of climate change, VEPB = Voluntary environmental protection behavior

Source: Analysis results from Smart PLS 4.0

Table 7 describes the mediating effects of the constructs in the research model as follows:

Table 7: Results of testing the effect of intermediate variables

Hypothesis		β	t-value	p-value	Conclusion
H6	PCC → PR → VEPB	0.322	2.241	0.005	Accepted
H7	PCC → ER → VEPB	0.314	2.263	0.021	Accepted

Note: PCC = Perception of climate change, ER = Environmental responsibility, PR = Perceived risk of climate change, VEPB = Voluntary environmental protection behavior

Source: Analysis results from Smart PLS 4.0

Table 7 shows that the hypothesis about the perceived risk of climate change mediating the relationship between perception of climate change and voluntary environmental protection behavior is supported (β = 0.322, p-value = 0.005). Furthermore, environmental responsibility also mediates the relationship between perception of climate change and environmental protection behavior (β = 0.314), and a p-value of less than 0.05 shows the significance of this mediating effect. Therefore, hypotheses H6 and H7 are supported.

5. DISCUSSION AND IMPLICATIONS

According to protection motivation theory, people will take action when they recognize threats and understand the severity of the risks (Wang et al., 2018). Previous research has demonstrated that perception of climate change and perceived risks of climate change influence voluntary environmental protection behaviors (Jamelske et al., 2013; Yilmaz et al., 2023). The findings in Vietnamese manufacturing firms also confirm that perceptions of climate change and perceived risk of climate change influence voluntary environmental protection behavior. When employees' perception increases, environmental protection behavior tends to increase. This result is consistent with the theoretical framework. Moreover, this study finds the mediating role of perceived risks of climate change in the relationship between perception of climate change and voluntary environmental protection behavior. This result is consistent with the conclusions of Han et al. (2019).

Furthermore, the test results indicate that environmental protection behavior is influenced by environmental responsibility. This result is compatible with the results of previous studies (Venghaus et al., 2022; Yilmaz et al., 2023). As employees' environmental responsibility grows, their environmental protection behavior also rises. Furthermore, a positive correlation exists between environmental responsibility, perception of climate change, and voluntary environmental protection behavior. This finding aligns with the study by Han et al. (2019).

The research findings have enhanced Protection Motivation Theory by showing how perceptions of climate change, perceived risks, and environmental responsibility influence environmental protection behavior among employees in Vietnam's manufacturing industry. The study's novelty is also demonstrated by confirming the mediating roles of environmental responsibility and perceived risk of climate change in this relationship.

Practically, the study offers valuable information for manufacturing companies in Hai Phong city to promote voluntary environmental protection behaviors among employees toward sustainable development goals. Based on the results, some implications are suggested as follows:

Firstly, employees in manufacturing companies need to understand the effects of climate change to adopt more environmentally friendly practices. Companies can develop informational campaigns or strategies about the impacts of greenhouse gas emissions and rising sea levels. It is necessary to organize regular training programs and seminars. They will provide employees with in-depth knowledge of environmental issues, from harmful industry impacts to effective environmental protection strategies. As a result, employees will understand the importance of preserving the environment and how individual actions influence the natural balance. Additionally, support can be given to programs that promote energy efficiency and the use of alternative materials.

Secondly, companies need to find ways to motivate employees to voluntarily take on more environmental responsibility besides requiring them to participate in environmental programs. Using renewable energy, protecting the environment, using fewer natural resources, engaging in environmental initiatives, and informing customers about climate change reduction programs are some examples of these approaches.

Additionally, establishing a continuous feedback system is essential. Employees should be encouraged to submit comments, suggest new ideas, and discuss environmental issues within the organization. This way, they will feel valued and contribute to creating a responsible and environmentally conscious work

environment. Developing effective internal communication channels also plays a crucial role in sharing information and experiences related to environmental protection. From sharing successes to discussing challenges, employees will learn from these experiences and feel more motivated to take actions to protect the environment.

5. CONCLUSION

The findings have achieved the following objectives: (1) Examine the relationship between environmental protection behavior and perception of climate change, perceived risk of climate change, and environmental responsibility; (2) Assess the mediating role of environmental responsibility and perceived risk of climate change in the link between perception of climate change and environmental protection behavior.

Although the study provides valuable insights, it has limitations due to the non-probability, convenience sampling method. Future research should utilize probability sampling to more accurately test the relationship within the population. Additionally, its findings cannot be applied to the service sector or to other countries with different cultural norms and economic systems because the research sample was limited to manufacturing companies, and the survey was only conducted in Hai Phong City, Vietnam. Thus, more studies in different industries or regions should be conducted.

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