

Moral responsibility and willingness to sacrifice as drivers of voluntary environmental action in public organizations

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Abstract

Growing environmental pressures and the need for sustainable governance require public organizations to encourage voluntary environmental engagement among employees. While environmental policies and regulations are important, everyday sustainability practices within institutions often depend on individuals' moral responsibility and commitment to environmental protection. This study examines how moral responsibility influences voluntary environmental action among employees in public organizations. Drawing on the Value-Belief-Norm framework and the Norm Activation Model, the study investigates the relationships between ascription of responsibility, environmental attitudes (eco-centric, techno-centric, and dual-centric), willingness to sacrifice, and voluntary environmental action in municipal public institutions. A cross-sectional survey of municipal employees was conducted, and structural equation modeling was used to test the direct and indirect relationships among the study variables and the moderating role of technocentric orientation. The results indicate that stronger perceptions of personal responsibility toward environmental protection are associated with more positive environmental attitudes and greater willingness to sacrifice for environmental goals. Willingness to sacrifice also serves as an important mechanism linking environmental attitudes to voluntary environmental action within public organizations. In addition, technocentric orientation moderates selected relationships, suggesting that beliefs about technological solutions influence how moral responsibility translates into sustainability-related behavior. Overall, the findings highlight the importance of internalized moral responsibility and motivational commitment in promoting voluntary environmental action in public organizations. The study offers practical implications for policymakers and public managers seeking to strengthen sustainability practices by fostering responsibility norms, environmental awareness, and voluntary employee engagement.

1 Introduction

Environmental sustainability increasingly depends on employees' discretionary behavior within organizations. In practice, it is often shaped by what individuals choose to do in their everyday routines rather than by formal policy statements alone. Environmental management systems may provide structure, yet the success of sustainability initiatives frequently hinges on small, voluntary actions such as switching off unused equipment, reducing paper consumption, or participating in environmental campaigns. These voluntary pro-environmental behaviors (VPEB) are not mandated by job descriptions, but they can meaningfully influence an organization's environmental footprint (Yuriev et al., 2018; Alt & Spitzack, 2016). In this sense, VPEB represents a sustainability-oriented form of organizational citizenship behavior, reflecting employees' willingness to go beyond formal role requirements in support of collective environmental goals. Interest in

sustainability-related behavior has grown considerably in recent years (Sánchez Flores et al., 2024; Confraria et al., 2024). However, much of the empirical evidence stems from private sector contexts. Comparatively less attention has been paid to public organizations (Farooq & Yusliza, 2023), where bureaucratic constraints, limited incentives, and rule-based governance structures may restrict the effectiveness of formal environmental enforcement. In such settings, internalized moral norms and personal responsibility perceptions may play a more decisive role in shaping voluntary environmental conduct (Zaidi & Azmi, 2024; Zacher et al., 2023). If sustainability in government depends partly on what employees choose to do beyond formal requirements, then understanding these internal drivers becomes essential. The Norm Activation Model (NAM) (Schwartz, 1977) offers one explanation. It suggests that individuals are more likely to engage in prosocial action when they experience a sense of personal responsibility—conceptualized as ascription of responsibility (AR)—for preventing negative consequences (Baierl et al., 2022; Fang et al., 2019). The Value-Belief-Norm (VBN) theory (Stern et al., 1999; Stern, 2000) extends this logic by linking values, ecological worldviews, and personal norms to pro-environmental behavior (Chu et al., 2022). Together, these frameworks imply that moral responsibility may operate as a cognitive trigger for voluntary sustainability behavior. Yet empirical integration of NAM and VBN within public sector organizational research remains limited. Environmental attitudes may represent a key pathway through which responsibility translates into action. Ecocentric orientations emphasize the intrinsic value of nature, technocentric perspectives place greater trust in technological solutions, and dual-centric approaches integrate both (Miller et al., 2022; Tian & Zhang, 2020). These distinctions likely shape how employees interpret environmental obligations and decide whether to engage in voluntary action (Shen et al., 2024). Still, empirical research examining differentiated environmental attitudes among public employees—particularly in developing contexts—remains scarce.

Willingness to sacrifice (WTS) adds another layer to this discussion. It captures an individual's readiness to incur personal effort, inconvenience, or cost for environmental protection (Tsai et al., 2021; Andersen & Mayerl, 2022). In public organizations, where sustainability-related incentives are often indirect or symbolic, WTS may be especially consequential. Employees who go beyond formal role expectations frequently drive meaningful organizational contributions (Walker & Andrews, 2015). Without some degree of personal sacrifice, voluntary sustainability initiatives may struggle to gain traction.

Although organizational factors such as leadership and sustainability-oriented HR practices matter (Paillé & Valéau, 2021; Rafiq et al., 2024; Zafar & Suseno, 2024), the individual moral dimension arguably remains a foundational catalyst. A deeper understanding of how responsibility perceptions, environmental attitudes, and willingness to sacrifice interact may therefore clarify the micro-foundations of sustainability-oriented extra-role behavior in public institutions.

To address these gaps, this study develops and empirically tests an integrated VBN-NAM framework linking ascription of responsibility, environmental attitudes, willingness to sacrifice, and voluntary pro-environmental behavior among public employees in South India. By examining these moral and attitudinal mechanisms, the study contributes to ongoing debates on the behavioral foundations of sustainable public management.

Specifically, the study makes three contributions. First, it integrates NAM and VBN perspectives within a public organizational context, clarifying how moral responsibility may translate into sustainability-oriented extra-role behavior. Second, it identifies willingness to sacrifice as a potential mediating mechanism connecting responsibility perceptions to voluntary action. Third, it considers how differentiated environmental attitudes shape the boundary conditions of this relationship. Taken together, the findings aim to enrich understanding of how sustainability commitments are enacted not only through policy frameworks, but through everyday human behavior inside public organizations.

2 Literature review

Pro-environmental behaviour (PEB) has increasingly been recognised as a critical micro-foundation of organisational sustainability and an important behavioural determinant of how organisations respond to environmental challenges (Kollmuss, 2002; Ones & Dilchert, (2012). Contemporary research emphasises that PEB involves voluntary actions that minimise environmental harm and support sustainability outcomes, including reducing resource consumption, preventing waste, influencing colleagues, and initiating green practices (Shafiei & Maleksaeidi, 2020; Carvajal et al., 2024). These behaviours reflect environmental values, moral norms, responsibility beliefs and attitudinal orientations (Casalo, & Escario, 2018; Farrow et al., 2017).

Within organisations, PEB has been conceptualised as a value-driven, pro-social behaviour that enhances not only environmental outcomes but also organisational performance, culture, and social responsibility (Latif et al., 2022; Meloni et al., 2019). Importantly, this behavioural stream complements formal sustainability structures such as environmental management systems, performance indicators and reporting frameworks by shaping how employees interpret and enact sustainability objectives in daily practice.

These features shape both the opportunities and constraints for environmental behaviour among employees. Public servants often experience competing priorities, administrative compliance cultures, and limited managerial incentives for discretionary sustainability actions. At the same time, public institutions have explicit societal obligations to pursue long-term environmental stewardship, equity and intergenerational responsibility. Thus,

PEB in government is not merely a personal or organisational behaviour, it is tightly linked to public value creation, policy implementation and sustainability governance.

Scholars in sustainability management and public administration stress that public employees act as street-level sustainability agents, whose behaviours influence the credibility and effectiveness of environmental policies, reporting commitments, and sustainability management systems (Priyankara et al., 2018; Ling, M. & Xu, 2020; Rafiq and Xiuqing, 2024).

The behavioural antecedents examined in your study environmental values, attitudes, responsibility feelings and willingness to sacrifice are deeply connected to public-sector sustainability performance. Public-service organisations operate as value-based institutions, where employees are expected to uphold social welfare and long-term stewardship (Tsai, Stritch and Christensen, 2016). When these values align with environmental ethics, employees are more likely to engage in voluntary environmental action that supports organisational sustainability goals.

Evidence shows that employees' moral responsibility and environmental norms influence whether public organisations can effectively meet sustainability targets, comply with environmental regulations, and implement environmental management systems (Farrow et al., 2017; Robertson, & Barling, 2017). In this context, PEB becomes a behavioural mechanism through which public institutions operationalise environmental policies.

The Value-Belief-Norm (VBN) and Norm Activation Model (NAM) frameworks used in your study are especially relevant for explaining how public employees internalise environmental responsibility as part of their professional identity and public-service motivation. These theoretical perspectives help clarify the psychological pathways through which sustainability commitments translate into day-to-day practices within public administration.

Recent studies highlight that public-sector sustainability outcomes depend not only on formal policies or reporting requirements but also on the discretionary behaviour of employees who enact sustainability norms and practices (Rafiq & Xiuqing, 2024; Tang et al., 2023). Your study contributes to this stream by empirically demonstrating how responsibility, attitudes and willingness to sacrifice shape voluntary environmental behaviour within municipal government settings.

2.2 Conceptual Framework and Hypotheses Development

Figure 1 illustrates the conceptual framework guiding this study. At its core, the model explores a fairly simple but surprisingly underexplored question: how does feeling

responsible for environmental problems translate into voluntary pro-environmental behaviour (VPEB) within public organizations?

Research on pro-environmental behaviour is extensive, yet much of it tends to treat moral norms, environmental attitudes, and behaviour as somewhat separate strands of inquiry (Stern, 2000; Wesselink et al., 2017). As a result, we still know comparatively little about how these elements unfold together as a psychological process, particularly within organizational settings. This gap may be even more pronounced in public sector contexts, where environmental initiatives often depend less on formal incentives and more on employees' willingness to engage voluntarily in sustainability practices (Fang et al., 2019).

To make sense of this process, the study draws primarily on Value-Belief-Norm (VBN) theory (Stern, 2000), alongside broader attitudinal perspectives in environmental psychology. The VBN framework suggests that pro-environmental behaviour begins with moral cognition. Individuals recognize environmental problems, attribute responsibility for addressing them, and—through this process—activate personal norms that guide behaviour (Stern, 2000).

Still, applications of the VBN framework often treat environmental beliefs and attitudes as relatively uniform constructs. In practice, however, people do not interpret environmental issues in identical ways. Some emphasize the intrinsic value of nature, others place faith in technological solutions, and many appear to occupy positions somewhere in between (Baierl et al., 2022). Ignoring this diversity of environmental perspectives may oversimplify how individuals interpret environmental responsibility.

With this in mind, the present study distinguishes among three environmental orientations: ecocentric, technocentric, and dualcentric attitudes. Ecocentric perspectives emphasize the intrinsic worth of nature and moral duties toward ecological systems (Thompson & Barton, 1994). Technocentric perspectives, by contrast, tend to reflect confidence in technological progress and human ingenuity as ways to address environmental challenges (O'Riordan, 1981). A dualcentric orientation blends these positions, combining concern for ecological preservation with optimism about technological intervention (Patwary & Aziz, 2024).

Such hybrid thinking may not be unusual in contemporary public administration. After all, many sustainability initiatives today rely on digital monitoring systems, smart infrastructure, or data-driven environmental management. In these contexts, employees might simultaneously value ecological protection while also believing that technology can help make such protection feasible.

Another element of the framework deserves attention: willingness to sacrifice (WS). Much research assumes that positive environmental attitudes naturally lead to environmental

behaviour. Yet everyday experience—and empirical evidence—suggests that this connection is far from automatic. People may express concern about environmental issues and still hesitate when action requires personal cost (Kollmuss & Agyeman, 2002; Wesselink et al., 2017).

Introducing willingness to sacrifice into the model helps capture this often-overlooked step. It reflects the point at which environmental concern begins to translate into a readiness to give something up—time, convenience, effort, or occasionally professional comfort—for environmental protection (Andersen et al., 2022).

In organizational settings, that sacrifice might look fairly ordinary: taking extra time to separate waste, supporting a workplace sustainability initiative, encouraging colleagues to conserve energy, or volunteering for a green committee that sits slightly outside one's formal duties (Zafar & Suseno, 2024). Small actions perhaps, but collectively meaningful.

Taken together, the framework proposes a gradual progression. Responsibility shapes environmental attitudes; those attitudes influence willingness to sacrifice; and willingness, in turn, appears likely to encourage voluntary pro-environmental behaviour.

Ascription of Responsibility and Environmental Attitudes

Ascription of responsibility refers to the degree to which individuals perceive themselves as morally accountable for environmental problems and their consequences (Stern, 2000). Within the VBN framework, this sense of responsibility plays an important role in activating personal norms and shaping environmental beliefs.

When people begin to see themselves even indirectly as part of environmental problems, their interpretation of environmental issues may shift. What once appeared distant or abstract may start to feel more personally relevant. Some studies suggest that individuals who internalize environmental responsibility often display stronger environmental concern and greater commitment to sustainability (Baierl et al., 2022; Patwary & Aziz, 2024).

In organizational environments, similar dynamics seem to emerge. Employees who feel responsible for environmental outcomes may become more attentive to sustainability practices and more supportive of environmentally oriented organizational initiatives (Fang et al., 2019). For public employees, whose work often involves stewardship of public resources and collective welfare, this sense of responsibility may carry particular weight.

Responsibility may also shape environmental worldviews in different ways. Some individuals might develop stronger ecocentric attitudes, emphasizing ecological preservation. Others might gravitate toward technocentric perspectives, viewing technological solutions as essential tools for addressing environmental challenges. Still

others may adopt dualcentric positions, balancing ecological values with confidence in technological progress.

Based on this reasoning, the following hypotheses are proposed:

H1a: Ascription of responsibility positively influences ecocentric attitude.

H1b: Ascription of responsibility positively influences technocentric attitude.

H1c: Ascription of responsibility positively influences dualcentric attitude.

Ascription of Responsibility and Willingness to Sacrifice

Responsibility may influence behaviour in another way as well. Beyond shaping attitudes, it may foster a readiness to incur personal costs for environmental protection.

When employees feel accountable for environmental outcomes, they may experience a stronger internal pressure to act even when doing so requires extra effort or inconvenience (Taye et al., 2018). In workplace settings, this sense of obligation might translate into discretionary actions such as supporting environmental initiatives, promoting sustainable practices, or volunteering for organizational sustainability programs (Saifulina et al., 2021).

Previous research suggests that individuals who perceive stronger environmental responsibility often display greater behavioural commitment and a higher willingness to make personal sacrifices for environmental protection (Andersen & Mayerl, 2022). Responsibility, in other words, may motivate action even before environmental attitudes become fully articulated.

Thus, the following hypothesis is proposed:

H2: Ascription of responsibility positively influences willingness to sacrifice.

Environmental Attitudes and Willingness to Sacrifice

Environmental attitudes are widely considered important predictors of pro-environmental intentions and behaviour (Pavalache-Ilie et al., 2018; Miller et al., 2022). Individuals who strongly endorse environmental values may be more inclined to accept personal costs associated with sustainability.

The motivations behind such sacrifices, however, may differ across environmental orientations. Individuals with ecocentric attitudes may view sacrifices as morally necessary because environmental protection aligns with their ethical commitment to nature (Thompson & Barton, 1994). Those with technocentric perspectives might see

sacrifices as practical investments that support technological solutions or environmental innovation (Tezel, 2019).

Meanwhile, individuals with dualcentric orientations may combine ecological concern with pragmatic optimism about technological progress, which may similarly encourage support for environmental initiatives.

Research generally supports the idea that stronger environmental attitudes are associated with greater willingness to engage in pro-environmental behaviour and accept personal costs for sustainability (Akterujjaman et al., 2022; Tian & Zhang, 2020). Within organizational contexts, these attitudes may therefore translate into a readiness to support sustainability initiatives—even when they demand additional effort or adjustment.

Accordingly, the following hypotheses are proposed:

H3a: Ecocentric attitude positively influences willingness to sacrifice.

H3b: Technocentric attitude positively influences willingness to sacrifice.

H3c: Dualcentric attitude positively influences willingness to sacrifice.

Willingness to Sacrifice and Voluntary Pro-Environmental Behaviour

Willingness to sacrifice may represent the turning point between environmental belief and observable action. It reflects an individual's readiness to accept financial, temporal, or psychological costs in support of environmental sustainability (Andersen et al., 2022).

Research on environmental willingness whether framed as willingness to act or willingness to pay often finds that individuals prepared to incur such costs are more likely to engage in environmentally responsible behaviour (Xu et al., 2024; Wang et al., 2024).

Within organizations, this willingness may translate into voluntary pro-environmental behaviour. Employees who demonstrate higher willingness to sacrifice may be more inclined to support sustainability initiatives, promote environmentally responsible practices, and participate in environmental programs that fall outside formal job requirements (Rafiq & Xiuqing, 2024; Zafar & Suseno, 2024).

Voluntary pro-environmental behaviour therefore includes discretionary actions such as reducing resource consumption, encouraging colleagues to adopt environmentally responsible practices, and supporting organizational sustainability efforts.

Thus, the following hypothesis is proposed:

H4: Willingness to sacrifice positively influences voluntary pro-environmental behaviour.

Mediating Role of Willingness to Sacrifice

Responsibility and environmental attitudes may influence behaviour, but their effects are unlikely to be immediate. People often move through intermediate stages before acting.

In this framework, willingness to sacrifice represents that intermediate step. Employees who feel responsible for environmental outcomes and endorse pro-environmental worldviews may gradually become more willing to accept personal trade-offs for environmental protection. Over time, this willingness may translate into voluntary action.

Prior studies suggest that willingness or behavioural intention frequently mediates the relationship between moral norms, attitudes, and behaviour (Yan et al., 2024; Wesselink et al., 2017). The same mechanism may operate within organizational sustainability contexts.

Accordingly, the following hypotheses are proposed:

H5a: Willingness to sacrifice mediates the relationship between ascription of responsibility and voluntary pro-environmental behaviour.

H5b: Willingness to sacrifice mediates the relationship between ecocentric attitude and voluntary pro-environmental behaviour.

H5c: Willingness to sacrifice mediates the relationship between technocentric attitude and voluntary pro-environmental behaviour.

H5d: Willingness to sacrifice mediates the relationship between dualcentric attitude and voluntary pro-environmental behaviour.

In brief, this framework aims to offer a slightly more layered explanation of pro-environmental behaviour in organizations. It extends the Value-Belief-Norm perspective by distinguishing among ecocentric, technocentric, and dualcentric environmental orientations, rather than treating environmental attitudes as a single construct. It also highlights willingness to sacrifice as a key psychological bridge linking moral responsibility and environmental beliefs to behavioural outcomes.

Finally, by situating these dynamics within public organizations, the study contributes to growing discussions about sustainability-oriented organizational citizenship behaviour. Public sector sustainability often depends not only on policy or regulation but also on employees' willingness to engage voluntarily in environmental practices. Understanding how such willingness develops may therefore offer useful insight into the human side of organizational sustainability.

3 Methods

3.1 Data Collection and Sample

Data collection took place in July 2024 through a structured questionnaire administered to employees in city government offices across South India. India’s local government system is vast 267,160 units, including 4,636 urban municipalities (Sharma, 2020) and far from uniform in how it operates day to day. With that diversity in mind, we opted for a systematic random sampling approach. Every tenth municipality listed in the national registry was contacted, which led to 87 municipalities being approached in the initial round.

Access, however, was not straightforward. Public-sector research often depends on administrative approval, and this study was no exception. Of the 87 municipalities contacted, 10 granted formal permission to participate. In each of these, the mayor endorsed the study and assigned an internal officer to assist with distribution. While this gatekeeping process is typical in government settings, it likely shaped both access and response dynamics in ways that are difficult to fully observe.

Rather than relying on digital distribution, we delivered printed questionnaires during in-person visits. In some offices, online surveys are rarely used; in others, digital infrastructure is inconsistent. Printing the surveys felt like the more practical option, even if it required additional coordination. Employees across hierarchical levels senior administrators, middle managers, and frontline staff were invited to participate.

Participation was voluntary and anonymous. Before completing the survey, respondents were given a brief explanation of the study’s purpose, assurances of confidentiality, and a reminder that they could decline without consequence. Returning a completed questionnaire was treated as informed consent. To minimize non-response bias, we conducted three follow-up visits over a two-week period. In total, 410 valid responses were obtained. The final sample reflects variation in age, gender, and organizational roles. While not representative, it appears reasonably diverse within the participating municipal contexts. Table 1 summarizes the demographic characteristics.

Table 1 presents respondents’ demographic characteristics.

3.2 Measures

All constructs were measured using previously validated scales. A five-point Likert format was used throughout to maintain consistency. Some minor wording adjustments were made to better fit the realities of municipal work in India. These changes were modest, though any adaptation carries the possibility of subtle shifts in meaning.

VPEB was assessed using a three-item scale adapted from Ishaswini (2011). The scale captures discretionary pro-environmental actions. A reviewer raised an important concern:

some items refer to consumption behaviours, such as purchasing environmentally friendly products, which may not always fall within the formal authority of public-sector employees. This is a fair point. In many municipal offices, procurement decisions are centralized or constrained by procedural rules. To address this, items were contextualized to reflect behaviours that remain voluntary yet plausible in a government workplace. For example, respondents were prompted to consider actions such as advocating for environmentally preferable options during departmental purchases, supporting sustainable procurement discussions, or choosing eco-friendly alternatives when discretion was available (e.g., office supplies, printing practices).

That said, autonomy likely varies across hierarchical levels. A frontline clerk may have less influence over purchasing decisions than a department head. It is therefore possible that some items capture broader pro-environmental engagement rather than strictly role-bound behaviour. Measurement diagnostics indicated acceptable loadings and internal consistency, which suggests the construct held together statistically. Still, the contextual boundaries of VPEB in public institutions remain a consideration and are acknowledged as a limitation.

WTS was measured using three items adapted from Stern et al. (1999). The items assess respondents' readiness to incur personal costs time, convenience, or effort for environmental benefit. Unlike VPEB, which focuses on behaviour, WTS reflects a more attitudinal commitment. In this sense, it may capture a motivational layer that precedes observable action. The items were retained largely as originally designed, as they translated reasonably well into the municipal context. Ascription of Responsibility was measured using a five-item scale adapted from Kaiser et al. (1999). The scale includes both positively worded and reverse-coded items. Reversed items can be useful in discouraging patterned responses, but they sometimes introduce unintended method effects. Respondents may misread them, especially in paper-based surveys, leading to artificial factor structures or inflated measurement error. With this in mind, several checks were conducted. Reverse-coded items were carefully recoded prior to analysis. We then examined indicator loadings and cross-loadings to see whether reversed items clustered separately. Variance inflation factors (VIFs) were also inspected to detect potential multicollinearity linked to wording effects. Environmental attitudes were assessed using a 12-item scale from Müderrisolu and Altanlar (2011), covering ecocentric, technocentric, and dual-centric dimensions. The multidimensional structure was retained. Only minor wording changes were made for instance, clarifying references that might otherwise feel abstract in a municipal administrative setting. Measurement model results supported the retained structure.

Data Analysis

Hypotheses were tested using Partial Least Squares Structural Equation Modelling (PLS-SEM) in SmartPLS 3.3 (Sarstedt et al., 2021). PLS-SEM was chosen primarily because the study is prediction-oriented and involves multiple mediating paths. With a sample size of 410 and several latent constructs measured by multiple indicators, the technique appeared appropriate. The analysis followed a two-step process.

First, the measurement model was assessed. Indicator reliability, internal consistency, convergent validity, and discriminant validity were examined. Particular attention was given to the reversed AR items and the contextualized VPEB indicators to ensure they behaved as intended. Second, the structural model was evaluated. Path coefficients, effect sizes (f^2), explained variance (R^2), and bootstrapped significance levels were estimated. Taken together, this approach provides a structured way of examining both measurement properties and hypothesized relationships. At the same time, as with any cross-sectional survey design, the results should be interpreted with appropriate caution regarding causal inference.

4 Results

Given that all constructs were measured using self-reported data collected at a single point in time, the potential for common method variance (CMV) was carefully examined. Both procedural and statistical remedies were employed. Procedurally, item order was randomized, scale formats were varied, and psychological separation between predictor and criterion constructs was introduced in the questionnaire design. Reverse-coded items were retained within the Ascription of Responsibility scale to reduce acquiescence bias. Statistically, multiple complementary diagnostics were conducted. The full collinearity assessment indicated that all variance inflation factor (VIF) values were below the threshold of 3.3, suggesting that pathological collinearity and severe method bias are unlikely. Harman's single-factor test showed that the first unrotated factor accounted for less than 50% of total variance, indicating the absence of a dominant common factor. In addition, a theoretically unrelated marker variable was incorporated into the model; controlling for this variable did not substantially alter structural path coefficients. A latent method factor linking all indicators was also estimated, and the variance attributable to this factor was considerably lower than that explained by substantive constructs. Collectively, these results suggest that CMV does not pose a substantial threat to the validity of the findings, although its complete absence cannot be definitively established.

4.1 Measurement Model Evaluation

The measurement model was assessed using the two-step PLS-SEM procedure recommended by Joseph F. Hair et al. (2021). The first result measures the outer model loadings, which can take values between 0 and 1. Outer loadings are presented in Table 2.

Most indicators exceeded the recommended threshold of 0.70, indicating satisfactory reliability (Hair et al., 2021).

Table 2. Measurement Constructs, Codes, and Items Used in the Study

We verified the internal reliability of the construct through three indicators. Cronbach’s alpha is expected to be between 0.7 and 0.9 (Sarstedt, 2016). As the EA, TA and DA is below 0.7 for the EA variable, we examined the other indicators (CR and rho_A), which met the requirements for all variables. Based on theory, rho_A should be between the value of Cronbach’s alpha and CR, which is satisfied in our model (Hair., 2021). Convergent validity was measured by calculating the average variance extracted (AVE) and meets the required values exceeding 0.5 for all constructs (Hair et al. 2019). Results of construct reliability and convergent validity presented in Table 3.

Table 3

Construct Reliability and Validity

Discriminant validity was assessed using the traditional Fornell-Larcker criterion (Sarstedt et al., 2021), with the square root of the AVE for the construct being greater than the inter-construct correlation. The Fornell-Larcker criterion revealed that, in several cases, inter-construct correlations approached or slightly exceeded the square root of AVE, particularly among the environmental attitude dimensions and between Ascription of Responsibility and Eco-centric Attitude. These results suggest a high degree of conceptual proximity among certain constructs. To further evaluate discriminant validity, the heterotrait-monotrait ratio (HTMT) was calculated and presented as a separate matrix with 95% bias-corrected bootstrapped confidence intervals. Although some HTMT values exceeded the conservative threshold of 0.90, none of the confidence intervals included 1.00. Accordingly, discriminant validity cannot be statistically rejected. Nevertheless, given the observed construct overlap, structural relationships were interpreted cautiously and supplemented with effect size analyses. We conclude that discriminant validity is established (Table 4).

Table 4: Discriminant Validity Assessment: Fornell-Larcker Criterion and HTMT Ratio

4.2 Structural model

The structural model was assessed using bootstrapping with 5,000 resamples in SmartPLS. Global fit indices indicated moderate fit (SRMR = 0.140; NFI = 0.759). The model fit indices (Table 5) indicated an acceptable overall fit, While SRMR exceeds the conservative 0.08 threshold, global goodness-of-fit measures in PLS-SEM remain debated and are not considered decisive model evaluation criteria. Greater emphasis was therefore placed on explanatory power and predictive performance.

Table 5

Model Fit Indices

The model explained 52.0% of the variance in Willingness to Sacrifice and 39.3% of the variance in Voluntary Pro-Environmental Behaviour, indicating moderate explanatory capacity. Predictive relevance was assessed using PLSpredict rather than the Stone-Geisser Q^2 statistic, which has been superseded in recent SmartPLS versions. For the majority of key indicators, the PLS model demonstrated lower prediction error (RMSE) than the naïve linear benchmark model, suggesting acceptable out-of-sample predictive performance.

Effect size (f^2) analysis revealed that, although several paths were statistically significant, most exhibited small practical effects. The direct effects of Eco-centric, Technocentric, and Dual-centric Attitudes on Willingness to Sacrifice were significant but modest in magnitude. Similarly, the effect of Ascription of Responsibility on Willingness to Sacrifice was statistically significant yet small. In contrast, the relationship between Willingness to Sacrifice and Voluntary Pro-Environmental Behaviour demonstrated a large effect size, indicating that willingness functions as the principal proximal predictor of behavioural outcomes.

4.3 Hypotheses testing

Table 6 and Fig. 2 present the path coefficients, t-values, and p-values. Hypothesis testing results indicated that Ascription of Responsibility positively predicts Willingness to Sacrifice ($\beta = 0.205$, $p = 0.002$). Eco-centric, Dual-centric, and Technocentric Attitudes also positively predict Willingness to Sacrifice. Willingness to Sacrifice, in turn, strongly predicts Voluntary Pro-Environmental Behaviour ($\beta = 0.627$, $p < 0.001$), representing the most substantial relationship in the model.

Table 6

Hypothesis Testing Results

In brief, the data support the hypothesized model, showing that Ascription of Responsibility and environmental attitudes (dual-centric, eco-centric, and techno-centric) significantly contribute to explaining Willingness to Sacrifice, which in turn strongly predicts Voluntary Pro-Environmental Behavior.

4.4 Moderation testing

Moderation analysis was extended beyond the initially specified interaction to address concerns regarding selective testing. Interaction terms between Ascription of Responsibility and each environmental attitude dimension were examined. Only

Technocentric Attitude significantly moderated the relationship between Ascription of Responsibility and Willingness to Sacrifice, indicating that the effect of responsibility on willingness is strengthened among individuals with stronger technocentric orientations. The moderating effects of Eco-centric and Dual-centric Attitudes were not statistically significant. Additional exploratory interaction tests did not yield significant results, suggesting that the observed moderation effect is specific rather than broadly distributed.

5.5 Mediation testing

Mediation analysis was conducted following established guidelines. Table 7 summarizes the mediation results. Indirect effects were estimated using bootstrapping, and direct effects were explicitly assessed in the presence of the mediator. For Eco-centric, Technocentric, and Dual-centric Attitudes, both direct and indirect effects on Voluntary Pro-Environmental Behaviour were significant, indicating partial mediation. In the case of Ascription of Responsibility, the indirect effect through Willingness to Sacrifice was significant, whereas the direct effect on behaviour was not. Consistent with contemporary mediation terminology, this pattern is classified as indirect-only mediation rather than full mediation. This classification is based on empirical testing of direct and indirect effects rather than constraints imposed by model specification. In sum, the results indicate that Willingness to Sacrifice serves as a central psychological mechanism linking environmental responsibility and attitudinal orientations to voluntary pro-environmental behaviour, while also revealing meaningful though sometimes modest direct attitudinal effects.

Table 7

Mediation Analysis Results

Thus, the results provide strong support for the proposed mediating role of willingness to sacrifice in the model.

Figure 2 illustrates this significant interaction effect, highlighting that individuals with stronger technocentric attitudes display greater willingness to sacrifice when they ascribe responsibility for environmental issues to themselves.

6 Discussion

This study examined how public employees’ environmental attitudes, moral responsibility, and willingness to sacrifice shape voluntary pro-environmental behaviour (VPEB) and, in turn, contribute to sustainable development within public organisations. The findings highlight that sustainability performance in the public sector cannot be driven solely through regulations, compliance systems, or formal environmental programmes. Instead, meaningful progress toward organisational sustainability and the United Nations

Sustainable Development Goals (SDGs) depends on the internalised moral norms, responsibility perceptions, and ethical commitments of public servants. This behavioural view aligns with the journal's emphasis on accountability, behavioural drivers of sustainability, and the micro-foundations of sustainable development.

First, the study confirms that environmental attitudes operate as moral evaluations rather than simple cognitive preferences. Public employees with stronger ecological orientations demonstrate a greater capacity to prioritise environmental welfare over personal convenience. This supports earlier research framing environmental attitudes as moral value structures that guide behaviour Kaiser and Bogner, (2022). In the public sector context, these moralised attitudes reflect the broader ethical expectations of public service namely, safeguarding collective well-being and intergenerational equity, principles central to the SDGs. The results therefore reinforce the idea that nurturing pro-environmental attitudes among employees can strengthen public organisations' moral accountability for environmental outcomes.

Second, the findings show that willingness to sacrifice (WTS) plays a pivotal mediating role in transforming environmental concern into voluntary action. Consistent with studies emphasising the motivational effects of moral attributions Zhang et al., (2022), WTS acts as the psychological mechanism that enables employees to convert beliefs into purposeful behaviour. Public servants willing to take on personal costs such as extra effort, reduced comfort, or behavioural adjustments—are significantly more likely to engage in VPEB. This insight is especially relevant in resource-constrained public sector environments, where formal incentives for sustainability may be limited. By illustrating that intrinsic motivation drives sustainability-oriented citizenship behaviour, the findings contribute to the broader conversation around public sector capability, ethical work cultures, and sustainability-driven management practices.

Third, the moderating role of ascription of responsibility (AR) underscores the importance of personal accountability in enabling sustainable development. The data show that when employees feel morally responsible for environmental outcomes, the link between attitudes and willingness to act becomes stronger. This finding aligns with prior work demonstrating that moral norms and responsibility perceptions are critical triggers of environmentally responsible behaviour (Fang et al., 2019; Shen et al. 2024). AR thus deepens the ethical dimension of environmental decision-making by strengthening personal accountability an important component of sustainable public management and environmental governance. For governments seeking to strengthen accountability mechanisms for sustainability, this highlights the need to embed moral responsibility within institutional culture, training, and performance systems.

Collectively, these findings contribute to debates on workforce capability and sustainable public governance. Previous research Walker and Andrews, (2015) emphasised that effective public sector performance depends not only on institutional structures but also on the behavioural dispositions of employees. This study extends those debates by demonstrating how moral cognition, attitudes, and intrinsic motivation shape sustainability outcomes at the individual level. By doing so, the study advances the behavioural foundations of public sector sustainability and sheds light on how public organisations can strengthen internal accountability to the SDGs.

The results also complement broader research on institutional enablers of employee environmental engagement. Studies show that socially responsible HRM, ethical leadership, and green organisational climates can enhance responsibility perceptions and intrinsic motivation (Zhao et al., 2021; Zafar and Suseno, (2024). Similarly, research on job embeddedness and global leadership highlights the role of organisational support and values alignment in sustaining pro-environmental engagement (Xiuqing, 2024 & Rafiq et al., 2024). The present study adds to this literature by clarifying how individual-level moral mechanisms interact with these institutional factors to drive sustainability behaviour. This intersection between personal moral agency and organisational systems is crucial for understanding how public institutions can develop accountable, values-driven sustainability cultures.

Finally, the findings extend arguments that civic-mindedness and public service motivation reinforce sustainability-oriented behaviour Azhar, (2018). The integrated model presented here linking environmental attitudes (moral belief), willingness to sacrifice (moral intention), and ascription of responsibility (moral accountability) illustrates how public servants' environmental actions are expressions of civic duty and ethical governance. This provides a refined behavioural pathway highly relevant for both sustainability policy and public sector management, supporting accountable, ethically grounded organisational practices.

Overall, this study advances a moral-responsibility-based model of voluntary environmental behaviour in the public sector and demonstrates that sustainable development is strengthened not only by organisational policies and systems but by the ethical agency and behavioural commitments of public employees. By providing empirical evidence on how moral and attitudinal processes foster sustainability-oriented behaviour, the study contributes to strengthening public sector accountability for environmental performance and advancing practical solutions for sustainable development.

7 Conclusion

This study shows that voluntary pro-environmental behaviour (VPEB) among public employees is shaped fundamentally by moral responsibility, internalised norms, and intrinsic motivation. The mediating role of willingness to sacrifice (WTS) demonstrates that environmental attitudes become behaviourally meaningful when they activate moral intent, while ascription of responsibility (AR) strengthens this process by reinforcing employees' sense of obligation toward environmental stewardship. These findings highlight that public employees do not engage in sustainability practices only because of compliance demands or administrative procedures; rather, they act because they perceive environmental care as an ethical duty and a professional commitment to society and future generations.

The study contributes to broader sustainability debates by showing how moral cognition at the individual level forms the behavioural foundation of environmentally responsible public sector operations. Given the pivotal role of public institutions in advancing the UN Sustainable Development Goals (SDGs), understanding these value-based mechanisms becomes essential for strengthening the behavioural pillars of sustainable governance. By applying the Value-Belief-Norm (VBN) theory and Norm Activation Model (NAM) within a public sector context, the study offers an integrated explanation of how environmental values and moral obligations translate into discretionary, sustainability-oriented action.

Overall, the findings underscore that sustainable public management depends not only on policy structures, regulations, or organisational systems, but also on the ethical engagement of public servants. Recognising and nurturing this moral dimension is therefore critical for building responsible, accountable public institutions capable of supporting long-term environmental goals.

Theoretical Implications

This study advances interdisciplinary understanding of the behavioural foundations of sustainability in public organisations by integrating concepts from moral psychology, environmental behaviour research, and public administration scholarship. The validated model establishes WTS as a key moral-intent mechanism that transforms environmental attitudes into observable behaviour, while AR functions as an accountability cue that strengthens this normative pathway.

These insights extend research on voluntary environmental engagement—including work on Organizational Citizenship Behaviour for the Environment (OCBE)—by demonstrating that such behaviour in the public sector is driven primarily by internalised responsibility rather than external incentives or managerial directives. This positions moral responsibility as a central antecedent of sustainability-oriented citizenship behaviour within public institutions.

The study also contributes to fields such as green human resource management (GHRM), ethical public leadership, and behavioural public administration by clarifying how psychological values interact with organisational expectations and institutional norms. This cross-level integration strengthens the conceptual link between individual behavioural mechanisms and broader sustainability governance objectives. It provides a theoretically grounded explanation for how public organisations can align internal behaviours with external sustainability commitments and SDG targets.

By applying and extending the VBN–NAM framework in a public governance setting, the study offers a theoretically robust and socially relevant account of how moral agency shapes sustainable development efforts in the public sector.

8 Practical Implications

What do these findings actually mean for managers? At a basic level, they suggest that sustainability in public organizations is unlikely to improve through policy directives alone. Formal environmental guidelines matter, of course. But daily behavior seems to depend more on whether employees feel internally motivated to act.

HR practices may quietly shape that motivation. Recruitment processes, for instance, could signal that environmental responsibility is valued not through grand statements, but through subtle cues in job descriptions or interview discussions. Orientation sessions might include concrete examples of how staff have reduced paper use or improved energy efficiency in their own departments. Professional development workshops could move beyond compliance training and instead invite reflection on personal responsibility. Even performance appraisals can make a difference. Recognition does not have to be financial; sometimes a public acknowledgment in a staff meeting is enough to communicate that voluntary sustainability efforts are noticed.

Leadership behavior appears especially influential. When managers switch off lights after meetings, avoid unnecessary printing, or openly support employee-led green initiatives, those actions may carry more weight than formal memos. Employees tend to watch what leaders actually do. If sustainability is treated as a shared norm rather than an optional add-on, it is more likely to become part of everyday organizational life.

The role of willingness to sacrifice also deserves attention. Asking employees to act “voluntarily” while giving them no time or flexibility may create frustration. Small adjustments such as allowing time for sustainability projects or simplifying recycling procedures can reduce the personal cost of engagement. These practical supports signal that the organization takes such efforts seriously.

Finally, framing sustainability as a collective responsibility rather than an individual burden may strengthen participation. When teams see environmental behavior as part of their shared identity, extra-role actions are more likely to emerge naturally. Over time, these small acts often unnoticed—may accumulate into measurable organizational change.

Declarations

Funding

This research received no external funding

Ethics Approval and Accordance

The need for formal ethics approval was deemed exempt by the Research Ethics Oversight, Department of Political Science, University of Kerala, because the study involved an anonymous, non-invasive questionnaire survey of public-sector employees and did not collect identifiable personal or sensitive personal data.

All procedures performed in this study were conducted in accordance with the ethical guidelines and regulations of the University of Kerala and the principles outlined in the Declaration of Helsinki for research involving human participants. Administrative permission to conduct the survey was obtained from the relevant government organisations through an official research authorization.

Consent to Participate

Informed consent was obtained from all participants prior to their participation in the study. Participants were informed about the purpose of the research, the voluntary nature of participation, and the confidentiality of their responses.

Consent to Publish

Not applicable. The study does not contain any individual person's data in any form.

Data Availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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Tables

Tables 1 to 7 are available in the supplementary files section

Figures

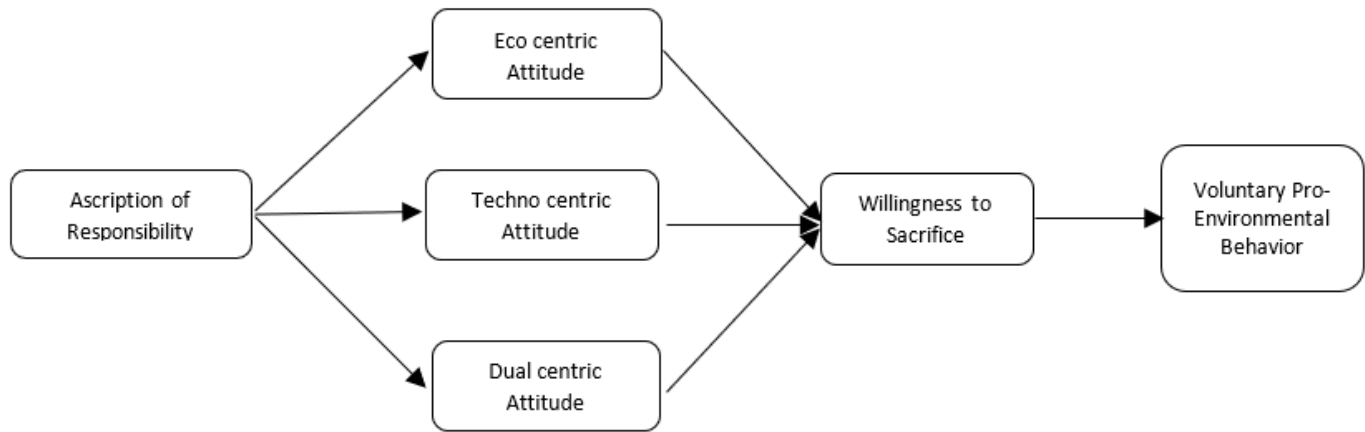


Figure 1

A proposed conceptual framework of VPEB

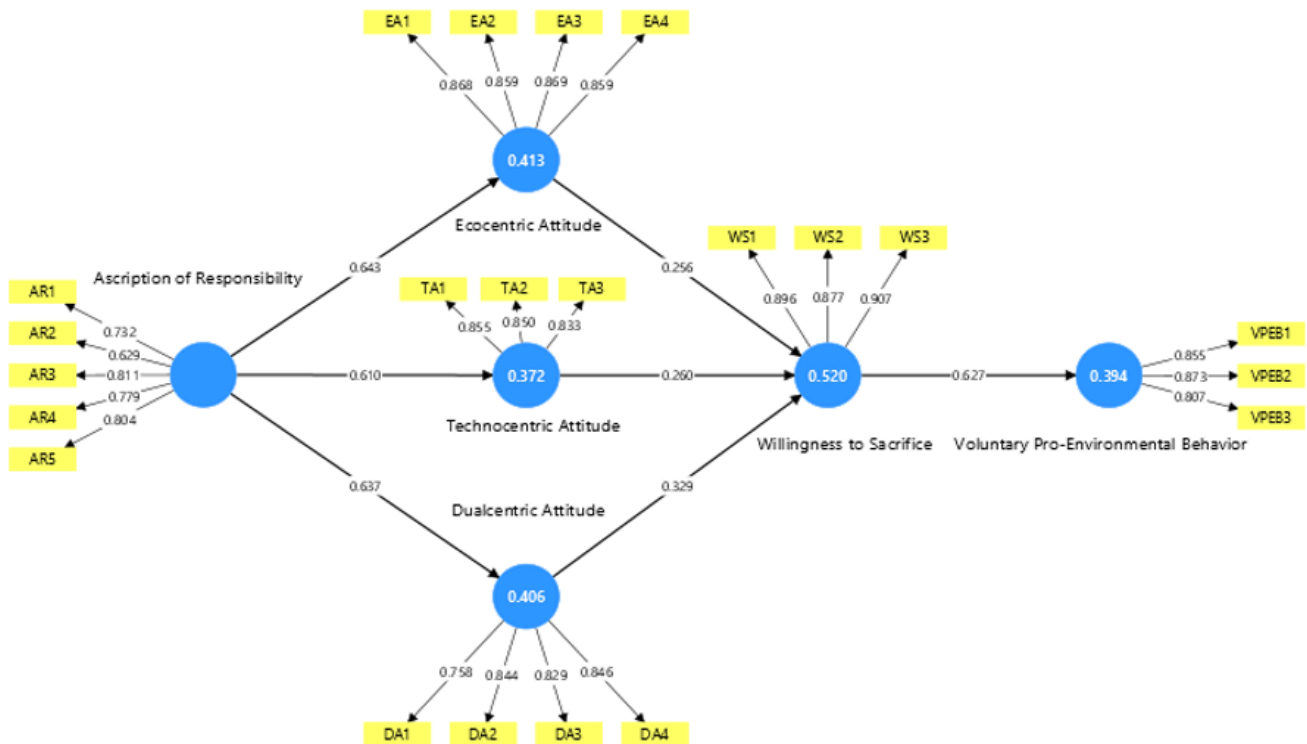


Figure 2

illustrates this significant interaction effect, highlighting that individuals with stronger technocentric attitudes display greater willingness to sacrifice when they ascribe responsibility for environmental issues to themselves.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Tables.docx](#)