

# **Pro-environmental behaviours: Empirical evidence of the theory of planned behaviour among Mandarin farmers in Syangja district, Nepal**

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## **1. Introduction**

Encouraging pro-environmental behaviours is pivotal for effective climate change mitigation. These behaviours involve actions to minimize environmental harm or contribute positively (Steg & Vlek, 2009), play a critical role in the agricultural sector. This sector not only stands as the primary emitter of greenhouse gas (GHG) emissions but also possesses the potential to sequester them (Smith et al., 2008). Consequently, encouraging pro-environmental behaviours within the agricultural sector holds immense potential to mitigate climate change. Despite extensive studies of pro-environmental strategies in organizational psychology and consumer behaviours (Norton et al., 2015; Peattie, 2010), there exists a gap in understanding farmers' psychology, who play a central role in agricultural production. This study addresses this gap by using Ajzen's Theory of Planned Behaviour (TPB) to provide insights into the pro-environmental behaviours of Mandarin farmers in Syangja, Nepal.

Nepal ranked as the fourth most vulnerable country to climatic disasters, faces increased challenges in its fruit production sector (Atreya & Kaphle, 2020; KC, 2018). Climate-induced factors like drought, rising temperatures, and disease and pest outbreaks significantly affect the economic growth and livelihoods of smallholders engaged in mandarin farming along the mid-hills of Nepal (Kharel et al., 2022). Sustainability issues, including declining soil organic matter and poor nutrition management in orchards, compound these challenges (Karki & Gurung, 2012). Despite the urgency posed by these challenges, a critical gap exists in understanding the psychological determinants of pro-environmental behaviours among farming communities in Nepal (Jones & Boyd, 2011). To address these challenges effectively, studying the determinants of pro-environmental behaviours becomes imperative for sustaining fruit production and upholding border environmental sustainability.

The study aims to bridge the knowledge gap by examining psychological factors influencing pro-environmental behaviours among Mandarin farmers. Its principal focus lies in understanding the interplay of TPB constructs- attitude, subjective norms, PBC, and intention in the context of Mandarin farmers. Additionally, it seeks to explore the moderating effect of socio-economic variables on these TPB constructs. To achieve these objectives, the study utilizes Covariance-Based Structural Equation Modelling (CB-SEM) to predict pro-environmental behaviours.

## **2. Hypothesis development**

The indicators for the measurement of TPB and farmers' pro-environmental behaviour were selected after careful consideration of the reviewed behaviours from past studies and their applicability in the context of Mandarin farmers (Akhtar et al., 2020; Kabir et al., 2017; Torres et al., 2020). The following hypothesis were tested concerning the prediction of behavioural intention from primary TPB constructs and pro-environmental behaviour from behavioural intentions.

**H1:** Attitude has a positive influence on behavioural intention

**H2:** Subjective norms have a positive influence on the behavioural intention

**H3:** PBC has a positive influence on the behavioural intention

**H4:** Behavioural intention has a positive influence on farmers' pro-environmental behaviours

Across these studies, disparities in gender, education, income, and training participation perspectives towards the environment have emerged prominently (Mohai, 2014; Mostafa, 2007; Shah et al., 2020). Considering these diverse findings, this study proposes the following hypothesis concerning the moderating effect of gender, education, training participation and income.

**H5:** Gender moderates the relationship between TPB components

**H6:** Education moderates the relationship between TPB components

**H7:** Participation in training related to good agricultural practices moderates the relationship between TPB components

**H8:** Income moderates the relationship between TPB components

The hypothetical relationship among TPB constructs and moderating variables proposed in this study is summarized in Figure 1.

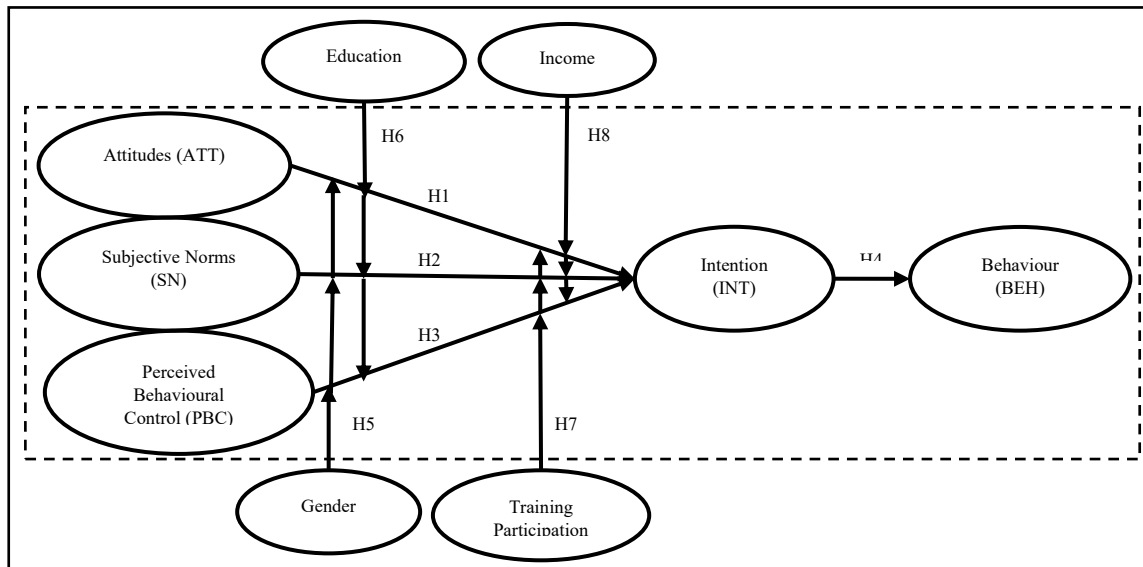


Figure 1. The conceptual framework for the TPB model with moderating variables

### 3. Methodology

#### 3.1 Data collection and sample

Data for this study were collected in Syangja district, Nepal, during December 2023. Multi-stage sampling technique was utilised to ensure a representative and diverse sample. In the first stage, four local levels were purposefully selected to include diverse categories of Mandarin farmers. In the second stage, a random selection technique was applied, with 30 farmers selected at random from each local level to create a total sample of 120 farmers. The questionnaire created using Qualtrics, a web-based survey tool for research and data collection, was administered to the household head.

#### 3.2 Measures

All theoretical constructs were operationalized and evaluated using indicators, each scored on a five-point scale (e.g. 1= strongly disagree, 5= strongly agree). Potential indicators for the constructs were initially identified through a literature review. Subsequently, a list of these indicators was presented to horticulture experts with significant experience in agricultural extension within the research area. The experts provided ratings and remarks based on their expertise. Through careful consideration of their feedback, the final set of indicators was determined, ensuring relevance and validity in capturing the intended constructs (Table 1).

### **3.3 Analysis**

To explain farmers' pro-environmental behaviours using the TPB, data was analysed using Structural Equation Modelling (SEM) with IBM SPSS Amos 29.0.0, which functions on covariance-based SEM. This approach was considered appropriate for the study, given the research's aim to scrutinize the causal links between attitude, subjective norms, and perceived behavioural control with intention, as well as to explore the degree to which intention influences behaviour (Dash & Paul, 2021). The study involved a two-step modelling process, with the first step focusing on establishing the measurement model, and the second step dedicated to testing the structural model.

To establish a measurement model, a confirmatory factor analysis (CFA) was performed using Amos. The adequacy of the measurement model in aligning with empirical data was evaluated using various metrics, including Chi-square ( $\chi^2$ ) statistics, the Goodness of Fit Index (GFI), the Comparative Fit Index (CFI), the Tucker and Lewis Index (TLI), the Standardized Root Mean Square Residual (SRMR), and the Root Mean Square of Approximation (RMSEA) (Hu & Bentler, 1999). Furthermore, the reliability of constructs was evaluated using Cronbach's Alpha and composite reliability. The convergent validity of scale items was determined by calculating the average variance extracted (AVE).

Subsequently, the moderation effect of gender, education, training participation and household income were evaluated. Gender was operationalized as a categorical variable, distinguishing participants into male and female. Similarly, education and training participation were treated as a categorical variable, differentiating participants based on whether they attended formal education or not.

## **4. Results**

### **4.1 Evaluation of measurement model**

Construct reliability, evaluated through both Cronbach's Alpha and composite reliability, exceeded the recommended threshold of 0.70 for each construct (Vaske et al., 2017). Composite reliabilities ranged from 0.838 to 0.887, surpassing the 0.70 benchmark suggested by Hair et al. (2014). Consequently, construct reliability was established for each construct in the study. The convergent validity of scale items was estimated using the average variance extracted, and the values exceeded the threshold of 0.50 (Ijigu et al., 2022). Thus, the scales employed in the present demonstrated the requisite convergent validity.

## 4.2 Evaluation of structural model

The model presented in Figure 3 demonstrated favourable fit indices, underscoring its robustness. The chi-square per degree of freedom is 1.36, comfortably below the recommended threshold of 3, while the p-value stands at 0.01, well below the recommended threshold of 0.05. Additionally, CFI is 0.94, surpassing the widely accepted threshold of 0.90. The TLI supports the model's fit with a value of 0.933, exceeding the 0.90 benchmark. Furthermore, the RMSEA is 0.05, well below the 0.08 threshold and SRMR stands at 0.06, falling comfortably below 0.08.

The intention had a squared multiple correlation of 0.362, while behaviour had 0.655. This indicates that attitude, subjective norms, and PBC explain 36.2% of the variance in intention. Similarly, 65.5% of variance in behaviour is explained by intentions.

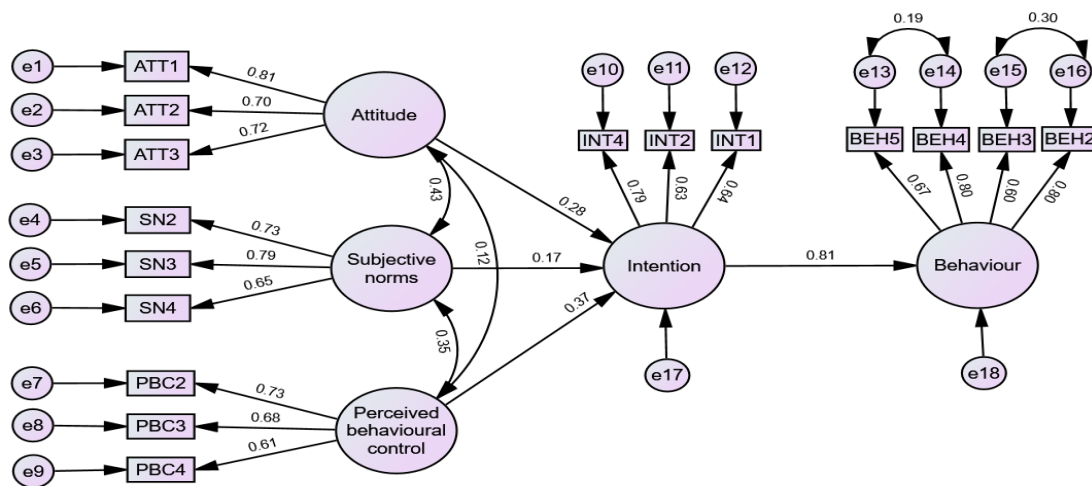


Figure 2. Overview of the structural model

The study revealed a statistically significant relationship between attitude and intention, providing support for H1 ( $\beta=0.445$ ,  $p=0.02$ ) (Table 1). Likewise, a significant association was observed between PBC and intention, supporting H3 ( $\beta=0.548$ ,  $p=0.004$ ). Additionally, there was a significant relationship between intention and behaviour thereby supporting H4 ( $\beta=0.869$ ,  $p=0.000$ ). However, in contrast, no significant association emerged between subjective norms and intention, and thus H2 was not supported.

Table 1. Hypothesised path coefficients of the structural model

Hypothesised paths	Coefficient ( $\beta$ )	P-value (Sig.)	Decision
Attitude $\rightarrow$ Intention (H1)	0.445	0.020	Supported
Subjective norms $\rightarrow$ Intention (H2)	0.185	0.187	Unsupported

Perceived behavioural control → Intention (H3)	0.548	0.004	Supported
Intention → Behaviour (H4)	0.869	0.000	Supported

### 4.3. Moderating effect of gender

The moderation analysis for gender results indicated a non-significant difference in chi-square values between the structural model and the unconstrained model ( $43.08-43.08=0$ ,  $p=2.872$ ), indicating gender does not serve as a moderator for the TPB constructs.

### 4.4 Moderating effect of education

The moderation analysis for education results indicated a significant difference in chi-square values between the structural model and the unconstrained model ( $36.91-23.98=12.93$ ,  $p=0.012$ ), indicating education serves as a moderator for the TPB constructs. The examination of the moderation effect on individual paths resulted in the path of subjective norms and intention to be significantly moderated by education (Table 2).

Table 2. Moderation of education on the TPB model

Hypothesised paths	No formal education		Formal education		z-score	Decision
	$\beta^1$	p-value	$\beta^2$	p-value		
Attitude → Intention	0.229	0.203	0.242	0.019	0.064	Unsupported
Subjective norms → Intention	0.726	0.000	0.302	0.000	-2.876	Supported
Perceived behavioural control → Intention	0.130	0.170	0.292	0.000	1.1348	Unsupported
Intention → Behaviour	0.888	0.000	0.768	0.000	-1.614	Unsupported

Figure 3 illustrates the slope plots for depicting the moderating impact of education on the association between subjective norms and intention. The slope of the line for participants lacking formal education is steeper compared to those with formal education, signifying that the connection between subjective norms and intention intensifies for participants without formal education.

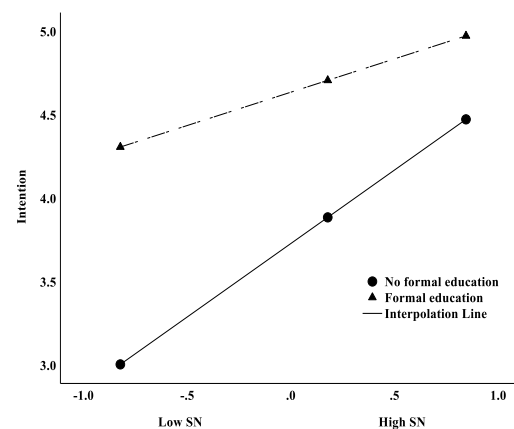


Figure 3. Moderating role of education: Subjective norms to intention

### 4.5 Moderating effect of training participation

The result of moderation of training participation showed a statistically significant chi-square difference among the structural weights and unconstrained model ( $31.18-20.51=10.67$ ,  $p=0.031$ ), indicating training participation moderates the TPB constructs. The examination of

the moderation effect on individual paths resulted in the path of subjective norms to intention and PBC to intention being significantly moderated by training participation (Table 3).

Table 3. Moderation effect of training participation

Hypothesized paths	Training non-recipients		Training recipients		Z-score	Decision
	$\beta^1$	p-value	$\beta^2$	p-value		
Attitude → Intention	0.128	0.615	0.312	0.003	-0.668	Unsupported
Subjective norms → Intention	0.825	0.000	0.219	0.000	3.02	Supported
Perceived behavioural control → Intention	-0.030	0.798	0.249	0.001	-1.989	Supported
Intention → Behaviour	0.859	0.000	0.813	0.000	0.484	Unsupported

The slope plots for the moderation of training participation are shown in Figure 4. As shown in Figure 4 left, the slope for the training non-recipients is more pronounced than that for training recipients, suggesting that the association between subjective norms and intention intensifies for those who did not receive training. Contrastingly, the slope line for the training recipients is steeper than that of training non-recipients, indicating that the association between PBC is stronger for those who received training (Figure 4, right).

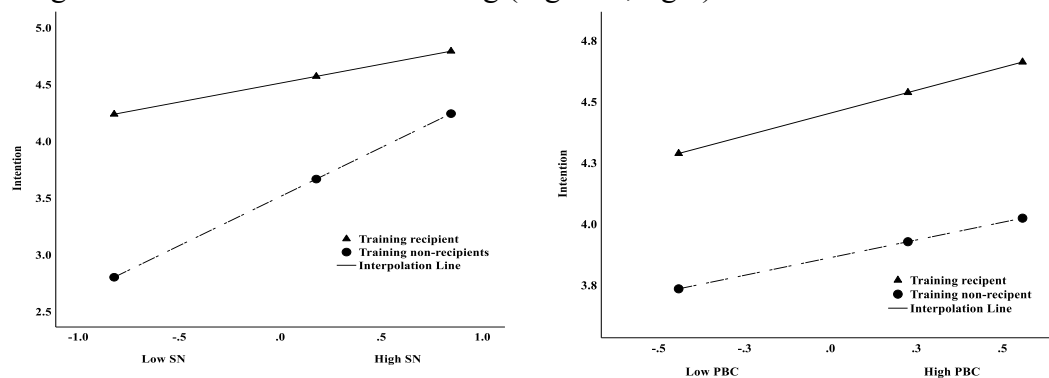


Figure 4. The moderating role of training participation: Subjective norms to intention (left), perceived behavioural control to intention (right)

#### 4.6 Moderating effect of household income

The result of the moderation analysis of household income revealed a statistically significant chi-square difference among the structural weights and unconstrained ( $36.83-23.97=12.85$ ,  $p=0.045$ ), indicating income moderates the TPB constructs (Table 4). Hayes SPSS process macro was used to test and examine the moderation effect of income along individual TPB paths, given its multicategorical nature; low, mid and high income (Hayes, 2017). The result revealed the path of subjective norms to intention to be significantly moderated by income. It was found that mid-income weakens the relationship between subjective norms and intention, and high income further weakens the relationship compared to low-income individuals,

indicating that higher-income individuals may be less influenced by subjective norms in the given context.

Table 4. Moderation effect of income

Hypothesized paths	Middle income		Decision	High income		Decision
	$\beta^3$	p-value		$\beta^4$	p-value	
Attitude → Intention	-0.048	0.824	Unsupported	-0.479	0.095	Unsupported
Subjective norms → Intention	-0.301	0.006	***	-0.392	0.006	Supported
Perceived behavioural control → Intention	.226	.179	Unsupported	-0.007	.937	Unsupported
Intention → Behaviour	0.041	.634	Unsupported	-0.011	.940	Unsupported

Note: Low income was considered as the base category

The slope plots for the moderation effect of income are presented in Figure 5. The figure illustrates that the slope line for low-income people is steeper than that of middle-income and higher income, indicating an intensified relationship between subjective norms and intention for participants with low income.

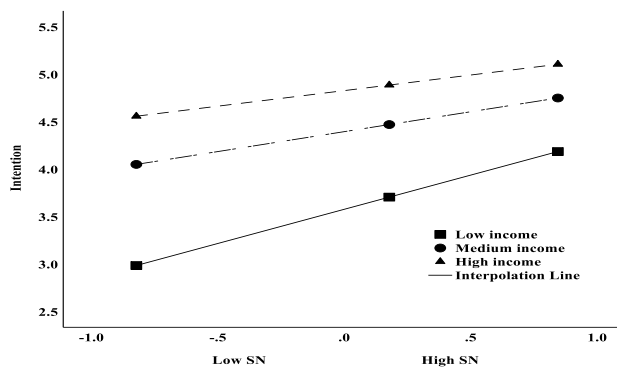


Figure 5. The moderating role of income: Subjective norms to intention

## 5. Discussion

The outcome derived from the TPB model revealed that the most substantial influence on a farmer's behavioural intention to adopt pro-environmental behaviour came from the PBC, with a coefficient of 0.548. The significant and positive correlation observed between PBC and behavioural intention underscored the crucial role of farmers' perception ability to engage in pro-environmental behaviours (Yuriev et al., 2020). This finding suggests tailoring strategies to identify potential barriers to PBC and addressing them to promote positive behavioural changes. This emphasizes on providing farmers with autonomy, and convenient pro-environmental schemes to result in an enhanced association between PCB and the intention to adopt pro-environmental behaviours in the farming community (Knook et al., 2020; Van Lange & Huckelba, 2021).

It was observed that attitude played a significant and positive role in shaping behavioural intentions. Thus, acknowledging and fostering positive attitudes through well-defined programs holds potential for improving environmentally conscious practices. However, criticisms of the TPB regarding its application in environmental behaviours contend that



attitudes are not sufficient alone to predict intentions (Bamberg & Moser, 2007; Tamar et al., 2021). The argument suggests that human brains have evolved with a cognitive bias that prioritizes short-term threats over long-term ones, and thus in environmental concerns, attitudes may not predict intentions accurately (Bamberg & Moser, 2007; Klockner, 2013).

The result revealed an interesting insight into the role of subjective norms in predicting the behavioural intention of farmers. Unlike subjective norms being the weakest predictor of intentions in pro-environmental behaviour particularly in the case of consumers (Ates, 2020; Bartlett, 2011; Lin, 2013), the study found similar findings with farmers. The findings imply that government organizations, extension workers and peer groups have not effectively communicated the importance of engaging in pro-environmental actions. This suggests governmental and organizational interventions in promoting pro-environmental behaviours within agricultural sectors exert a more substantial influence on shaping intentions and behaviours. Further, this finding supports previous research indicating that subjective norms are a weaker predictor within The TPB, emphasizing the need for a nuanced exploration of measures about subjective norms (Armitage & Conner, 2001).

A significant association between behavioural intention and self-reported pro-environmental behaviours was identified. The higher coefficient ( $\beta=0.869$ ) denotes that the path of intention to pro-environmental behaviour has minimum obstacles or external factors that prevent the intentions from turning into actual behaviours (Armitage & Conner, 2001). The TPB assumes that behavioural intentions also have a direct influence on behaviours (Ajzen, 1991), which was not significant in this study. This might be the reason for the higher impact of intention to pro-environmental behaviours.

The moderation analysis emphasizes that formal education significantly weakens the connection between subjective norms and farmers' intentions to adopt pro-environmental behaviour. This implies that farmers' intentions are less influenced by societal pressure when they have received formal education. While these findings align with the findings of Shah et al. (2020), and Amijaya et al. (2021), reporting similar results where education either negatively moderated the path or had no moderation effect, they contrast with Meyer (2015), arguing that individuals with higher education are typically more concerned about environmental behaviours. However, such concerns weaken when individuals are in profit-driven business (Tikka et al., 2000). The degree of moderation is also contingent on the inclusion of environmental aspects in formal education, as emphasized by (Bhujju et al., 2017),

underscoring the need to upgrade the curriculum for environmental education, especially in the Nepalese context, for effective climate change education.

The study found participation in training significantly weakens the relationship between subjective norms and intention, while concurrently strengthening the association between perceived PBC and intention. This finding diverges from Liu et al. (2019), which suggests that training programs enhance the integration of low-carbon technologies among farmers. However, It is important to note that Liu's findings do not specifically address whether this facilitation arises from a change in subjective norms. Butler et al. (2006) argues that training programs introducing new concepts create cognitive dissonance; and psychological discomfort resulting from conflicting beliefs, subsequently leading to changes in attitude (Yahya & Sukmayadi, 2020). This cognitive dissonance may contribute to a weakness in the association between subjective norms and intentions. Simultaneously, training programs focused on skills acquisition are posited to diminish perceived barriers, consequently strengthening the relationship between PBC and intention (Kim & Fortner, 2006).

The findings demonstrate that middle-income weakens the association between subjective norms and intention compared to their low-income counterparts. Moreover, higher income intensifies this trend, indicating a diminishing impact of subjective norms as income levels further increase. These outcomes align seamlessly with the proposition of Manstead (2018) stating lower-income groups may be more susceptible to the influence of subjective norms due to economic constraints and a greater reliance on communal resources. Likewise, the argument of Lancee and Van de Werfhorst (2012) regarding the reduced reliance on social norms with higher income is affirmed. The findings support the notion that individuals may exhibit decreasing responsiveness to subjective norms as their income levels rise, providing valuable insights into the relationship between income, subjective norms, and behavioural intentions.

## **6. Conclusion and implications**

This study utilized Ajzen's TPB to study the determinants of farmers' pro-environmental behaviours, revealing robust predictive capabilities. Attitudes, subjective norms, and PBC collectively explain 36.2% of the variance in farmers' behavioural intentions, with these intentions predicting 65.5% of the variance in self-reported pro-environmental behaviours. PBC and attitudes emerge as influential factors positively impacting intentions, while subjective norms play a non-significant role. The study identifies a significant relationship between behavioural intention and self-reported pro-environmental behaviours, emphasizing an unobstructed path from intention to action. These findings underscore the pivotal role of

individual perceptions and highlight the need for targeted interventions to foster positive attitudes.

The non-significant correlation between subjective norms and intention underscores the necessity for improved communication by governmental organizations, extension workers, and peer groups to underscore the significance of pro-environmental actions in the agricultural sector. Additionally, educational and training programs should concentrate on enhancing social norms, and efforts should include higher-income individuals to promote positive environmental behaviours. This study contributes valuable insights, emphasizing the potential for tailored interventions to drive positive environmental behaviours among farmers.

## References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179-211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Akhtar, R., Afroz, R., Masud, M. M., Rahman, M., Khalid, H., & Duasa, J. B. (2020). Farmers' perceptions, awareness, attitudes and adaption behaviour towards climate change. In *Climate Change Mitigation and Sustainable Development* (pp. 60-76). Routledge. <https://doi.org/10.4324/9780429029035>
- Amijaya, D. T., Sulhaini, S., & Herman, L. E. (2021). Influence of trust, subjective norm, and perceived usefulness on the intention of using contraceptives with education level as moderation variables. *International Journal of Multicultural and Multireligious Understanding*, 8(8), 125-137. <https://doi.org/10.18415/ijmmu.v8i8.2848>
- Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *British journal of social psychology*, 40(4), 471-499. <https://doi.org/10.1348/014466601164939>
- Ates, H. (2020). Merging theory of planned behavior and value identity personal norm model to explain pro-environmental behaviors. *Sustainable Production and Consumption*, 24, 169-180. <https://doi.org/10.1016/j.spc.2020.07.006>
- Atreya, P. N., & Kaphle, M. (2020). Visible evidence of climate change and its impact on fruit production in Nepal. *International Journal of Agriculture Environment and Food Sciences*, 4(2), 200-208. <https://doi.org/10.31015/jaefs.2020.2.10>
- Bamberg, S., & Moser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of environmental psychology*, 27(1), 14-25. <https://doi.org/10.1016/j.jenvp.2006.12.002>
- Bartlett, D. (2011). *Going green: The psychology of sustainability in the workplace*. The British Psychological Society,
- Bhujra, B. D. R., Ranjit, B. K., Adhikari, S., & Pant, T. R. (2017). Climate change education and perception of school children in Nepal. *Status of Child Rights in Nepal*, 91. <https://www.researchgate.net/publication/333295251>
- Butler, A., Le Grice, P., & Reed, M. (2006). Delimiting knowledge transfer from training. *Education + Training*, 48(8/9), 627-641. <https://doi.org/10.1108/00400910610710056>

- Dash, G., & Paul, J. (2021). CB-SEM vs PLS-SEM methods for research in social sciences and technology forecasting. *Technological Forecasting and Social Change*, 173, 121092. <https://doi.org/10.1016/j.techfore.2021.121092>
- Hair, J. F., Gabriel, M., & Patel, V. (2014). AMOS covariance-based structural equation modeling (CB-SEM): Guidelines on its application as a marketing research tool. *Brazilian Journal of Marketing*, 13(2). [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2676480](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2676480)
- Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford publications.
- Hu, L. t., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural equation modeling: a multidisciplinary journal*, 6(1), 1-55. <https://doi.org/10.1080/10705519909540118>
- Ijigu, A. W., Alemu, A. E., & Kuhil, A. M. (2022). The mediating role of employee ambidexterity in the relationship between high-performance work system and employee work performance: An empirical evidence from ethio-telecom. *Cogent Business & Management*, 9(1), 2135220. <https://doi.org/10.1080/23311975.2022.2135220>
- Jones, L., & Boyd, E. (2011). Exploring social barriers to adaptation: Insights from Western Nepal. *Global environmental change*, 21(4), 1262-1274. <https://doi.org/10.1016/j.gloenvcha.2011.06.002>
- Kabir, M. H., Rainis, R., & Azad, M. J. (2017). Are spatial factors important in the adoption of eco-friendly agricultural technologies? Evidence on integrated pest management (IPM). *Journal of Geographic Information System*, 9(2), 98-113. <https://doi.org/10.4236/jgis.2017.92007>
- Karki, R., & Gurung, A. (2012). An overview of climate change and its impact on agriculture: a review from least developing country, Nepal. *International Journal of Ecosystem*, 2(2), 19-24. <https://doi.org/10.5923/j.ije.20120202.03>
- KC, A. (2018). Climate change communication in Nepal. In *Handbook of Climate Change Communication: Vol. 2: Practice of Climate Change Communication* (pp. 21-35). Springer. [https://doi.org/10.1007/978-3-319-70066-3\\_2](https://doi.org/10.1007/978-3-319-70066-3_2)
- Kharel, M., Dahal, B. M., & Raut, N. (2022). Good agriculture practices for safe food and sustainable agriculture in Nepal: A review. *Journal of Agriculture and Food Research*, 100447. <https://doi.org/10.1016/j.jafr.2022.100447>
- Kim, C., & Fortner, R. W. (2006). Issue-specific barriers to addressing environmental issues in the classroom: An exploratory study. *The Journal of Environmental Education*, 37(3), 15-22. <https://doi.org/10.3200/JOEE.37.3.15-22>
- Klockner, C. A. (2013). A comprehensive model of the psychology of environmental behaviour—A meta-analysis. *Global environmental change*, 23(5), 1028-1038. <https://doi.org/10.1016/j.gloenvcha.2013.05.014>
- Knook, J., Eory, V., Brander, M., & Moran, D. (2020). The evaluation of a participatory extension programme focused on climate friendly farming. *Journal of Rural Studies*, 76, 40-48. <https://doi.org/10.1016/j.jrurstud.2020.03.010>
- Lancee, B., & Van de Werfhorst, H. G. (2012). Income inequality and participation: A comparison of 24 European countries. *Social science research*, 41(5), 1166-1178. <https://doi.org/10.1016/j.ssresearch.2012.04.005>
- Lin, S.-P. (2013). The gap between global issues and personal behaviors: pro-environmental behaviors of citizens toward climate change in Kaohsiung, Taiwan. *Mitigation and Adaptation Strategies for Global Change*, 18(6), 773-783. <https://doi.org/10.1007/s11027-012-9387-1>

- Liu, Y., Ruiz-Menjivar, J., Zhang, L., Zhang, J., & Swisher, M. E. (2019). Technical training and rice farmers' adoption of low-carbon management practices: The case of soil testing and formulated fertilization technologies in Hubei, China. *Journal of Cleaner Production*, 226, 454-462. <https://doi.org/10.1016/j.jclepro.2019.04.026>
- Manstead, A. S. R. (2018). The psychology of social class: How socioeconomic status impacts thought, feelings, and behaviour. *Br J Soc Psychol*, 57(2), 267-291. <https://doi.org/10.1111/bjso.12251>
- Meyer, A. (2015). Does education increase pro-environmental behavior? Evidence from Europe. *Ecological economics*, 116, 108-121. <https://doi.org/10.1016/j.ecolecon.2015.04.018>
- Mohai, P. (2014). Men, women, and the environment: An examination of the gender gap in environmental concern and activism. In *Women Working in the Environment* (pp. 215-239). Routledge.
- Mostafa, M. M. (2007). Gender differences in Egyptian consumers' green purchase behaviour: the effects of environmental knowledge, concern and attitude. *International journal of consumer studies*, 31(3), 220-229.
- Norton, T. A., Parker, S. L., Zacher, H., & Ashkanasy, N. M. (2015). Employee green behavior: A theoretical framework, multilevel review, and future research agenda. *Organization & Environment*, 28(1), 103-125. <https://doi.org/10.1177/10860266155757>
- Peattie, K. (2010). Green consumption: behavior and norms. *Annual review of environment and resources*, 35, 195-228. <https://www.annualreviews.org/doi/pdf/10.1146/annurev-environ-032609-094328>
- Shah, I. A., Amjed, S., & Jaboob, S. (2020). The moderating role of entrepreneurship education in shaping entrepreneurial intentions. *Journal of Economic Structures*, 9(1), 19. <https://doi.org/10.1186/s40008-020-00195-4>
- Smith, P., Martino, D., Cai, Z., Gwary, D., Janzen, H., Kumar, P., McCarl, B., Ogle, S., O'Mara, F., & Rice, C. (2008). Greenhouse gas mitigation in agriculture. *Philosophical transactions of the royal Society B: Biological Sciences*, 363(1492), 789-813. <https://doi.org/10.1098/rstb.2007.2184>
- Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of environmental psychology*, 29(3), 309-317. <https://doi.org/10.1016/j.jenvp.2008.10.004>
- Tamar, M., Wirawan, H., Arfah, T., & Putri, R. P. S. (2021). Predicting pro-environmental behaviours: the role of environmental values, attitudes and knowledge. *Management of Environmental Quality: An International Journal*, 32(2), 328-343. <https://doi.org/10.1108/MEQ-12-2019-0264>
- Tikka, P. M., Kuitunen, M. T., & Tynys, S. M. (2000). Effects of educational background on students' attitudes, activity levels, and knowledge concerning the environment. *The Journal of Environmental Education*, 31(3), 12-19. <https://doi.org/10.1080/00958960009598640>
- Torres, M. A. O., Kallas, Z., & Herrera, S. I. O. (2020). Farmers' environmental perceptions and preferences regarding climate change adaptation and mitigation actions; towards a sustainable agricultural system in Mexico. *Land use policy*, 99, 105031. <https://doi.org/10.1016/j.landusepol.2020.105031>
- Van Lange, P. A. M., & Huckelba, A. L. (2021). Psychological distance: How to make climate change less abstract and closer to the self. *Current Opinion in Psychology*, 42, 49-53. <https://doi.org/10.1016/j.copsyc.2021.03.011>
- Vaske, J. J., Beaman, J., & Sponarski, C. C. (2017). Rethinking internal consistency in Cronbach's alpha. *Leisure sciences*, 39(2), 163-173. <https://doi.org/10.1080/01490400.2015.1127189>

- Yahya, A. H., & Sukmayadi, V. (2020). A review of cognitive dissonance theory and its relevance to current social issues. *MIMBAR*, 36(2), 480-488. <https://doi.org/10.29313/mimbar.v36i2.6652>
- Yuriev, A., Dahmen, M., Paillé, P., Boiral, O., & Guillaumie, L. (2020). Pro-environmental behaviors through the lens of the theory of planned behavior: A scoping review. *Resources, Conservation and Recycling*, 155, 104660. <https://doi.org/10.1016/j.resconrec.2019.104660>