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# Investigating Sustainability: A Comprehensive Approach to Understanding Intentional Pro-environmental Behaviour Through Awareness, Religious Beliefs, and Environmental Attitudes

## Abstract

This paper investigates the psychological and cultural elements that influence pilgrims' pro-environmental activity. By combining the Theory of Planned Behaviour (TPB) with insights from the religious studies literature, a conceptual framework was developed that identified religious beliefs, environmental knowledge, pro-environmental attitudes, and normative perspectives as the main determinants of pilgrims' intentions to engage in sustainable practices during their journey. Using Structural Equation Modelling (SEM) via SmartPLS and data collected from a sample of 201 pilgrims, the study demonstrates complex interactions among these variables. A person's degree of environmental awareness is influenced by their religious beliefs and values; thus, their pro-environmental attitudes and intentions to act also alter. Moreover, the data showed how these aspirations change in keeping with society's expectations. Though there was no clear direct link between pro-environmental views and behavioural intentions, our results suggest that religious beliefs and values—formed by environmental knowledge—are crucial in shaping pilgrims' pro-environmental activities. We advise that projects that aim to support sustainability in pilgrimage settings focus on raising environmental awareness through shared values and religious doctrines. This strategy could effectively use the psychological and cultural settings of pilgrims to encourage more environmentally responsible travel habits.

**Keywords:** pro-environmental behaviour, pilgrims, Theory of Planned Behaviour, religious beliefs, environmental awareness, normative belief

## 1. Introduction

Among the most significant long-standing global religious and cultural activities, pilgrimages draw millions of people every year on profound spiritual adventures. Pilgrimages are rooted in religious devotion and human experience, giving opportunities for social interaction, cultural contact, and personal transformation (Clingingsmith et al., 2009). Examples of such pilgrimages include the Hajj in Saudi Arabia, the Camino de Santiago in Spain (Lois González, 2013), and the Kumbh Mela in India (Dey, 2023).

However, even as these sites support personal and societal development, they do pose significant environmental concerns. The large influx of pilgrims can strain nearby ecosystems, resources, and infrastructure, as they generate more waste, increase energy consumption, and use more water (Fiedler et al., 2024). For instance, around 1.5 million people travel to Makkah each year for the Hajj (General Authority for Statistics [GASTAT], 2024), generating substantial waste and severely stressing the city's ecosystem (Abonomi et al., 2022). Similar issues are prevalent across other pilgrimage locations around the world (Singh & Bisht, 2014; Abdulredha et al., 2017).

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The transient character of these events accentuates the difficulties in sustainable management (Shinde & Olsen, 2022). Thus, encouraging environmentally friendly behaviour among pilgrims could reduce their impact on the surrounding environment. That said, promoting environmental responsibility in many religious contexts requires greater knowledge and awareness of the reasons people adopt sustainable behaviours. As the current literature has primarily concentrated on secular tourism or general urban populations, research on pro-environmental conduct is limited (Kala & Chaubey, 2024). Since this is the case, pilgrimages provide a unique opportunity to investigate how spiritual beliefs, cultural customs, and societal concerns can shape environmental activity (Senbeto, 2024; Ullah et al., 2024). Combining ideas from religious studies and environmental psychology, this study identifies the elements influencing pilgrims' pro-environmental activity. It examines how sustainable awareness, religious views, environmental viewpoints, and societal standards shape behaviour. The results could enable religious leaders and legislators to design initiatives/projects that successfully blend the spiritual values and ideals of pilgrimages with the pressing demand for environmental sustainability.

## 1.1. Research framework

Grounded in the Theory of Planned Behaviour (TPB), which holds that attitudes, social conventions, and perceived control shape people's intentions to act, the theory clarifies how religious beliefs, awareness of the surroundings, eco-friendly attitudes, and society standards within the framework of pilgrimages can affect sustainable actions (Senbeto, 2024; Si et al., 2022). Using environmental psychology as a prism, this study investigates how people's environmental issues influence their chances of engaging in environmentally responsible behaviour. Previous research shows that pro-environmental intentions are strongly influenced by environmental awareness (Helferich et al., 2023; Shah et al., 2023). Furthermore, since many religions encourage stewardship and a feeling of duty towards the environment, religious beliefs could play a crucial role (Albrecht et al., 2024; Fiedler et al., 2024).

Furthermore, the purpose of social conventions is also important to consider. The group can significantly influence the actions of people within pilgrim groups, particularly regarding their behaviour and expectations. This paper investigates how normative beliefs affect attitudes and behaviour. The study examines these links using Structural Equation Modelling (SEM) in SmartPLS. This approach emphasises how many psychological and cultural elements interact to influence sustainable behaviour. By relating theoretical ideas with practical implementations, the study seeks to offer valuable suggestions for enhancing the environmental sustainability of pilgrimages.

## 2. Literature review & research gaps

Although the Theory of Planned Behaviour (Ajzen, 1991) is widely used to analyse environmental behaviour, its applicability in religious settings remains somewhat limited. Most studies on sustainable travel focus on secular travel, thereby neglecting the exceptional values and motivations that guide pilgrims (Govender et al., 2020). By investigating how environmental attitudes are linked to religious and cultural elements, this study aims to close the discrepancy.

### 2.1. Key hypotheses

Though most current studies on this subject have focused on non-religious environments (leaving a gap in knowledge about how these attitudes play out in faith-based settings), people who care deeply about the environment typically show heightened awareness of sustainability challenges. The first hypothesis (H1) postulates that environmental awareness (PEA → EA) of pilgrims is favourably influenced by pro-environmental attitudes. Although they are not necessarily directly related to environmental action, religious beliefs often foster a sense of duty towards nature. That said, their indirect impact, especially on the formation of pro-environmental attitudes, remains underexplored in pilgrimage settings.

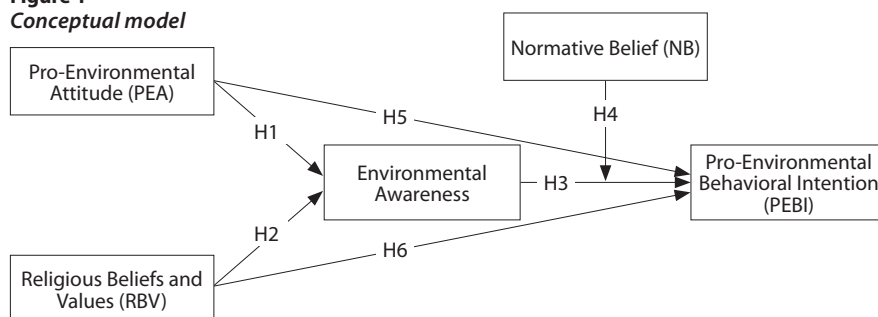
Under Hypothesis 2 (H2), religious beliefs create pro-environmental attitudes (RBV → EA), hence indirectly influencing environmental awareness. Environmental awareness is itself critical, as those who are more concerned about environmental problems are more likely to adopt sustainable behaviours. Although this has been investigated in several settings, its relevance to religious travel is limited. This is investigated in Hypothesis 3 (H3) through the mediation of environmental awareness on pro-environmental attitudes, religious beliefs, and behavioural intentions (EA → PEBI). Social conventions are also important, especially in close-knit religious communities where shared values can significantly influence behaviour.

Hypothesis 4 (H4) suggests that normative beliefs moderate the link between pro-environmental attitudes and behavioural intentions (NB ← PEBI). Even with good attitudes, turning them into action is not always easy, particularly in religious environments, where conflicting priorities can arise. Hypothesis 5 (H5) addresses this by suggesting that pilgrims with pro-environmental attitudes are more likely to participate in sustainable behaviours throughout their travels (PEA ← PEBI). Although this link is understudied in pilgrimage environments, religious beliefs can ultimately directly influence aspirations to act sustainably. Hypothesis 6 (H6) emphasises this by implying that pilgrims' intentions to participate in pro-environmental activities (RBV → PEBI) directly impact their religious beliefs and values. These theories seek to provide a better understanding of how environmental awareness, religious ideals, and social conventions interact to influence sustainable behaviour in pilgrimage settings.

## 2.2. Conceptual model

This research compiles social conventions, religious views, environmental attitudes, and awareness to provide a framework for comprehending sustainable behaviour during pilgrimages. The model emphasises (1) the indirect influence of religious views on environmental problem awareness. (2) The way awareness helps to convert attitudes into intentions. (3) The impact of social conventions on either promoting or discouraging ecologically responsible actions. This study also emphasises the psychological and cultural factors influencing pilgrims' sustainable behaviour to help interested parties develop effective interventions. Encouraging sustainability at pilgrimage sites not only mitigates negative impacts on the surrounding environment but also aligns with the moral and spiritual principles upheld by religious groups.

**Figure 1**  
*Conceptual model*



## 3. Methodology

This study uses a methodical research approach combining measurement instruments, data collection methods, and sample selection. The methods for data analysis are described, with special reference to structural equation modelling using SmartPLS.

### 3.1. Participants and procedures

The proposed methodology was tested in Saudi Arabia using a convenience sample consisting of 201 pilgrims during their Hajj pilgrimage. Participants were asked to complete a survey either online or in person, and

they signed an informed permission before answering. The survey was completed anonymously to ensure confidentiality and took approximately 10 minutes.

The variables and measurement scales used in this investigation primarily came from reliable, well-tested sources. The selected actions were chosen for their validity and reliability in assessing factors directly related to the aims of this research.

Bronfman et al. (2015) developed the Environmental Awareness (EA) scale. Some contextual changes were made to reflect the environmental conditions that pilgrims encountered during the Hajj, including references to "tents," "Mina," and "Hajj", all of which are fundamental components of the Hajj experience, ensuring that the questions appealed to the experiences of the respondents and improved construct relevance.

For evaluating Normative Beliefs (NB), Wang and Lin (2017) listed the tools used. These objects were used without modification because they reasonably conveyed the descriptive and injunctive elements of normative beliefs, which are crucial for understanding social expectations and influences within a group environment. Joshi and Rahman (2016) devised the scale to gauge Pro-Environmental Attitudes (PEA). While the general arrangement of the objects remained the same, some language changes were made to relate the features of the Hajj pilgrimage better; for example, "environmental protection works" and "environmental protection during Hajj" were used.

Pro-environmental Behavioural Intention (PEBI) was evaluated using a scale developed by Pan et al. (2018) and Doran et al. (2017). Items were modified to align with the behavioural objectives of the Hajj journey. For instance, "I plan to buy environmentally friendly tourism products" was revised to include "during Hajj" to ensure relevance to the study population. Mostly drawing upon the writings of Rice (2006) and Kala & Chaubey (2024), the Religious Beliefs and Values (RBV) scale was used, and these objects were carefully contextualised in line with the Islamic background of the Hajj travel and Islamic teachings that mirrored the respondents' cultural and spiritual ethos. Based on Islamic sources (the Holy Quran and Hadiths), the artefacts underscored the obligation to preserve the environment as part of religious practice.

## 4. Results

The study's conclusions mostly came from the analysis of the SmartPLS results. An assessment of how well the structural model fits the data was provided, along with the thorough path coefficients and significance levels for the suggested correlations. The results help to clarify the impact of religious beliefs, environmental awareness, pro-environmental attitudes, and normative perspectives on pilgrims' readiness to participate in sustainable behaviour during their journey.

### 4.1. Sample description

Of the 201 responders, 72.1% were male (n=145) and 27.9% were female (n=56). According to the age distribution, 47.3% fell into the 31–40 age bracket (n=95), whereas 31.3% were aged 41–50 years (n=63). In terms of academia, 48.3% had a bachelor's degree (n=97), 26.4% had a master's degree (n=53), 10% had a PhD (n=21), and 7% had either a diploma (n=15) or finished secondary education (n=15). In relation to nationality, most of the sample was from the Middle East, representing 75.1% of pilgrims (n=151), followed by Asia at 21.9% (n=44), Africa at 1.5% (n=3), North America at 1.0% (n=2), and Australia at 0.5% (n=1).

### 4.2. Validity of measurement scale

Comprising 26 questions and five components, the measuring scales were validated by Exploratory Factor Analysis (EFA). Pro-Environmental Attitude and Religious Beliefs and Values were exogenous variables (5 and 3 items respectively); Pro-Environmental Behavioural Intention was the endogenous variable (7 items);

Environmental Awareness was the mediator variable (6 items); and Normative Belief was the mediator variable (5 items). Their measurements and high internal consistency demonstrated excellent construct measurement quality.

We tested the measurements over a spectrum of statistical analyses to confirm them. This comprised the Kaiser-Meyer-Olkin (KMO) test and Bartlett's Test of Sphericity to assess sampling adequacy, Cronbach's Alpha to measure internal consistency, and the Skewness and Kurtosis coefficients to assess normality. We also examined the Total Explained Variance (TVE) and Principal Component Analysis (PCA), which provided further confirmation of the measuring items. Table 1 presents the results of the validity and reliability tests, along with a description of the exploratory factor analysis for the measurement scales.

**Table 1**  
*Exploratory factor analysis for measurement scales*

Variables	Code	N of items retained	Cronbach's alpha	KMO and Bartlett's test		Total variance explained (Cumulative %)
				Kaiser-Meyer-Olkin measure	Bartlett's test (Sig.)	
Environmental awareness	EA	2	0.847	0.771	0.000	49.005
Normative belief	NB	5	0.842			
Pro-environmental attitude	PEA	2	0.875			
Pro-environmental behavioural intention	PEBI	4	0.799			
Religious beliefs and values	RBV	2	0.920			

With Cronbach's Alpha higher than 0.80, all measurement instruments were verified to be valid and internally consistent. Since the results of the normalcy test (Kurtosis and Skewness) fell within the reasonable range of -1 to +1, all items were kept after validation. Item loadings were confirmed using the Total Variance Explained (TVE); significant results came from the KMO and Bartlett's tests. High sample fit and factor appropriateness were indicated by KMO values over 77.1% and a p-value of 0.000. Furthermore, the variance analysis revealed that the found factors could explain around 49% of the variance in the five latent variables.

### 4.3. Confirmatory Factor Analysis (CFA)

Once the measuring scale was validated, analysing item loadings inside the relevant constructs and evaluating the measurement model, usually using significant criteria such as Average Variance Extracted (AVE), Jöreskog's Rho, and Cronbach's Alpha, helped to analyse the structural model. Table 2 presents the results for the five components, including independent and dependent variables that together define the projected model.

**Table 2**  
*The reliability and validity of constructs*

Constructs	Code	N of Items	Cronbach's alpha	Jöreskog's rhos	Average variance extracted (AVE)
Environmental awareness	EA	2	0.848	0.929	0.868
Normative belief	NB	5	0.842	0.886	0.609
Pro-environmental attitude	PEA	2	0.875	0.936	0.879
Pro-environmental behavioural intention	PEBI	4	0.798	0.868	0.621
Religious beliefs and values	RBV	2	0.921	0.962	0.927

Representing the five latent variables, the first fifteen questions were statistically tested to verify their validity and dependability within the reflecting measurement models. With Cronbach's Alpha values ranging from 0.791 to 0.921, the results indicated that each construct exhibited strong internal consistency. Jöreskog's Rho exceeded 86.8% and met the 0.6 criterion; hence, the internal coherence and robustness of the measurement

model were further verified. The signals verified the dependability of the fifteen components for the study model.

Tests of convergent and discriminant validity helped to evaluate validity. Referring to Fornell and Larcker (1981), Hair et al. (2017, 2019) underlined that the Average Variance Extracted (AVE) should be more than 0.5 to prove convergent validity. The study's AVE exceeded 60.9%, meeting this requirement. On average, latent variables explain over half of the variance in their indicators (Hair et al., 2019; Götz et al., 2009). We used the Heterotrait-Monotrait Ratio (HTMT), as demonstrated in Table 4, together with the Fornell–Larcker criterion shown in Table 3 to evaluate discriminant validity.

**Table 3**  
*Fornell-Larcker criterion (discriminant validity)*

	EA	NB	PEA	PEBI	RBV
Environmental awareness	0.932				
Normative belief	0.211	0.780			
Pro-environmental attitude	-0.200	0.005	0.938		
Pro-environmental behavioural intention	0.429	0.374	-0.069	0.788	
Religious beliefs and values	0.480	0.380	-0.204	0.497	0.963

The discriminant validity test verified that, using the rules set by Hair et al. (2019), the AVE values for each construct exceeded the squared correlations with other latent variables. This criterion was met, as indicated by the AVE values for Environmental Awareness (0.932), Normative Belief (0.780), Pro-Environmental Attitude (0.938), Pro-Environmental Behavioural Intention (0.789), and Religious Beliefs and Values (0.963). The fact that the AVE for every construct exceeded its correlations with other factors suggests that the constructs have discriminant validity (Götz et al., 2009; Hair et al., 2017).

**Table 4**  
*The Heterotrait-Monotrait Ratio (HTMT) (discriminant validity)*

	EA	NB	PEA	PEBI	RBV
Environmental awareness	0.234				
Normative belief	0.215	0.074			
Pro-environmental attitude	0.503	0.441	0.103		
Pro-environmental behavioural intention	0.543	0.419	0.224	0.563	
Religious beliefs and values	0.627	0.131	0.014	0.240	0.393

Henseler et al. (2016) and Hair et al. (2019) provide evidence that the HTMT value has to be less than 0.90 if it is judged appropriately for assessing discriminant validity with the HTMT criterion. With a HTMT threshold of 0.90, the formative constructions satisfied it; the Heterotrait-Monotrait Ratio bootstrapping test confirmed statistical significance. Using the Variance Inflation Factor (VIF), multicollinearity was assessed; findings ranged from 1 to 2, suggesting no problems with multicollinearity. The inner VIF values for the structural model were as follows: EA → PEBI (1.772), NB → PEBI (1.186), PEA → EA (1.044), PEA → PEBI (1.098), RBV → EA (1.044), RBV → PEBI (1.531), and NB × EA → PEBI (1.574).

Reflecting the model's predictive accuracy, the R-squared (R<sup>2</sup>) values for Environmental Awareness (R<sup>2</sup> = 0.241) and Pro-Environmental Behavioural Intention (R<sup>2</sup> = 0.337) indicate modest predictive ability. Bootstrapping examination of path coefficients validated the amplitude, direction, and relevance of the correlations between components, as well as important causal linkages between (1) EA → PEBI, (2) NB → PEBI, (3) RBV → EA, and (4) RBV → PEBI.

Here, the reflective and emotional constructions, as well as the structural model's fit, were assessed using SmartPLS 4. The results showed very notable discrepancies from the relevant requirements. The Standardised Root Mean Square Residual (SRMS) for the Common Factor Model and Composite Model proved statistically

significant (below 5%). A good model fit was shown by the SRMS, which measured the variance between actual and expected correlations (Henseler et al., 2014; Chou, Bentler, & Satorra, 1991, as referenced by Hair et al., 2019). Its value was 0.078. Moreover, a strong fit based on the Bentler-Bonett index—often referred to as the normed fit index—which is used to assess the validity of global models, requires a value of 0.9. Here, the NFI was 0.731, a small number still within a reasonable range.

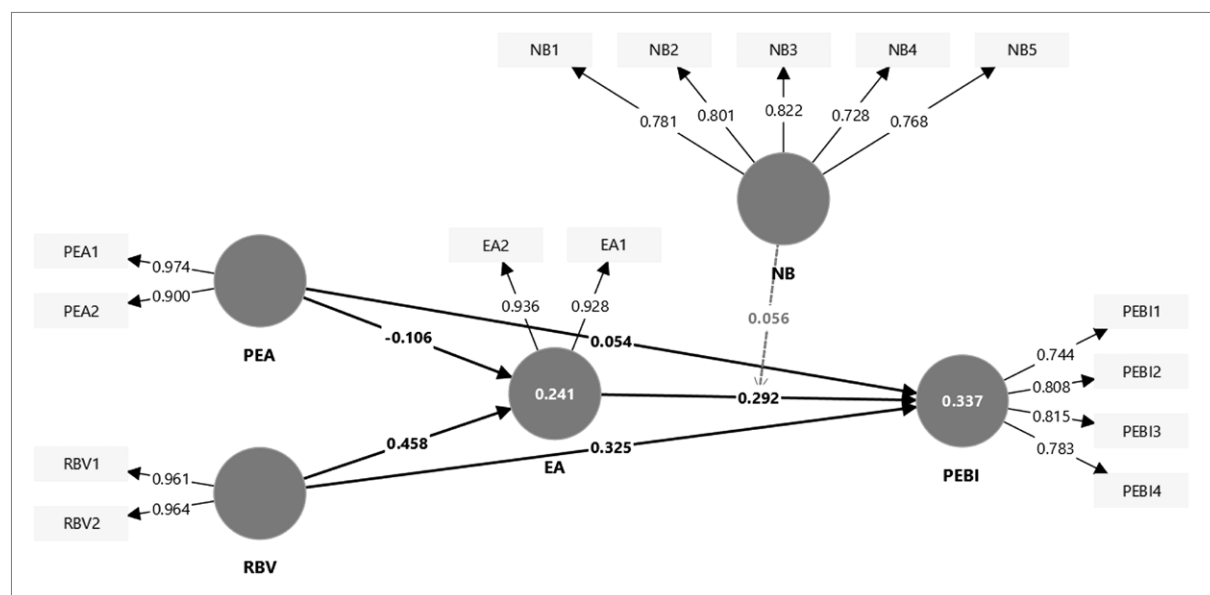
Additional criteria were computed to underline the strength of the model: dULS (0.728) and Chi-Square (424.400, p-value = 0.000), both of which showed a good fit for the structural model. As Table 5 highlights, the path coefficients were statistically significant at the 5% level (p-value = 0.05).

**Table 5**  
*The estimates of path coefficients*

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ( O/STDEV )	p-values
EA → PEBI	0.292	0.283	0.084	3.487	0.001*
NB → PEBI	0.199	0.214	0.069	2.871	0.004*
PEA → EA	-0.106	-0.120	0.095	1.122	0.262
PEA → PEBI	0.054	0.050	0.059	0.925	0.355
RBV → EA	0.458	0.437	0.128	3.582	0.000*
RBV → PEBI	0.325	0.323	0.071	4.561	0.000*
NB x EA → PEBI	0.056	0.048	0.064	0.868	0.386

Furthermore, as Figure 2 shows, the structural model amply displays the causal relationships between the constructions.

**Figure 2**  
*The structural model with estimated parameters*



#### 4.4. Hypotheses testing results

The results of this research either support or contradict the ideas offered in the conceptual framework. The proximity of the coefficients, such as R<sup>2</sup> (0.337) and NFI (0.731), indicates that the structural model fits the data nicely. The f<sup>2</sup> values also range from 0.044—suggesting little influence—to 4.342—suggesting a

significant influence. At 0.078, the SRMR value for the chi-square test yielded a value of 424.400 and a p-value of 0.000. Six direct and indirect relationships were also examined to investigate component causality.

**Table 6**  
*The significance analysis of the direct and indirect effects*

Hypotheses		Path	Direct (DE)/ Indirect effects (IDE)/ NR	t-values	p-values	Outcome	H <sub>0</sub> validation
H1	EA: Pro-environmental attitudes positively influence pilgrims' level of environmental awareness.	PEA → EA	NR (no relationship)	1.122	0.262	No (Neither direct nor indirect)	Rejected
H2	EA: Religious beliefs and values indirectly influence environmental awareness through their impact on pro-environmental attitudes.	RBV → EA	DE	3.582	0.000*	Yes	Accepted
H3	Environmental awareness mediates the relationship between both pro-environmental attitudes and religious beliefs/values and behavioural intention.	EA → PEBI	DE	3.487	0.001*	Yes	Accepted
H4	PEBI: Normative belief within pilgrim communities moderates the relationship between pro-environmental attitudes and behavioural intention, such that the influence of attitudes on intention varies depending on the level of normative belief.	NB (as a moderator) → PEBI	DE	2.871	0.004*	Yes	Accepted
H5	Pilgrims with positive attitudes towards the environment are more likely to engage in pro-environmental behaviours during their pilgrimage.	PEA → PEBI	NR (no relationship)	0.925	0.355	No (Neither direct nor indirect)	Rejected
H6	Religious beliefs and values directly influence pilgrims' intention to engage in pro-environmental behaviours, possibly mediated by environmental awareness.	RBV → PEBI	DE	4.561	0.000*	Yes	Accepted

## 5. Discussion

The implications of the results were examined for theory and practice, with particular attention to the potential for integrating environmental education and awareness initiatives within pilgrimage contexts. This study examined the role of religious institutions, pilgrimage organisers, and local communities in promoting sustainable behaviours among pilgrims. The findings also provided insights into the relationships between pro-environmental attitudes, religious beliefs, environmental awareness, normative beliefs, and behavioural intentions.

### 5.1. Key hypotheses revisited

**H1: Pro-Environmental Attitudes → Environmental Awareness (Rejected):** The study found that EA and PEA showed no appreciable link ( $t = 1.122$ ,  $p = 0.262$ ), therefore negating H1. This is consistent with the results of Fiedler et al. (2024), who argued that attitudes alone may not be sufficient to raise awareness in the absence of external factors, such as media or education. Albrecht et al. (2024) discovered a direct association in the general population, thereby highlighting the distinctive features of pilgrimage.

**H2: Religious Beliefs/Values → Environmental Awareness (Accepted):** With  $t=3.582$  and  $p=0.000$ , the results for H2 revealed a clear relationship between EA and RBV. This is consistent with the results of Shah et al. (2023) and Helderich et al. (2023), who underlined the need of religious teachings in forming environmental consciousness, especially in environments motivated by faith.

**H3: Environmental Awareness mediates PEA/RBV → Behavioural Intention (Accepted):** With a t-value of 3.487 and a p-value of 0.001, the results suggest that EA moderates the link between RBV and PEBI. Consistent with the results of Zeng et al. (2023) and Doran et al. (2017), this emphasises the need for awareness as a fundamental link between values and activities.

**H4: Normative Belief moderates PEA → Behavioural Intention (Accepted):** NB ( $t=2.871$ ,  $p=0.004$ ) considerably lessened the effect of PEA on PEBI. This is consistent with the results of Bleidorn et al. (2021) and Sulphey et al. (2023), who underlined the influence of social conventions on behaviour, particularly in group environments, including pilgrimages.

**H5: Pro-Environmental Attitudes → Behavioural Intention (Rejected):** Fascinatingly, in contrast to previous investigations, PEA and PEBI had no appreciable connection ( $t=0.925$ ,  $p=0.355$ ) (Zeng et al., 2023; Albrecht et al., 2024). This implies that, in religious settings, societal conventions and beliefs may exert more influence on behavioural intention than personal opinions (Helferich et al., 2023).

**H6: Religious Beliefs/Values → Behavioural Intention (Accepted):** RBV directly affected PEBI in a manner that strongly supported H6 ( $t=4.561$ ,  $p=0.000$ ). This is supported by the results of Albrecht et al. (2024) and Shah et al. (2023), which showed that religious beliefs, especially in faith-driven communities, significantly affect environmental behaviour. The study emphasises how closely personal views, religious values, and societal conventions interact to shape pilgrims' pro-environmental behaviours. Although societal conventions and religious beliefs exerted significant influence, personal opinions alone were insufficient. The results highlight the need for sustainability initiatives, including religious and cultural elements, to promote environmental responsibility in pilgrimage destinations.

## 6. Conclusion

This study provides insightful analyses of the relevance of environmental awareness, pro-environmental attitudes, and religious beliefs in clarifying the elements influencing pilgrims' pro-environmental activity. The results show that although pro-environmental sentiments by themselves do not directly affect behavioural intentions, religious beliefs and values can significantly influence environmental awareness and those intentions. Furthermore, normative beliefs serve as major moderators, supporting the relationship between attitudes and behavioural intentions. The results imply that encouraging pro-environmental attitudes is crucial, but their efficacy depends much on the degree of support from normative beliefs and religious values (Georgopoulou, 2024).

### 6.1. Theoretical implications

This study explored the dynamics of pro-environmental activity within the framework of religious pilgrimages, thereby improving our knowledge of it. It also revealed how religious and normative concepts influence behavioural intentions, hence increasing the relevance of the Theory of Planned Behaviour (TPB) in such surroundings. The findings emphasised the importance of incorporating spiritual and cultural elements into traditional behavioural models such as the TPB. The study further highlighted the necessity of environmental awareness to connect internal thoughts to external action and provides examples of how normative views can affect results.

### 6.2. Practical implications

The findings of this study provide significant direction for practitioners seeking to support environmental sustainability in pilgrimage environments. This includes incorporating sustainability concepts into religious teachings to enable religious leaders and organisations to influence and promote environmentally friendly behaviour and practices significantly. Sermons, educational programs, and ceremonies can all underscore the spiritual value of environmental protection, thereby linking ecological responsibility to religious requirements.

In addition, by fostering common values among groups of pilgrims, pro-environmental viewpoints can significantly influence conduct through peer pressure and support for community-oriented environmental activities. Encouraging peer-led environmental projects, team-building activities involving cleanup campaigns, and recognising environmentally friendly achievements with rewards can all help raise community involvement.

Lastly, legislators and pilgrimage planners should create focused campaigns aligned with religious beliefs to inspire environmentally friendly actions. Environmental education programs designed for pilgrims will enable them to perceive environmental problems (Fuchs, 2023), while seminars, online resources, and on-site training courses can help effectively promote sustainable practices and convey the environmental effects of pilgrimage activities (Carlisle et al., 2022; Cheung & Fok, 2014).

### 6.3. Policy implications

Policymakers and those leading pilgrimages can participate in the following activities to support sustainability: certifying ecologically friendly hotels, modes of transportation, and businesses—all of which could inspire Hajj stakeholders to use more sustainable practices (especially if there are financial incentives). Pilgrimage sites can also improve environmental sustainability by investing in sustainable infrastructure, combining waste management systems, water conservation technology, and renewable energy sources (Abonomi et al., 2022). Combining environmental goals with religious values in behavioural projects will enable highly effective promotion of sustainability, particularly given cleanliness as a religious requirement. Thus, this will enable stakeholders to design more effective treatments that reduce the environmental impact of pilgrimages and advance overall sustainability objectives.

### 6.4. Study limitations and future research directions

Though it provides outstanding contributions, this study has numerous limitations. Given that the sample consisted of 201 pilgrims from a particular religious environment, the findings are not necessarily relevant in different cultural or religious settings. Future studies should replicate this study at several pilgrimage sites and across many religious traditions to ascertain whether these conclusions are universally valid. Examining pilgrims from diverse demographic backgrounds also helps expose differences in pro-environmental behaviour, thereby providing a better understanding of the underlying reasons. Moreover, a cross-sectional approach will provide insight into how attitudes and behaviours evolve. Cross-sectional studies capture a single point in time, whereas longitudinal studies can provide a more comprehensive understanding of how attitudes towards the surroundings, beliefs, and behaviours develop over time. By recording changes that persist beyond the Hajj, this study may shed light on how pilgrimage experiences affect environmental awareness and behaviour.

Furthermore, social desirability bias may be introduced by the emphasis on self-reported data, potentially affecting the findings. Future studies may use observational or experimental methods to establish a connection between self-reported objectives and actual behaviour. Combining objective measurements, such as behavioural tracking or assessments of environmental effects, with self-reported data would produce more accurate results. Moreover, more sophisticated knowledge of the motives behind pro-environmental actions could be obtained through qualitative methods, such as in-depth interviews or anthropological studies.

Consequently, even if it emphasises psychological and cultural aspects, this study overlooks other possible factors, such as institutional policies, legal frameworks, or financial incentives. These elements could be incorporated into the framework in future studies aiming at how legislative acts, financial incentives, and organisational support influence ecologically friendly pilgrimage behaviours. Analysing how religious organisations and pilgrimage groups implement “green projects” or incentive systems for sustainability will help us understand the broader elements that motivate pro-environmental behaviour.

A mixed-methods approach could also improve the data by combining qualitative observations or interviews with quantitative polling. Although quantitative methods help identify patterns, qualitative research can highlight underlying psychological, cultural, and emotional aspects of pro-environmental behaviour. Through qualitative insights, researchers can gain a deeper understanding of pilgrims' perspectives on their environmental responsibilities, the influence of religious teachings, and the challenges of adopting sustainable practices.

Dealing with these constraints and investigating possible directions for future research may help us better grasp pro-environmental behaviour in religious settings. This helps religious institutions, politicians, and other interested parties in their efforts to support sustainability in pilgrimage locations and to guide more successful projects.

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